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## SOCIAL AND ECONOMIC DIMENSIONS OF AN AGING POPULATION

**Cancer-related health behaviors and health service use  
among Inuit and other residents of Canada's north**

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**SEDAP Research Paper No. 248**

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# **Cancer-related health behaviors and health service use among Inuit and other residents of Canada's north**

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## **Abstract**

**Objective:** To identify the extent to which differences between Inuit and other residents of Canada's North in a set of health behaviors and health service use related to cancer incidence and diagnosis can be accounted for by demographic, socio-economic and geographic factors.

**Study Design:** Data on residents aged 21-65 who live in Canada's North are drawn from the 2000-01 and 2004-05 Canadian Community Health Surveys and the 2001 Aboriginal People's Survey.

**Methods:** Multivariate Logistic regression analysis is applied to 1) a set of health behaviors including smoking, binge drinking and obesity, and 2) a set of basic health service use measures including consultations with a physician and with any medical professional, Pap smear testing and mammography.

**Results:** Higher smoking and binge drinking rates and lower rates of female cancer screening among Inuit are not accounted for by differences in demographic characteristics, education, location of residence or distance from a hospital.

**Conclusions:** Factors specific to Inuit individuals and communities may be contributing to negative health behaviors associated with increased cancer risk, and to a lower incidence of diagnostic cancer screening. Policy interventions to address these issues may need to be targeted specifically to Inuit Canadians.

**Keywords:** Inuit, aboriginal, cancer screening, smoking, health

**JEL Classification:** I12, I18, J61

## **Résumé**

**Objectif:** Déterminer dans quelle mesure les différences de comportements et d'utilisation des services de santé entre les Inuits et les autres habitants du Nord du Canada par rapport à l'incidence des cancers et de leur diagnostic peuvent être expliquées par des facteurs démographiques, socio-économiques et géographiques

**Plan d'étude :** L'étude examine les résidents âgés de 21 à 65 ans vivant dans le Nord du Canada tirés des sondages 2000-01 et 2004-05 de l'Enquête sur la santé dans les collectivités canadiennes et de l'Enquête sur les peuples autochtones.

**Méthodes:** Une analyse multivariée de régression logistique est employée pour examiner 1) un ensemble de comportements de santé y compris le tabagisme, l'obésité et les consommations occasionnelles excessives d'alcool, et 2) un ensemble d'indicateurs standards de l'utilisation des services de santé y compris les consultations avec un médecin et autre professionnel de la santé, les frottis cervicovaginaux et les mammographies.

**Résultats :** Les taux supérieurs de tabagisme et de consommation excessive d'alcool ainsi que les taux de dépistage inférieurs du cancer chez les Inuits ne s'expliquent pas par les différences de caractéristiques démographiques, éducationnelles, résidentielles ou d'éloignement d'un centre hospitalier.

**Conclusion :** Des facteurs spécifiques aux individus des communautés Inuit pourraient contribuer aux comportements néfastes à la santé associés à l'augmentation des risques liés au cancer et à la plus faible incidence de son dépistage. Les interventions publiques pour traiter de ces questions devraient spécifiquement cibler les Inuits Canadiens.

## **Introduction**

The health of the Inuit residents of Canada's northern regions has been the subject of extensive analysis by researchers and is of considerable interest and concern for policymakers and health practitioners (Wilson and Young, 2008; Healey and Meadows, 2007; Bjerregaard et.al., 2004; Young, 2003). It has been established that Inuit and other aboriginal residents of Canada exhibit poorer health outcomes than non-aboriginal residents across many measures of physical and mental health, and that Aboriginal health status falls far below national standards (ITK, 2009, 2004; Curtis, 2007; NDHSS, 2004; Cass, 2004).

Although the last few decades have seen a significant decline in the incidence of infectious diseases among Inuit residents, there has been a concomitant increase in the incidence of chronic diseases as well as social pathologies (Bjerregaard et.al., 2004). Among chronic diseases, the incidence of cancer in particular has been increasing among both Inuit men and women across all circumpolar regions (Circumpolar Inuit Cancer Review Working Group, 2008). Further, there have been marked changes in the prevalent types of cancer among Inuit. The incidence of cancers of the nasopharynx, salivary glands and oesophagus have historically been relatively high but have been declining, while the incidence of 'modern' cancers of the lung, breast, colon and cervix have been increasing (Friborg and Melbye, 2008; NDHSS, 2003; Neilson et.al., 1996). Data on cancer incidence from the Northwest Territories (NWT) and Nunavut (NVT) Cancer registries (NDHSS, 2004; NDHSS, 2003; NWT, 2003) indicate that while the incidence of invasive cancer among Inuit men in Nunavut is still lower than the national Canadian average, the rate is higher for Inuit women in Nunavut than for other Canadian women.

The incidence of lung cancer is particularly high for both men and women living in Nunavut - male residents of Nunavut have lung cancer rates 3.2 times the national average for Canadian men, while female residents of Nunavut have lung cancer rates 5.3 times the national average for Canadian women.

Cancer is a disease of special concern in Canada's northern regions. Because most of the communities are small, isolated and close-knit (Inuit communities in Nunavut in particular) many residents have been indirectly affected by cancer (NDHSS, 2003). Further, treatment and diagnosis of most cancers are not generally undertaken in the regions or territories themselves so that most cancer patients must travel to cities like Edmonton or Ottawa that are far removed from their homes and communities. This presents significant challenges for Inuit because of the resulting separation from family and community social support networks (ITK, 2008).

