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ᓄᓇᕕᒃ NUNAVIK 2017

RESPIRATORY HEALTH

QANUILIRPITAA? 2017

Nunavik Inuit Health Survey

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RÉGIE RÉGIONALE DE LA SANTÉ ET DES SERVICES SOCIAUX DU NUNAVIK
NUNAVIK REGIONAL BOARD OF HEALTH AND SOCIAL SERVICES

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QANUILIRPITAA? 2017 HEALTH SURVEY

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In memory of Audrey Flemming and Linda Shipaluk.

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** Each name is listed only once even though it may have been mentioned in more than one category.*

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APS	Aboriginal Peoples Survey
ATS	American Thoracic Society
BOLD study	Burden of Obstructive Lung Disease study
CanCOLD study	Canadian Cohort of Obstructive Lung Disease study
CCHS	Canadian Community Health Survey
CHMS	Canadian Health Measures Survey
CLSC	Local community services centre
COPD	Chronic obstructive lung disease
ERS	European Respiratory Society
FEV_1	Forced expiratory volume in one second
FVC	Maximal volume of air exhaled through forced effort from a position of maximal inspiration
GINA	Global Initiative for Asthma
GOLD	Global Initiative for Chronic Obstructive Lung Disease
IgE	Immunoglobulin E (a type of antibody)
LLN	Lower limit of normal (corresponding to the 5th percentile of a non-smoking healthy population)
mMRC	Modified Medical Research Council scale of dyspnea (from 0 to 4)
NHANES	National Health and Nutrition Examination Survey (equivalent of CHMS in the United States)
OR	Odds ratio
PR	Prevalence ratio
WHS	World Health Survey (conducted by the World Health Organization)

1 BACKGROUND OF THE *QANUILIRPITAA?* 2017 HEALTH SURVEY

The *Qanuilirpitaa?* 2017 Health Survey is a major population health survey conducted in Nunavik that involved the collection, analysis and dissemination of information on the health status of Nunavimmiut. The last health survey conducted prior to it in Nunavik dated from 2004. Since then, no other surveys providing updated information on the health of this population had been carried out. Thus, in February 2014, the Board of Directors of the Nunavik Regional Board of Health and Social Services (NRBHSS) unanimously adopted a resolution to conduct a new health survey in all 14 Nunavik communities, in support of the Strategic Regional Plan.

The general objective of the 2017 health survey was to provide an up-to-date portrait of the health status of Nunavimmiut. It was also aimed at assessing trends and following up on the health and health determinants of adult participants since 2004, as well as evaluating the health status of Nunavik youth. This health survey has strived to move beyond traditional survey approaches so as to nurture the research capabilities and skills of Inuit and support the development and empowerment of communities.

Qanuilirpitaa? 2017 included four different components: 1) an adult component to document the mental and physical health status of adults in 2017 and follow up on the adult cohort of 2004; 2) a youth component to establish a new cohort of Nunavimmiut aged 16 to 30 years old and to document their mental and physical health status; 3) a community component to establish the health profiles and assets of communities in a participatory research approach; and 4) a community mobilization project aimed at mobilizing communities and fostering their development.

This health survey relied on a high degree of partnership within Nunavik (Nunavik Regional Board of Health and Social Services, Makivik Corporation, Kativik Regional Government (KRG), Kativik Ilisarniliriniq (KI), Avataq Cultural Institute, Qarjuit Youth Council, Inuulitsivik Health Centre, Ungava Tulattavik Health Centre), as well as between Nunavik, the Institut national de santé publique du Québec (INSPQ) and academic researchers from three Canadian universities: Université Laval, McGill University and Trent University. This approach followed the OCAP principles of Ownership, Control, Access and Possession (First Nations Information Governance Centre, 2007).[1] It also emphasized the following values and principles: empowerment and self-determination, respect, value, relevance and usefulness, trust, transparency, engagement, scientific rigour and a realistic approach.

TARGET POPULATION

The survey's target population was all permanent Nunavik residents aged 16 years and over. Persons living full time in public institutions were not included in the survey. The most up-to-date beneficiaries register of all Inuit living in Nunavik, obtained from the Makivik Corporation in spring 2017, was used to construct the main survey frame. According to this register, the population of Nunavik was 12 488 inhabitants spread out in 14 communities. This register allowed respondents to be selected on the basis of age, sex and coast of residence (Hudson coast and Ungava coast).

SURVEY FRAME

The survey used a stratified proportional model to select respondents. Stratification was conducted based on communities and age groups, given that one of the main objectives of the survey was to provide estimates for two subpopulations aged, respectively, 16 to 30 years and 31 years and over. In order to obtain precise estimates, the targeted sample size was 1 000 respondents in each age group. Assuming a 50% response rate, nearly 4 000 people were required to obtain the necessary sample size. From this pool, the number of individuals

1. OCAP® is a registered trademark of the First Nations Information Governance Centre (FNIGC).

recruited from each community was proportionate to population size and took into account the number of days that the survey team would remain in each community – a situation that imposed constraints on the number of participants that could be seen. Within each stratum, participants were randomly selected from the beneficiaries register. However, the individuals from the 2004 cohort, all 31 years old and over (representing approximately 700 individuals), were automatically included in the initial sample.

DATA COLLECTION

Data were collected from August 19, 2017 to October 5, 2017 in the 14 villages. The villages were reached by the *Amundsen*, a Canadian Coast Guard Icebreaker, and participants were invited on board the ship for data collection purposes.

Two recruitment teams travelled from one community to another before the ship's arrival. An Inuk assistant in each community helped: identify, contact and transport (if necessary) each participant; inform participants about the sampling and study procedures; obtain informed consent from participants (video) and fill in the identification sheet and sociodemographic questionnaire.

Data collection procedures for the survey included questionnaires, as well as clinical measurements. The survey duration was about four hours for each wave of participants, including their transportation to and from the ship. Unfortunately, this time frame was sometimes insufficient to complete the data collection process. This survey received ethical approval by the Comité d'éthique de la recherche du Centre Hospitalier Universitaire de Québec – Université Laval.

Aboard the ship, the survey questionnaires were administered by interviewers, many of whom were Inuit. Face-to-face interviews were conducted using a computer-assisted interviewing tool. If there were problems with the laptop connections, paper-form questionnaires were filled out. The questionnaires were administered in Inuktitut, English or French, according to the preference of the participants. Interviewers received training in administering the questionnaires prior to the start of the survey. The questionnaires were divided into five blocks: psychosocial interview (blocks 1 and 3), physical health and food security interview (block 2), food frequency questionnaire (block 4), and sociodemographic interview (block 5).

The survey also included a clinical component, with tests to document aspects of physical health, sampling of biological specimens (such as blood, oropharyngeal swabs, urine, stool, and vaginal swabs), spirometry, and an oral clinical exam. These sessions were supervised by a team comprised of nurses, respiratory therapists, dentists, dental hygienists and assistants, and laboratory technicians.

PARTICIPATION

There were a total of 1 326 participants, including 574 Nunavimmiut aged 16 to 30 years old and 752 Nunavimmiut aged 31 years and over, for total response rates of 30.7% and 41.5%, respectively. The participants' distribution between the two coasts (Ungava and Hudson) was similar. The distribution of men and women was unequal, with twice as many women (873) than men (453) participating in the survey. If the results obtained from this sample are to be inferred to the target population, survey weights must be used.

Overall, as compared to the 2004 survey, the response rate (i.e., the rate of participants over the total number of individuals on the sampling list) was lower than expected, especially among young people. This includes the refusal rate and especially a low contact rate. Several reasons might explain the low response rate, including the short time period available to contact individuals prior to the ship's arrival in the community and non-contact due to people being outside of the community or on the land. Nevertheless, among the individuals that were contacted (n = 1 661), the participation rate was satisfactory with an internal participation rate of 79.7% More details on the collection, processing and analysis of the data are given in the Methodological Report (Hamel et al., 2020).

2 INTRODUCTION

Chronic obstructive lung disease (COPD), asthma, lung cancer, tuberculosis and respiratory infections are public health priorities because they are frequent, serious, preventable and treatable (Ferkol & Schraufnagel, 2014). Respiratory diseases impose an important burden of social and economic costs on Canada (PHAC et al., 2007). In 2017, lung cancer, COPD and respiratory infection were, respectively, the third, fifth and seventh causes of death in Canada (Institute for Health Metrics and Evaluation, 2019). Although they were not among the ten leading causes of disability in Canada, lung cancer and COPD were the third and seventh causes of death and disability combined. Their main cause, tobacco smoking, was also the first risk factor of death and disability in Canada (Institute for Health Metrics and Evaluation, 2019).

Respiratory health is also an area of concern in Nunavik. Respiratory diseases and lung cancer are among the main causes of death in Nunavik, together with suicide, non-intentional injuries and cardiovascular diseases (NRBHSS, 2015). They are the leading cause of hospitalization, for both men and women. Respiratory diseases are an example of health inequalities between Inuit and other Canadians that are tied to broader inequities between Nunavik and the rest of the country with respect to socioeconomic conditions, housing, and access to health care. Respiratory diseases are a major contributor to the disparity in life expectancy between Inuit and other Canadians, explaining 35% and 15% of the differences in life expectancy among women and men, respectively (Peters, 2013).

Health surveillance systems provide data about tuberculosis and lung cancer. Tuberculosis elimination is already the target of action plans from the Nunavik region, the Canadian government and Inuit Tapiriit Kanatami aimed at eliminating tuberculosis disease in Inuit Nunangat by 2030. In contrast, little is known about the burden of COPD and asthma in Nunavik. Most patients need outpatient care, so hospitalizations represent only the “tip of the iceberg”. In other cases, symptoms of asthma or COPD can be prevented by public health interventions or improved through access to health care.

Usually diagnosed during adulthood, COPD is characterized by airway obstruction and persistent respiratory symptoms such as breathlessness, cough, sputum production, and wheezing. It is caused by inhaling noxious particles, principally tobacco smoke, as well as by suboptimal lung development during pregnancy and childhood (GOLD, 2019). Smoking is the dominant cause of COPD: up to 50% of smokers will develop the disease during their lifetime (Mannino & Buist, 2007). The prevalence of COPD in a population is usually directly linked to smoking rates, which are high in Nunavik. The best method to estimate the prevalence of COPD is spirometry, a lung function test that detects airway obstruction (Douwes et al., 2015). It is used by the Canadian Health Measures Survey to estimate the prevalence of COPD in Canada, but Nunavik is not included. The *Qanuilirpitaa?* 2017 Health Survey aims to address this gap.

Asthma is also characterized by airway obstruction and persistent respiratory symptoms, but they are variable in time. Asthma usually develops earlier in life and is closely related to atopy, or allergy susceptibility. Asthma and allergies have been reported to be rare among Inuit, but data are limited (Bruce et al., 2014; Chang et al., 2012; Crighton et al., 2010; Garner et al., 2010). Data about asthma rely on self-reported diagnosis, while asthma is susceptible to be under-recognized, especially among vulnerable populations (Aaron et al., 2018). As in the case of COPD, a variety of determinants can contribute to the development of asthma, its deterioration or symptoms. Both CODP and asthma have special interest for public health since prevention and primary care can reduce their burden and improve quality of life.

While respiratory health is generally considered as the absence of respiratory disease in the scientific literature, a new perspective invites us to consider it globally, prior to the development of manifest respiratory diseases (Reyfman et al., 2018). This would allow earlier identification of respiratory health determinants and preventive interventions. Indicators of respiratory health are currently lung function (parameters measured by spirometry) and respiratory symptoms (Reyfman et al., 2018). Little is known about the prevalence of these indicators in Nunavik or in the rest of Inuit Nunangat.

Therefore, the portrait drawn in this report aims to describe the state of respiratory health among the Nunavik population, aged 16 years and over, and to identify some of its determinants.

The specific objectives are to:

1. Describe the prevalence of airway obstruction (and other lung function abnormalities), respiratory symptoms, physician-diagnosed respiratory diseases, respiratory medication, and sensitization to aerial allergens.
2. Identify some determinants of airway obstruction and respiratory symptoms, among already established protective and risk factors of COPD and asthma, and other factors relevant to the Inuit context.
3. Evaluate the impact of airway obstruction and respiratory symptoms on quality of life, and evaluate the correlation between airway obstruction and respiratory symptoms.

3 METHODOLOGICAL ASPECTS

In this report, respiratory health is described using a combination of several indicators that represent lung function, symptoms of respiratory diseases, diagnosed diseases and medication for respiratory diseases. Four sources of data were used for respiratory health indicators: spirometry for airway obstruction and lung function, a questionnaire for respiratory symptoms, a review of medical files for relevant diagnosis and medication, and blood tests for allergic sensitization. Several potential determinants were assessed with questionnaires, anthropometric measures, blood tests and urinary tests.

SPIROMETRY AND AIRWAY OBSTRUCTION

Spirometry, a lung function test, measures the volume of air that a person can exhale with effort. In this survey, it was performed by experienced respiratory therapists using an EasyOne™ Spirometer (New Diagnostic Design, Andover, MA, USA), and following the protocol from the CanCOLD study (Bourbeau et al., 2014). This protocol is comparable to the Canadian Health Measures Survey (CHMS) protocol and follows American Thoracic Society (ATS) standards. Some participants had to be excluded from spirometry for safety reasons: the exclusion criteria were the same as those in CanCOLD (Figure 3, Appendix C). Two lung volumes were measured: forced vital capacity (FVC), which is the maximal volume of air exhaled through a forced effort from a position of maximal inspiration, and forced expiratory volume in one second (FEV1), which is the maximal volume of air exhaled during the first second of this expiration. All participants with at least three acceptable spirometry curves were included in the analysis following ATS recommendations (Miller et al., 2005). A respirologist specialized in COPD examined each of the curves of the remaining participants and retained those with interpretable curves in order to maximize the use of the sample. This approach also prevented underestimation of severe obstruction limiting the ability of participants to produce three acceptable curves. The main indicator was airway obstruction, defined by a FEV1/FVC ratio below the lower limit of normal (LLN), as recommended by ATS and the European Respiratory Society (ERS) (Pellegrino et al., 2005). The LLN corresponds to the fifth percentile of the FEV_1/FVC ratio distribution in a non-smoking population, adjusted for sex, height and ethnic group. Since there are no reference values for Inuit, we used the ones for Caucasians in NHANES III (Hankinson et al., 1999). These values allowed comparisons with CHMS and CanCOLD. They were also used in the BOLD study to compare the lung function of many ethnic groups in different countries (Hooper et al., 2012). The sample of non-smokers in *Qanuilirpitaa?* 2017 was too small to derive a specific equation for Inuit. Another criterion is also used in the literature, namely, a FEV_1/FVC ratio lower than 0.7, as recommended by GOLD (2019). This fixed ratio has a good predictive validity after 40 years of age (Bhatt et al., 2019), but it underestimates the prevalence of obstruction in younger individuals (GOLD, 2019; Pellegrino et al., 2005). Since half of Nunavik's adult population is under 35 years old, the primary criterion of airway obstruction was the lower limit of normal (LLN); however, a sensitivity analysis was performed with the fixed ratio. Airway obstruction was classified according to the GOLD severity grading.

In addition to airway obstruction, restrictive and mixed (restrictive and obstructive) syndromes were described in this survey. A small FVC can be used as a proxy of a small total lung capacity (measured by tests other than spirometry) to suggest a restrictive syndrome (Kurth & Hnizdo, 2015). Once again, the above-mentioned respirologist specialized in COPD examined all spirometry curves with an FVC lower than 80% of the predicted value. The curves were classified as restrictive if they were suggestive of restriction and the FEV_1/FVC ratio was higher than 0.7; the curves were classified as mixed if they were suggestive of obstruction and the FEV_1/FVC ratio was lower than 0.7.

Among the 1 661 participants recruited, 335 did not participate in the data collection on the *Amundsen* icebreaker; 134 did not perform spirometry because of refusal or time constraints; 69 were excluded from spirometry for safety reasons; and 11 did not have an acceptable spirometry. Among the 1 110 participants

included in the analysis, 927 had at least three acceptable curves according to ATS standards. A total of 183 participants had fewer than three acceptable curves but were judged interpretable by the respirologist.

