

Northern Projections
Greater Sudbury
Human Capital Series



**Sudbury
& Manitoulin**
Workforce Planning
Planification en
main-d'œuvre



Science North, Sudbury

Who We Are

Northern Policy Institute

Northern Policy Institute is Northern Ontario's independent think tank. We perform research, collect and disseminate evidence, and identify policy opportunities to support the growth of sustainable Northern Communities. Our operations are located in Thunder Bay and Sudbury. We seek to enhance Northern Ontario's capacity to take the lead position on socio-economic policy that impacts Northern Ontario, Ontario, and Canada as a whole.

Sudbury & Manitoulin Workforce Planning

Workforce Planning for Sudbury & Manitoulin (WPSM) conducts research and provides labour market information on industry and workforce trends from both a supply and demand perspective. WPSM connects stakeholders from various sectors, collaborates on partnership projects, activities and programs to address current and emerging labour market issues, and supports economic growth and development.



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& Manitoulin**

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Sudbury & Manitoulin Districts

About the Series

This Human Capital Series is an update of an earlier series published in partnership with Northern Ontario Workforce Planning.

Workforce Planning Ontario is a network of 26 Workforce Planning Boards covering four regions across the province. Workforce Planning Boards gather intelligence on local labour market supply and demand, and work in partnership with employers, employment services, educators, researchers, economic development, government and other stakeholders to identify, understand and address labour market issues. This includes supporting and coordinating local responses to meet current and emerging workforce needs.

Given the unique geography and labour market issues that impact Northern Ontario, all 6 planning boards in the north have collaborated to form Northern Ontario Workforce Planning. They include: Algoma Workforce Investment Corporation (AWIC); Far Northeast Training Board (FNETB); The Labour Market Group (LMG); Northwest Training and Adjustment Board (NTAB); North Superior Workforce Planning Board (NSWPB); and Workforce Planning for Sudbury & Manitoulin (WPSM). FNETB and NSWPB are currently pilot sites for Local Employment Planning Councils (LEPC).

The objective of this series is to examine past and present trends in each Northern Ontario Census District and to forecast future challenges and opportunities. The author examines demographic trends as well as the labour market, including human capital composition, employment trends, the future occupational demand of the employed workforce, trends in industrial workforce composition of goods-producing and services-producing sectors, as well as labour income trends and gross domestic product (GDP).

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This report was made possible through the support of our partner, Northern Ontario Heritage Fund Corporation. Northern Policy Institute expresses great appreciation for their generous support but emphasizes the following: The views expressed in this commentary are those of the author and do not necessarily reflect the opinions of the Institute, its Board of Directors or its supporters. Quotation with appropriate credit is permissible.

Author's calculations are based on data available at the time of publication and are therefore subject to change.

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874 Tungsten St.
Thunder Bay, Ontario P7B 6T6

ISBN: 978-1-989343-20-3

Editor: Alex Ross
Copy Editor Mark Campbell
Graphic Design : Korkola Design

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Dr. Moazzami has taught Economics and Econometrics at Lakehead University since 1988. He is well known for his research activities particularly related to Northern Ontario.

He has written many reports on Northern Ontario's economic development challenges and opportunities. He was commissioned by the Ministry of Northern Development and Mines to undertake a comprehensive study of Northern Ontario's economy as a part of the research conducted for the Growth Plan for Northern Ontario. Included in the study were the identification of growing, declining and emerging industrial clusters in the region.

Professor Moazzami has also written extensively on Northern Ontario's Indigenous people and Northern Indigenous economy. Dr. Moazzami's expertise and influence reaches beyond Lakehead University and Northern Ontario. He has been a regular guest speaker at the University of Waterloo's Economic Development Program.

Executive Summary

Northeastern Ontario covers approximately 276,124 square kilometres and recorded a population of 548,449 in 2016. Increasing levels of out-migration of youth, declining fertility rates, and lower levels of immigration have resulted in an age distribution of the population in Northeastern Ontario that is different from that of Ontario. These demographic changes have a significant impact on social and economic conditions in the region. The population will continue to age in the foreseeable future, with implications for healthcare costs, supply of labour, production capacity, and the ability of the Northeastern Districts to remain economically viable.

The purpose of this report is to analyze demographic and labour market trends in Northeastern Ontario and Greater Sudbury. Both past and current trends are examined, as well as projections into the future. This report is an update to a previous report published in 2017 but with updated information using 2016 census data, as well as additional sections including sector-specific projections for future labour market demand.

Key Findings

Individuals in Sudbury with university education or higher experience lower unemployment rates compared to the rest of Ontario, and Canada as a whole.

The human capital index for Greater Sudbury's Francophone population is higher than that of Northeastern Ontario but below both Ontario and Canada. Further, among both the Immigrant and Indigenous populations, the Human Capital Index is higher in Greater Sudbury than in Northeastern Ontario, Ontario, and Canada, reflecting a higher level of educational achievement in both groups.

Since 2001, Greater Sudbury has experienced a small but positive population growth from 155,268 to 161,647. Based on the Ministry of Finance's projections, Greater Sudbury's population is expected to rise slightly from 165,030 in 2017 to 167,254 in 2041.

The continuing aging of the regional population is also evident, with the share of individuals ages 20 to 64 expected to decline from 61.3 per cent in 2017 to 53.5 per cent in 2041. Similarly, the share of individuals age 65 and older is expected to rise from 18.3 per cent in 2017 to 27.7 per cent in 2041. The Indigenous population in Greater Sudbury is expected to increase from 15,010 in 2017 to 17,791 in 2030, a growth rate of approximately 18.5 per cent.

Male participation rates in Greater Sudbury have increased since 2001, while they declined in the Northeast Region as a whole. Further, female participation rates have increased by 4% both in the District and in the Northeast.

Total employment in the goods-producing sector rose from 13,540 in 2001 to 15,285 in 2016 – an increase of 12.9 per cent. The major contributors to the employment increase in the goods-producing sector are mining and construction industries. Employment in the manufacturing industries declined by approximately 23.9 per cent between 2001 and 2016. During the same time, the service-producing sector grew by approximately 4.5 per cent. The major contributors to this growth are professional, scientific, and technical services linked to the mining sector, education services, and healthcare and social services industries.

Employment in management, business, finance, and administration, as well as sales occupations and those unique to primary industries, declined between 2001 and 2016. All other sectors experienced employment growth during the above period.

Recommendations:

Market the City of Greater Sudbury as a desirable destination for secondary immigration

Greater Sudbury has experienced positive population growth since 2001. The city should focus on continuing this trend while attracting new talent to the region, to counter the declining labour force which is projected in the coming years. The human capital indexes for immigrants in Greater Sudbury are higher than in Ontario and Canada. The research demonstrates that unemployment rates for those with university credentials in Greater Sudbury are lower than both the province and the country. With significant numbers of unemployed and underemployed Canadians in the Greater Toronto Area, there is a real opportunity for Greater Sudbury to address its population challenges by playing to its demonstrated strengths in supporting immigrant success.

Marketing High Quality Education in Greater Sudbury

The skill levels of the prime-working-age population in Greater Sudbury are only slightly lower than Ontario and Canada for the total population, while the Indigenous population has notably higher levels of education compared to provincial and national levels. Greater Sudbury is in a better position than any other census districts in Northern Ontario to meet current and future skills requirements. This provides another high quality product for the city to market over and above its traditional strengths in mining and mining supply. Recent investments in Post-Secondary Institutions in Greater Sudbury indicate a collective awareness of this opportunity.

Continue to build on Indigenous partnerships

The Indigenous population in Greater Sudbury will represent a higher proportion of Greater Sudbury's workforce over the coming years. Human capital indexes for the Indigenous labour force in Greater Sudbury, while below the rest of the population, are higher than in Ontario and Canada. As with new Canadians, there is a real opportunity for Greater Sudbury to be marketed as a destination for Indigenous migration within Canada.