Changes in health outcomes such as the increase in lung cancer have been attributed to the social and cultural upheaval that has characterized Inuit experiences especially over the past number of decades. This upheaval has led to major changes in lifestyle and living conditions (Bjerregaard et.al., 2004, Friborg and Melbye, 2008; Shephard and Rode, 1996). Statistics on health behaviors (Healey and Meadows, 2007; NDHSS, 2004; NWT, 2003; NDHSS, 2003) indicate that smoking rates among people aged 12 or more in NWT are almost twice the national rate while NWT has the highest proportion of smokers over the age of 12 in all of Canada. Obesity/overweight rates are also higher in NWT than in the rest of Canada: 62% of NWT men and 52% of NWT women are overweight or obese, compared to 57% and 39% for other Canadian men and women respectively. The figures for NWT are 56% for men and 51% for women. Obesity

rates are markedly higher in NWT, especially for women: 21% for men and 25% for women compared to 16% and 14% for the rest of Canada. NWT has the highest proportion of heavy drinkers in Canada, while NWT has the third highest.<sup>1</sup>

At the same time, there is evidence that the utilization of preventative and diagnostic health services is lower among Inuit and other aboriginal groups than among non-aboriginals. McDermott (2002) analyzes Pap smear test data collected from the main lab responsible for all Pap smear cytological analysis in the NWT since 1997. Over the period 1997 to 2000, the screening rate for eligible NWT women (defined as 15 years of age and older) was 82%. However, 72.8% of the target population of Aboriginal women in NWT obtained cervical cancer screening in the period compared with 89.8% of non-Aboriginal women (a statistically significant difference). Other figures confirm that rates of cervical cancer screening are lower in NWT than in other Canadian provinces: 50% of Nunavut women had cervical cancer screening in the last year, compared with 67% of women in BC, 69% of women in Manitoba, and 74% of women in Nova Scotia (Health Canada, 1998). This is of concern since Pap smear testing is widely recognized as an inexpensive way to reduce the incidence and provide early detection of cervical cancer and is a preventative health care measure that should be available on a regular basis to all women at risk (Gupta, et.al, 2002). The geographic isolation of these regions may be particularly important in terms of limiting access to health care services (Newbold, 1998).

In this context, Inuit Tapiriit Kanatami (ITK), the national organization representing Inuit in Canada, has identified the promotion of healthier lifestyles with regard to smoking, alcohol, diet and activity, and the prevention, screening, and early detection of cancer in their list of cancer priorities (ITK, 2008). However, what factors

underpin differences in Inuit health behaviors and health service use relative to other Canadians are uncertain. Observed differences in the incidence of these intermediate outcomes can be due to a variety of factors such as demographic attributes, socioeconomic characteristics, and geographic remoteness and isolation, as well as social and cultural dimensions that may be specific to Inuit individuals and communities. It is notable that in statistical analyses of aboriginal health outcomes, a common finding is that disparities between aboriginal and non-aboriginal populations, or within aboriginal populations living in different areas, tend to disappear once demographic, socio-economic and health behavior differences are accounted for (Curtis, 2007; Cass, 2004; Tjepkema, 2002; Wilson and Rosenberg, 2002). The question then arises as to the contribution of demographic and socio-economic factors to the differences in health behaviors and health service use identified above.

In this paper, we use regression analysis applied to two large population-level datasets to identify the determinants of a range of health behaviors and health service use among Inuit and other ethnic groups living in Canada's northern regions. Analysis of these measures will contribute to a research framework for the development and evaluation of cancer policy aimed at Inuit and other northern residents.

### **Material and Methods**

We use survey data from two Statistics Canada population-level surveys that specifically identify individuals of Inuit ethnic origin – the 2000-01 and 2004-05 waves of the Canadian Community Health Survey (CCHS) and the 2001 wave of the Aboriginal Peoples Survey (APS). One strength of the CCHS is its large sample size, although the



sampling framework excludes any individuals living in institutions, aboriginal people living on-reserve, and any residents of Nunavik and Jamesie, two regions of Northern Quebec that have significant aboriginal populations.<sup>2</sup> The APS survey is restricted to individuals who self-identify as being of aboriginal origin (Inuit, Métis and First Nations) but does include both aboriginal people living on-reserve as well as aboriginal residents of Northern Quebec. In both cases, we identify aboriginal status based on responses to questions about which ethnic or cultural groups an individual's ancestors belonged to. The main results focus on individuals who report Inuit as being the only ethnic group to which they belong.<sup>3</sup> We focus on four groups of individuals distinguished by aboriginal status: Inuit, Métis, First Nations, and non-Aboriginal individuals.

In order to help identify differences in health behaviors and health service use that are specific to Inuit groups and not simply reflecting residence in Canada's North, we limit the sample to individuals residing in Inuit areas and the regions adjoining them: the Northwest Territories (that contains the Inuit region of Inuvialuit), Nunavut, the northern regions of Quebec (that for the APS contain the regions of Jamesie and the Inuit region of Nunavik), Labrador (that contains the Inuit region of Nunatsiavut), as well as the northern parts of Saskatchewan and Manitoba, regions in which significant numbers of aboriginal people reside (11% and 13% respectively, based on CCHS data). We exclude Northern Ontario from our sample because it does not adjoin Canada's territories, and only 6% of the residents of Northern Ontario are of aboriginal ancestry. According to the 2001 APS, 84% of people who identify their ancestry as Inuit reside in Nunavut, NWT, Quebec and Newfoundland/Labrador.

In the empirical analysis, we use multivariate Logistic regression to identify significant differences in the health behaviors and preventative health services use between Inuit and other residents of Canada's north and the extent to which such differences are explained by demographic and socio-economic characteristics and geographic remoteness, or are due to other unobserved factors specific to Inuit individuals. We analyze the determinants of two sets of intermediate outcomes that both contribute to future health. These are 1) health behaviors such as smoking, alcohol consumption and obesity; and 2) the use of basic health services such as a visit to a physician as well as specific health services such as Pap smears and mammograms that are aimed at the early detection of cancer in women.

In addition to controls for ethnicity (Inuit, other Aboriginal, non-Aboriginal), the regression models include controls for age and age-squared, binary controls for gender, marital status (married, widowed/divorced/separated), educational attainment (less than grade 8, less than grade 12, high school only, some post-secondary, university degree or more), and province/territory of residence. We restrict consideration to adults aged between 21 and 65 inclusive.

To capture the degree of geographic remoteness, we compute the linear distance from the physical centre of the census subdivision in which an individual resides to the nearest hospital. This is an admittedly rough approximation of remoteness for two reasons: first, it does not take account of actual travel times that would depend on infrastructure and modes of transportation; and second, in large census subdivisions it measures the actual distance with error. For these reasons, we control for distance to a

hospital in the analysis by including a set of broadly defined binary indicator variables: within 50km, 50-400km and more than 400km.

We estimate models separately using the CCHS data and the APS data, although the variables are constructed so as to be defined as similarly as possible between the two sets of data. One exception is in terms of marital status. While the CCHS distinguishes common law relationships separately, the APS does not, so that individuals living in common law relationships likely report their status as single. As well, in the APS individuals married according to traditional customs are recorded as married. This distinction is not made in the CCHS.