RESPIRATORY SYMPTOMS

The main respiratory symptoms were measured using questions from the CanCOLD questionnaire (Bourbeau et al., 2014), which was developed from many validated and widely used questionnaires. Questions were pre-tested in an Inuit community as described in the Methodological Report (Hamel et al., 2020). **Chronic cough** is a cough that occurs on most days for three months each year. **Chronic sputum** (also known as phlegm) is defined as bringing up mucus on most days for three months each year, if the person usually brings up mucus from their chest when they do not have a cold. **Chronic bronchitis** is classically defined as having a cough with sputum for at least three months of the year during the past two consecutive years. **Wheezing** is defined as wheezing or whistling in the chest at any time during the last 12 months. **Breathlessness** (also known as dyspnea) is defined as walking slower than people of the same age on the level because of breathlessness or having to stop for breath when walking at one's own pace on the level. It corresponds to the second stage of the Modified Medical Research Council scale (GOLD, 2019). Breathlessness is an important characteristic of lung disease, but it can also be caused by cardiac diseases or other problems. Finally, an indicator of the burden of respiratory symptoms has been created: "**at least one symptom**" is defined as a cough (usual but not necessarily chronic), sputum (usual but not necessarily chronic) and/or wheezing (past 12 months).

PHYSICIAN DIAGNOSIS AND MEDICATION IN MEDICAL FILES

The medical files of all participants were reviewed by trained research nurses in collaboration with local medical archivists. The files included outpatient visits, emergency visits and hospitalizations. They were reviewed from their beginning in search of physician diagnosis of asthma, COPD (including emphysema and chronic bronchitis), tuberculosis (latent or active/pulmonary) and hospitalization for respiratory infection during childhood (before the age of 5). Physician diagnoses are as written by a doctor in the medical file. We did not verify if asthma and COPD diagnosis were supported by spirometry, as recommended by clinical guidelines. In all likelihood, spirometry was not performed for many patients since it is rarely accessible in Nunavik. Therefore, asthma and COPD diagnoses must not be interpreted as indicating the real frequency of these conditions in Nunavik. Childhood hospitalizations include only stays in Nunavik's two hospitals, located in Kuujjuaq and Puvirnituq, and transfers to hospitals in southern Quebec. Children who stayed in local health centres were not counted as hospitalized, even if they spent more than 24 hours in the health centre. Lung cancer diagnosis was searched as of 2004. All currently prescribed medications were noted.

ALLERGIC SENSITIZATION TO AERIAL ALLERGENS

Blood samples were analyzed with a fluoro-enzyme-immunoassay (ImmunoCAP™) at the Laboratoire Multidisciplinaire CHUL du CHU de Québec (Quebec, QC) in order to detect the presence of specific IgE for five common allergens: dogs, dust mites (*Dermatophagoides pteronyssinus* and *Dermatophagoides farinae*) and moulds (*Alternaria* and *Aspergillus*). The threshold for sensitization was the level of detection of the test (0.34 kUA/L). This test was performed only if a participant had elevated blood total immunoglobulin E (IgE > 100 kU/L), which was the case of 25% of the population. Other participants, who had normal blood total IgE and were not tested for specific IgE, were assumed not to be sensitized.

DETERMINANTS OF RESPIRATORY HEALTH AND INDICATORS OF QUALITY OF LIFE

Respiratory indicators were examined in relation to potential biological, lifestyle, environmental and social determinants. Determinants were selected among available variables in the *Qanuilirpitaa*? 2017 Health Survey, according to the scientific literature on risk factors and protective factors of COPD and asthma (Eisner et al., 2010; GINA, 2018b; GOLD, 2019). We also explored certain relevant variables for the Inuit context based on social determinants of Inuit health, according to Inuit Tapiriit Kanatami (2014). Table 27 (Appendix C: Methodological supplement) presents these variables, their distribution among Nunavimmiut and references to other thematic reports for additional information. Figure 4 (Appendix C) shows the hypothetical relations between these

determinants and respiratory health. Variables were collected through questionnaires (lifestyle, nutritional, environmental and social variables, and quality of life indicators), a review of medical files (tuberculosis and hospitalization for respiratory infection in childhood), anthropometric measures (obesity), blood tests (vitamin D) and urine tests (cotinine). Urinary cotinine, a metabolite of nicotine, was measured in urine samples using an ELISA kit (#KA1416, Abnova, Taipei, Taiwan) at the Institut universitaire de cardiologie et de pneumologie du Québec (Quebec, QC). Urinary cotinine is a widely used biomarker of tobacco smoke exposure, either through active smoking or second-hand smoke. Using biomarkers has been advocated because second-hand exposure is difficult to measure by questionnaire and because smoking tends to be underestimated by self-reported data. Urinary cotinine is stable in daily smokers and reflects the intake of nicotine during the past two or three days (Campo et al., 2016). The threshold of 30 ng/mL is a good predictor of daily smoking, although occasional smokers can be missed. A threshold of 1.78 ng/mL was suggested in one study as the upper limit of normal (95th percentile) for individuals that are not exposed to second-hand smoke (Campo et al., 2016). The interval 1.78-30 ng/mL mostly represents exposure to second-hand smoke and/or occasional smoking.

STATISTICAL ANALYSIS

This report presents descriptive and bivariate analyses. The descriptive analyses focus on the prevalence of different indicators and determinants. The prevalence of indicators is stratified according to the age groups used in CHMS, sex and ecological regions (Hudson Bay, Hudson Strait, Ungava Bay). Stratification by community size and ethnic groups (Inuit vs. non-Inuit) did not produce relevant differences. The bivariate analyses focus on the prevalence of indicators according to different categories of determinants using a global chi-square test. When this global test was significant, categories were compared two-by-two with the construction of a Wald statistic based on the difference between the logit transformations of the estimated proportions. Tobacco smoking is an example of a categorical variable with more than two categories. In this survey, the prevalence of "at least one respiratory symptom" was 65% among daily smokers; 46% among occasional smokers; 48% among former smokers and 37% among never smokers. A global chi-square test (also known as a global test of independence) showed a statistical association, globally, between smoking status and "at least one symptom". In two-by-two comparisons, the prevalence of "at least one symptom" was statistically different between daily and occasional smokers, daily and former smokers, and daily and never smokers. It was not statistically different between occasional and former smokers, occasional and never smokers, and former and never smokers. A significant global test means that there is at least one significant association between two categories. Significant differences are usually the largest of the differences between categories with a higher number of individuals. A few variables were continuous and were compared with a Student's t-test. The significance level was $\alpha = 0.05$ (two-side test). Prevalence ratios (PRs) are presented in the text for information purposes only, and only if they are statistically significant, with a view to providing insight on the relative importance of each determinant. They have not been adjusted for age, smoking status or other potential confounding factors. All data analysis for this thematic report was done using SAS software, Version 9.4 (SAS Institute Inc., Cary, NC, USA).

ACCURACY OF ESTIMATES

The data used in this report come from a sample and are thus subject to a certain degree of error. Following the guidelines of the Institut de la Statistique du Québec (ISQ), coefficients of variation (CV) were used to quantify the accuracy of estimates. Estimates with a CV between 15% and 25% are accompanied by a * to indicate that they should be interpreted carefully, while estimates with a CV greater than 25% are presented with a ** and are shown for information purposes only.

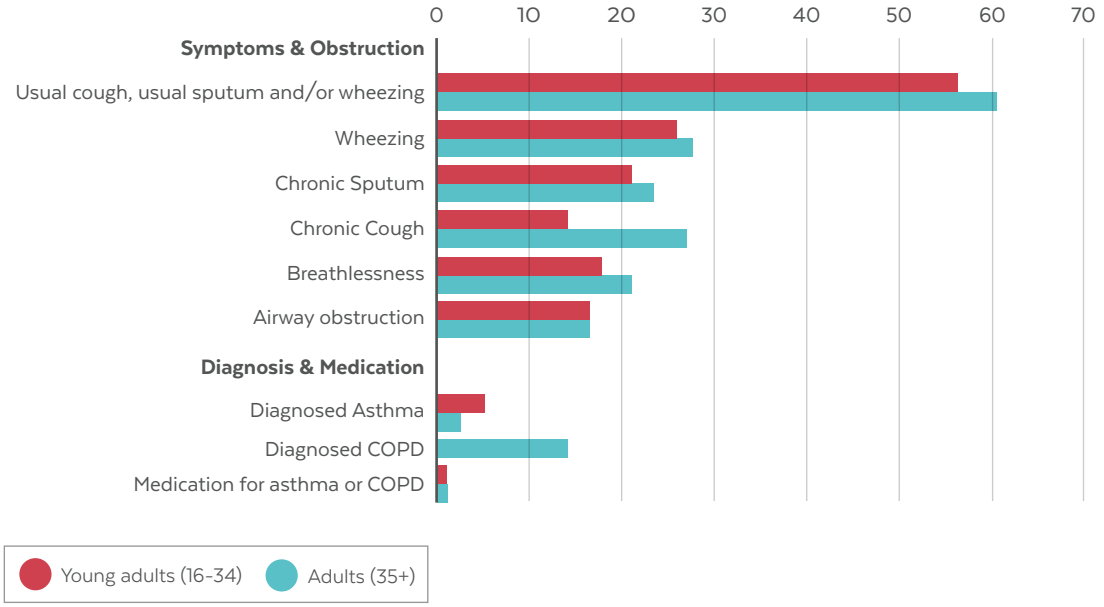
4 RESULTS

PREVALENCE OF RESPIRATORY HEALTH INDICATORS

The prevalence of different respiratory indicators is summarized in Figure 1 for both age groups (16 to 34 years and 35 years and over) and is described in Tables 1 to 7. All tables are presented in Appendix A and Appendix B. Overall, 41% of Nunavimmiut did not report any symptoms, while 59% had usually coughed and/or usually had sputum and/or wheezing in the previous year (an indicator named "at least one symptom"). Looking at each symptom separately, 80% of Nunavimmiut did not experience breathlessness; meaning that they could walk as fast as other people of the same age and did not have to stop to catch their breath when walking at their own pace. Most of the population (79%) did not report chronic cough, 77% did not report chronic sputum, and 73% had not experienced wheezing in the previous year. Symptoms of chronic bronchitis were reported by only 5% of the population.

The vast majority of Nunavimmiut had normal lung function: 83% did not have airway obstruction. For others, obstruction was mostly mild. According to the medical files, few people had been diagnosed with COPD (7%) or asthma (4%) by a physician, and the frequencies observed were much lower than for symptoms or airway obstruction. Medication for asthma or COPD was rare (used by around 1% of the population). A history of tuberculosis was relatively frequent in the medical files: 5% of the population had had active tuberculosis disease in the past; 13% had latent tuberculosis infection; and 16% had received a diagnosis of tuberculosis in the past, without explicit mention of its being active or latent.

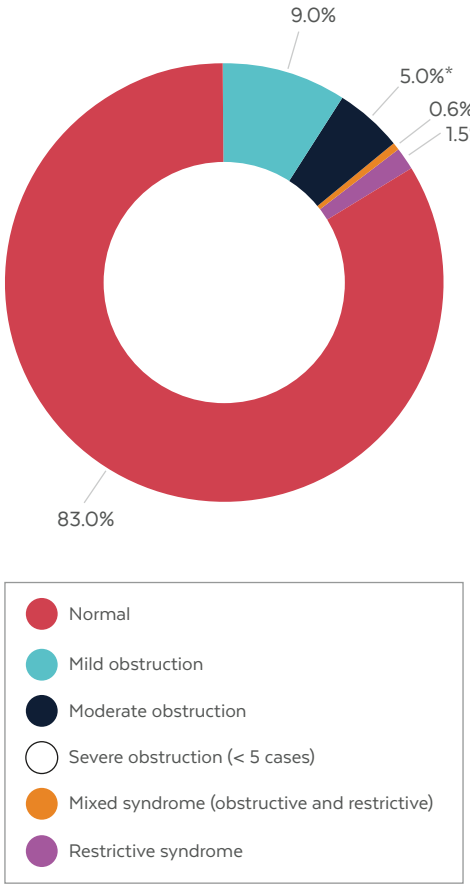
Figure 1 Prevalence of selected respiratory health indicators, young adults (aged 16-34 years) and adults (aged 35 years and over), Nunavik, 2017



SPIROMETRY AND PREVALENCE OF AIRWAY OBSTRUCTION

Figure 2 and Table 1 present the results of lung function tests (i.e., spirometry) according to six mutually exclusive categories. Most people (83%) exhibited normal lung function, while 9% had mild obstruction, 5%* had moderate obstruction, and a few had severe obstruction. Severe obstruction was probably underestimated because participants had to be able to come on board the *Amundsen* icebreaker for data collection, which might have excluded some people with more severe conditions. Restrictive and mixed syndromes were both rare.

Figure 2 Classification (%) of lung function among adults aged 16 years and over, Nunavik, 2017



* The coefficient of variation is greater than 15% and lower than or equal to 25%. The proportion should be interpreted carefully.

** The coefficient of variation is greater than 25%. The proportion is shown for information only.

Table 2 describes the prevalence of airway obstruction according to sex, age group and region. Airway obstruction was more frequent among men than women (20% vs. 14%). The excess cases among men were mostly mild in severity: Fourteen percent (14%) of men had mild obstruction, versus 4% of women (not presented in Table 2), while the prevalence of moderate-to-severe obstruction was similar for both sexes (7% vs. 5%). The prevalence of airway obstruction did not increase with age, because the lower limit of normal (LLN) takes age into account. Table 2 also describes the prevalence of moderate-to-severe obstruction (6%). This condition did not differ between sexes, but it increased significantly with age. No relevant difference was observed across the three ecological regions (Hudson Bay, Hudson Strait and Ungava Bay) or according to community size.

PREVALENCE OF RESPIRATORY SYMPTOMS

Table 3 presents the prevalence of six indicators of respiratory symptoms. All symptoms tended to be more frequent with age, but differences were statistically significant only for chronic cough and chronic bronchitis. Among young adults (16 to 34 years old), 57% reported "at least one symptom", 26% reported wheezing, 21% reported chronic sputum, 18% reported breathlessness and 14% reported chronic cough. For all symptoms, there was no relevant difference according to sex, region or community size. All symptoms were associated with moderate-to-severe airway obstruction [prevalence ratio (PR) = 1.43–2.28], as described in Table 4. They were also associated with airway obstruction but not with breathlessness (PR = 1.21–1.94). Breathlessness was not associated with airway obstruction, indicating that mild obstruction is not sufficient to cause breathlessness.

PHYSICIAN DIAGNOSIS AND MEDICATION IN MEDICAL FILES

Table 5 describes the prevalence of seven diagnosed conditions according to medical files. The most frequent conditions were latent tuberculosis infection (13%) and unknown status tuberculosis (latent or active; 16%). Many Nunavimmiut were classified as unknown status because tuberculosis terminology has evolved over the past few decades. Five percent (5%) of people had had active tuberculosis disease in the past. Older individuals, aged

50-59 and 60-69, had an even higher prevalence of active tuberculosis disease in the past (9%** and 18%*), latent tuberculosis infection (16%* and 23%*), and tuberculosis of unknown status (latent or active; 22% and 30%) (Table 17).

Diagnosed COPD (7%) and diagnosed asthma (4%*) were much less frequent (Table 5). In fact, their prevalence was too small to detect any relevant difference between age groups, sexes or regions. Six percent (6%) of the population had been hospitalized in Kuujjuaq, Puvirnituq or a hospital in southern Quebec for a respiratory infection before the age of five. As expected, none of the people who took part in the survey had lung cancer because participants had to be able to come on board the icebreaker for data collection.

Current medication for asthma or COPD is presented in Table 6. Less than 2%* of the population had a prescription of short-action medication for asthma or COPD (salbutamol or ipratropium bromide), medication for asthma (inhaled corticosteroids, combined or not with a long-acting beta-agonist), or medication for COPD (inhaled long-acting anti-muscarinic and/or long-acting beta-agonist). Such medication was less frequent than diagnosed asthma or COPD. According to medical files, almost no participants used medication for allergic rhinitis (second-generation antihistamines).

ALLERGIC SENSITIZATION TO AERIAL ALLERGENS

Atopy is a genetic predilection to develop antibodies (specific IgE) in reaction to allergens, such as dust mites, dogs, moulds, pollen or food (Stokes & Casale, 2019). These antibodies are responsible for allergic diseases such as asthma. The production of antibodies against allergens, called “allergic sensitization”, is measured with blood tests (specific IgE) or skin prick tests. Relatively few Nunavimmiut were sensitized to dust mites (5%), dogs (3%*) or moulds (< 1%**), as described in Table 7. The geometric mean of blood total IgE was 42.9 kU/L (95% CI 39.0–46.7).

DETERMINANTS OF RESPIRATORY HEALTH

Tables 8, 9, 10 and 11 describe the prevalence of respiratory health indicators according to personal health antecedents, lifestyle, home environment, and social determinants. The few determinants measured as continuous variables are presented in Table 12. Significant associations are summarized in Figure 3.