Introduction

The objective of this report is to examine past and present trends and characteristics in Greater Sudbury's economy and to forecast its future challenges and opportunities. We first examine population trends in Greater Sudbury and Northeastern Ontario. Then, we study the labour market, including its human capital composition; employment trends; the shifting occupational and industrial composition of the employed workforce; and the changes in labour income and gross domestic product (GDP). The aging population and its impact on future demand for healthcare and education service providers are also examined. Finally, the report estimates the impact of an aging population on demand for workers in trade occupations in the region.

The report begins by examining demographic change in Greater Sudbury during the past three decades. We find that the city's population has increased by approximately 4.1 per cent between 2001 and 2016. We focus on three segments of the regional population, namely Indigenous, Francophone, and immigrant. The study looks ahead and provides projections for total and Indigenous populations in Greater Sudbury between 2015 and 2030. We find that the Indigenous and total population in Greater Sudbury are expected to grow during the projection period. From these population projections, the study estimates past, present, and future trends in the size and composition of the regional labour force. The impact of migration flows on the regional population is also discussed.

The next part of the study examines labour market trends, including participation, employment, and unemployment rates among various population groups between 2001 and 2016. Using demographic changes and labour market indicators, the study forecasts the size and composition of the future labour force in Greater Sudbury.

In the section that follows, the study defines and quantitatively measures the human capital composition of Greater Sudbury's workforce in the coming years. This section also discusses the implications of the growing application of technology in the production process and, accordingly, the future skill requirements of the workforce.

The study also examines the shifting occupational composition of the employed workforce, and the implication thereof for total regional income and GDP in Greater Sudbury.

The study concludes by looking ahead and examining the future demand for healthcare and education service providers, and for trades workers.

Data Sources:

The data used in this report are based on detailed information regarding individual census subdivisions (CSDs) in Northeastern Ontario obtained through special tabulations from Statistics Canada. We have also used population forecasts based on data made available by the Ontario Ministry of Finance. Some of the data displayed below may differ slightly from census population data, in instances where a custom tabulation was used to demonstrate unique characteristics of the target geography. In these instances, the discrepancies are due to the fact that the custom tables are based on 25% sample data, as oppose to 100% population data.

Population Groups Studied

The report provides information on the following four population groups:

- The total population;
- The Francophone population, defined as individuals who report their mother tongue to be French;
- The Indigenous population, defined by Statistics Canada as persons who reported identifying with at least one Indigenous group – that is, North American Indian, Métis, or Inuit – and/or those who reported being a Treaty Indian or a registered Indian, as defined by the Indian Act, and/or those who reported they were members of an Indian band or First Nation;
- The immigrant population, defined as persons who are, or have ever been, landed immigrants in Canada.

The Geographical Specification of Northern Ontario

Northern Ontario is subdivided into the Northwest and the Northeast Economic Regions. The three most western census divisions, commonly known as districts – namely Rainy River, Kenora, and Thunder Bay – constitute Northwestern Ontario, which is also referred to as the Northwest Economic Region. The region that lies north and east of lakes Superior and Huron constitutes Northeastern Ontario, which is also referred to as the Northeast Economic Region. It includes the following census divisions: Cochrane, Timiskaming, Algoma, Sudbury, Nipissing, Manitoulin, Parry Sound, and Greater Sudbury. The federal government and FedNor also include Muskoka District in their definition of Northeastern Ontario. However, the provincial government removed the District of Muskoka from the jurisdictional area of the Ministry of Northern Development and Mines and the Northern Ontario Heritage Fund Corporation in 2004. It has continued to include Parry Sound as a Northern Ontario division.

Demographic Change in Northeastern Ontario: The Past Three Decades

Demographic Trends in Northeastern Ontario

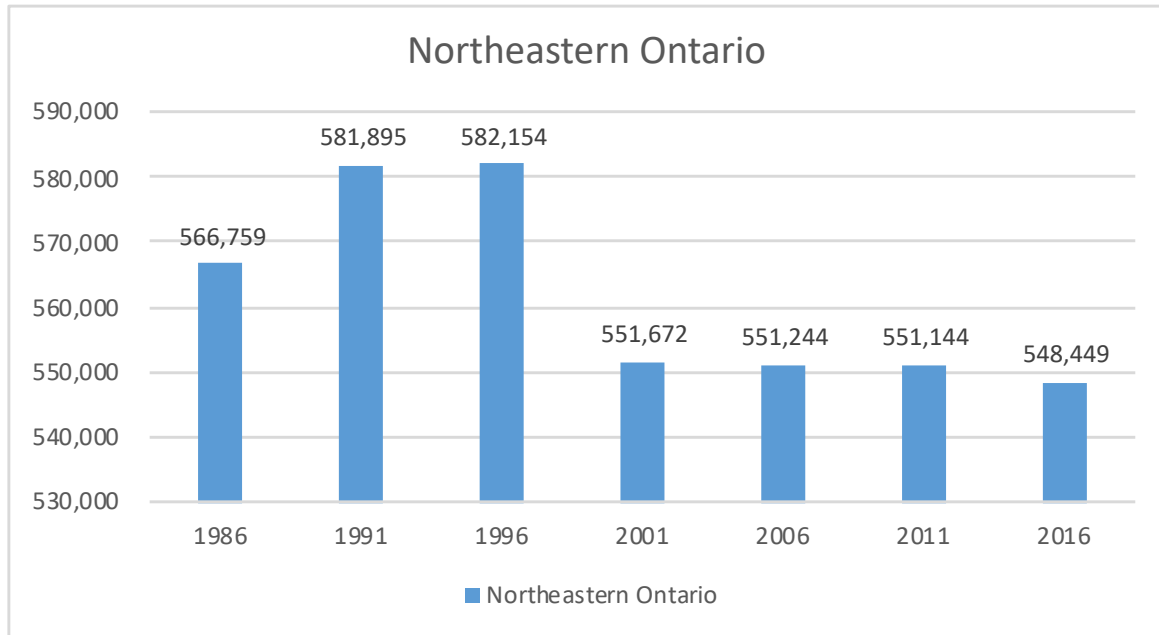
Northeastern Ontario covers approximately 276,124 square kilometres and recorded a population of 548,449 in 2016. It has a population density of approximately two persons per square kilometre, which is well below that of Ontario (14.8). Greater Sudbury is the largest city in Northeastern Ontario. It recorded a population of approximately 161,647 in 2016. Other major communities in the region include Sault Ste. Marie, North Bay, Timmins, Elliot Lake, and Temiskaming Shores.

According to Statistics Canada's Census of Population, Northeastern Ontario's population grew from 566,759 in 1986 to 582,154 in 1996 but declined to 551,672 in 2001 and to 548,449 in 2016 (Figure 1). The trend of a rising population during the 1980s and 1990s, followed by a decline during the 21st century, is similar to that which has been observed in Northwestern Ontario.