## **Results**

To give some context for the regression analysis, we first present in Table 1 a set of descriptive statistics on the variables of interest. Differences between the CCHS and APS results will reflect the inclusion of both on-reserve individuals and residents of Northern Quebec in the APS sampling framework.<sup>4</sup> In the top panel of Table 1, the figures clearly indicate that Inuit residents of Canada's northern regions have much higher smoking rates than other aboriginal groups and non-aboriginals. According to both the CCHS data and the APS data, around 65% of adult Inuit report that they are currently daily smokers, compared to around 40% of other aboriginal groups and around 24% of non-aboriginal individuals. From the CCHS data, Inuit are also more likely to be obese and to have binged on alcohol in the last month than are non-aboriginal residents of Canada's north. The comparable figures from the APS data indicate higher rates of obesity among Inuit and lower rates of binge drinking than what is indicated in the

CCHS. Since very few Inuit live on reserve, the suggestion is that Inuit residents of northern Quebec who are excluded from the CCHS sampling framework but included in the APS have substantially higher obesity rates. (In fact, obesity rates for adult Inuit living in Northern Quebec are a staggering 59%, according to the APS data.)

Inuit residents of the North are also substantially less likely to have consulted with a physician in the last year than are both other aboriginal groups and non-aboriginals. The gaps are narrower for the incidence of a visit to any health care professional. Data on cancer screening and unmet healthcare needs are only available in the CCHS, and indicate relatively lower rates of both cervical cancer screening and mammography for Inuit women compared to non-aboriginal women. The incidence of unmet healthcare needs is also higher among Inuit than non-aboriginal individuals, but is highest for people of other aboriginal groups which include Métis and FN.

In terms of demographic and socio-economic characteristics, Inuit are younger and less educated than other aboriginal groups and non-aboriginals. In particular, more than 25% of adult Inuit respondents in both the CCHS and APS have less than a grade 8 education. The comparable figure in the CCHS for non-aboriginal Northern residents is 4% and for other aboriginal residents is 10%. In the APS, 10% of Métis and 18% of FN adults living in Northern Canada have less than a grade 8 education. The percentage of adults who are married is broadly comparable across the different groups, although comparisons between the CCHS and APS are difficult because of the differences in how marital status is classified.

The next panel of Table 1 gives some statistics on distance from a health centre and on the geographic distribution of the sample of residents in both the CCHS and APS.

Not surprisingly, non-aboriginal residents are almost entirely clustered in larger population centers, with 94% of adults living within 50km of a hospital. In contrast, 31.4% of Inuit live within 50km of a hospital, while 49.7% live more than 400km from a hospital, according to CCHS data. The corresponding figures for the APS are 26.7% and 42.8% respectively. A large majority of other aboriginal residents also live within 50km of a hospital based on both CCHS and APS samples.

The provincial/territorial distribution also clearly indicates that Inuit residential patterns are quite distinct from those of other Northern residents. In the CCHS that excludes northern Quebec, close to 70% of Inuit in the sample reside in Nunavut while 16% and 14% reside in the NWT and Labrador respectively. Two-thirds of Inuit residents of NWT live in the Inuit region of Inuvialuit, while 20% of Inuit residents of Labrador live in the Inuit region of Nunatsiavut. There are very few Inuit residents of the northern regions of the provinces of Saskatchewan or Manitoba or of the northern regions of Quebec outside of Jamesie and Nunavik. In contrast, a majority of our samples of both aboriginal people and non-aboriginal people live in Northern Saskatchewan and more than 20% live in northern Manitoba, with few living in Nunavut. In the APS data, 21% of Inuit in our sample live in Northern Quebec (almost all in Nunavik), indicating that a significant proportion of Inuit are excluded from the CCHS sample. Similarly, 15% of FN individuals in our APS sample reside in Northern Quebec (mainly in Jamesie). The rest of the distribution is generally comparable to the CCHS sample. The last component of Table 1 indicates that in the APS data, very few Inuit live on-reserve.

In summary, the descriptive statistics indicate that Inuit residents of the North are actively engaging in certain health behaviors, particularly smoking, that are strongly

correlated with cancer and other serious health conditions. At the same time, their access to GPs is lower and their rates of usage of some forms of cancer screening such as mammograms are also lower. Unmet health care needs are somewhat more likely to occur, particularly among women. It is important to emphasize however that none of these statistics are adjusted for age or other factors. The key question is then the extent to which observed differences are due to demographic and socio-economic characteristics such as low education levels, remoteness from larger population centres and the attendant health infrastructure, or are due to other unobserved factors associated with cultural or societal characteristics that are related to Inuit people themselves.

Table 2a presents results from a Logistic regression analysis of the determinants of health behaviors and selected health service use using the combined 2001 and 2005 CCHS data, while Table 2b presents comparable results using the 2001 APS data. Table 3 presents Logistic regression results for the determinants of cancer screening and unmet health care needs using the CCHS data only, since this information is not available in the 2001 APS survey. As before, the sample is restricted to individuals aged 21-65 who reside in the Northwest Territories, Nunavut, Labrador and the northern regions of Saskatchewan and Manitoba. The APS also includes individuals residing in the northern regions of Quebec including Jamesie and Nunavik as well as individuals living both on and off reserve.

Turning first to Table 2a, we can see that while gender, age, marital status and education are all highly significant determinants of daily smoking, even after controlling for these factors the odds of an Inuit individual being a daily smoker are almost four times as large as for a non-aboriginal person living in Canada's north (OR 3.9 p-value

0.000). The odds of individuals from other aboriginal groups being daily smokers are twice as high as for non-aboriginals (OR 2.0 p-value 0.000). Controls for territory or region of residence as well as distance from a hospital are not significantly different from zero.