In regard to personal antecedents (Table 8), hospitalization for respiratory infection in childhood was associated with chronic cough (PR = 2.26) and chronic sputum (PR = 1.72). Those who had been hospitalized for respiratory infection in childhood seemed more likely to have wheezing, “at least one symptom” and airway obstruction, but these associations were not statistically significant. Active tuberculosis in the past was related to chronic cough (PR = 1.95) and “at least one symptom” (PR = 1.24). Diagnosed asthma was associated with airway obstruction (PR = 2.16) and wheezing (PR = 1.82). Obesity had conflicting effects: it was associated with more wheezing (PR = 1.27) but with less airway obstruction (PR = 0.52). The mean level of blood total IgE was higher only among people with “at least one symptom” (Table 12).

Figure 3 Determinants significantly associated with respiratory health indicators, population aged 16 years and over, Nunavik, 2017

		At least one symptom	Wheezing	Chronic sputum	Chronic cough	Airway obstruction
MEDICAL HISTORY	Hospitalization for respiratory infection in childhood			^	^	
	Antecedent of active tuberculosis				^	
	Diagnosed asthma		^			^
	Obesity		^			^
	Blood total IgE (atopy marker)	^				
LIFESTYLE	Smoking status	^	^	^	^	^
	Number of cigarettes per day	^	^			^
	Number of pack years of cigarettes in lifetime	^	^		^	^
	Urinary cotinine	^			^	^
	Cannabis use	^		^	^	^
	Inhalation of solvent in lifetime	^	^		^	
	Electronic cigarette use					
	Marine mammal and fish consumption	^	^		^	
	Vitamin D deficit					
	Fruit and vegetable consumption					
	Time spent sitting per day				^	
HOME ENVIRONMENT	Second-hand smoke exposure	^	^	^	^	
	Number of people who smoke inside one's house	^		^	^	
	House in need of repair	^			^	
	Housing crowding		^			
	Number of children at home					
	Allergic sensitization to dogs	^	^	^		
	Allergic sensitization to dust mites			^		
	Allergic sensitization to at least two aerial allergens			^		
SOCIAL DETERMINANTS	Going on the land	^		^	^	
	Participating in traditional or harvesting activities			^	^	
	Food security	^	^	^	^	
	Education	^				^
	Employment	^				
	Personal income	^				
	Having enough money to meet one's needs			^		

Blue and red cases represent significant associations according to a global chi-square test (p-value < 0.05). Blue represents potential protective factors and red, potential risk factors. The purpose of this figure is simply to facilitate understanding of the results. Interpretation should not only rely on statistical significance. Readers are encouraged to consult Tables 8-12 for a full understanding of the magnitude of the associations and the non-significant trends.

Tobacco smoking stands out as the strongest lifestyle determinant (Table 9). Compared to abstaining, daily smoking was associated with airway obstruction (PR = 2.07), chronic cough (PR = 2.33), chronic sputum (PR = 1.81), wheezing (PR = 1.88) and "at least one symptom" (PR = 1.78). The associations between tobacco smoke exposure and airway obstruction, chronic cough or "at least one symptom" were confirmed when smoking status was ascertained using urinary cotinine levels. Among smokers, people who had airway obstruction, chronic cough, wheezing or "at least one symptom" had smoked a greater quantity of cigarettes in the past. On average, this greater quantity was equivalent to a pack of cigarettes per day for five or six years (Table 12). People who had airway obstruction, wheezing or "at least one symptom" also smoked more cigarettes per day, i.e., approximately two or three additional cigarettes per day on average. Fortunately, quitting or abstaining from smoking protected against airway obstruction, chronic cough and chronic sputum.

Using cannabis daily or regularly (more than once a month) was associated with airway obstruction (PR = 1.86), chronic cough (PR = 1.37), chronic sputum (PR = 1.36) and "at least one symptom" (PR = 1.26). Even among daily cigarette smokers, cannabis use was associated with airway obstruction (PR = 1.68, Table 18) and "at least one symptom" (PR = 1.13, Table 19). Inhalation of solvents at least once during lifetime also appeared to be a risk factor for "at least one symptom", but this association could be confounded by cigarette smoking (Tables 19-21). No significant association or trend was observed for electronic cigarette use. It should be noted that the binary measure (using or not using e-cigarettes) did not take into account frequency of use.

Consumption of marine mammals and fish (seven times or more per week, compared to fewer than three times per week) was unexpectedly associated with a higher frequency of wheezing (PR = 1.54), chronic cough (1.61) and "at least one symptom" (PR = 1.19). This association could be confounded by smoking if people who often eat these country foods also tend to smoke more. The results among daily smokers were conflicting: these foods were associated with chronic cough (Table 20) but not with wheezing (Table 21) and "at least one symptom" (Table 19). They may also be confounded by age if older people tend to eat more fish and marine mammals. No significant association or trend was observed for fruit and vegetable consumption or vitamin D (blood level < 50 nmol/L). People with respiratory symptoms tended to spend more time sitting, but the time was significantly longer only in the case of chronic cough (more than 41 minutes/per day) (Table 12).

Several determinants related to the home environment were associated with respiratory symptoms (Table 10). Self-reported frequency of second-hand smoke exposure ("nearly every day" vs. "once a month or less") was associated with chronic cough (PR = 1.51), chronic sputum (PR = 1.61), wheezing (PR = 1.31) and "at least one symptom" (PR = 1.25). These associations might be confounded by smoking if smokers tend to live with other smokers. Living with three people who smoke inside the house was a risk factor of chronic cough (PR = 1.34), chronic sputum (1.44) and "at least one symptom" (PR = 1.28). The need for major repairs, which is an indicator of poor housing quality, was associated with "chronic cough" PR = 1.56 and "at least one symptom" (PR = 1.22). Housing crowding (more than 1 person per room) was not associated with respiratory indicators, except wheezing. People who lived in crowded houses were less likely to report wheezing (PR = 0.61) an unexpected result that is examined in the Discussion. Otherwise, respiratory indicators were not associated with the number of children living in a house.

Although infrequent, allergic sensitization to dogs increased the risk of wheezing (PR = 1.90), chronic sputum (PR = 2.70) and "at least one symptom" (PR = 1.53). Sensitization to dust mites was associated only with chronic sputum (PR = 1.97). Sensitization to moulds was too rare to conduct bivariate analyses.

Several social determinants of health were protective against respiratory symptoms, especially food security (Table 11). Food security consistently protected against all symptoms (PR between 0.41 and 0.71). People who often "go on the land" were less likely to report chronic cough (PR = 0.50), chronic sputum (PR = 0.58) and "at least one symptom" (PR = 0.74). Similarly, those who "participate in harvesting or traditional activities" were less likely to have chronic cough (PR = 0.68) and chronic sputum (PR = 0.69.). People who graduated from high school were less likely to have airway obstruction (PR = 0.67) and "at least one symptom" (PR = 0.89). In general, employment, income and financial security were not predictive of respiratory symptoms, with some exceptions (Table 11).

IMPACT ON QUALITY OF LIFE

In general, Table 13 shows that people without respiratory symptoms were more likely to have a "very good or excellent" self-rated health, to be able to get around "well or very well," or to be "satisfied or very satisfied" with their life. Conversely, airway obstruction and moderate-to-severe airway obstruction were not associated with these indicators.

COMPARISON BETWEEN NUNAVIK, CANADA AND OTHER POPULATIONS

Table 14 compares the prevalence of some indicators between Nunavik and the rest of Canada for adults over 35 years old. The Canadian data have been adjusted for the younger age of the Nunavik population (using the Nunavik population as the standard). Both airway obstruction (17% vs. 12%) and diagnosed COPD (14% vs. 9%) were more frequent in Nunavik. Conversely, diagnosed asthma was much less frequent in Nunavik (3%** vs. 15%). For young adults (16-34 years old), age-standardized comparison was possible only for diagnosed asthma (Table 15): it was less frequent in Nunavik (5%* vs. 15%).

OTHER RESULTS (APPENDIX B: DETAILED RESULTS)

Tables 18-21 present the prevalence of respiratory indicators according to the main determinants, stratified by three potential confounding factors: smoking status, age group, and sex. Categories of smoking status other than daily smokers were too small to assess relevant associations, so only data for daily smokers are presented. Most associations were consistent among age groups and sexes, even if they were not always significant because there were fewer individuals in each category. No determinants were significant only among young people. Some determinants were significant among older people, but not among young people: antecedent of active tuberculosis, hospitalization for respiratory infection during childhood (unexpectedly), "going on the land", participation in traditional activities, and income. Tobacco smoking seemed particularly widespread among young people: there were few abstainers, and those that did abstain rarely had symptoms.

Determinants of breathlessness are presented separately (Table 22) because this symptom is less specific to respiratory diseases. Consequently, breathlessness was associated with fewer determinants. Socioeconomic determinants, especially food security, were more predictive.

In previous results, airway obstruction was defined according to the lower limit of normal (LLN). Tables 23-26 present the results of a sensitivity analysis with the fixed ratio (0.7). This criterion did not influence the prevalence of airway obstruction in the overall population, but it influenced which individuals were identified with airway obstruction. These individuals tended to be younger with the LLN and older with the fixed ratio (Table 23). The fixed ratio also widened the difference between the sexes (Table 23). Determinants tended to be the same, but associations did not always reach the significance level for both criteria (Table 24). When the fixed ratio was used instead of the LLN, additional associations were identified: second-hand smoke exposure, number of smokers inside the house, housing crowding and employment. On the contrary, some associations were no longer significant with the fixed ratio: smoking status, urinary cotinine and cannabis use. Differences between both criteria will need to be examined in multivariate analyses. They could be attributed to misclassification of younger people. For example, cannabis use is not associated with airway obstruction according to the fixed ratio, possibly because the ratio is less likely to identify obstruction among young people, who are more exposed to cannabis. Finally, the criterion does not seem to influence the relation between airway obstruction and respiratory symptoms (Table 25) or quality of life (Table 26).

5 DISCUSSION

A PORTRAIT OF RESPIRATORY HEALTH

The following portrait of respiratory health shows that the majority of Nunavimmiut have good respiratory health. Indeed, most people had normal lung function and did not report chronic cough, chronic sputum, wheezing or breathlessness. Most could walk as fast as other people of the same age and did not have to stop walking to catch their breath. As for those who did experience some symptoms, most (around 80%) were satisfied with their life and got around easily. Even people with breathlessness or moderate-to-severe airway obstruction declared that they were satisfied with their life and could get around easily, suggesting a strong sense of resilience. Overall, airway obstruction did not seem to impair the quality of life of Nunavimmiut. Restrictive lung diseases seemed rare in Nunavik.

This portrait also shows that six people out of ten (59%) reported having had a respiratory symptom such as usual cough, usual sputum production or wheezing in the previous year. These symptoms might seem frequent and potentially bothersome, but they do not necessarily represent a lung disease (such as COPD or asthma). It is not clear why respiratory symptoms were common (57%) even when lung function was normal. Possibly, these symptoms were reported more commonly because of cultural or linguistic factors, frequent smoking, the dry and cold environment, or other unknown reasons.

Other studies that can be used to place these data in perspective concern COPD, asthma or airway obstruction. This is because much of the current scientific research focuses on respiratory diseases (Reyfman et al., 2018). The next sections of this report provide some background information about other studies and other populations. They reveal some of the strengths of Nunavimmiut, but also a number of inequalities.

Airway obstruction and COPD

Airway obstruction is the main characteristic of chronic obstructive pulmonary disease and an essential criterion for diagnosing this disease. In the *Qanuilirpitaa?* 2017 Health Survey, 17% of the population had airway obstruction, measured without the administration of a bronchodilator medication. While this represents the proportion of the population with abnormal lung function, based on reference values without a bronchodilator, it overestimates the prevalence of COPD by up to 50%. A bronchodilator is required for the diagnosis of COPD (GOLD, 2019). That being said, the data collected in this survey are still comparable to those of other epidemiological studies that also did not use a bronchodilator when testing lung function, including the Canadian Health Measures Survey (CHMS). CHMS also observed few severe cases (around 1%). However, severe obstruction was probably underestimated, because people with this condition would have been less likely to be able to participate in the data collection. Still, the majority of COPD patients have mild or moderate disease (Barrecheguren et al., 2018). They greatly benefit from smoking cessation and increased physical activity. They may also benefit from medication, but only if they have symptoms, which seemed to be the case for around 10% to 40% of Nunavimmiut with airway obstruction in this survey (Table 4).

Airway obstruction and COPD results did not differ between sexes. The most important difference was the prevalence of airway obstruction, which was six percentage points (6%) higher in men. Historically, COPD was thought to be more frequent among men, but this was attributed to higher smoking rates (GOLD, 2019). Nowadays, no sex-based differences in smoking rates are observed in CHMS and the international BOLD study (Evans et al., 2014; Hooper et al., 2012). The differences in airway obstruction in Nunavik cannot be explained by tobacco smoking rates because, according to the data from *Qanuilirpitaa?* 2017, *Qanuippitaa?* 2004 and the 1992 Inuit health surveys (*Qanuilirpitaa*? 2017 Substance Use Thematic Report) (Jetté, 1994; Plaziac, 2007), men did not exhibit higher rates than women. However, men used to smoke more cigarettes per day than women (Plaziac, 2007). Men could

also be more exposed to other risk factors of COPD, such as dust, gases and fumes in the workplace or during activities such as hunting and spending time in cabins. Occupational exposures in the past, for example in mines, were not available in *Qanuilirpitaa?* 2017, but they could also contribute to the sex-based difference in airway obstruction.

In order to draw comparisons between Nunavik and Canada, adults (35 years and older) and young adults (16-34 years old) have to be considered separately. In *Qanuilirpitaa?* 2017, airway obstruction among adults was 40% more frequent in Nunavik compared to the rate in CHMS 2007-2009 (age-standardized; Table 14). However, most of the cases were mild, they did not reduce quality of life and did not cause breathlessness. Similarly, diagnosed COPD was 60% more frequent in Nunavik (age-standardized; Table 14), while the prevalence of COPD medication was much lower. The discrepancy between COPD diagnosis and medication may suggest that people are less symptomatic or are not bothered by their symptoms. It could also suggest lower primary care access or use in Nunavik. This discrepancy has already been documented in northern Ontario, where there are fewer physician visits for COPD but higher rates of COPD incidence, emergency visits and hospitalizations (Crighton et al., 2015).

The situation seems different among young adults. Few population-based data are available for comparison. However, airway obstruction seemed more prevalent in Nunavik (17%) compared to the rates observed in two other large studies. A Canadian multi-centre study found a prevalence of 7% among 2 262 adults aged 20-44 years old in 1994 (Al-Hazmi et al., 2007). The European Community Respiratory Health Survey measured a prevalence of 9% among adults aged 20-44 years old (Sunyer et al., 2004). The prevalence of airway obstruction among young Nunavimmiut greatly exceeded the prevalence of diagnosed COPD (fewer than five cases) or diagnosed asthma (5%). This discrepancy is difficult to explain, but we can examine some hypotheses. The equations that we used (NHANES III for Caucasians) may have overestimated airway obstruction among young Inuit. However, this does not seem to be the case for older adults and it would not be consistent with the high frequency of chronic cough and sputum among young adults or with frequent exposure to COPD's risk factors. Alternatively, this discrepancy could be explained by undiagnosed asthma (discussed later) or COPD. In most communities, the necessary diagnostic tests are not routinely available. In addition, physicians may diagnose COPD less frequently among younger patients given that it is usually diagnosed after 35-40 years of age. Known factors of COPD underdiagnosis include underuse of spirometry, lower education levels, belonging to an ethnic minority, and underreporting of symptoms to physicians (Diab et al., 2018). Finally, it should be noted that underdiagnosis is not necessarily problematic for everyone: the major advantages of a diagnosis are access to medication for symptom relief and counselling for tobacco smoking cessation.