Bridge of Nations, Sudbury

Figure 1: Population Trends in Northeastern Ontario

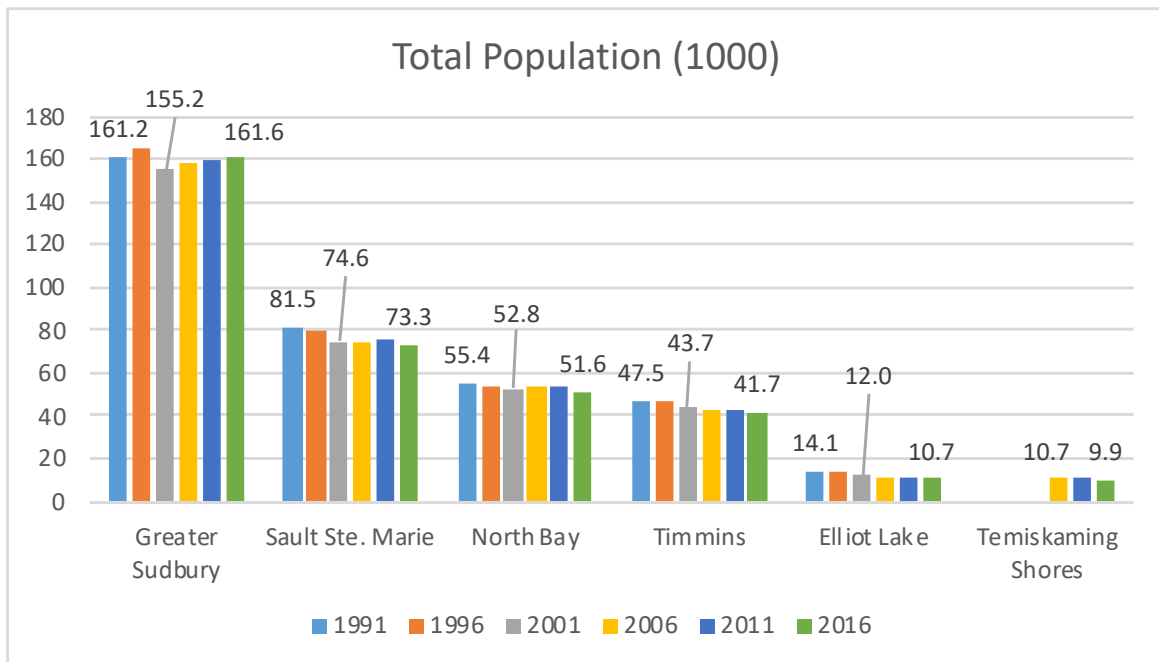


Source: Statistics Canada, Census of Population, various issues

Declining population trends can also be observed in almost all major cities in Northeastern Ontario (Figure 2). Note that Temiskaming Shores is a city created by the amalgamation

of the towns of New Liskeard and Haileybury and the township of Dymond in 2004. Therefore, there are no census data for that city prior to 2004.

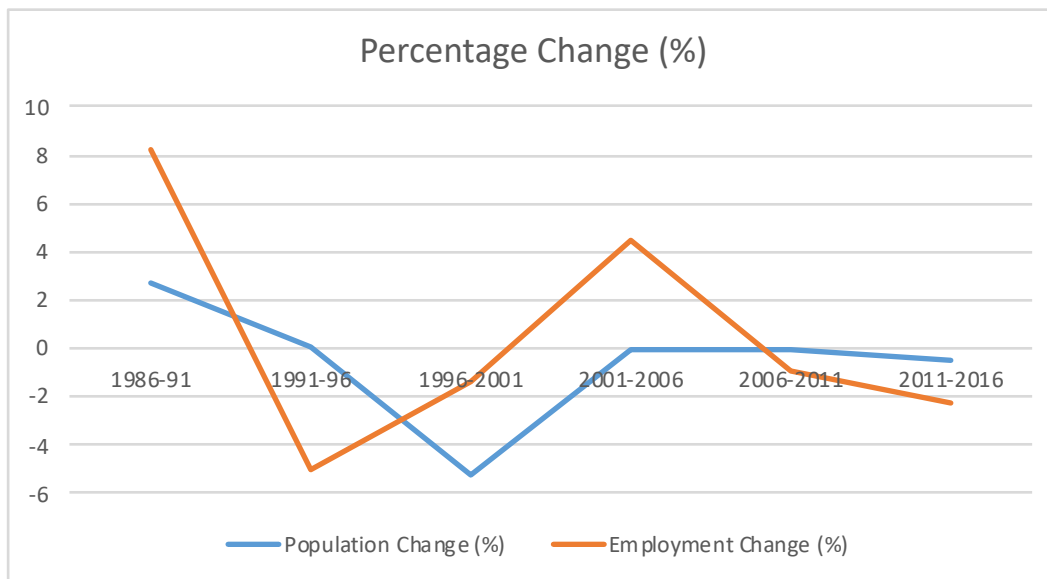
Figure 2: Population Trends in Major Northeastern Ontario Cities



Source: Statistics Canada, Census of Population, various issues.

The declining population closely follows employment changes in the regional economy (Figure 3). Total employment in Northeastern Ontario fluctuated between

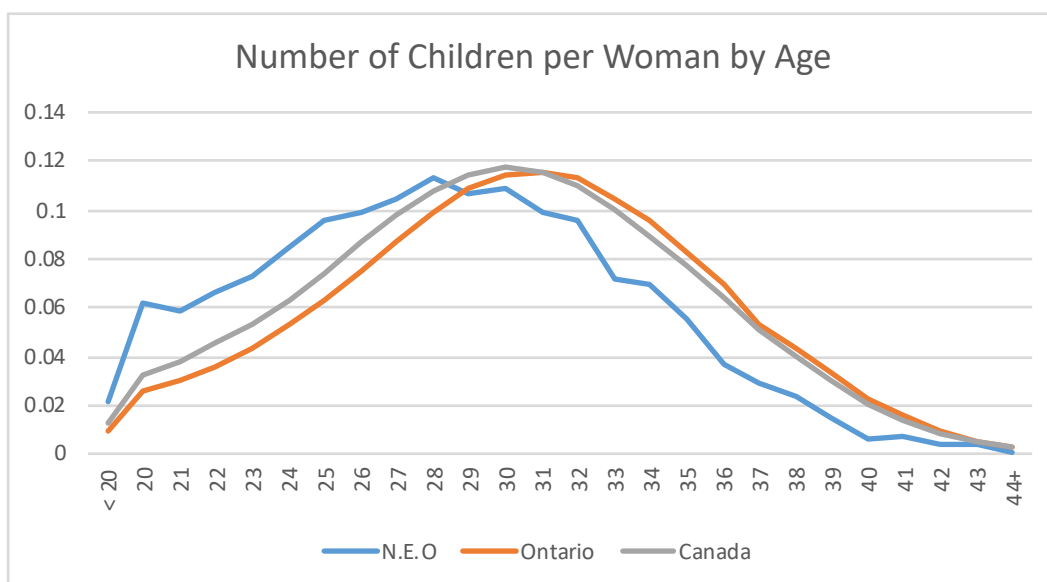
236,355 in 1986 and 250,330 in 2006 but declined to 247,905 in 2011 and to 242,415 in 2015.

Figure 3: Employment & Population Growth/Decline in Northeastern Ontario

Source: Calculated based on Statistics Canada, various censuses, custom tabulation.

Northeastern Ontario's share of the provincial population declined from 6.23 per cent in 1986 to 5.77 per cent in 1991, 4.83 per cent in 2001, 4.29 per cent in 2011, and 4.07 per cent in 2016. The declining population share has happened for two reasons. First, as we will see below, the region has experienced significant out-migration of youth in search of employment opportunities in other parts of Canada. The second factor contributing to slow or negative population change relates to the fact that the total fertility rate in Northeastern Ontario (1.60) has been significantly below the

generational replacement rate of 2.1. The total fertility rate is defined as the average number of children that a woman will have during her lifetime. In Canada, the total fertility rate equaled 1.61 in 2011 compared with 1.55 in Ontario and 1.77 in Northwestern Ontario (Figure 4). As Figure 4 shows, the fertility rate among Northeastern Ontario women age 28 years and younger is higher than the provincial and national levels but is significantly lower than the provincial and national levels for those older than 28.

Figure 4: Number of Children Born per Woman by Age in Northeastern Ontario, Ontario, and Canada in 2011¹

Source: Statistics Canada, 2011, custom tabulation.