Marital status and education are also important determinants of obesity and after controlling for these and other factors, Inuit are no more likely than non-aboriginal residents to be obese. Thus, the higher obesity rates of Inuit indicated in Table 1 are due to differences in socio-economic, demographic and geographic factors. However, other aboriginal groups have 50% greater odds of being obese (OR 1.5 p-value 0.000). Region and distance are also both important determinants, with individuals living between 50-400 km from a hospital and Nunavut residents both more likely to be obese. The odds ratio for Quebec is based on a small sample size of residents in northern regions outside of Jamesie and Nunavik and so should be interpreted with caution. The third health behavior we consider is bingeing on alcohol in the last month, where bingeing is defined as having five or more drinks in a single sitting. Again, demographic and socio-economic characteristics are significant determinants of bingeing, but after controlling for these factors, Inuit remain significantly more likely than non-aboriginal individuals to binge on alcohol (OR 1.8 p-value 0.003). Other aboriginal people are marginally more likely to binge although the odds ratio is only significant at the 10% level (OR 1.15 p-value 0.085). Other things equal, residents of Nunavut are significantly less likely than residents of the Northwest Territories to binge, while people living between 50-400 km from a hospital are also significantly more likely to binge (OR 1.35 p-value 0.006).

The last two columns of results in Table 2a give the determinants of two basic measures of access to health services – whether the individual had a visit with a doctor in the past year and whether the individual had a visit with any health care professional in the past year. As with health behaviors, gender, marital status, age and education all are significant determinants of both measures of health service use. In particular, contact with an MD or any health care professional is much more likely for people who finished high school and especially so for people with higher levels of education. Not surprisingly, distance from a hospital is an important determinant of a visit with a physician, with the odds of an MD visit decreasing with distance: relative to a person living within 50km of a hospital, the odds of a person 50-400km from a hospital are 0.68 (p-value 0.000) and a person living more than 400km from a hospital are 0.47 (p-value 0.000). After controlling for these factors, Inuit still have a significantly lower likelihood of visiting an MD than an otherwise comparable non-aboriginal resident of Canada's north (OR 0.71, p-value 0.039), while other aboriginal residents are actually more likely to visit an MD (OR 1.27, p-value 0.001). The results also show that for a visit to any health care professional, there are no significant differences by region of residence, distance from a hospital or by ethnic grouping.

The regressions in Table 2b use data from the APS and so the reference group is individuals whose ethnicity is one of Canada's First Nations. In the first column of results we see that after controlling for a range of other factors that are important determinants of smoking behavior, the odds ratio for Inuit who smoke daily is almost three times larger than the base group (OR 2.87, p-value 0.000), a result also implied in Table 2a. The likelihood of daily smoking is also higher for individuals living on-reserve (OR 1.24 p-



value 0.003). Daily smoking does not appear to vary significantly by region of residence in Canada's north or by distance from a hospital, although the odds ratio for Labrador is significantly lower than the base region of the Northwest Territories (OR 0.75, p-value 0.042). The prevalence of obesity among aboriginal Northern residents also depends on age, marital status, gender and education level although the odds ratios for individuals with more than a grade 8 education are of comparable magnitude. Inuit and Métis have somewhat smaller odds of being obese than FN residents, although the differences are only significant at the 10% level. While the likelihood of obesity is higher in more remote areas, the most striking result for the geographic controls is for northern Quebec. The odds of being obese for residents here are more than two and half times higher than in most other region: OR 2.64 p-value 0.000). This indicates that the high obesity rates evident in the descriptive statistics are not due to observed demographic and socio-economic factors but rather to other factors more intrinsic to the residents of these areas. For bingeing, the only key results of note are that bingeing is more likely among residents living on-reserve and is less likely for residents of Nunavut.

The final two columns give the results for the incidence of a visit to an MD and to any health care professional. As in the CCHS data, gender, age, marital status and education are all very important determinants of both measures. Higher education levels in particular are associated with higher odds of visiting an MD or health care professional. Also similar to what was reported in Table 2a, the likelihood of visiting an MD in the previous year is negatively correlated with distance from a hospital (OR 0.59 p-value 0.000 for 50-400km; OR 0.58 p-value 0.000 for 400+km) and is lower for Inuit than for other aboriginal groups (OR 0.76, p-value 0.003). The likelihood of visiting an

MD varies by region of residence as well, with significantly lower odds for residents of Nunavut (OR 0.62 p-value 0.000) but higher odds for residents of Northern Saskatchewan (OR 1.39 p-value 0.000) and Northern Manitoba (OR 1.63 p-value 0.000), relative to the base case of Northwest Territories. Individuals living on-reserve are significantly less likely to consult with an MD (OR 0.80 p-value 0.003). The prevalence of a visit to any health care professional show no marked significant differences by ethnicity, distance from a hospital, living on-reserve, or region of residence except for residents of Northern Quebec who are relatively more likely to have a visit (OR 1.45 p-value 0.004).

Table 3 presents regression results for the incidence of unmet health care needs and for three measures of cancer screening for women – Pap smear test in the last 12 months and in the last 3 years, and a mammogram in the last two years. Since data on these outcomes are not available in the APS 2001, the analysis is restricted to the CCHS dataset. After controlling for demographic and socio-economic factors, we find that individuals living between 50-400 km from a hospital and non-Inuit aboriginal persons both have a greater incidence of experiencing unmet health care needs (OR 1.33 p-value 0.008 and OR 1.61 p-value 0.000 respectively). Unmet health care needs are also more prevalent in Nunavut (OR 1.63 p-value 0.022) and in Northern Saskatchewan (OR 1.37 p-value 0.007).

Education appears to figure prominently in the incidence of Pap smear testing, with higher education levels associated with a greater likelihood of having been screened. After controlling for education and other factors however, Inuit and other aboriginal women are statistically as likely to have had a recent Pap smear test as non-aboriginal

female residents of Canada's north. Distance from a hospital also does not appear to have any effect. This is notable since distance from a hospital and Inuit status are both negatively correlated with a visit to a doctor. It is also notable that relative to the Northwest Territories, women living in all other regions of Canada's north have lower rates of Pap smear testing. In the final column of Table 3, we present estimated odds ratios for having had a mammogram in the last two years. For this regression, we restrict the sample to women aged 50-65 only. Health Canada guidelines do not recommend regular mammography screening for asymptomatic women aged less than 40, while recommendations for women aged 40-49 are mixed. Provinces and territories also vary in the inclusion of women aged 40-49 in the provincial mammography screening registry. Interestingly, distance from a hospital does not have a significant effect on mammography screening after controlling for other factors, nor does region of residence. However, Inuit women are found to have significantly lower incidence of mammography screening (OR 0.41 p-value 0.047).