Respiratory symptoms

In *Qanuilirpitaa?* 2017, chronic cough, chronic sputum and breathlessness seemed relatively frequent among the inhabitants of Nunavik compared to other populations. Among adults aged 35 and over, the prevalence of these symptoms was comparable to the CanCOLD data that include Canadians aged 40 and over (Tan et al., 2015). It is important to remember that CanCOLD is a multi-centric study, but it has not been sampled and weighted to represent the Canadian population. In the above-mentioned age groups, chronic cough and chronic sputum seemed more frequent in Nunavik. Chronic cough is a major symptom of COPD and asthma, but it has many other causes, including irritation by air contaminants, allergic rhinitis, bronchiectasis, gastro-esophageal reflux, medication, and so forth (Smith & Woodcock, 2016; Tarlo et al., 2016). Chronic cough also represents a significant inconvenience for people who cough regularly. The prevalence of chronic cough seemed higher in Nunavik (27%) than in CanCOLD (13%). It was also higher than the worldwide average (10%) according to a meta-analysis of 90 studies. That being said, some countries have a prevalence of over 20%, namely, Australia, Greece, Norway and Vietnam (Song et al., 2015). Chronic sputum, present in COPD and bronchiectasis, was more frequent in Nunavik (24%) than in CanCOLD (10%). In the *Qanuilirpitaa?* 2017 survey, breathlessness was defined more severely than in CanCOLD (mMRC scale 2/4 vs. 1/4), but both studies found a similar prevalence (21% vs. 24%). Hence, less severe breathlessness is probably more frequent in Nunavik. Chronic bronchitis, a more restrictive definition of COPD symptoms, does not seem much more frequent in Nunavik (7%) than in the rest of Canada (4%) (Evans et al., 2014). Again, it should be kept in mind that most people who took part in *Qanuilirpitaa?* 2017 were satisfied with their life and had good mobility even if they reported respiratory symptoms.

Wheezing, asthma and atopy

Asthma and atopy have been reported to be less frequent among Inuit people. According to the Aboriginal Peoples Survey 2006, self-reported asthma was similar among Inuit adults (9%) and Canadians (7%), and significantly less frequent than among First Nations (14%) (Garner et al., 2010). The same phenomenon was observed in previous health surveys (Bruce et al., 2014; Chang et al., 2012; Crighton et al., 2010). While asthma is more frequent

among Indigenous populations in Canada and the United States (Ospina et al., 2012), this does not seem to be the case for Inuit, possibly due to their genetic background (Chang et al., 2012). All these studies relied on self-reported asthma diagnosis, which depends on access to care and on participants' recall. To our knowledge, the *Qanuilirpitaa?* 2017 Health Survey is the first to use wheezing and diagnosis in medical files to estimate the frequency of asthma among Inuit adults. Wheezing is an indicator of asthma, especially among adults under 40 years old. The Nunavik data can be compared with those of the World Health Survey, an international survey of around 170 000 participants aged 18-45 years old conducted in 70 countries (excluding Canada) (To et al., 2012). Wheezing appeared to be more frequent in Nunavik (25%) than worldwide (9%) or on the different continents (ranging from 8% to 11%). The prevalence in Nunavik was similar to the highest prevalence, reported mainly in high-income countries: Australia (27%), Netherlands (23%), United Kingdom (23%), Brazil (23%) and Sweden (22%). In older populations, wheezing is less specific to asthma because COPD is more frequent. The prevalence of wheezing was similar between Nunavik (28%) and CanCOLD (29%), a Canadian study that included people over 40 years of age (Tan et al., 2015).

In contrast, diagnosed asthma was much less frequent in Nunavik (4%) than in the rest of Canada according to surveillance data (11%) (Public Health Agency of Canada, 2018), even after adjustment for age (Tables 14-15). The prevalence of diagnosed asthma in Nunavik (5% and 2% among the 16-34 and 35-49 age groups) was similar to the prevalence of self-reported diagnosed asthma worldwide (4%) and on the different continents (ranging from 3% to 6%) (To et al., 2012). Self-reported diagnosis supposedly underestimates asthma prevalence because some participants may not recall their diagnosis.

In summary, wheezing seemed more frequent among the inhabitants of Nunavik than among Canadian or international populations, while diagnosed asthma seemed equally or less frequent. Wheezing was five times more frequent than diagnosed asthma in Nunavik, while it was only twice the rate worldwide and 1.5 to three times the rate across the different continents (To et al., 2012). In countries with a similar prevalence of wheezing, wheezing was only one or two times more frequent than diagnosed asthma. It is possible that participants understood the question about wheezing differently, but this question was used in 70 countries with diverse languages. Diseases other than asthma, such as earlier COPD, respiratory infections or bronchiectasis, might explain the higher burden of wheezing among young Nunavimmiut (Irwin, 2019). This discrepancy might also indicate under-recognition of asthma. Asthma is frequently underdiagnosed and undertreated, especially among vulnerable populations (Aaron et al., 2018). The disease must be diagnosed with clinical examination and lung function tests, which are not available in remote locations, including most Nunavik communities. Children and adults living in the northern territories, on reserves or in rural locations are less likely to be diagnosed with asthma (Crighton et al., 2010). Treatment of asthma is highly effective to prevent exacerbation, hospitalization and death (GINA, 2018a), but few Nunavimmiut were taking medication at the time of the *Qanuilirpitaa?* 2017 Health Survey (around 1% according to the medical files).

Asthma and atopy frequently go together, and like asthma, atopy was reported in *Qanuilirpitaa?* 2017 to be infrequent among Inuit. Effectively, sensitization to dust mites, dogs and moulds was rare among adult Nunavimmiut. Low prevalences of sensitization to aerial allergens have also been observed among Nunavik children, as well as Greenlandic children and adults (Table 16) (Hemmelgarn & Ernst, 1997; Krause et al., 2002; Porsbjerg et al., 2002). Allergic sensitization to dust mites and dogs seemed less frequent among Nunavimmiut than among Denmark Inuit, and much less frequent than among Quebec teenagers and United States adults (Table 16) (Lévesque et al., 2005; Porsbjerg et al., 2002; Salo et al., 2014). Studies in Nunavik and Greenland have measured few dust mites in houses, possibly because of low humidity levels, which prevent the growth of dust mites (Hemmelgarn & Ernst, 1997; Porsbjerg et al., 2002). It is possible that some important allergens were not tested in *Qanuilirpitaa?* 2017. However, the low burden of atopy is consistent with data from other socioeconomically disadvantaged populations (Uphoff et al., 2015). Even if this portrait is limited, it suggests that atopy contributes less than other factors, such as cigarette smoke exposure and lung infections, to the development of asthma in Nunavik.

Tuberculosis and respiratory infections during childhood

Tuberculosis and respiratory infections share similar risk factors, such as housing crowding, tobacco smoking and low socioeconomic status (Basnayake et al., 2017). The historically high incidence of tuberculosis in Nunavik has led to a frequent history of active tuberculosis disease or latent tuberculosis infection. In contrast, less than 2% of participants in CanCOLD reported a history of active or latent tuberculosis (Tan et al., 2015). Active tuberculosis disease can leave sequelae in the lung for the long term. Tuberculosis is a known risk factor of airway obstruction and COPD (Eisner et al., 2010; Jordan et al., 2010). In some regions of the world where tuberculosis is still prevalent, airway obstruction and symptoms of chronic bronchitis are more strongly associated with tuberculosis than with smoking (Jordan et al., 2010). In the present survey, a

history of active tuberculosis disease was associated with chronic cough (PR = 1.95) and breathlessness (PR = 1.63), but not with airway obstruction. Multivariate models adjusted for age and smoking status are required to better assess the impact of tuberculosis on the prevalence of respiratory symptoms. Both tobacco smoking and tuberculosis cause respiratory symptoms and COPD. Eighty percent (80%) of daily smokers who had a history of active tuberculosis reported chronic cough at the time of the survey (Table 20).

Many Nunavimmiut were hospitalized for respiratory infection during childhood (6%). Respiratory infections requiring hospitalizations are more severe, since children have to be transferred by plane from their community to Kuujjuaq, Puvirnituq or hospitals in southern Quebec. In the present survey, children who stayed overnight in their local community services centre (CLSC) were not considered to have been hospitalized. However, they would have been considered hospitalized if they had lived elsewhere in Quebec. Considering overnight stays in local community services centres would have led to a much higher hospitalization rate. Dallaire and al. (2006) reviewed the medical files of 354 children in Nunavik between 1994 and 2001. They documented that 57% of children had been "hospitalized" at least once for lower respiratory tract infection before the age of 5. In comparison, only 6% of CanCOLD participants reported hospitalization for respiratory illness before 5 years of age (Tan et al., 2015).

DETERMINANTS OF RESPIRATORY HEALTH

Some determinants stand out as more frequent and more strongly related to respiratory health in Nunavik. Food security appeared to be strongly protective (PR = 0.50-0.67). The strongest potential risk factors were daily smoking (PR = 1.78-2.33), using cannabis more than once a month (PR = 1.86 with airway obstruction), and daily or almost daily second-hand smoke exposure (PR = 1.51-1.61 with chronic cough and chronic sputum). These determinants were also the most frequent (Table 27, Appendix C: Methodological supplement). People who often go on the land were less likely to have respiratory symptoms (PR 0.50-0.58 with chronic cough and chronic sputum). While this association may illustrate the beneficial effect of Inuit culture and identity on respiratory health, going on the land less frequently could be a consequence of respiratory diseases (possible reverse causation). Education, income, employment and better housing also appeared protective.

Tobacco smoking

Daily smoking emerged as the most frequent and strongest determinant of airway obstruction and respiratory symptoms. One can roughly estimate that 43% of the cases of airway obstruction could be attributed to daily smoking in Nunavik (unadjusted population attributable fraction). Occasional (non-daily) smoking being less frequent, it is difficult to assess its impact. However, people who smoked more cigarettes per day, or people who have smoked more cigarettes during their lifetime, were more likely to have respiratory symptoms or airway obstruction. Tobacco smoking is causally related to COPD, asthma, tuberculosis, lung cancer and pneumonia (National Center for Chronic Disease Prevention and Health Promotion, 2014). It is the dominant cause of COPD around the world (Eisner et al., 2010; GOLD, 2019). Actual evidence also suggests that tobacco smoking is causally linked with the development of asthma and with asthma symptoms among teenagers and adults (National Center for Chronic Disease Prevention and Health Promotion, 2014). Indeed, wheezing was more frequent among daily smokers in Nunavik. Smoking could also contribute to the high burden of tuberculosis in Nunavik, because it doubles the risks of latent tuberculosis infection, active tuberculosis disease and mortality from tuberculosis (National Center for Chronic Disease Prevention and Health Promotion, 2014). The prevalence of tobacco smoking must be interpreted in the context of many personal, environmental and social determinants (for more information, see the Substance Use Thematic Report). Difficult socioeconomic conditions, acculturation and discrimination can all contribute to the high rates of smoking observed in many populations around the world (Garrett et al., 2015). Therefore, action on various social determinants is needed to prevent smoking initiation, help people to quit smoking and protect respiratory health.

Second-hand smoke

Second-hand smoke, or environmental tobacco smoke, can cause respiratory symptoms among children and adults, reduce lung function, and cause lung cancer (National Center for Chronic Disease Prevention and Health Promotion, 2014). People exposed to second-hand smoke were more likely to have respiratory symptoms, even if they were smokers themselves. In contrast, people having a level of urinary cotinine between 1.78-30 ng/mL (indicating second-hand smoke exposure) were not more likely to have symptoms. This probably reflects the lack of sensitivity of urinary cotinine to identify exposure to second-hand smoke (Campo et al., 2016).

Cannabis use

Cannabis smoking is emerging as a cause of respiratory symptoms and as a potential cause of COPD (GOLD, 2019). In *Qanuilirpitaa?* 2017, people who used cannabis more than once a month were more likely to have respiratory symptoms and airway obstruction. This association was also present among daily tobacco smokers, but it will have to be assessed by multivariate analysis adjusting for the quantity of smoked cigarettes. Cannabis smoke contains toxic particles similar to those of tobacco smoke, in similar concentration (Martinasek et al., 2016). Similar effects are observed on the respiratory tract (Owen et al., 2014). Compared to tobacco smokers, cannabis smokers typically inspire more deeply, hold their breath longer, and do not use a filter, (Ribeiro & Ind, 2016). Several studies have consistently shown that chronic cannabis smoking increases the risk of respiratory symptoms (odds ratios up to 3) (Martinasek et al., 2016; Owen et al., 2014; Ribeiro & Ind, 2016). Evidence is less clear for airway obstruction. The effect of cannabis, without tobacco smoking, is uncertain because the largest cohort studies have not shown an increased risk. However, cannabis and tobacco smoking can have a synergistic effect. For example, in a transversal study of 878 adults in Vancouver, the risk of respiratory symptoms (OR 2.39) and airway obstruction (OR 2.90) increased with concurrent use of cannabis (50 cannabis cigarettes in a lifetime) and tobacco (Tan et al., 2009). This might be of concern since both tobacco and cannabis use are frequent in Nunavik.

Housing conditions

Housing conditions are an important determinant of health, but Nunavik is facing shortages and poor quality housing. Housing conditions have been cited as a potential explanation for the increased risk of COPD among poorer populations (GOLD, 2019; Mannino & Buist, 2007). Such conditions increase exposure to second-hand smoke and enable the transmission of respiratory viruses and bacteria, leading to more pneumonia, bronchiolitis and tuberculosis infections (Basnayake et al., 2017). These infections may in turn contribute to the development of airway obstruction, COPD or bronchiectasis (that manifests with chronic cough and sputum). In this survey, poor housing quality, measured as the need for major repairs, was associated with certain symptoms. In contrast, people who lived in crowded houses were not more likely to have respiratory symptoms or airway obstruction. Unexpectedly, they were even less likely to have wheezing. To explain this surprising result, the first hypothesis might be that larger families were prioritized to receive newly built houses. The effects of crowding might thus have been offset by better housing quality. Alternatively, the "hygiene hypothesis" suggests that crowding would prevent allergic sensitization and asthma development (GINA, 2018b). For example, living with many siblings or attending day care reduces the risk of asthma (GINA, 2018b). Indeed, a third of Nunavimmiut had moved at least once during the year prior to the survey.

Otherwise, exposure to biomass smoke at home is a predominant risk factor of COPD worldwide (Mannino & Buist, 2007), but it is not examined in this study because wood heating is almost inexistent in Nunavik.

Traditional lifestyle

According to Inuit Tapiriit Kanatami (2014), culture and traditional lifestyle are important determinants of Inuit health. They have been studied in relation to well-being, mental health and smoking (Bougie & Kohen, 2018; Kant et al., 2013). The present survey explores their relationship with physical health, specifically respiratory health. It has found that going on the land and participating in harvesting/traditional activities are both protective against chronic respiratory symptoms. However, respiratory diseases may reduce the physical ability to go on the land. For example, even people with mild COPD tend to reduce their physical activities (Barrecheguren et al., 2018). This relation could be further explored to see if traditional lifestyle could indirectly prevent respiratory diseases. Physical activity has been associated with better lung function, slower lung function decline, lower COPD incidence and reduced COPD progression (Garcia Aymerich, 2019).

Socioeconomic status

Education, employment and income are three other determinants of Inuit health (Inuit Tapiriit Kanatami, 2014). They are generally associated with COPD and asthma (GINA, 2018b; GOLD, 2019). While COPD is clearly associated with lower socioeconomic status, the association has been controversial for asthma, because the "hygiene hypothesis" predicts that poorer life conditions will decrease the development of asthma and allergies. A meta-analysis of 183 studies recently found that this hypothesis is true for allergies, but not for asthma (Uphoff et al., 2015). Lower socioeconomic status was clearly associated with an increased risk of asthma (OR = 1.38, CI 1.37-1.39). In this survey, socioeconomic indicators were associated with a few respiratory indicators. For example, education was associated with a lower prevalence of respiratory symptoms and airway obstruction, while employment and financial security were associated with a lower prevalence of breathlessness. Associations would perhaps have been stronger if more categories had been used. The Canadian Institute for Health Information (2018) recommends the use of income quintiles and five education attainment categories. Because of the limited

sample size in the current survey, we used only two or three categories, which necessarily represent a narrower gradient of socioeconomic status (SES). The Aboriginal Peoples Survey 2012 opted for more categories, and found that people who earned $5 000-$10 000 were much more likely to report COPD (OR = 5.24) than those who earned $50 000 or more (Bird et al., 2017). People who did not graduate from high school were also more likely to report COPD (OR = 2.25) than people with a post-secondary certificate. Among Australian Indigenous people, food security was a better socioeconomic predictor of asthma than typical indicators like education or income (Cunningham, 2010).

Food security

Food security has multiple consequences on physical, mental and psychosocial health but its effects on respiratory health are less studied (Council of Canadian Academies, 2014). In this survey, food security was strongly protective against respiratory symptoms across all age groups and sexes. Recent studies have started to demonstrate the effect of food insecurity on respiratory health, especially on obstructive lung diseases (Mangini et al., 2019; Nagata et al., 2019). Many mechanisms might explain the effect of food insecurity: it might be seen as a complementary indicator of socioeonomic status, or as a cause of psychosocial stress. A large body of literature supports the hypothesis that stress contributes to asthma morbidity and development, through plausible biological mechanisms (Yonas et al., 2012). Food insecurity could also exert a more direct effect through nutritional intakes and weight.