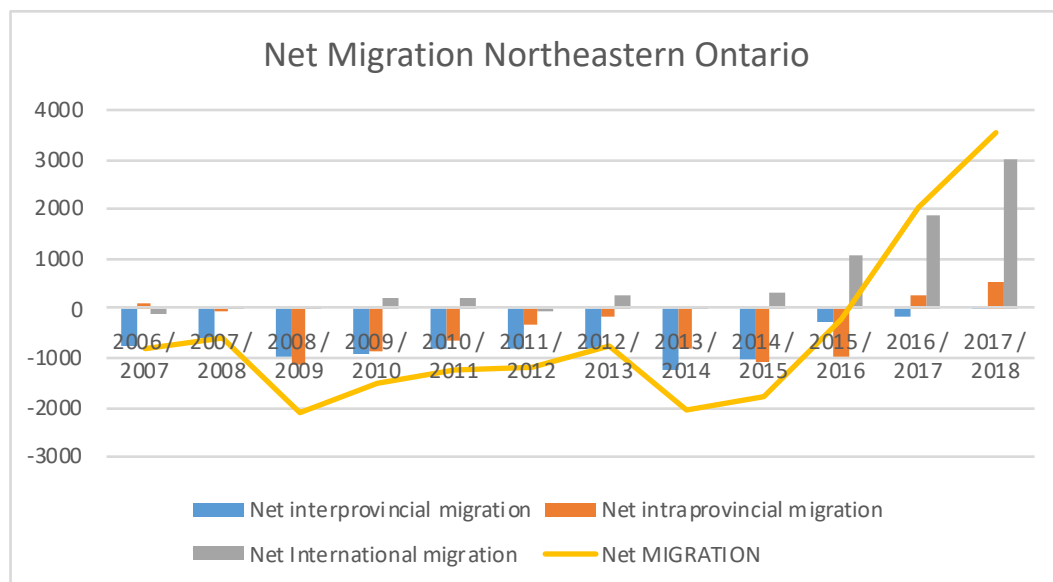
¹ Note that calculating the total fertility rate (which is number of children born to a woman during her lifetime) requires one to add across all the age groups in Figure 4.

There are other factors besides aging of the population and low fertility rate that explain declining regional population. First, Northeastern Ontario has been receiving disproportionately low rates of immigration. Net immigration is defined as the number of immigrants who came minus those who left. However, the number of immigrants in Northeastern Ontario declined from 34,845 in 2001 to 30,565 in 2011 and to 29,390 in 2016 (due to deaths and out-migration of resident immigrants being greater than the arrival of new immigrants).² In other words, the region experienced negative net immigration between 2001 and 2016. This is one of the important factors influencing the declining population. The second and perhaps more important factor relates to out-migration.

Figure 5 shows that Northeastern Ontario experienced significant interprovincial and intraprovincial out-migration

between 2006 and 2016. Interprovincial migration refers to the movement of population from one province to another, and Intraprovincial migration refers to the movement of population from one census division to another within the province. The Ministry of Finance reports that since 2003, net interprovincial migration to Ontario has been negative, largely due to net outflows to Alberta. During the past 30 years, net interprovincial migration into Ontario averaged 2,700 per year. However, this includes the abnormally large inflows from Quebec recorded in the years following the 1980 referendum. When those inflows are excluded, long-term net interprovincial migration to Ontario is modestly negative.³ At the same time, it appears that recent efforts to increase international immigration to the Northeast region have resulted in positive net migration for 2017 and 2018.

Figure 5: Net Migrations Flows in Northeastern Ontario



Source: Author's calculations based on Statistics Canada, table 17-10-0138-01.

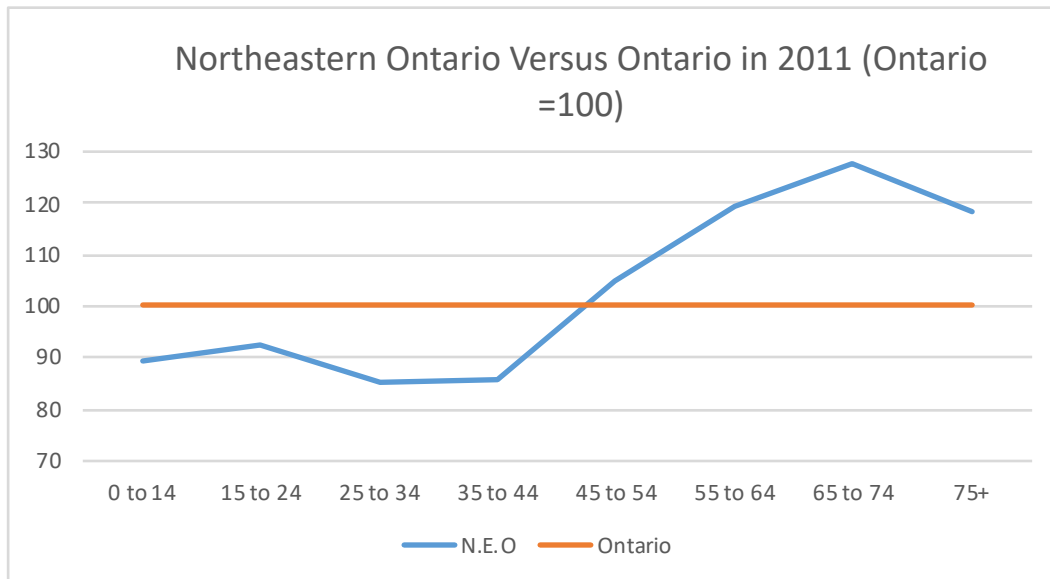
The above demographic trends have resulted in an age distribution of the population in Northeastern Ontario that is different from that of Ontario. As Figure 6 shows, compared

with the provincial average, there is a relatively low share of people younger than 45 years of age and a higher share of older people, including seniors, in Northeastern Ontario.⁴

² According to the census data, net immigration to Ontario between 2001 and 2011 equaled 586,990.

³ Ontario Ministry of Finance, Ontario Population Projections Update based on the 2011 Census 2017-2041 Ontario and Its 49 Census Divisions.

⁴ In Figure 5, the horizontal axis shows different age groups and the vertical axis shows the percentage share of Northeastern Ontario's population in each age group relative to Ontario.

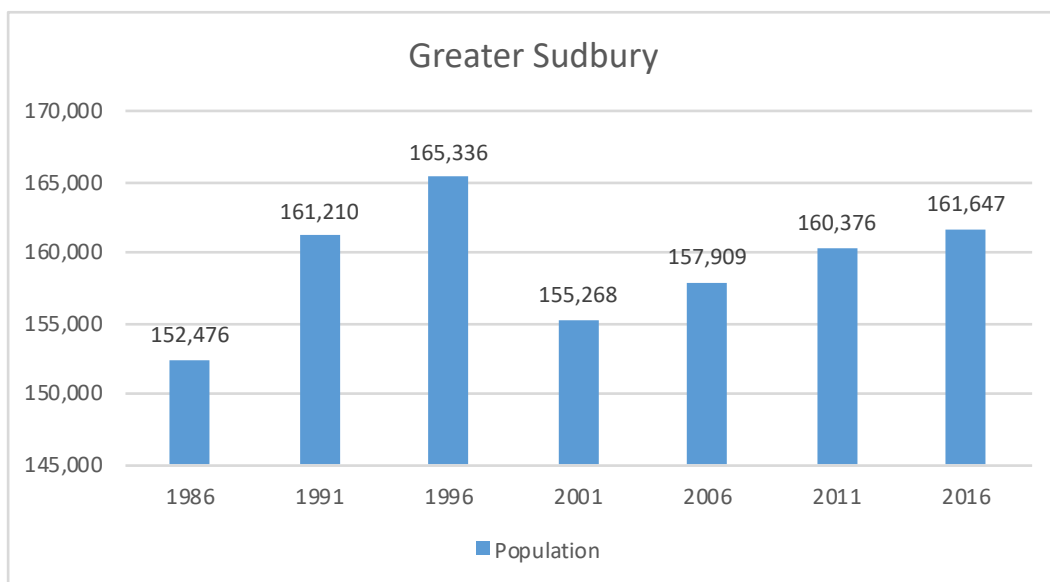
Figure 6: Relative Age Distribution in 2011

Source: Author's calculation based on 2011 National Household Survey, special tabulation.

Population Trends in the City of Greater Sudbury

Greater Sudbury covers 3,238 square kilometres and recorded a population of 161,647 in 2016. It has a population density of 49.5 persons per square kilometre, making it the densest census district in Northern Ontario.