## **Discussion**

This research has sought to identify how distance, socioeconomic characteristics and other identifiable factors correlate with different measures of health behaviors and health service that are at least indirectly related to the incidence and diagnosis of cancer among Inuit and other residents of Northern Canada. Consistent with research for all of Canada (e.g., Maclean et.al., 2004), we find that Northern residents with greater educational attainment have lower smoking rates, lower prevalence of obesity, and a greater likelihood of visiting with a doctor or other health care professional during the

year. We also find that geography matters, in terms of both province and/or region of residence and of distance to the nearest hospital. In particular, the likelihood of having visited a physician during the year is significantly lower the greater is the distance from a hospital though access to any health care professional is equivalent. As well, there is a high degree of consistency between the results based on the CCHS and on the APS even though they have substantially different sampling frameworks.

After accounting for differences in geography, socio-economic status and demographics, however, ethnicity remains a very important determinant of specific health behaviors. We find that Inuit individuals are significantly and markedly more like to smoke daily than members of other aboriginal groups residing in the North, even though Métis and FN individuals are themselves significantly more likely to smoke than non-aboriginals. Further, there is significant variation across Inuit regions, with residents of the Inuit territory of Nunavik in Northern Quebec having three times the odds of smoking as an otherwise comparable resident of Nunavut. Inuit are also more likely to have binged on alcohol in the previous month, though on average they are no more likely to be obese than other groups once socio-economic status, geography and other factors are controlled for. The use of basic health services – at least one visit to a physician or to any health care professional – are also not significantly lower for Inuit compared to other ethnic groups. There are significant differences however in the odds of having had a Pap smear test in the past 3 years and a mammogram in the last 2 years. In both cases, the odds of an Inuit woman undergoing either procedure are significantly lower than they are for non-aboriginal women.

A number of caveats should be kept in mind when interpreting these results. First, aside from the explicit exclusions in the CCHS sampling framework, the remoteness of many Inuit communities means that our results may not be fully representative of the Inuit population of Canada's north. Analyses of the health behaviors of particular communities are clearly complementary to this research. Second, all data in the CCHS and APS are based on self-reports so may be characterized by measurement error, particularly for the determination of BMI and obesity. Third, calculation of distance to the nearest hospital is based on linear distance from the centerpoint of the individual's local region of residence and so does not necessarily reflect the means and duration of travel required.

Despite these caveats, the result that Inuit individuals exhibit higher rates of smoking and bingeing on alcohol as well as lower rates of female cancer screening compared both to other aboriginal groups and to non-aboriginal Northern residents after controlling for differences in remoteness, socio-economic status and demographic factors is an important result. Factors specific to Inuit individuals and communities appear to be contributing to negative health behaviors associated with increased cancer, and to a lower incidence of diagnostic cancer screening. Social support in Inuit communities might have negative as well as positive consequences for health, for example by exerting pressures to conform to certain behaviors such as smoking (Richmond and Ross, 2008). Since many Inuit individuals also have relatively low education levels and live in remote areas, the problems of unhealthy behaviors and limited use of basic health services that are related to negative social support may be compounded by limited resources that can tie individuals to their immediate social contexts (Richmond and Ross, 2008). At the same

time, research has identified the importance of environmental and cultural connections to good health among residents of rural and remote communities (Richmond and Ross, 2009). The interrelatedness of health behaviors and outcomes also suggests that policy responses to problems such as high smoking rates must not only be culturally appropriate but should not be considered in isolation. For example, it may be that high smoking rates are a manifestation of other underlying problems that are also contributing to the poor mental health outcomes, stress and suicide that are also of concern in Inuit communities.

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## ENDNOTES

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<sup>1</sup> It is worth noting that high rates of tobacco and alcohol consumption are found in indigenous groups in the Northern regions of other countries (e.g., Bjerregaard et.al, 2004, 2003, 1997).

<sup>2</sup> The 2002-03 wave of the CCHS does include individuals living in Jamesie but not Nunavik. However, Inuit are not identified separately from other groups of aboriginal people. Jamesie is primarily the area of North-Western Quebec that borders James Bay to the West and Nunavik to the North.

<sup>3</sup> An alternative definition of Inuit is based on responses to questions that ask whether the respondent is an aboriginal person. However, decomposition by specific aboriginal group is not available in the 2001 CCHS.

<sup>4</sup> It is possible that other differences in the survey design and coverage between the CCHS and APS will limit the extent to which results can be compared between surveys. However, as an initial check of the comparability of the data, we restricted the APS sample to off-reserve residents outside of Quebec and compared frequencies of key variables between this restricted APS dataset and the CCHS dataset limited to aboriginal individuals. In general there is a reasonably close correspondence between the CCHS and APS results including distance from a hospital and in distribution of the sample across provinces and territories. The main exception is in terms of the incidence of a visit with an MD or any health care professional: the incidence of a visit in both cases is about 8 percentage points lower in the APS than in the CCHS.

Table 1: Statistical profile of health behaviors and personal characteristics of Northern residents of Canada<sup>1</sup>