Nutrition, weight and physical activity

According to the ATS, GOLD and GINA, many nutriments might prevent airway obstruction, COPD or asthma: omega-3 polyunsaturated fatty acids (n-3 PUFAs), antioxidants such as vitamin C, and vitamin D (Eisner et al., 2010; GINA, 2018b; GOLD, 2019). In the traditional Nunavimmiut diet, fish is rich in n-3 PUFAs, and arctic marine mammals are a source of n-3 PUFAs, vitamin C and vitamin D (Baines et al., 2015). A study of 1 000 people in Greenland found that Inuit who consumed seal or whale (at least once a month vs. less often) had better lung function (FEV_1 +169 mL) after adjustment for tobacco smoking (Baines et al., 2015). This protective effect was not seen in the present survey: no association was found with vitamin D or fruit/vegetable consumption, while fish/marine mammal consumption appeared to be associated with the prevalence of some respiratory symptoms. This unexpected association could be confounded by other factors such as smoking or age and will have to be examined through multivariate analyses. High rates of tobacco smoking may have masked the effect of nutrients. It is also important to keep in mind the imprecision of the data on fish and marine mammal consumption, which was assessed using a food frequency questionnaire covering only the three months prior to the survey, and did not consider portion sizes.

Obesity is known to increase the risk of asthma (GINA, 2018b). Accordingly, the results of the present survey also indicate a positive relation between obesity and the risk of asthma. In contrast, obesity has been associated with a reduced risk of airway obstruction, possibly because smokers tend to have lower body weight (Chiolero et al., 2008). The negative association between obesity and airway obstruction has also been observed in other Canadian, American and international studies (Halldin et al., 2015; Hooper et al., 2012; Tan et al., 2015).

As mentioned earlier, physical activity can slow COPD progression. Recent evidence also suggests that physical activity could prevent the development of COPD (Garcia Aymerich, 2019). In the present survey, we used sedentary time as a proxy of physical activity, even if both concepts are different. For all indicators, people with symptoms or obstruction spent more time sitting per day, but it was significant only for chronic cough. The likely imprecision of sitting time would underestimate its effect.

LIMITATIONS

These results from the *Qanuilirpitaa?* 2017 Health Survey must be interpreted in the context of certain limitations, the first being the absence of control for confounding factors. Some associations might be explained by other factors such as differences in age, sex or smoking status. For example, the association between cannabis use and airway obstruction could be explained by tobacco smoking, if people who use cannabis are more likely to smoke tobacco, and if tobacco smokers are more likely to have airway obstruction. Age and smoking status could both cause confusion, but in a different direction. Older people are more likely to have respiratory problems. If another determinant is associated with age, the association between that determinant and respiratory problems might be explained by age. The same applies to smoking. However, the situation is further complicated by the fact that older people are less likely to smoke. The confounding effect of smoking might therefore be reduced by age, and *vice versa*. Multivariate analyses are required to take into account possible confounding factors.

The second main limitation is the transversal design of the survey. Both determinants and respiratory indicators were documented at the same time, making it impossible to know if the determinant was present in the past, and for how long. Respiratory diseases develop over several years, even decades (Eisner et al., 2010). In transversal studies, it is assumed that actual exposures represent past exposures. This is plausible for certain determinants, such as respiratory infections in childhood, tuberculosis, smoking status and education. It is less plausible for cannabis use, second-hand smoke, housing conditions, nutritional factors, food security and income. This bias is probably non-differential and would underestimate the strength of associations. Nonetheless, transversal studies are considered useful for etiologic research about diseases that develop progressively, such as respiratory diseases, because it is difficult to know precisely when these diseases began (Douwes et al., 2015). Transversal studies are also very useful for studying specific populations that otherwise would not be included in longitudinal studies, such as the Nunavik population (Douwes et al., 2015). This limitation was mitigated by examining proven risk or protective factors, not to investigate their causality, but to identify high-priority risk/preventive factors in Nunavik.

It was impossible to assess all of the potential determinants of respiratory health in this survey. Some of the unmeasured factors are well established in the scientific literature and could be useful for public health. In particular, factors that influence lung development during pregnancy, childhood and adolescence have an impact later in life. For example, a longitudinal study found that one half of people with COPD developed the disease because of an accelerated decline in lung function during adulthood, and the other half developed it because of abnormal lung development during childhood (GOLD, 2019). The factors involved include low birth weight, respiratory infections, and home crowding during childhood (GOLD, 2019). The last two factors seem to act synergistically with smoking.

Exposure to dusts, gases and fumes in the workplace is a recognized cause of COPD according to the American Thoracic Society (Eisner et al., 2010). Workplace exposures, although often underappreciated, are responsible for 15% to 20% of COPD cases in the United States (Eisner et al., 2010). Future research should examine if these exposures could explain the higher prevalence of COPD among men in Nunavik. Outdoor air pollution is also a risk factor of COPD (Eisner et al., 2010), but it seems less important at the international level, and probably in Nunavik too. WHO estimates that only 1% of COPD cases in high-income countries and 2% of those in developing countries are attributable to urban air pollution, (Mannino & Buist, 2007). The cold weather prevailing in Nunavik could be explored as a contributor to the burden of respiratory diseases. The higher COPD morbidity during winter has been attributed to more frequent viral infections, colder outdoor temperatures and cooler indoor temperatures. On the other hand, northern regions in Europe exhibit lower excess respiratory morbidity during winter than southern regions, because their inhabitants are better adapted to the cold climate (Donaldson & Wedzicha, 2014).

IMPLICATIONS FOR PUBLIC HEALTH INTERVENTION AND RESEARCH

There are obviously grey zones where additional research will be required to better understand the determinants of respiratory health among Nunavimmiut. However, some findings of the current survey could already support public health action. Based on these data, we would like to suggest some implications for action, simply to guide or inspire reflection about respiratory health on the part of communities and health professionals.

Coupled with the existing literature, the portrait we have drawn shows that certain life conditions influence respiratory health, notably food security, education, employment, income and housing. In the current survey, food security was consistently protective against respiratory symptoms. It is useful to improve life conditions in Nunavik because they are associated with several other health priorities. Addressing social determinants of health has already been advocated to eliminate the tobacco-related inequalities faced by vulnerable populations (Garrett et al., 2015).

In keeping with an extensive body of research, the data from the present survey confirm the dominant role of tobacco smoking as a cause of respiratory diseases. To some extent, preventing respiratory diseases mainly implies preventing tobacco use, by acting on the complex social determinants of tobacco smoking. Several studies have already examined the determinants of tobacco smoking among Inuit. For example, Bougie and Kohen (2018) found that several social determinants of health are correlated with smoking in Inuit Nunangat. Kyu and al. (2015) also examined several factors among Inuit and First Nations in Canada. Some qualitative studies conducted in Cambridge Bay and in Greenland might help to understand the daily experience of tobacco smokers and the importance of interpersonal relationships (Doucette, 2007; Jensen & Hounsgaard, 2013). Lastly, the grey literature provides an understanding of communities' knowledge: for example, the Pauktuutit Inuit Women's Association (2000) has produced material about tobacco recovery that sheds light on the Inuit context.

These data could serve to mobilize communities, leaders, elders, provincial governments and the federal government about respiratory health and smoking. They show that respiratory conditions prevent many Nunavimmiut from going on the land and participating in traditional activities. Inuit women from Pauktuutit have already published the reflections of elders about how tobacco has affected Inuit communities: they said that "our ancestors never smoked", and they feel engaged in efforts to reduce smoking (Angiyou et al., 2006). Some opportunities can be seized to target tobacco smoking. The "made in Nunavut approach" developed by the Government of Nunavut to reduce smoking can be inspiring. It has produced resources for enabling people to quit tobacco use, while emphasizing that "tobacco was never part of Inuit culture" (Government of Nunavut, 2019). Resources can be found in Canada's Tobacco Strategy, which aims to achieve a smoking rate below 5% before 2035. The strategy is committed to reaching out to Inuit, First Nations and Metis people. Several interventions to reduce tobacco smoking among Indigenous people have been documented, according to a recent overview of reviews (Chamberlain et al., 2017). The reviewers concluded that these interventions benefit from cultural tailoring, holistic approaches and building workforce capacity. Research, especially participatory research, could contribute to such interventions by improving their implementation and effectiveness. Interventions should understand and consider the perception of Nunavimmiut about smoking.

Some determinants, such as cannabis use, second-hand smoke, housing conditions or nutritional factors, will require multivariate analysis in order to gain a better understanding of their effect on the respiratory health of Nunavimmiut. That being said, the scientific literature supports the role of these determinants, except for nutritional factors given the mixed results in the literature in their regard. There are several other reasons to take action on these determinants, as explained in other thematic reports.

Finally, primary care for respiratory conditions has emerged as a potential issue for research and intervention in Nunavik. Although limited, the data in the present report support the need to improve primary care in order to strengthen respiratory health. Early detection of COPD is recommended among people who have symptoms (GOLD, 2019). Detection and management of respiratory diseases require spirometry and chest radiology, which are not available in most communities. Providing these resources and developing the human workforce required to use them would improve primary care for respiratory diseases. Apart from medication, a major component of respiratory care are self-management interventions that aim to "motivate, engage and coach the patient to adapt their behaviour and to better manage their disease" (GOLD, 2019). People must be involved in addressing smoking, diet and exercise to adhere to treatment; maintain regular contact with health professionals, and manage the psychosocial consequences of disease. Such strategies would need to be adapted to the Inuit culture, life conditions in Nunavik and the organization of health care services. They would also require a culturally competent workforce, which could be the focus of research and training.

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APPENDIX A
MAIN RESULTS

PREVALENCE OF RESPIRATORY HEALTH INDICATORS

Table 1 Lung function of population aged 16 years and over, Nunavik, 2017

	% of population	CI Min	CI Max
Normal	83.4	80.5	85.9
Mild obstruction (GOLD 1)	8.9	6.9	11.4
Moderate obstruction (GOLD 2)	5.0*	3.7	6.7
Severe obstruction (GOLD 3)	NP		
Very severe obstruction (GOLD 4)	NP		
Mixed syndrome (obstructive and restrictive)	0.6**	0.2	1.6
Restrictive syndrome	1.5*	0.9	2.5

* The coefficient of variation is greater than 15% and lower than or equal to 25%.The proportion should be interpreted carefully.
** The coefficient of variation is greater than 25%. The proportion is shown for information only.
NP: Data not presented (n < 5).

Table 2 Prevalence of airway obstruction, population aged 16 years and over, Nunavik, 2017

	Airway obstruction			Moderate-to-severe airway obstruction		
	%	CI Min	CI Max	%	CI Min	CI Max
Total	16.6	14.1	19.5	6.2	4.7	8.2
Sex						
Men	19.5	15.3	24.6	7.3*	4.9	10.9
Women	13.6	11.1	16.5	5.1*	3.7	7.1
Age						
16-34 years	16.6	13.2	20.6	3.3**	1.8	5.7
35-49 years	15.3*	10.0	22.8	5.4**	2.9	9.9
50-59 years	20.6*	14.4	28.6	15.5*	9.9	23.4
60-69 years	14.7**	8.4	24.7	12.1**	6.4	21.4
70 years and over	NP			NP		
Region						
Hudson Bay	17.0	13.2	21.7	6.9*	4.8	9.9
Hudson Strait	19.7*	13.7	27.7	8.8**	5.1	14.7
Ungava Bay	13.8	10.7	17.6	3.6**	2.2	5.9

Values in **blue** are statistically different according to a global chi-square test (p-value < 0.05).
* The coefficient of variation is greater than 15% and lower than or equal to 25%. The proportion should be interpreted carefully.
** The coefficient of variation is greater than 25%. The proportion is shown for information only.
NP: Data not presented (n < 5).

Table 3 Prevalence of respiratory symptoms, population aged 16 years and over, Nunavik, 2017

	At least one symptom[A]			Wheezing			Chronic sputum[B]		
	%	CI Min	CI Max	%	CI Min	CI Max	%	CI Min	CI Max
Total	59.0	56.0	61.9	27.1	24.3	30.0	22.5	20.0	25.2
Sex									
Men	57.0	53.6	60.4	28.0	23.6	32.8	24.4	20.4	28.9
Women	59.0	56.0	61.9	26.1	23.1	29.3	20.6	17.8	23.7
Age									
16-34 years	56.8	52.4	61.1	26.1	22.4	30.2	21.3	17.9	25.2
35-49 years	56.0	49.6	62.2	25.0	20.0	30.9	23.7	18.6	29.8
50-59 years	66.8	59.4	73.5	29.2	22.7	36.6	21.4*	15.6	28.6
60-69 years	67.1	57.5	75.5	32.0	23.5	42.0	26.7*	18.8	36.3
70 years and over	62.0*	41.8	78.7	40.1**	22.5	60.7	26.2**	12.8	46.2
Region									
Hudson Bay	59.4	54.4	64.2	27.1	22.9	31.7	24.3	20.2	29.0
Hudson Strait	60.8	54.0	67.2	26.7	20.9	33.3	22.0	17.3	27.6
Ungava Bay	57.1	52.2	61.8	27.3	23.2	31.7	20.5	16.6	25.1

	Chronic cough			Breathlessness			Chronic bronchitis		
	%	CI Min	CI Max	%	CI Min	CI Max	%	CI Min	CI Max
Total	20.5	18.2	22.9	19.5	17.1	22.2	5.1	3.8	6.6
Sex									
Men	19.2	15.6	23.4	19.0	15.2	23.4	5.5*	3.6	8.4
Women	21.8	19.0	24.8	20.1	17.6	22.9	4.6*	3.3	6.3
Age									
16-34 years	14.2	11.6	17.3	17.9	14.7	21.7	3.0**	1.7	5.0
35-49 years	25.8	20.4	32.1	19.6	15.1	25.1	5.0**	2.8	8.8
50-59 years	28.1	21.7	35.4	22.7	16.9	29.8	9.2**	5.3	15.6
60-69 years	30.5	22.4	40.1	23.5*	16.4	32.5	10.3**	5.5	18.4
70 years and over	20.8**	8.8	41.9	20.2**	8.7	40.3	NP		
Region									
Hudson Bay	23.0	19.1	27.3	16.7	13.2	20.9	5.3*	3.4	8.0
Hudson Strait	20.7	16.3	25.9	22.8	17.5	29.2	5.4**	3.1	9.2
Ungava Bay	17.1	14.0	20.7	20.8	17.1	25.0	4.6*	2.8	7.4

Values in **blue** are statistically different according to a global chi-square test (p-value < 0.05).

* The coefficient of variation is greater than 15% and lower than or equal to 25%. The proportion should be interpreted carefully.

** The coefficient of variation is greater than 25%. The proportion is shown for information only.

[A] "At least one symptom" among cough (usual, not necessarily chronic), sputum (usual, not necessarily chronic) or wheezing (in the last 12 months).

[B] For all symptoms, there is no significant difference according to community size, except in the case of chronic sputum: it is significantly more frequent in large communities (26%) than in small ones (18.0%).

NP: Data not presented (n < 5).

Table 4 Relation between respiratory symptoms and airway obstruction: prevalence of symptoms according to airway obstruction, population aged 16 years and over, Nunavik, 2017

		At least one symptom[A]	Wheezing	Chronic sputum	Chronic cough	Breath-lessness
		%	%	%	%	%
YOUNG ADULTS (16-34 YEARS)	**Airway obstruction**					
	Airway obstruction	65.1	35.1*	42.2	24.7*	12.8**
	No obstruction	57.0	24.7	19.2	12.4	17.8
	Severity of airway obstruction					
	Moderate to severe	NP	39.2**	31.6**	23.2**	42.1**
	Mild	69.9*	44.2**	56.2*	NP	NP
	No obstruction	57.2	25.0	20.9	13.7	16.9
ADULTS (35 YEARS AND OVER)	**Airway obstruction**					
	Airway obstruction	74.3	48.0	36.8*	34.3*	25.2*
	No obstruction	57.9	23.3	21.7	23.8	19.3
	Severity of airway obstruction					
	Moderate to severe	84.0	58.8	37.5*	46.7*	31.1*
	Mild	75.4	38.5*	34.2**	22.3**	15.3**
	No obstruction	55.2	21.6	20.8	23.5	19.9

Values in **blue** are statistically different according to a global chi-square test (p-value < 0.05).

* The coefficient of variation is greater than 15% and lower than or equal to 25%. The proportion should be interpreted carefully.