According to Statistics Canada's Census of Population, Greater Sudbury's population grew from 1986 to 1996, and after a sharp decline in 2001, increased again until 2016 (Figure 7).

Figure 7: Population Trends in Greater Sudbury

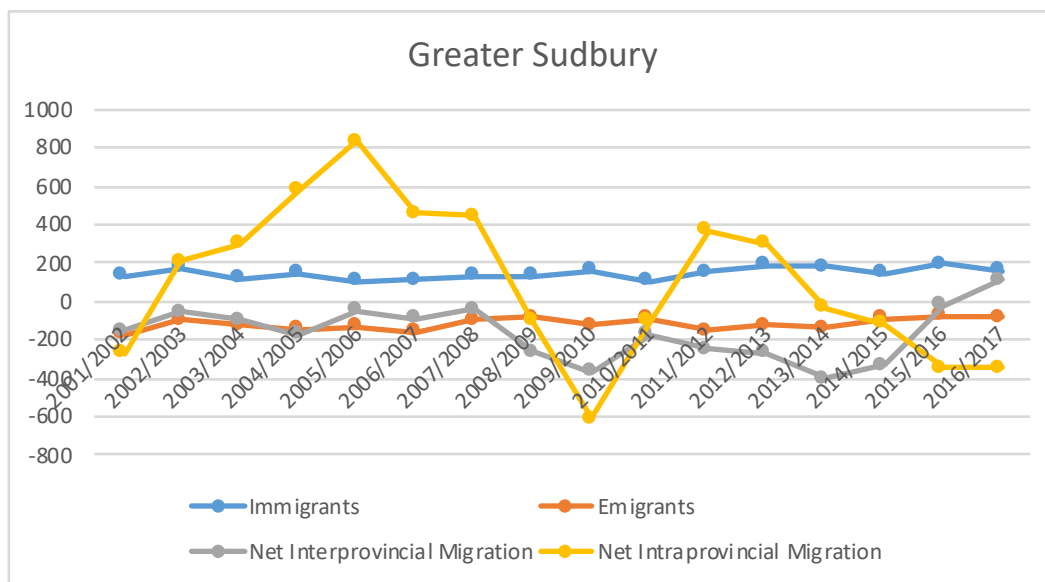
Source: Calculated based on Statistics Canada, various censuses, custom tabulation.

Other factors have contributed to the overall change in the regional population. First, Greater Sudbury has been receiving disproportionately low rates of immigration. Net immigration is defined as the number of immigrants who came minus those who left. Data shows that 2,332 immigrants came to the city between 2001 and 2016 while 1,893 emigrated (Figure 8).

This is one of the important factors influencing the slow population growth during the above period. The second and perhaps more important factor relates to out-migration.

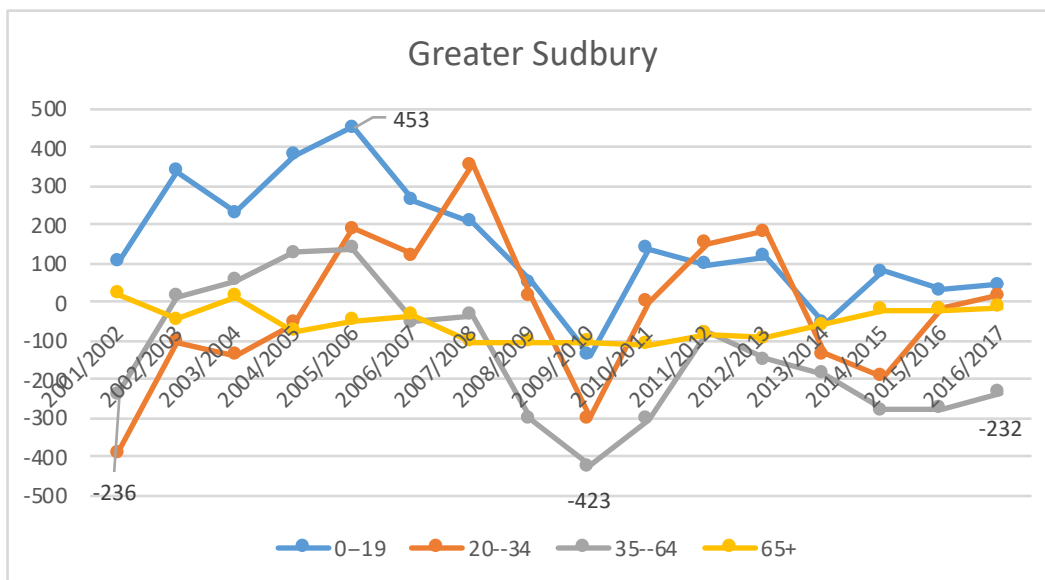
Figure 8 shows that Greater Sudbury experienced interprovincial out-migration, especially during the late 2000s. The majority of those who choose to move appear to move within the province. The largest portion of individuals who out-migrate to other provinces are between the ages of 35 and 64 (Figure 9). Prior to 2010, Greater Sudbury experienced net inflow of individuals younger than age 19. Overall, Sudbury experienced a net inflow of 2,358 people younger than age 19 between 2001 and 2017. On the other hand, the city experienced a net outflow of people between the ages of 20 and 34 (280), 35 and 64 (2,197) and age 65 and older (857) during the period under study.

Figure 8: Net Migration Flows



Source: Author's calculations based on Statistics Canada, CANSIM database, tables 051-0063

Figure 9: Net Migration by Age Group



Source: Author's calculations based on Statistics Canada, CANSIM database, tables 051-0063.

Aging of the Population in Greater Sudbury

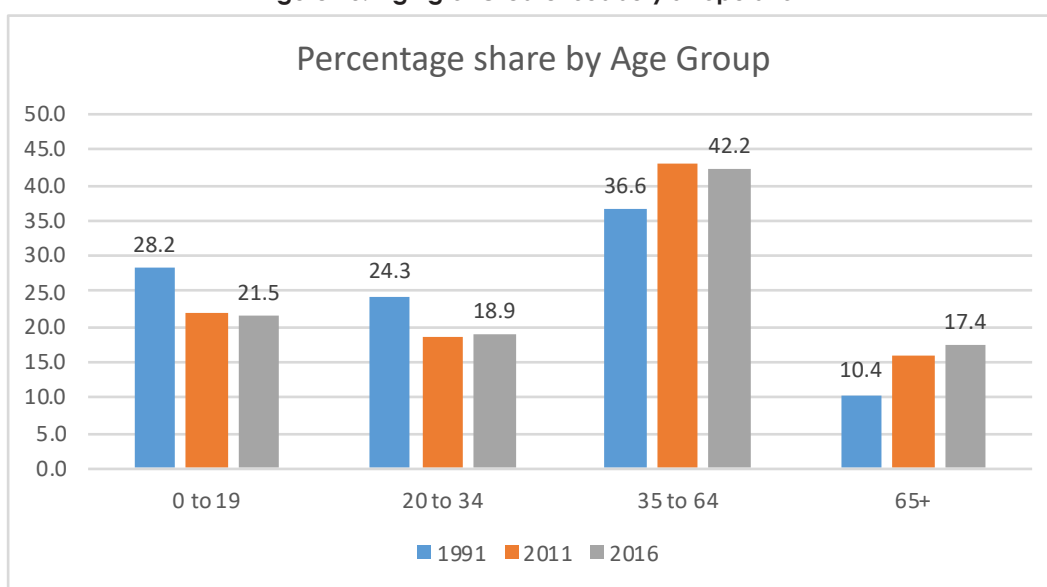
In addition to out-migration and low levels of immigration in the region, rising life expectancy has resulted in the aging of Sudbury's population. At the same time, the large baby-boom generation, born in the two decades following the Second World War, is now beginning to retire. The generations that followed were much smaller, primarily due to a declining fertility rate.