	CCHS 2000-01 and 2004-05				APS 2001		
	Inuit	Métis	First Nations	Not Aboriginal	Inuit	Métis	First Nations
Daily Smoker	65.2	42.7	43.8	23.7	65.0	40.1	42.7
Obese	31.1	36.8	32.9	26.0	41.8	34.3	41.1
Binged last month	21.7	18.9	18.3	14.1	16.5	17.5	18.9
Visited MD last year	51.8	79.7	76.6	77.4	42.2	68.6	65.0
Visited any HCP	87.9	93.4	93.3	93.2	79.9	85.5	85.8
Unmet healthcare needs	16.8	16.8	23.0	13.1	n/a	n/a	n/a
Pap test last 12 months	52.5	49.2	55.0	55.4	n/a	n/a	n/a
Pap test last 3 years	75.4	80.2	80.6	80.1	n/a	n/a	n/a
Mammogram last 2 yrs	27.9	39.2	41.1	50.6	n/a	n/a	n/a
Male	49.0	45.1	43.9	50.9	50.1	47.7	45.2
Age (years)	36.7	38.0	36.2	41.9	37.1	38.3	37.4
Married	67.4	64.5	58.9	72.8	38.9	46.3	38.3
Div/Sep/Widowed	5.8	8.6	11.6	8.7	8.2	14.2	12.7
Single	26.9	27.0	29.4	18.5	52.7	39.2	48.5
Less than grade 8	26.4	8.0	12.0	4.0	28.8	10.0	18.1
Less than high school	27.3	22.8	20.1	11.8	21.1	27.6	27.6
Finished high school	13.7	27.2	29.1	28.1	19.8	23.3	22.2
Finished Post-secondary	28.7	31.7	30.0	37.3	28.3	33.3	26.5
Finished Degree	2.7	9.6	7.9	17.3	1.9	5.5	5.1
Within 50km of hospital	31.4	84.4	73.4	94.0	26.7	80.6	65.9
50-400km from hospital	18.9	8.7	17.4	4.7	30.6	12.6	20.5
>400km from hospital	49.7	6.8	9.2	1.3	42.8	6.8	13.6
Northern Manitoba	*	30.1	18.9	22.0	0.4	28.4	27.8
Northern Saskatchewan	*	59.0	54.8	66.1	0.5	54.6	41.0
Northern Quebec	*	*	1.0	2.1	21.0	1.5	15.3
- Nunavik	n/a	n/a	n/a	n/a	20.2	0.1	1.0
Labrador	14.4	2.4	1.2	4.1	14.5	8.2	1.3
- Nunatsiavut	2.8	*	*	*	6.5	0.6	*
Nunavut	69.3	*	0.4	1.1	52.9	0.2	0.1
Northwest Territories	15.5	8.2	23.6	4.6	10.6	7.1	14.5
- Inuvialuit	10.3	0.5	1.6	0.4	7.9	0.7	0.6
Lives on-reserve	n/a	n/a	n/a	n/a	0.5	3.9	30.5
Sample size	921	784	954	9634	3776	4719	5797

1. Coverage for the CCHS data includes Nunavut, NWT, the northern parts of Newfoundland and Labrador, Saskatchewan and Manitoba, and the northern part of Quebec *excluding* Nunavik and Jamesie. Individuals residing on-reserve are also excluded. Coverage for the APS includes Nunavik and Jamesie as well as individuals living on-reserve.

Table 2a: Logistic regression analysis of health behaviors and health service use of adults in Canada's northern regions, CCHS 2000-01 and 2004-05 (Adults 21-65: n=12293)

	Daily smoker		Obese		Binged last month		MD visit last year		Any HCP visit last year	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Male	<b>1.19</b>	<b>(1.04-1.35)</b>	0.97	(0.85-1.10)	<b>2.18</b>	<b>(1.84-2.58)</b>	<b>0.47</b>	<b>(0.41-0.54)</b>	<b>0.37</b>	<b>(0.30-0.46)</b>
Age	<b>1.11</b>	<b>(1.06-1.15)</b>	1.01	(0.97-1.05)	0.98	(0.94-1.03)	0.97	(0.93-1.01)	0.98	(0.92-1.04)
Age-sq	<b>1.00</b>	<b>(1.00-1.00)</b>	1.00	(1.00-1.00)	1.00	(1.00-1.00)	1.00	(1.00-1.00)	1.00	(1.00-1.00)
Div/Sep/Wid	<b>2.12</b>	<b>(1.74-2.58)</b>	<b>0.78</b>	<b>(0.64-0.96)</b>	1.22	(0.94-1.58)	0.95	(0.76-1.19)	0.75	(0.52-1.07)
Single	<b>1.25</b>	<b>(1.04-1.49)</b>	<b>0.72</b>	<b>(0.61-0.86)</b>	<b>1.31</b>	<b>(1.09-1.58)</b>	<b>0.78</b>	<b>(0.66-0.93)</b>	<b>0.57</b>	<b>(0.43-0.75)</b>
Education (< gr8 =1.0)										
Less than HS	0.92	(0.68-1.25)	0.92	(0.69-1.23)	1.43	(0.98-2.09)	0.88	(0.67-1.16)	1.02	(0.70-1.50)
Finished HS	<b>0.52</b>	<b>(0.39-0.71)</b>	<b>0.69</b>	<b>(0.52-0.92)</b>	1.35	(0.92-1.97)	<b>1.33</b>	<b>(1.01-1.76)</b>	1.43	(0.96-2.12)
Finished Post-sec	<b>0.50</b>	<b>(0.37-0.67)</b>	<b>0.68</b>	<b>(0.52-0.90)</b>	1.41	(0.98-2.02)	<b>1.35</b>	<b>(1.03-1.75)</b>	<b>1.82</b>	<b>(1.25-2.64)</b>
Finished Degree	<b>0.14</b>	<b>(0.10-0.21)</b>	<b>0.53</b>	<b>(0.38-0.73)</b>	1.12	(0.75-1.68)	<b>1.54</b>	<b>(1.13-2.10)</b>	<b>3.24</b>	<b>(1.99-5.28)</b>
Linear km to hospital (<50km = 1.0)										
50-400km	0.84	(0.69-1.02)	<b>1.31</b>	<b>(1.07-1.60)</b>	<b>1.36</b>	<b>(1.05-1.76)</b>	<b>0.70</b>	<b>(0.58-0.84)</b>	0.97	(0.70-1.35)
>400km	0.90	(0.66-1.22)	<b>0.73</b>	<b>(0.54-0.99)</b>	0.90	(0.62-1.31)	<b>0.47</b>	<b>(0.35-0.64)</b>	0.72	(0.47-1.11)
Ethnicity (non-aboriginal=1.0)										
Inuit	<b>3.34</b>	<b>(2.50-4.46)</b>	0.97	(0.71-1.31)	<b>1.70</b>	<b>(1.20-2.42)</b>	0.76	(0.57-1.01)	0.89	(0.54-1.46)
Métis	<b>2.07</b>	<b>(1.65-2.59)</b>	<b>1.65</b>	<b>(1.32-2.07)</b>	1.22	(0.91-1.62)	<b>1.32</b>	<b>(1.00-1.73)</b>	1.17	(0.79-1.74)
First Nation	<b>2.00</b>	<b>(1.58-2.54)</b>	<b>1.43</b>	<b>(1.10-1.85)</b>	1.07	(0.81-1.40)	1.23	(0.94-1.62)	1.29	(0.79-2.09)
Region (Nunavut=1.0)										
Northern Manitoba	<b>0.65</b>	<b>(0.47-0.90)</b>	0.73	(0.52-1.02)	1.46	(0.99-2.16)	1.26	(0.91-1.75)	1.05	(0.59-1.85)
Northern Sask	0.77	(0.57-1.05)	<b>0.65</b>	<b>(0.47-0.89)</b>	1.30	(0.90-1.89)	<b>1.67</b>	<b>(1.22-2.28)</b>	1.03	(0.60-1.75)
Northern Quebec	0.87	(0.62-1.23)	<b>0.43</b>	<b>(0.30-0.63)</b>	0.99	(0.65-1.52)	0.88	(0.62-1.24)	0.58	(0.32-1.04)
Labrador	0.89	(0.63-1.24)	<b>0.69</b>	<b>(0.49-0.97)</b>	1.42	(0.94-2.14)	<b>1.60</b>	<b>(1.14-2.27)</b>	0.85	(0.47-1.50)
--Nunatsiavut	1.02	(0.34-3.05)	<b>2.78</b>	<b>(1.05-7.36)</b>	0.72	(0.14-3.54)	0.36	(0.11-1.14)	1.39	(0.22-8.76)
Northwest Territories	0.82	(0.59-1.12)	<b>0.67</b>	<b>(0.48-0.93)</b>	<b>1.54</b>	<b>(1.06-2.25)</b>	1.32	(0.96-1.81)	0.98	(0.57-1.70)
--Inuvialuit	<b>2.20</b>	<b>(1.50-3.23)</b>	0.76	(0.51-1.15)	1.32	(0.86-2.03)	0.89	(0.60-1.31)	0.86	(0.47-1.59)