** The coefficient of variation is greater than 25%. The proportion is shown for information only.

[A] "At least one symptom" among cough (usual, not necessarily chronic), sputum (usual, not necessarily chronic) or wheezing (in the last 12 months)

NP: Data not presented (n < 5).

Table 5 Prevalence of diagnosed diseases in medical files of population aged 16 years and over, Nunavik, 2017

	%	CI Min	CI Max
Tuberculosis of unknown status (latent or active, undetermined in the medical file)	16.0	13.8	18.5
Latent tuberculosis infection	13.0	11.3	15.0
Active tuberculosis disease (in the past, not currently)	5.4	4.2	6.9
Chronic obstructive lung disease (COPD)[A]	6.5	5.4	7.9
Hospitalization for respiratory infection in childhood	6.4	4.9	8.2
Asthma[B]	3.9*	2.8	5.4
Lung cancer	No participants		

* The coefficient of variation is greater than 15% and lower than or equal to 25%. The proportion should be interpreted carefully.

[A] There are less than 5 cases of COPD among young adults (aged 16-34 years; NP) secondary while the prevalence of COPD is 14.1% among adults (aged 35 years and over).

[B] The prevalence of asthma is significantly higher among young adults (aged 16-34 years; 5%*) than adults (35 years and over; 3%**).

Table 6 Prescribed medication for asthma, COPD or allergic rhinitis, population aged 16 years and over, Nunavik, 2017

	%	CI Min	CI Max
Prescription of short-action medication for asthma or COPD (inhaled salbutamol or ipratropium bromide)	1.8*	1.3	2.6
Prescription of medication for asthma (inhaled corticosteroids, combined or not with a long-acting beta-agonist)	1.1**	0.6	1.8
Prescription of medication for COPD (inhaled long-acting anti-muscarinic and/or long-acting beta-agonist)	1.2**	0.7	2.0
Prescription of medication for allergic rhinitis (second-generation antihistamines)	0.3**	0.1	0.6

* The coefficient of variation is greater than 15% and lower than or equal to 25%. The proportion should be interpreted carefully.
** The coefficient of variation is greater than 25%. The proportion is shown for information only.

Table 7 Prevalence of sensitization to aerial allergens, population aged 16 years and over, Nunavik, 2017

	%	CI Min	CI Max
Allergic sensitization to at least two types among dogs, *Farinae, Pteronyssinus, Alternaria, Aspergillus*	4.4	3.3	5.8
Allergic sensitization to dust mites: *Farinae* and/or *Pteronyssinus*	5.3	4.1	6.9
Allergic sensitization to dust mites: *Farinae*	4.8	3.6	6.2
Allergic sensitization to dust mites: *Pteronyssinus*	4.6	3.5	6.1
Allergic sensitization to dogs	2.8*	1.9	4.1
Allergic sensitization to moulds: *Alternaria*	0.4**	0.2	1.0
Allergic sensitization to moulds: *Aspergillus*	0.5**	0.2	0.9

* The coefficient of variation is greater than 15% and lower than or equal to 25%. The proportion should be interpreted carefully.
** The coefficient of variation is greater than 25%. The proportion is shown for information only.

DETERMINANTS OF RESPIRATORY HEALTH

Table 8 Prevalence of respiratory indicators according to personal antecedents, population aged 16 years and over, Nunavik, 2017

	At least one symptom[A]	Wheezing	Chronic sputum	Chronic cough	Airway obstruction
	%	%	%	%	%
Hospitalization for respiratory infection in childhood					
Yes	71.8	37.8*	35.8*	41.5*	24.8**
No	57.8	26.1	20.8	18.4	15.4
Antecedent of active tuberculosis					
Yes	71.8	32.2*	23.3*	36.4*	12.4**
No	57.8	27.0	22.4	18.7	15.8
Diagnosed asthma					
Yes	71.8	47.2*	28.7**	18.2**	33.0**
No	58.3	26.0	21.5	20.0	15.3
Obesity					
Yes (BMI > 30)	55.2	31.3	19.6	19.7	10.0*
No (BMI < 30)	61.3	25.0	23.7	20.7	19.4

Values in **blue** are statistically different according to a global chi-square test (p-value < 0.05).

* The coefficient of variation is greater than 15% and lower than or equal to 25%. The proportion should be interpreted carefully.

** The coefficient of variation is greater than 25%. The proportion is shown for information only.

[A] "At least one symptom" among cough (usual, not necessarily chronic), sputum (usual, not necessarily chronic) or wheezing (in the last 12 months).

Table 9 Prevalence of respiratory indicators according to lifestyle habits, population aged 16 years and over, Nunavik, 2017

	At least one symptom[A]	Wheezing	Chronic sputum	Chronic cough	Airway obstruction
	%	%	%	%	%
Smoking status					
Daily	65.2	29.0	25.5	23.8	19.0
Occasional	46.7	19.4*	15.1**	16.8**	8.0**
Former	47.9	31.6	16.2*	11.3*	11.8**
Abstainer	36.6	15.4*	14.1*	10.2**	9.2**
Urinary cotinine[B]					
Active smoking	61.5	27.0	22.7	20.9	17.8
Second-hand smoke and/or occasional smoking	44.2	25.5*	15.1*	12.1**	14.3**
No exposure	40.2*	23.8*	17.5**	14.6**	NP
Cannabis use					
More than once a month	66.0	28.9	26.2	23.8	21.6
Once a month or less	52.3	25.1	19.2	17.4	11.6
Inhalation of solvent in lifetime					
At least once	65.7	33.4	26.7	24.6	18.6*
Never	56.3	24.5	20.8	18.8	15.6

No significant association or trend was observed for:

Electronic cigarette use (Yes; No)
Fruit and vegetable consumption (5 times or more per day; fewer than 5 times per day)
Vitamin D deficit (blood level < 50 nmol/L; > = 50 nmol/L)

Values in **blue** are statistically different according to a global chi-square test (p-value < 0.05).
* The coefficient of variation is greater than 15% and lower than or equal to 25%. The proportion should be interpreted carefully.
** The coefficient of variation is greater than 25%. The proportion is shown for information only.
[A] "At least one symptom" among cough (usual), sputum (usual) or wheezing (in the last 12 months).
[B] > 30 ng/mL = active smoking; 1.78-30 ng/mL = second-hand smoke and/or occasional smoking; < 1.78 ng/mL = no exposure.
NP: Data not presented (n < 5).

Table 10 Prevalence of respiratory indicators according to home environment, population aged 16 years and over, Nunavik, 2017

	At least one symptom[A]	Wheezing	Chronic sputum	Chronic cough	Airway obstruction
	%	%	%	%	%
Second-hand smoke exposure					
Daily or nearly daily	68.3	32.9	31.0	26.8	21.8
Once a week	65.1	22.7*	21.5*	23.0**	13.0**
Once a month or less	54.7	25.2	19.2	17.7	14.7
Number of smokers inside the house					
3 people or more	70.7	30.6	28	23.4*	21.8*
1 or 2 people	66.4	31.1	30.1	29.7	17.7*
None	55.1	25.4	19.5	17.4	15.3
House in need of repair					
Need for major repairs	68.9	31.1	27.4	29.0	16.0
Need for minor repairs or regular maintenance	56.7	26.2	21.7	18.6	16.8*
Housing crowding (PPR)					
> 1 person per room	56.7	18.8	24.4	24.5	14.9
1 person or less	60.0	31.0	22.0	19.5	17.2
Allergic sensitization to dogs					
Sensitized	88.6	49.8*	55.9*	11.0**	28.0**
Not sensitized	58	26.2	20.7	19.8	16.5
Allergic sensitization to dust mites (*Pteronyssinus* type and/or *Farinae* type)					
Sensitized	68.9	34.2*	40.6*	18.1**	19.6**
Not sensitized	58.3	26.4	20.6	19.6	16.7
Allergic sensitization to two types or more among dogs, *Farinae, Pteronyssinus, Alternaria, Aspergillus*					
Sensitized to 2 types	68.8	37.9*	45.0*	18.6**	22.1**
Sensitized to 1 or 0 types	58.4	26.3	20.6	19.6	16.6

No significant association or trend was observed for: Number of children at home (3 or more children, 2 children, 1 child, no children).

Allergic sensitization to moulds (*Alternaria* or *Aspergillus*) was too rare to conduct bivariate analyses.

Values in **blue** are statistically different according to a global chi-square test (p-value < 0.05).

* The coefficient of variation is greater than 15% and lower than or equal to 25%. The proportion should be interpreted carefully.

** The coefficient of variation is greater than 25%. The proportion is shown for information only.

[A] "At least one symptom" among cough (usual, not necessarily chronic), sputum (usual, not necessarily chronic) or wheezing (in the last 12 months).

Table 11 Prevalence of respiratory indicators according to social determinants, population aged 16 years and over, Nunavik, 2017

	At least one symptom[A]	Wheezing	Chronic sputum	Chronic cough	Airway obstruction
	%	%	%	%	%
Going on the land					
Never	74.9	27.5	34.4	32.9	19.9*
Occasionally	57.4	25.3	21.3	21.1	15.7
Often	55.7	28.9	20.1	16.3	16.6
Participation in harvesting or traditional activities					
No	66.5	22.1	31.0*	28.5*	20.4*
Yes	58.0	27.5	21.4	19.5	16.1
Food security					
Severely insecure	73.8	34.1	34.7	31.3	20.4*
Moderately insecure	57.6	25.3	20.5	20.9	15.9
Secure	49.4	24.2	15.9	12.9	15.5*
Education					
Elementary school or less	77.4	30.8*	28.6*	22.8*	9.3**
Secondary school not completed	59.2	26.5	23.9	22.0	19.6
Secondary school or higher	52.6	27.1	18.7	17.2	13.1*
Employment[A]					
Not employed	66.5	27.9	22.7	23.5*	21.5*
Employed	57.4	27.0	22.4	20.0	15.7
Income					
Less than $20 000	62.0	27.4	24.5	19.2	18.3
$20 000 or more	54.0	28.6	20.4	21.6	16.2
Having enough money to meet one's needs					
Not at all	63.4	27.4	25.3	23.8	17.6*
A little or moderately	59.7	24.7	24.9	21.0	15.6
Mostly or completely	54.1	30.8	15.8	16.7	17.7*

Values in **blue** are statistically different according to a global chi-square test (p-value < 0.05).

* The coefficient of variation is greater than 15% and lower than or equal to 25%. The proportion should be interpreted carefully.

** The coefficient of variation is greater than 25%. The proportion is shown for information only.

[A] Employed = paid work (job or self-employed); Not employed = housework, hunter support program, retired or on pension, employment insurance, parental leave, income support or student.

Table 12 Mean values of continuous determinants according to respiratory indicators, population aged 16 years and over, Nunavik, 2017

	At least one symptom[A]		Wheezing		Chronic sputum		Chronic cough		Airway obstruction	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Blood total IgE Mean kU/L [SD]	179.0 [22.3]	97.7 [8.6]	191.7* [39.1]	129.1 [11.0]	204.3* [44.3]	128.7 [12.1]	170.9* [33.8]	139.8 [14.2]	160.1** [40.4]	145.9 [14.2]
Number of pack-years[B] of cigarettes among daily and occasional smokers, Mean [SD]	14.8 [0.8]	10.3 [0.7]	16.5 [1.4]	11.8 [0.5]	15.0 [1.4]	12.6 [0.6]	17.6 [1.2]	11.8 [0.6]	16.9 [1.5]	11.9 [0.6]
Number of cigarettes per day among daily and occasional smokers, Mean [SD]	13.4 [0.6]	11.2 [0.5]	14.5 [0.8]	11.8 [0.4]	13.5 [0.7]	12.3 [0.5]	13.6 [0.5]	12.3 [0.5]	14.4 [1.0]	11.7 [0.4]
Time spent sitting per day, Mean hours [SD]	6.3 [0.1]	6.2 [0.2]	6.4 [0.2]	6.2 [0.1]	6.6 [0.2]	6.2 [0.1]	6.8 [0.3]	6.1 [0.1]	6.1 [0.3]	6.2 [0.1]

Values in **blue** are statistically different according to a global chi-square test (p-value < 0.05).

* The coefficient of variation is greater than 15% and lower than or equal to 25%. The proportion should be interpreted carefully.

** The coefficient of variation is greater than 25%. The proportion is shown for information only.

[A] "At least one symptom" among cough (usual, not necessarily chronic), sputum (usual, not necessarily chronic) or wheezing (in the last 12 months).

[B] "Pack-year" is a standard measure of the total number of cigarettes that someone has smoked. It is calculated by multiplying the number of packs of cigarettes smoked per day by the number of years the person has smoked.

IMPACT ON QUALITY OF LIFE

Table 13 Proportions of indicators of quality of life according to respiratory indicators, population aged 16 years and over, Nunavik, 2017

	Perception of health	Ability to get around	Life satisfaction
	% very good or excellent	% well or very well	% satisfied or very satisfied
At least one symptom[A]			
Yes	23.9	85.0	79.7
No	33.6	90.5	84.2
Wheezing			
Yes	19.0	85.2	75.4
No	31.1	88.0	83.6
Chronic sputum			
Yes	24.4	81.9	74.0
No	28.8	88.9	83.9
Chronic cough			
Yes	19.7	80.4	77.4
No	29.9	89.1	82.5
Breathlessness			
Yes	16.4*	78.2	76.3
No	30.6	89.4	82.8
Airway obstruction (LLN)			
Yes	27.5	89.6	83.0
No	28.5	88.2	81.9
Severity of airway obstruction			
Moderate to severe (GOLD 2-3-4)	14.7**	86.6	86.1
Mild (GOLD 1)	39.0*	86.4	82.0
No airway obstruction	28.2	88.8	81.8

Values in **blue** are statistically different according to a global chi-square test (p-value < 0.05).

* The coefficient of variation is greater than 15% and lower than or equal to 25%.The proportion should be interpreted carefully.

** The coefficient of variation is greater than 25%. The proportion is shown for information only.

[A] "At least one symptom" among cough (usual, not necessarily chronic), sputum (usual, not necessarily chronic) or wheezing (in the last 12 months).

COMPARISON OF NUNAVIK, CANADA AND OTHER POPULATIONS

Table 14 Comparison[A] of airway obstruction, diagnosed COPD and diagnosed asthma among adults aged 35 years and over, Nunavik, 2017, and Canada

	Airway obstruction			Diagnosed COPD			Diagnosed asthma		
	%	CI Min	CI Max	%	CI Min	CI Max	%	CI Min	CI Max
Nunavik (*Qanuilirpitaa?* 2017)	16.6	12.9	21.1	14.1	11.6	17.1	2.5**	1.5	4.1
Canada	11.8[B]	9.7	13.9	8.82[C]	8.80	8.84	15.31[C]	15.30	15.33
Prevalence ratio	1.40	1.10	1.79	1.60	1.31	1.95	0.16	0.10	0.27

Values in **blue** are statistically different according to the confidence interval of the prevalence ratio.
** The coefficient of variation is greater than 25%. The proportion is shown for information only.
[A] Canadian data are adjusted for the age of Nunavik's population (standardization with Nunavik as the standard).
[B] Canadian Health Measures Survey, 2007-2009 (Evans et al., 2014).
[C] Canadian Chronic Disease Surveillance System, Canadian population, 2011-2012 (Public Health Agency of Canada, 2018).

Table 15 Comparison[A] of diagnosed asthma among young adults aged 16-34 years Nunavik, 2017, and Canada

	Diagnosed asthma		
	%	CI Min	CI Max
Nunavik (*Qanuilirpitaa?* 2017)	5.2*	3.5	7.6
Canada[A]	14.89[B]	14.86	14.91
Prevalence ratio	0.35	0.24	0.52

Values in **blue** are statistically different according to the confidence interval of the prevalence ratio.
* The coefficient of variation is greater than 15% and lower than or equal to 25%. The proportion should be interpreted carefully.
[A] Canadian data are adjusted for the age of Nunavik's population (standardization with Nunavik as the standard).
[B] Canadian Chronic Disease Surveillance System, Canadian population, 2011-2012 (Public Health Agency of Canada, 2018).