As a result, the share of individuals in Sudbury younger than age 20 has declined from 28.8 per cent in 1991 to 21.5 per cent in 2016, while the share of seniors rose from 10.4 per cent in 1991 to 17.4 per cent in 2016 (Figure 10). During the

same period, the share of individuals between the ages of 20 and 34 declined from 24.3 per cent to 18.9 per cent, while the share of individuals ages 35 to 64 increased from 36.6 per cent to 42.2 per cent.

These demographic changes have had a significant impact on social and economic conditions. Individuals grow older as they move through the life cycle. As a result, Sudbury's population will continue to age in the foreseeable future, with implications for healthcare costs, supply of labour, production capacity, and the ability of the city to stay economically viable.

Figure 10: Aging of Greater Sudbury's Population



Source: Author's calculations based on Statistics Canada, various censuses, custom tabulation.

Linguistic and Cultural Diversity of the Population in Northeastern Ontario and Greater Sudbury

Another aspect of demographic change in Northeastern Ontario and Greater Sudbury relates to the cultural and linguistic diversity of the population (Figure 11). The total Francophone population in Northeastern Ontario declined from 130,085 in 2001 to 114,770 in 2011 but rose to 121,830 in 2016. The total Francophone population in Greater Sudbury rose from 40,005 in 2011 to 43,720 in 2016.

The total Indigenous population in Northeastern Ontario increased from 42,425 in 2001 to 57,715 in 2011 and to 69,510 in 2016. They represented approximately 12.9 per cent of the total population in Northeastern Ontario and 9.5 per cent of the total population in Greater Sudbury in 2016.

The high Indigenous population growth is not solely due to the natural demographic process. According to Statistics

Canada, the traditional demographic components of growth (fertility, mortality, and migration) are not the only factors that have affected the growth of the Indigenous population in Canada. Another phenomenon that has also affected the size, growth, and composition of the Indigenous population in recent years is referred to as a "change in reporting" or "ethnic mobility." Ethnic mobility refers to people changing the reporting of their Indigenous affiliations from a non-Indigenous identity to an Indigenous identity from one census to the next.⁵ The passage of Bill C31 in 1986 has been a factor in this ethnic mobility.

Additionally, there has been a higher participation in the census in recent years. Statistics Canada reports that some First Nations reserves and settlements did not participate

⁵ A. Signer and Rosalinda Costa, "Aboriginal Conditions in Census Metropolitan Areas, 1981-2001," Statistics Canada, 2005.

in the census because enumeration was not permitted, or it was interrupted before completion. In 2006, there were 22 incompletely enumerated reserves, down from 30 in 2001 and 77 in 1996.⁶ Other factors explaining the higher Indigenous population growth include better and more accessible health care leading to a lower mortality rate and a decline in infant mortality.

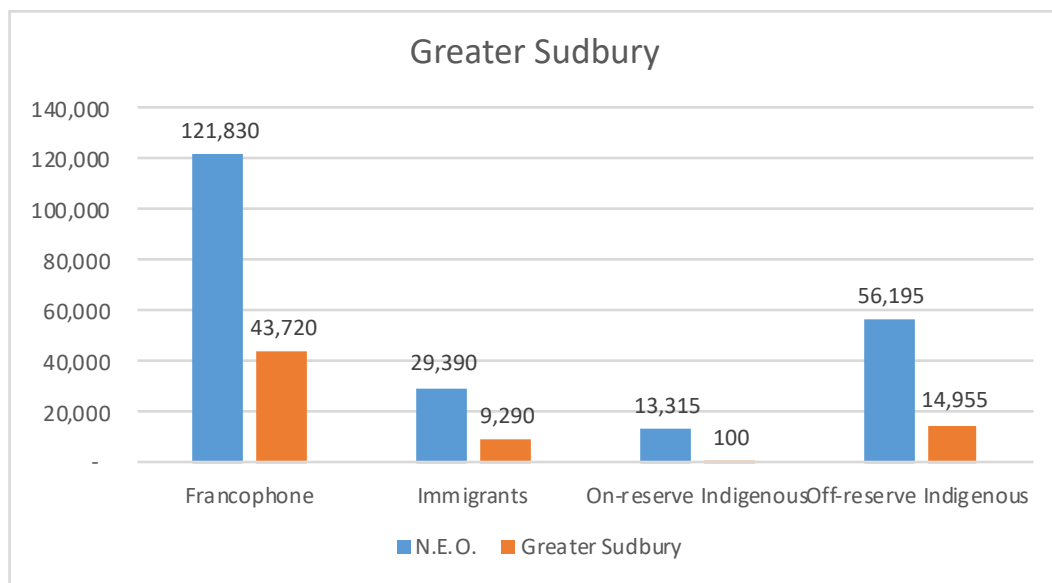
Finally, one of the main factors explaining the rising share of the Indigenous population relates to fertility rate. The rate among Indigenous women has been significantly higher than the regional average. A report by the Ontario Ministry of Health states that: "Fertility is almost exclusively the source of population growth for Aboriginal peoples in Ontario. Provincially, some in-migration of Aboriginal people takes place from other provinces but does not substantially impact population dynamics among Ontario's Aboriginal peoples although the impact may be greater in some urban areas. Although minimal information is directly

available on Aboriginal fertility in Canada, INAC (Indian and Northern Affairs Canada) has reported a total fertility rate (TFR), which is the number of children a woman would have under current prevailing fertility rates, of 2.9 children in 2000 for Registered Indian women. In the same year, the TFR for Canadian women was approximately half that rate at 1.5 children."⁷

In general, the Indigenous population is much younger than the non-Indigenous population. Therefore, Indigenous peoples will be entering the labour market in large numbers as the non-Indigenous population retires. They will represent a significant share of the region's workforce in the coming years.

The immigrant population represented approximately 5.5 percent of Northern Ontario's and 5.8 per cent of Greater Sudbury's total population in 2016. The majority of the immigrant population in Northeastern Ontario live in Greater Sudbury and Algoma District.

Figure 11: Linguistic & Cultural Diversity in Northeastern Ontario and Greater Sudbury in 2016



Source: Author's calculations based on Statistics Canada, 2016 census, custom tabulation.

Population Trends in Urban & Rural Northeastern Ontario

There are many ways to define rural and urban areas. The term rural is intuitively understood as an area with low population concentration dispersed at a low density. On the other hand, the term urban is often understood as a place with high population concentration at a high density. This intuitive understanding is the basis for Statistics Canada's approach to defining an urban area as having

a population of at least 1,000 and a density of 400 or more people per square kilometre.⁸ Statistics Canada offers an alternative and perhaps more appropriate definition of rural areas as "rural and small towns" as opposed to "large urban centres." This definition is based on the commuting flows between different areas. It defines urban regions as including all census metropolitan areas (CMAs) and census

⁶ Ibid

⁷ Ontario Ministry of Health and Long-Term Care, Health Analytic Branch, "First Nations Peoples in Ontario: A Demographic Portrait," January 2009, 15.