\* Coverage includes Nunavut, NWT, the northern parts of Newfoundland and Labrador, Saskatchewan and Manitoba, and the northern part of Quebec *excluding* Nunavik and Jamesie. Individuals residing on-reserve are also excluded.

Table 2b: Logistic regression analysis of health behaviors and health service use of aboriginal adults in Canada's northern regions: APS 2001 (adults 21-65: n=14117)

	Daily smoker		Obese		Binged last month		MD visit last year		Any HCP visit last year	
	OR	p-value	OR	p-value	OR	p-value	OR	p-value	OR	p-value
Male	0.98	(0.89-1.08)	<b>0.65</b>	<b>(0.59-0.72)</b>	<b>1.75</b>	<b>(1.55-1.97)</b>	<b>0.50</b>	<b>(0.45-0.55)</b>	<b>0.53</b>	<b>(0.47-0.60)</b>
Age	<b>1.09</b>	<b>(1.06-1.13)</b>	0.98	(0.95-1.01)	1.01	(0.97-1.05)	<b>0.95</b>	<b>(0.92-0.98)</b>	<b>0.95</b>	<b>(0.92-0.99)</b>
Age-sq	1.00	(1.00-1.00)	1.00	(1.00-1.00)	1.00	(1.00-1.00)	1.00	(1.00-1.00)	1.00	(1.00-1.00)
Div/Sep/Wid	<b>1.87</b>	<b>(1.60-2.18)</b>	<b>0.73</b>	<b>(0.62-0.85)</b>	<b>1.55</b>	<b>(1.26-1.90)</b>	0.94	(0.80-1.12)	1.04	(0.84-1.30)
Single	<b>1.55</b>	<b>(1.38-1.74)</b>	<b>0.88</b>	<b>(0.78-0.98)</b>	<b>1.47</b>	<b>(1.27-1.69)</b>	0.91	(0.81-1.02)	<b>0.68</b>	<b>(0.59-0.78)</b>
Education (< gr8 =1.0)										
Less than HS	1.10	(0.95-1.27)	<b>0.84</b>	<b>(0.73-0.97)</b>	1.19	(0.99-1.42)	1.09	(0.94-1.26)	<b>1.19</b>	<b>(1.01-1.40)</b>
Finished HS	0.98	(0.84-1.15)	<b>0.82</b>	<b>(0.71-0.96)</b>	<b>1.28</b>	<b>(1.06-1.55)</b>	<b>1.34</b>	<b>(1.15-1.57)</b>	<b>1.55</b>	<b>(1.29-1.87)</b>
Finished Post-sec	<b>0.85</b>	<b>(0.74-0.98)</b>	<b>0.81</b>	<b>(0.71-0.93)</b>	1.12	(0.94-1.34)	<b>1.43</b>	<b>(1.24-1.64)</b>	<b>1.67</b>	<b>(1.41-1.98)</b>
Finished Degree	<b>0.31</b>	<b>(0.23-0.41)</b>	0.78	(0.60-1.02)	0.88	(0.60-1.29)	<b>1.81</b>	<b>(1.35-2.43)</b>	<b>3.62</b>	<b>(2.28-5.77)</b>
Linear km to hospital (<50km = 1.0)										
50-400km	0.97	(0.86-1.10)	1.12	(0.99-1.27)	0.92	(0.78-1.08)	<b>0.59</b>	<b>(0.52-0.67)</b>	0.96	(0.81-1.13)
>400km	1.11	(0.95-1.31)	<b>1.32</b>	<b>(1.13-1.55)</b>	0.90	(0.73-1.11)	<b>0.58</b>	<b>(0.50-0.68)</b>	<b>0.83</b>	<b>(0.68-1.00)</b>
Ethnicity (First Nation/Indian=1.0)										
Inuit	<b>1.80</b>	<b>(1.34-2.42)</b>	0.85	(0.62-1.15)	<b>1.45</b>	<b>(1.02-2.06)</b>	0.77	(0.58-1.03)	0.92	(0.67-1.28)
Métis	0.95	(0.84-1.08)	0.89	(0.78-1.02)	0.97	(0.84-1.13)	0.99	(0.87-1.13)	0.97	(0.82-1.14)
Region (Nunavut=1.0)										
Northern Manitoba	<b>0.69</b>	<b>(0.48-0.98)</b>	1.00	(0.70-1.44)	<b>2.13</b>	<b>(1.37-3.33)</b>	<b>2.68</b>	<b>(1.89-3.78)</b>	1.37	(0.92-2.04)
Northern Sask	<b>0.67</b>	<b>(0.47-0.96)</b>	0.86	(0.60-1.24)	<b>2.12</b>	<b>(1.35-3.34)</b>	<b>2.28</b>	<b>(1.60-3.24)</b>	1.25	(0.83-1.87)
Northern Quebec	<b>0.41</b>	<b>(0.28-0.59)</b>	<b>2.04</b>	<b>(1.40-2.98)</b>	<b>2.46</b>	<b>(1.56-3.90)</b>	<b>1.83</b>	<b>(1.27-2.64)</b>	<b>1.91</b>	<b>(1.21-3.01)</b>
----Nunavik	<b>3.06</b>	<b>(2.05-4.56)</b>	1.27	(0.85-1.89)	0.66	(0.41-1.05)	1.07	(0.73-1.56)	0.76	(0.48-1.19)
Labrador	<b>0.63</b>	<b>(0.45-0.89)</b>	0.90	(0.64-1.27)	<b>2.13</b>	<b>(1.39-3.26)</b>	<b>1.64</b>	<b>(1.17-2.28)</b>	1.26	(0.85-1.87)
----Nunatsiavut	1.18	(0.75-1.85)	1.04	(0.65-1.69)	0.67	(0.38-1.19)	0.90	(0.56-1.46)	1.64	(0.76-3.50)
Northwest Territories	<b>0.70</b>	<b>(0.49-0.99)</b>	0.95	(0.66-1.35)	<b>2.26</b>	<b>(1.45-3.53)</b>	<b>1.69</b>	<b>(1.20-2.37)</b>	1.19	(0.80-1.76)
----Inuvialuit	1.36	(0.95-1.95)	<b>0.67</b>	<b>(0.46-0.96)</b>	0.86	(0.55-1.36)	0.86	(0.61-1.22)	0.88	(0.58-1.35)
Lives on-reserve	<b>1.37</b>	<b>(1.18-1.59)</b>	1.01	(0.86-1.18)	<b>1.19</b>	<b>(1.00-1.41)</b>	<b>0.81</b>	<b>(0.70-0.95)</b>	1.11	(0.91-1.36)