Table 16 Prevalence of sensitization to aerial allergens in different Inuit and non-Inuit populations

	Dust mites	Dogs	Moulds	Pollen	
				Grass	Birch
	%	%	%	%	%
Nunavik, *Qanuilirpitaa?* 2017 Aged 16 years and over, Specific IgE	4.6 (*Pteronyssinus*) 4.8 (*Farinae*)	2.8*	0.4** (*Alternaria*) 0.5** (*Aspergillus*)	–	–
Uummannaq, Greenland village, Only Inuit, aged 18 years and over, Skin prick test, n = 172 (Porsbjerg et al., 2002)	1.2 (*Pteronyssinus*) 1.7 (*Farinae*)	0.6	0 (*Alternaria*) 0 (*Cladosporum*)	3.5	0.6
Nuuk, a Greenlandic city, Only Inuit, aged 18 years and over, Skin prick test, n = 264 (Porsbjerg et al., 2002)	3.0 (*Pteronyssinus*) 2.7 (*Farinae*)	3.8	0.4 (*Alternaria*) 0.8 (*Cladosporum*)	3.4	1.1
Sisimiut, a Greenlandic village, Only Inuit, aged 5-18 years, Specific IgE, n = 827 (Krause et al., 2002)	3.7 (*Pteronyssinus*)	2.5	1.2 (*Cladosporum*)	11.0	1.0
Nunavik, 1997 Aged 7-12 years, Skin prick test, n = 509 (Hemmelgarn & Ernst, 1997)	0 (*Pteronyssinus* and *Farinae*)		Tested and reported "uncommon"		
Inuit living in Denmark, Aged 18 years and over, Skin prick test, n = 683 (Porsbjerg et al., 2002)	6.3 (*Pteronyssinus*) 6.1 (*Farinae*)	6.7	1.0 (*Alternaria*) 1.3 (*Cladosporum*)	11.1	7.9
Québec, Aged 9, 13 and 16 years, Specific IgE, n = 451 (Lévesque et al., 2005)	20 (*Pteronyssinus*) 20 (*Farinae*)	18	0 (*Alternaria*)	8	–
United States, Age group 20-69 years, Specific IgE, n = 9,440 (Salo et al., 2014)	14-30 (*Pteronyssinus*) 15-28 (*Farinae*)	8-14	5-11 (*Alternaria*) 5-8 (*Aspergillus*)	9-21	9-13

* The coefficient of variation is greater than 15% and lower than or equal to 25%. The proportion should be interpreted carefully.
** The coefficient of variation is greater than 25%. The proportion is shown for information only.
– Not tested in the survey.

APPENDIX B
DETAILED RESULTS

PREVALENCE OF TUBERCULOSIS

Table 17 Prevalence of tuberculosis (latent, active or unknown), population aged 16 years and over, Nunavik, 2017

	Active tuberculosis disease			Latent tuberculosis infection			Tuberculosis of unknown status (latent or active)		
	%	CI Min	CI Max	%	CI Min	CI Max	%	CI Min	CI Max
Total	5.4	4.2	6.9	13.0	11.3	15.0	16.0	13.8	18.5
Age									
16-34 years	2.4**	1.3	4.4	11.8	9.5	14.7	11.5	8.9	14.7
35-49 years	4.9**	2.8	8.4	10.8*	7.7	14.9	17.6*	12.9	23.4
50-59 years	9.2**	5.5	14.8	15.7*	10.8	22.2	21.8	16.0	28.8
60-69 years	18.3*	11.9	27.1	22.6*	15.4	31.9	30.4	22.3	40.0
70 years and over	NP			NP			20.2**	7.9	42.7

Values in **blue** are statistically different according to a global chi-square test (p-value < 0.05).
* The coefficient of variation is greater than 15% and lower than or equal to 25%. The proportion should be interpreted carefully.
** The coefficient of variation is greater than 25%. The proportion is shown for information only.
NP: Data not presented (n < 5).

PREVALENCE OF RESPIRATORY INDICATORS ACCORDING TO VARIOUS DETERMINANTS, STRATIFIED BY SMOKING STATUS, AGE AND SEX

Table 18 Prevalence of airway obstruction according to various determinants, stratified by smoking status, age and sex, population aged 16 years and over, Nunavik, 2017.

	Airway obstruction (LLN)				
	Daily smokers	16-34 years	35 years and over	Men	Women
	%	%	%	%	%
Diagnosed asthma					
Yes	35.9**	32.9**	33.4**	38.2**	27.3**
No	17.4	15.8	14.6	18.2	12.3
Hospitalization for respiratory infection in childhood					
Yes	29.4**	NP	23.6**	34.8**	16.5**
No	17.4	16.2	14.3	18.1	12.6
Obesity					
Yes (BMI > 30)	13.5**	7.8**	11.3**	13.3**	7.2**
No (BMI < 30)	20.7	18.9	19.9	20.5	17.8
Smoking status					
Daily	–	18.4	19.7	21.3	16.8
Occasional	–	NP	NP	NP	6.3**
Former	–	NP	12.0**	19.5**	NP
Abstainer	–	11.8**	6.8**	13.0**	NP
Urinary cotinine[A]					
Active smoking	–	17.8	17.7	20.4	15.3
Second-hand smoke and/or occasional smoking	–	12.9**	15.4**	20.9**	NP
No exposure	–	NP	NP	NP	NP
Cannabis use					
> Once a month	23.0	21.7	21.5	22.8	20.0
Once a month or less	13.7*	10.4*	12.7*	14.9*	9.1*
Inhalation of solvent in lifetime					
At least once in lifetime	21.2*	19.2**	18.2*	21.2*	14.2*
Never	17.9	15.5	15.8	18.2	13.5
Second-hand smoke exposure					
Every day or nearly every day	22.8	18.9*	24.4*	25.4*	17.4*
Once a week	15.8**	NP	20.7**	14.8**	NP
Once a month or less	17.5	16.3	* 13.0	* 17.0	12.7
Education					
Elementary school or less	12.2**	NP	12.5**	6.3**	14.5**
Secondary school not completed	21.7	19.3	20.1*	23.3*	15.8
Secondary school or higher	15.2*	13.3*	12.9*	16.3*	10.4*

Values in **blue** are statistically different according to a global chi-square test (p-value < 0.05).

* The coefficient of variation is greater than 15% and lower than or equal to 25%. The proportion should be interpreted carefully.

** The coefficient of variation is greater than 25%. The proportion is shown for information only.

[A] > 30 ng/mL = active smoking; 1.78-30 ng/mL = second-hand smoke and/or occasional smoking; < 1.78 ng/mL = no exposure.

NP: Data not presented (n < 5).

Table 19 Prevalence of "at least one symptom"[A] according to various determinants, stratified by smoking status, age and sex, population aged 16 years and over, Nunavik, 2017.

	"At least one symptom"[A]				
	Daily smokers	16-34 years	35 years and over	Men	Women
	%	%	%	%	%
Antecedent of active tuberculosis					
Yes	80.4	50.3**	78.3	NP	66.8
No	63.5	56.7	59.3	58.9	56.6
Hospitalization for respiratory infection in childhood					
Yes	73.6	51.4**	78.4	66.2*	74.9
No	64.5	57.1	59.2	59.7	56.2
Blood total IgE (atopy marker)					
Abnormal (> 100 kU/L)	70.9	61.0	69.5	70.9	60.4
Normal (< 100 kU/L)	63.4	56.0	57.3	56.6	56.7
Smoking status					
Daily	–	62.5	68.5	67.5	63.1
Occasional	–	42.8*	51.5*	51.7*	41.3*
Former	–	55.8	43.4	54.1	42.1
Abstainer	–	21.2**	48.7	34.8*	39.5*
Urinary cotinine[B]					
Active smoking	–	59.0	64.3	62.6	60.4
Second-hand smoke and/or occasional smoking	–	46.1*	42.8	46.4*	41.4
No exposure	–	NP	50.3*	46.4*	34.6*
Cannabis use					
Daily, regular or occasional	68.7	64.2	68.3	63.5	69.8
Experimenter or abstainer	60.7	48.3	55.8	57.3	48.7
Inhalation of solvent in lifetime					
At least once in lifetime	69.5	71.5	61.7	65.8	65.4
Never	63.1	52.3	61.2	58.1	54.7
Marine mammal and fish consumption					
7 times or more per week	67.2	61.5	64.9	64.6	61.6
3 to 6 times per week	68.9	64.5	58.5	64.6	59.4
2 times or less per week	60.7	48.2	58.2	52.4	53.8
Second-hand smoke exposure					
Every day or nearly every day	70.3	63.1	72.8	67.9	68.8
Once a week	75.6	63.9	66.3	76	46.6*
Once a month or less	61.8	53.9	55.6	55.8	53.7
Number of smokers inside the house					
3 people or more	73.2	71.3	69.9	74.0	65.9
1 or 2 people	69.2	55.4	74	68.2	63.9
None	61.8	54.1	56.1	55.6	54.6
House in need of repair					
Major repairs	71.2	66.7	70.9	69.3	68.4
Only regular maintenance or minor repairs	63.9	54.8	58.6	59.2	54.1

	"At least one symptom"[A]				
	Daily smokers	16-34 years	35 years and over	Men	Women
	%	%	%	%	%
Going on the land					
Never	77.0	62.8	84.9	82.8	66.4
Occasionally	65.4	57.8	56.9	58.6	56.2
Often	60.7	53.9	57.6	56.3	55.0
Food security					
Severely insecure	79.2	70.3	77.5	69.9	78.8
Moderately insecure	61.4	55.4	60.4	59.6	55.5
Secure	57.8	46.7	51.7	52.4	47.0
Education					
Elementary school or less	81.9	72.6	79.2	79.9	73.7
Secondary school not completed	64.8	57.4	61.5	61.6	56.8
Secondary school or higher	61.7	54.0	51.2	51.3	53.9
Income					
Less than $20 000	66.5	57.2	70.2	64.3	59.6
$20 000 or more	61.8	55.0	53.5	55.9	51.8

Values in **blue** are statistically different according to a global chi-square test (p-value < 0.05).

* The coefficient of variation is greater than 15% and lower than or equal to 25%. The proportion should be interpreted carefully.

** The coefficient of variation is greater than 25%. The proportion is shown for information only.

[A] "At least one symptom" among cough (usual, not necessarily chronic), sputum (usual, not necessarily chronic) or wheezing (in the last 12 months).

[B] > 30 ng/mL = active smoking; 1.78-30 ng/mL = second-hand smoke and/or occasional smoking; < 1.78 ng/mL = no exposure

NP: Data not presented (n < 5).

Table 20 Prevalence of chronic cough according to various determinants, stratified by smoking status, age and sex, population aged 16 years and over, Nunavik, 2017

	Chronic cough				
	Daily smokers	16-34 years	35 years and over	Men	Women
	%	%	%	%	%
Hospitalization for respiratory infection in childhood					
Yes	42.1*	27.2**	46.7*	42.4**	40.8*
No	21.7	13.7	24.2	17.0	19.8
Antecedent of active tuberculosis					
Yes	46.5*	NP	46.5*	37.6**	35.3*
No	21.8	14.8	24.3	17.7	19.8
Smoking status					
Daily	-	17.0	31.8	22.5	24.9
Occasional	-	11.4**	23.7**	16.0**	17.8**
Former	-	NP	14.4**	10.6**	11.9**
Abstainer	-	NP	18.3**	9.6**	11.1**
Urinary cotinine[A]					
Active smoking	-	15.1	27.3	18.4	23.3
Second-hand smoke and/or occasional smoking	-	NP	17.8**	10.9**	13.7**
No exposure	-	NP	21.8**	13.9**	15.1**
Cannabis use					
> Once a month	26.1	16.2	33.1	21.1	27.8
Once a month or less	20.9	12.0*	22.3	16.7*	17.9
Inhalation of solvent in lifetime					
At least once in lifetime	28.5	20.6*	27.4	24.2	25.3
Never	21.5	12.3	26.9	16.3	20.8
Marine mammal and fish consumption					
7 times or more per week	28.9	20.8*	30.5	25.8	26.1
3 to 6 times per week	18.8	10.8*	28.1	15.1*	21.1
2 times or less per week	20.6*	8.4*	23.8*	15.4**	16.8
Second-hand smoke exposure					
Every day or nearly every day	29.1	16.9*	35.4	23.6*	31.1
Once a week	29.2**	NP	36.7**	30.5**	NP
Once a month or less	20.7	13.7	22.4	15.7*	19.5
Number of smokers inside the house					
3 people or more	26.4*	16.9**	32.2*	19.6**	29.1
1 or 2 people	31.9	19.9*	36.5	30.1*	29
None	20.0	12.3	23.3	15.4*	19.2*
House in need of repair					
Major repairs	32.0	22.8*	34.7	28.4*	29.8
Only regular maintenance or minor repairs	21.9	12.4	25.3	17.3	19.9

	Chronic cough				
	Daily smokers	16-34 years	35 years and over	Men	Women
	%	%	%	%	%
Going on the land					
Never	32.5	14.8**	47.5	35.7*	29.8*
Occasionally	24.7	16.7	25.8	18.6*	23.4
Often	19.9	11.6*	21.5	15.0*	17.8
Participation in harvesting or traditional activities					
No	31.4*	15.1**	42.7*	28.4*	28.6*
Yes	22.6	14.1	25.1	17.7	21.2
Food security					
Severely insecure	34.3	19.8*	43.3	26.4*	37.6
Moderately insecure	23.5	15.6	27.4	19.9*	21.9
Secure	15.6*	7.5**	17.3*	10.8**	14.7*

Values in **blue** are statistically different according to a global chi-square test (p-value < 0.05).
* The coefficient of variation is greater than 15% and lower than or equal to 25%.The proportion should be interpreted carefully.
** The coefficient of variation is greater than 25%. The proportion is shown for information only.
[A] > 30 ng/mL = active smoking; 1.78-30 ng/mL = second-hand smoke and/or occasional smoking; < 1.78 ng/mL = no exposure
NP: Data not presented (n < 5).

Table 21 Prevalence of wheezing according to various determinants, stratified by smoking status, age and sex, population aged 16 years and over, Nunavik, 2017

	Wheezing				
	Daily smokers	16-34 years	35 years and over	Men	Women
	%	%	%	%	%
Diagnosed asthma					
Yes	50.1*	39.4**	65.5*	43.9**	51.9*
No	28.0	25.4	26.7	27.2	24.9
Obesity					
Yes (BMI > 30)	35.0	25.7*	34.7	33.3*	29.7
No (BMI < 30)	27.3	25.1	24.9	25.1	24.8
Smoking status					
Daily	NA	28.7	29.3	29.5	28.5
Occasional	NA	21.1**	17.4**	18.8**	20.1*
Former	NA	34.7*	29.8*	39.1*	24.5*
Abstainer	NA	NP	26.8*	16.7**	13.5**
Cannabis use					
> Once a month	30.0	30.4	27.0	28.2	29.9
Once a month or less	27.4	20.8	28.9	27.4	23.5
Inhalation of solvent in lifetime					
At least once in lifetime	33.9	44.1	26.1	32.0	35.7
Never	26.6	20.7	29.2	25.8	23.4
Marine mammal and fish consumption					
7 times or more per week	32.3	31.6	33.0	35.2	28.8
3 to 6 times per week	29.7	29.6	25.8	26.5*	29.5
2 times or less per week	24.0	17.2*	24.9	21.7*	20.5
Second-hand smoke exposure					
Every day or nearly every day	32.7	32.2	33.4	34.2	31.1
Once a week	22.8**	23.3**	22.0**	21.3**	25.0**
Once a month or less	27.7	24.3	26.2	25.7	24.7
Housing crowding (PPR)					
> 1 person per room	20.8	20.5	16.3*	21.0*	16.8
1 person or less	33.5	29.6	32.2	31.0	30.9
Number of children at home					
3 children or more	28.6**	27.4**	NP	NP	22.1**
2 children	24.8*	21.7*	19.3**	24.0**	18.6*
1 child	26.4	26.2	20.2*	25.3*	23.0
No children	31.6	27.7	31.6	30.1	30.1
Food security					
Severely insecure	36.7	28.6*	39.8	31.5*	37.5
Moderately insecure	27.2	26.4	24.1	25.8	24.9
Secure	24.8	23.2*	25.0	25.6*	23.0

Values in **blue** are statistically different according to a global chi-square test (p-value < 0.05).

* The coefficient of variation is greater than 15% and lower than or equal to 25%. The proportion should be interpreted carefully.

** The coefficient of variation is greater than 25%. The proportion is shown for information only.

NA: Not applicable because analyses were restricted to daily smokers.

NP: Data not presented (n < 5).