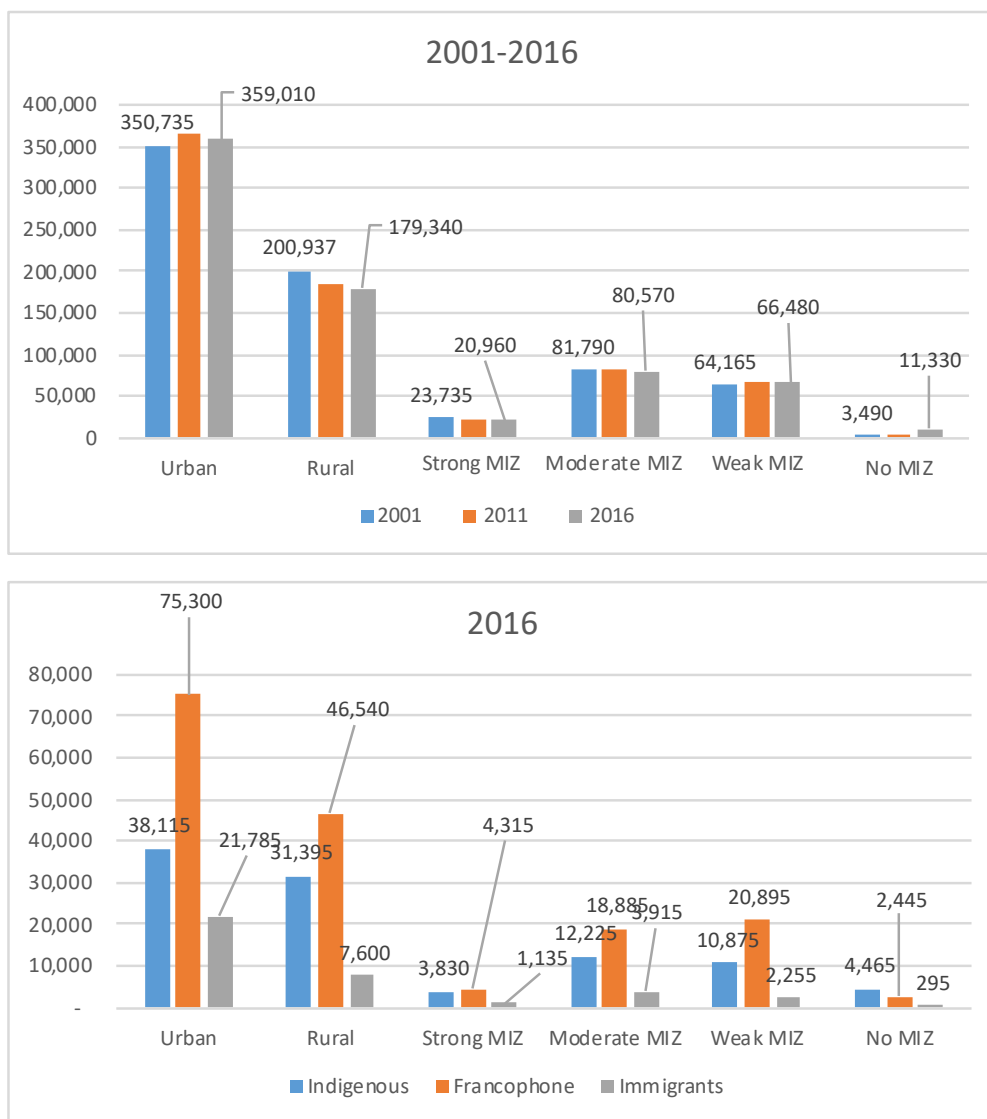
⁸ One problem with this definition is that it can lead to misleading identification of rural and urban areas. Based on this definition, Attawapiskat Indian Reserve in James Bay area is classified as an urban area.

agglomerations (CAs). Both CMAs and CAs include the total population of neighbouring census subdivisions (CSDs). Based on the above definition of an urban region, rural and small town (RST) areas are defined as non-CMA/CA areas. RSTs are further divided into four types of zones based on the degree of influence that large urban centres have on them.⁹ This is measured by the percentage of people who commute to work in an urban centre.

Using the above definition, Figure 12 shows the distribution of Northeastern Ontario's population among rural and urban areas. Note that all of Greater Sudbury is designated as an urban area, therefore this section will

focus on Northeastern Ontario only. Approximately 66.7 per cent of Northeastern Ontario's population live in urban areas. The rest (33.3 per cent) live in rural areas. The majority (54.8 per cent) of the Indigenous population live in urban areas. These are mostly off-reserve Indigenous peoples. Approximately 45.2 per cent of the Indigenous population live in rural areas. Among them, 48.9 per cent live in relatively remote areas with a weak or no link to urban centres. These are mostly on-reserve Indigenous peoples living in remote Northeastern Ontario regions. Approximately 61.8 per cent of the Francophone population and 74.1 per cent of the immigrant population live in urban centres.

Figure 12: Population in Urban and Rural Areas in Northeastern Ontario



Source: Author's calculations based on Statistics Canada, various censuses, custom tabulation.

⁹ For a definition of various zones, see Roland Beshiri and Jiaosheng He, Rural and Small Town Canada Analysis Bulletin 8, No. 2 (June 2009): Catalogue No. 21-006-X.

Demographic Change in Greater Sudbury: The Next Three Decades

This part of the study provides population projections for Greater Sudbury, both for the total population and for the Indigenous population. Estimates for the former are based on projections by the Ontario Ministry of Finance and estimates for the latter are based on Northern Ontario's Demographic Model, developed by the author. The model is based on the Cohort Component method.¹⁰ The base year data for the projection are from Statistics Canada's 2016 census.

A few words regarding the Ministry of Finance projections are in order. First, the Ministry's estimated parameters for fertility at the census division level were modelled to maintain regional differences. The census division-to-province ratio for mean age at fertility in the most recent period was assumed to remain constant.

Second, the Ministry's mortality estimates at the census division level were developed using a ratio methodology. The government applied the Ontario-level mortality structure to each census division's age structure during the most recent three years of comparable data and calculated the expected number of deaths. It then

compared these estimates to the actual annual number of deaths in each census division during this period to create ratios of actual-to-expected numbers of deaths. These ratios were then multiplied by provincial age-specific death rates to create death rates for each census division. These rates were then applied to the corresponding census division populations to derive the number of deaths for each census division.

Third, the Ministry uses population estimates based on the 2016 census adjusted for net undercoverage. Specifically, the projections use Statistics Canada's preliminary July 1, 2017 postcensal population estimates as a base.

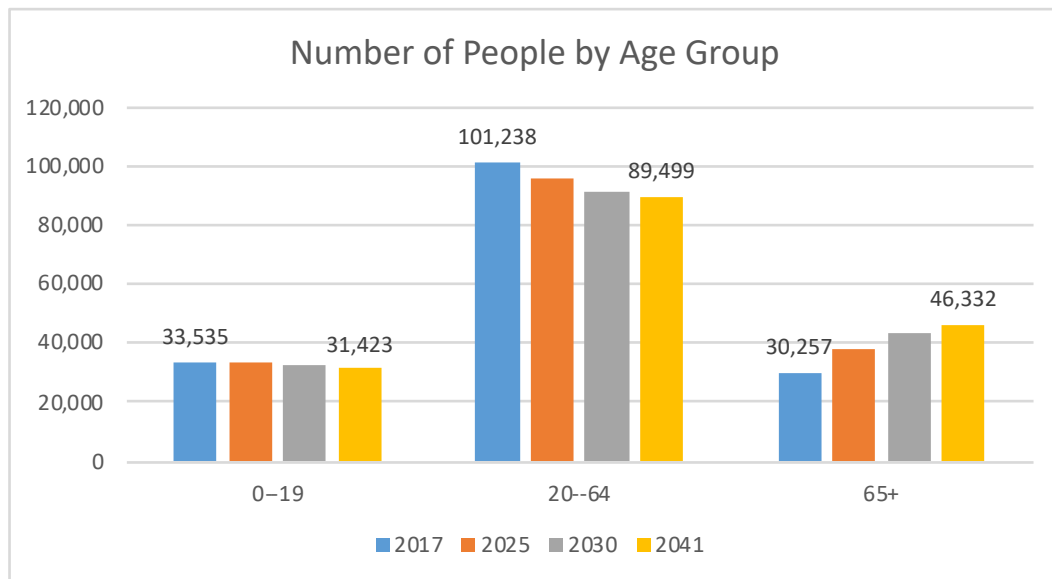
Based on the Ministry's projections, Greater Sudbury's population is expected to rise slightly from 165,030 in 2017 to 167,254 in 2041 (Table 1). The continuing aging of the regional population is also evident (Figure 13), with the share of individuals ages 20 to 64 expected to decline from 61.3 per cent in 2017 to 53.5 per cent in 2041. Similarly, the share of individuals age 65 and older is expected to rise from 18.3 per cent in 2017 to 27.7 per cent in 2041.