\* Coverage includes Nunavut, NWT, the northern parts of Newfoundland and Labrador, Saskatchewan and Manitoba, and the northern part of Quebec *including* Nunavik and Jamesie. Individuals residing on-reserve are included.

Table 3: Logistic regression analysis of health behaviors and health service use of adults in Canada's northern regions, CCHS 00-01 and 2004-05

	Unmet healthcare needs (n=12293)		Pap exam last 12m (women 21-65: n=6412)		Pap exam last 3 yrs (women 21-65: n=6412)		Mammogram last 2 yrs (women 50-65: n=2429)	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Male	<b>0.65</b>	<b>(0.56-0.76)</b>						
Age	<b>1.10</b>	<b>(1.04-1.15)</b>	<b>0.94</b>	<b>(0.89-0.98)</b>	1.01	(0.95-1.07)	<b>2.73</b>	<b>(1.12-6.63)</b>
Age-sq	1.00	(1.00-1.00)	1.00	(1.00-1.00)	1.00	(1.00-1.00)	<b>0.99</b>	<b>(0.98-1.00)</b>
Div/Sep/Wid	<b>1.41</b>	<b>(1.11-1.79)</b>	1.11	(0.87-1.42)	0.92	(0.69-1.22)	<b>0.67</b>	<b>(0.46-0.97)</b>
Single	1.21	(0.98-1.49)	<b>0.50</b>	<b>(0.40-0.62)</b>	<b>0.33</b>	<b>(0.25-0.42)</b>	0.54	(0.28-1.04)
Education (< gr8 =1.0)								
Less than HS	0.86	(0.59-1.26)	1.02	(0.67-1.53)	0.98	(0.64-1.49)	0.97	(0.51-1.85)
Finished HS	1.09	(0.74-1.59)	1.48	(0.99-2.23)	1.35	(0.89-2.05)	1.01	(0.52-1.98)
Finished Post-sec	1.41	(0.99-2.01)	1.46	(0.98-2.18)	<b>1.61</b>	<b>(1.08-2.39)</b>	1.62	(0.86-3.03)
Finished Degree	1.08	(0.73-1.60)	<b>1.87</b>	<b>(1.22-2.87)</b>	1.51	(0.95-2.38)	1.20	(0.60-2.42)
Linear km to hospital (<50km=1.0)								
50-400km	1.32	(0.98-1.77)	1.09	(0.82-1.46)	<b>1.42</b>	<b>(1.02-1.98)</b>	0.93	(0.57-1.51)
>400km	0.76	(0.51-1.11)	1.07	(0.70-1.61)	1.40	(0.86-2.28)	0.78	(0.27-2.26)
Ethnicity (non-aborig=1.0)								
Inuit	1.05	(0.73-1.52)	0.81	(0.56-1.17)	<b>0.63</b>	<b>(0.40-0.98)</b>	<b>0.35</b>	<b>(0.14-0.89)</b>
Métis	1.30	(0.99-1.70)	0.85	(0.64-1.12)	1.04	(0.71-1.52)	0.58	(0.28-1.18)
First Nation	<b>1.98</b>	<b>(1.48-2.64)</b>	0.93	(0.66-1.31)	0.93	(0.62-1.41)	0.57	(0.21-1.53)
Region (NWT=1.0)								
Northern Manitoba	0.85	(0.57-1.27)	0.85	(0.55-1.29)	1.12	(0.66-1.88)	1.39	(0.53-3.64)
Northern Sask	<b>0.49</b>	<b>(0.33-0.72)</b>	0.97	(0.65-1.46)	1.19	(0.73-1.95)	1.75	(0.68-4.48)
Northern Quebec	<b>0.44</b>	<b>(0.28-0.68)</b>	0.95	(0.60-1.49)	0.93	(0.54-1.60)	2.52	(0.87-7.27)
Labrador	0.71	(0.47-1.08)	1.32	(0.85-2.05)	1.69	(0.97-2.91)	1.42	(0.52-3.90)
--Nunatsiavut	0.57	(0.18-1.82)	1.56	(0.33-7.36)	4.22	(0.43-41.0)	0.52	(0.05-4.88)
Northwest Territories	<b>0.60</b>	<b>(0.40-0.90)</b>	1.45	(0.95-2.21)	1.33	(0.80-2.22)	1.64	(0.60-4.50)
--Inuvialuit	0.90	(0.56-1.46)	0.92	(0.55-1.55)	1.05	(0.54-2.04)	2.00	(0.61-6.61)

\* Coverage includes Nunavut, NWT, the northern parts of Newfoundland and Labrador, Saskatchewan and Manitoba, and the northern part of Quebec *excluding* Nunavik and Jamesie. Individuals residing on-reserve are also excluded.

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