DETERMINANTS OF BREATHLESSNESS

Table 22 Prevalence of breathlessness according to various determinants, population aged 16 years and over, Nunavik, 2017

		Breathlessness
		%
Hospitalization for respiratory infection in childhood	Yes	34.5*
	No	19.2
Antecedent of active tuberculosis	Yes	32.0*
	No	19.6
Diagnosed asthma	Yes	29.2**
	No	19.8
Obesity	Yes (BMI > 30)	24.3
	No (BMI < 30)	17.5
Smoking status	Daily	20.3
	Occasional	22.6*
	Former	16.4*
	Abstainer	15.5*
Urinary cotinine[A]	Active smoking	20.3
	Second-hand smoke and/or occasional smoking	16.6*
	No exposure	8.6**
Number of smokers inside the house	3 people or more	21.7*
	1 or 2 people	26.0
	None	17.5
Housing crowding (PPR)	> 1 person per room	16.2
	1 person or less	20.7
Going on the land	Never	24.1*
	Occasionally	17.7
	Often	20.0
Participation in harvesting or traditional activities	No	23.5*
	Yes	18.9
Food security	Severely insecure	30.3
	Moderately insecure	18.3
	Secure	14.2
Education	Elementary school or less	24.9*
	Secondary school not completed	19.2
	Secondary school or higher	19.1

		Breathlessness
		%
Employment	Not employed	28.6
	Employed	17.8
Having enough money to meet one's needs	Not at all	25.5
	A little or moderately	18.1
	Mostly or completely	16.6

No significant association or trend was observed for cannabis use; inhalation of solvent in lifetime, electronic cigarette use, fruit and vegetable consumption, marine mammal and fish consumption, vitamin D deficit, second-hand smoke exposure, house in need of repair, number of children at home, allergic sensitization to dust mites (*Pteronyssinus* type and/or *Farinae* type), allergic sensitization to two types or more among dogs, *Farinae, Pteronyssinus, Alternaria, Aspergillus*, income

Values in **blue** are statistically different according to a global chi-square test (p-value < 0.05).

* The coefficient of variation is greater than 15% and lower than or equal to 25%. The proportion should be interpreted carefully.

** The coefficient of variation is greater than 25%. The proportion is shown for information only.

[A] > 30 ng/mL = active smoking; 1.78-30 ng/mL = second-hand smoke and/or occasional smoking; < 1.78 ng/mL = no exposure.

NP: Data not presented (n < 5).

AIRWAY OBSTRUCTION: FIXED RATIO (0.7) VERSUS THE LOWER LIMIT OF NORMAL (LLN)

Table 23 Prevalence of airway obstruction, population aged 16 years and over, Nunavik, 2017

	Airway obstruction (< fixed ratio)			Airway obstruction (< LLN)		
	%	CI Min	CI Max	%	CI Min	CI Max
Total	15.2	12.7	18.0	16.6	14.1	19.5
Sex						
Men	21.2	16.9	26.3	19.5	15.3	24.6
Women	9.0	7.0	11.4	13.6	11.1	16.5
Age						
16-34 years	7.9*	5.5	11.4	16.6	13.2	20.6
35-49 years	16.1*	10.5	23.8	15.3*	10.0	22.8
50-59 years	29.1	22.0	37.4	20.6*	14.4	28.6
60-69years	30.3*	21.3	41.1	14.7**	8.4	24.7
70 years and over	33.3**	13.9	60.5	NP		
Region						
Hudson Bay	15.8	12.1	20.4	17.0	13.2	21.7
Hudson Strait	17.7*	11.8	25.6	19.7*	13.7	27.7
Ungava Bay	12.5	9.6	16.2	13.8	10.7	17.6

Values in **blue** are statistically different according to a global chi-square test (p-value < 0.05).

* The coefficient of variation is greater than 15% and lower than or equal to 25%. The proportion should be interpreted carefully.

** The coefficient of variation is greater than 25%. The proportion is shown for information only.

NP: Data not presented (n < 5).

Table 24 Prevalence of airway obstruction according to various determinants, population aged 16 years and over, Nunavik, 2017

	Airway obstruction (< fixed ratio)	Airway obstruction (< LLN)
	%	%
Hospitalization for respiratory infection in childhood		
Yes	26.9*	24.8**
No	13.9	15.4
Antecedent of active tuberculosis		
Yes	18.4**	12.4**
No	13.2	15.8
Diagnosed asthma		
Yes	29.7**	33.0**
No	14.1	15.3
Obesity		
Yes (BMI > 30)	12.2*	10.0*
No (BMI < 30)	16.9	19.4
Smoking status		
Daily	15.9	19.0
Occasional	11.7**	8.0**
Former	13.9**	11.8**
Abstainer	13.5*	9.2**
Urinary cotinine[B]		
Active smoking	15.5	17.8
Second-hand smoke and/or occasional smoking	17.7*	14.3**
No exposure	10.8**	NP
Cannabis use		
> Once a month	17.6	21.6
Once a month or less	13.0	11.6
Inhalation of solvent in lifetime		
At least once	18.5*	18.6*
Never	13.8	15.6
Marine mammal and fish consumption		
7 times or more per week	17.8	15.4*
3 to 6 times per week	13.5*	18.5
2 times or less per week	13.1*	16.1*
Second-hand smoke exposure		
Daily or nearly daily	24.2	21.8
Once a week	14.1**	13.0**
Once a month or less	11.7	14.7
Number of smokers inside the house		
3 people or more	23.0*	21.8*
1 or 2 people	19.1*	17.7*
None	12.8	15.3
House in need of repair		
Need for major repairs	13.0*	16.0
Need for minor repairs or regular maintenance	16.1	16.8*
Housing crowding (PPR)		
> 1 person per room	9.7*	14.9
1 person or less	18.3	17.2

	Airway obstruction (< fixed ratio)	Airway obstruction (< LLN)
	%	%
Allergic sensitization to dogs		
Sensitized	26.9**	28.0**
Not sensitized	15.2	16.5
Allergic sensitization to dust mites (*Pteronyssinus* type and/or *Farinae* type)[B]		
Sensitized	20.4**	19.6**
Not sensitized	15.2	16.7
Allergic sensitization to two types or more among dogs, *Farinae, Pteronyssinus, Alternaria, Aspergillus*		
Sensitized to 2 types	21.4**	22.1**
Sensitized to 1 or 0 types	15.3	16.6
Going on the land		
Never	18.1*	19.9*
Occasionally	13.5	15.7
Often	16.0*	16.6
Participation in harvesting or traditional activities		
No	19.5*	20.4*
Yes	14.6	16.1
Food security		
Severely insecure	16.1*	20.4*
Moderately insecure	14.6	15.9
Secure	15.5*	15.5*
Education		
Elementary school or less	25.6*	9.3**
Secondary school not completed	15.4	19.6
Secondary school or higher	10.9*	13.1*
Employment		
Not employed	22.0*	21.5*
Employed	13.9	15.7
Income		
Less than $20 000	16.0	18.3
$20 000 or more	16.2	16.2
Having enough money to meet one's needs		
Not at all	19.6*	17.6*
A little or moderately	12.2	15.6
Mostly or completely	16.4*	17.7*
No significant association or trend was observed for:		
Electronic cigarette use (Yes; No)		
Fruit and vegetable consumption (5 or more per day, less than 5 per day)		
Vitamin D deficit (blood level < 50 nmol/L; > = 50 nmol/L)		
Number of children at home (3 or more children, 2 children, 1 child, no children)		
Allergic sensitization to moulds (*Alternaria* or *Aspergillus*)		

Values in **blue** are statistically different according to a global chi-square test (p-value < 0.05).

* The coefficient of variation is greater than 15% and lower than or equal to 25%. The proportion should be interpreted carefully.

** The coefficient of variation is greater than 25%. The proportion is shown for information only.

[A] "At least one" among cough (usual), sputum (usual) or wheezing (in the last 12 months).

[B] > 30 ng/mL = active smoking; 1.78-30 ng/mL = second-hand smoke and/or occasional smoking; < 1.78 ng/mL = no exposure.

NP: Data not presented (n < 5%).

Table 25 Prevalence of respiratory symptoms according to airway obstruction, population aged 16 years and over, Nunavik, 2017

	At least one symptom[A]	Wheezing	Chronic sputum	Chronic cough	Breathlessness
	%	%	%	%	%
Airway obstruction (< 0.7)					
Airway obstruction	76.6	45.5	38.5	29.6*	20.7*
No airway obstruction	56.3	23.5	20.9	18.0	18.2
Airway obstruction (LLN)					
Airway obstruction	69.6	41.4	39.5	29.4	18.8*
No airway obstruction	57.4	24.0	20.4	17.9	18.6

Values in **blue** are statistically different according to a global chi-square test (p-value < 0.05).
* The coefficient of variation is greater than 15% and lower than or equal to 25%. The proportion should be interpreted carefully.
[A] "At least one" among cough (usual), sputum (usual) or wheezing (in the last 12 months).

Table 26 Proportions of indicators of quality of life according to respiratory indicators, population aged 16 years and over, Nunavik, 2017

	Self-rated physical health	Ability to get around	Life satisfaction
	% very good or excellent	% well or very well	% satisfied or very satisfied
Airway obstruction (< 0.7)			
Yes	29.0*	86.5	83.7
No	28.2	88.8	81.8
Airway obstruction (LLN)			
Yes	27.5	89.6	83.0
No	28.5	88.2	81.9

No values are statistically different according to a global chi-square test (p-value < 0.05).
* The coefficient of variation is greater than 15% and lower than or equal to 25%. The proportion should be interpreted carefully.

APPENDIX C
METHODOLOGICAL SUPPLEMENT

Table 27 Description of variables

		Proportion of Nunavik population aged 16 years and over	Reference to other thematic reports
		%	
Obesity	Yes (BMI > 30)	30.2	Cardiometabolic health
	No (BMI < 30)	69.8	
Smoking status	Daily	71.6	Substance use
	Occasional	7.9	
	Former	10.6	
	Abstainer	9.9	
Urinary cotinine[B]	Active smoking	84.8	
	Second-hand smoke and/or occasional smoking	10.9	
	No exposure	4.2	
Cannabis use	> Once a month	48.1	Substance use
	Once a month or less	51.9	
Inhalation of solvent in lifetime	At least once	29.3	Substance use
	Never	70.7	
Second-hand smoke exposure	Daily or nearly daily	27.3	Substance use
	Once a week	5.6	
	Once a month or less	67.1	
Electronic cigarette use	Yes	12.2	Substance use
	No	87.8	
Fruit and vegetable consumption	Fewer than 5 times per day	84.9	Eating habits
	5 times per day or more	15.1	
Marine mammal and fish consumption	7 times or more per week	40.9	Eating habits
	3 to 6 times per week	29.9	
	2 times or less per week	29.3	
Vitamin D deficit	Deficit (blood level < 50 nmol/L)	31.8	Eating habits
	No deficit (blood level > 50 nmol/L)	68.2	

		Proportion of Nunavik population aged 16 years and over %	Reference to other thematic reports
Number of smokers inside the house	3 people or more	12.1	Substance use
	1 or 2 people	18.5	
	None	69.4	
House in need of repair	Need for major repairs	19.1	Housing
	Need for minor repairs or regular maintenance	80.9	
Housing crowding (PPR)	> 1 person per room	32.5	Housing
	1 person or less	67.5	
Number of children at home	3 children or more	2.8*	
	2 children	10.8	
	1 child	27.3	
	None	59.0	
Going on the land	Never	13.4	Sociocultural determinants of health
	Occasionally	43.0	
	Often	43.6	
Participation in harvesting or traditional activities	No	10.6	Food security
	Yes	89.4	
Food security	Severely insecure	18.2	Food security
	Moderately insecure	48.3	
	Secure	33.5	
Education	Elementary school or less	10.1	Sociodemographic characteristics
	Secondary school not completed	60.5	
	Secondary school or higher	29.4	
Employment	Not employed	16.1	Sociodemographic characteristics
	Employed	83.9	
Income	Less than $20 000	53.2	Sociodemographic characteristics
	$20 000 or more	46.8	
Having enough money to meet one's needs	Not at all	21.9	Mental health and wellness
	A little or moderately	48.3	
	Wellness or completely	29.8	

Figure 4 Hypothetical relations between certain determinants and respiratory health

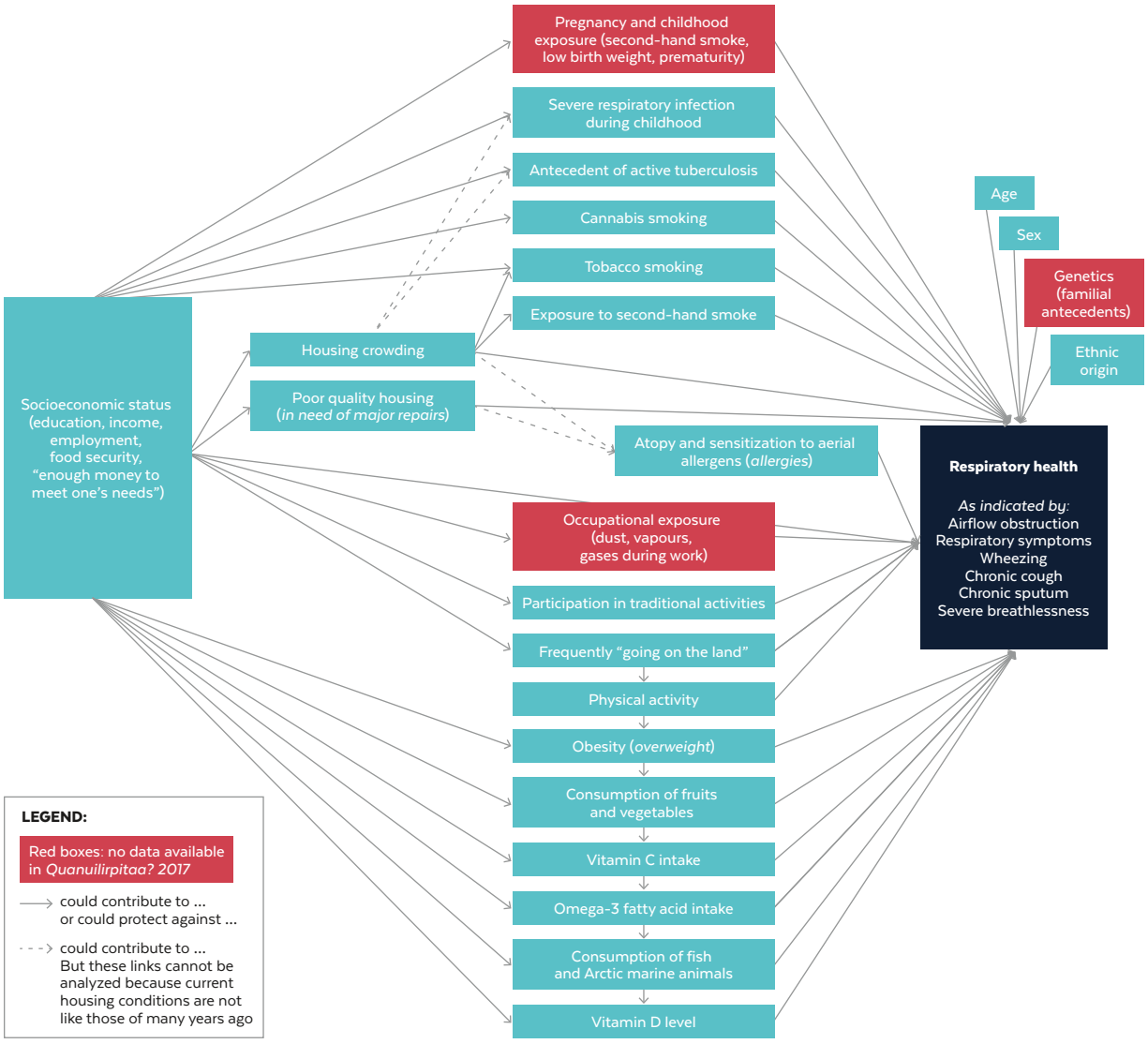

Figure 5 List of criteria for excluding spirometry for safety reasons

- Participant is more than 27 weeks pregnant;
- Participant has suffered a heart attack within the last three months;
- Participant has had major surgery on his/her chest or abdomen within the last three months;
- Participant had eye surgery within the last six weeks;
- Participant takes medication for tuberculosis;
- Participant has a stoma (tracheostomy);
- Participant has extreme difficulty breathing at rest;
- Participant suffers from an acute condition that prevents him/her from performing the test (e.g., persistent cough);
- Participant suffers from a chronic condition that prevents him/her from performing the test (e.g., persistent cough);
- Any other reason as assessed by the technician in charge of the test.

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RÉGIE RÉGIONALE DE LA SANTÉ ET DES SERVICES SOCIAUX DU NUNAVIK
NUNAVIK REGIONAL BOARD OF HEALTH AND SOCIAL SERVICES