¹⁰ For a complete discussion of this model, see B. Moazzami, "It's What You Know (and Where You Can Go): Human Capital and Agglomeration Effects on Demographic Trends in Northern Ontario," (Thunder Bay, ON: Northern Policy Institute, 2015).

Table 1: Population Projections by Age Group, Greater Sudbury, 2015-2030

Year	0--19	20--44	45--64	65+	Total
2017	33,535	53,906	47,332	30,257	165,030
2018	33,301	54,065	46,910	31,227	165,503
2019	33,216	54,052	46,392	32,185	165,845
2020	33,181	53,897	45,817	33,247	166,142
2021	33,179	53,735	45,254	34,213	166,381
2022	33,180	53,557	44,573	35,251	166,561
2023	33,193	53,330	43,852	36,353	166,728
2024	33,198	53,110	43,201	37,370	166,879
2025	33,208	52,809	42,636	38,360	167,013
2026	33,160	52,489	42,022	39,458	167,129
2027	33,075	52,327	41,247	40,578	167,227
2028	32,983	52,085	40,598	41,639	167,305
2029	32,820	51,917	40,030	42,597	167,364
2030	32,644	51,730	39,562	43,471	167,407
2031	32,609	51,373	39,336	44,116	167,434
2032	32,474	51,134	39,404	44,440	167,452
2033	32,368	50,876	39,500	44,715	167,459
2034	32,254	50,558	39,597	45,047	167,456
2035	32,122	50,130	39,865	45,324	167,441
2036	31,979	49,753	40,043	45,643	167,418
2037	31,806	49,397	40,297	45,888	167,388
2038	31,700	49,035	40,560	46,061	167,356
2039	31,599	48,704	40,861	46,159	167,323
2040	31,507	48,402	41,095	46,284	167,288
2041	31,423	48,144	41,355	46,332	167,254

Figure 13: Population Projections by Age Group, Greater Sudbury, 2017-2041



Source: Author's calculations based on the Ministry of Finance population projections.

Indigenous Population Projection

In making projections for the Indigenous population in Greater Sudbury out to 2030, we assume zero net migration of Indigenous peoples during the forecast period, since the existing evidence suggests there is relatively low mobility among the Indigenous population in the region.¹¹ The fertility rate for the Indigenous population is assumed to be equal to that of rural Northwestern Ontario and the mortality rate is assumed to be equal to that of the general population of Canada based on the 2011 census.

Based on these assumptions, Table 2 and Figure 14 show that the Indigenous population in Greater Sudbury is expected to increase from 15,010 in 2017 to 17,791 in 2030,

a growth rate of approximately 18.5 per cent. The number of individuals younger than age 20 is expected to increase from 4,635 in 2017 to 5,494 in 2030, while working-age Indigenous peoples are expected to rise from 9,215 in 2017 to 9,511 in 2030, an increase of approximately 3.2 per cent. The number of individuals age 65 and older is expected to rise from 1,160 in 2017 to 2,786 in 2030.

The Indigenous population's share of the region's total population is expected to increase from 9.5 per cent in 2017 to 10.6 per cent in 2030. The share of working-age Indigenous peoples (those ages 20 to 64) is expected to increase from 9.1 per cent in 2017 to 10.6 per cent in 2030.

¹¹ Mobility is often related to the level of educational achievement. According to the 2016 census, Aboriginal Population Profile, interprovincial migration among the Indigenous population during a one-year period (2015 to 2016) was only 1.1 per cent. Also, intraprovincial migration during the same one-year period was 5 per cent. When they moved, they mostly moved within their census division.

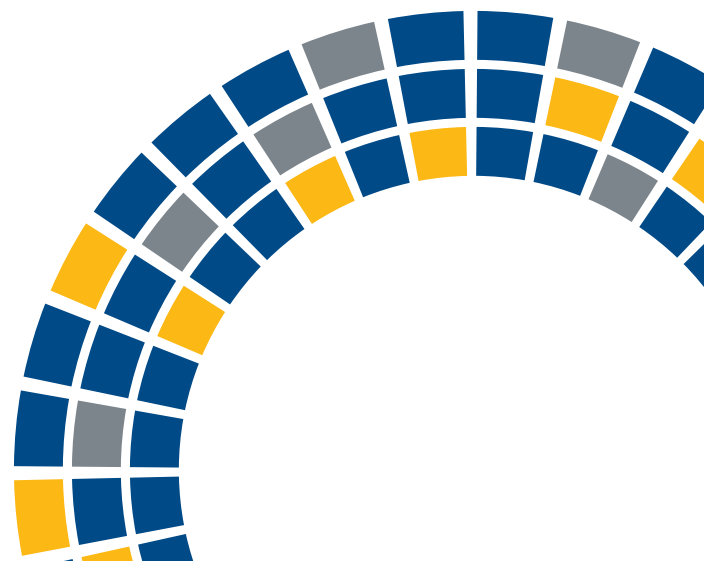
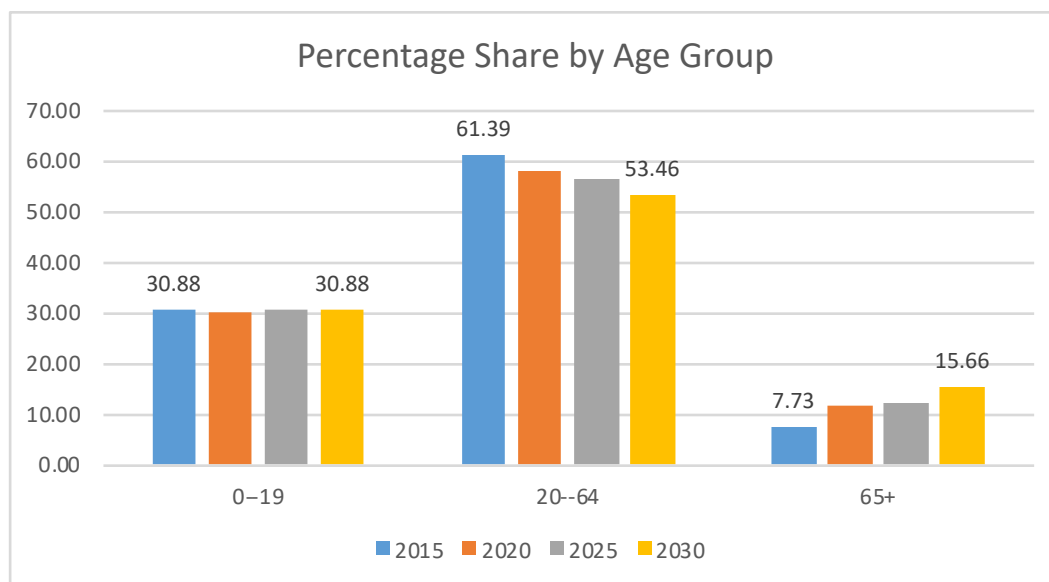


Table 2: Projected Indigenous Population, Greater Sudbury, 2015-2030

Age Group	2017	2020	2025	2030
0 - 4 years	1,040	1,409	1,551	1,512
5 - 9 years	1,140	1,046	1,402	1,543
10 - 14 years	1,205	1,208	1,044	1,399
15 - 19 years	1,250	1,220	1,203	1,040
20 - 24 years	1,210	1,221	1,209	1,192
25 - 29 years	1,175	1,200	1,208	1,196
30 - 34 years	895	1,057	1,188	1,197
35 - 39 years	960	942	1,046	1,175
40 - 44 years	1,030	936	931	1,034
45 - 49 years	1,005	995	919	915
50 - 54 years	1,150	1,054	971	897
55 - 59 years	955	1,060	1,020	939
60 - 64 years	835	913	1,003	965
65 - 69 years	535	717	842	926
70 - 74 years	220	424	634	742
75 - 79 years	195	180	353	531
80 + years	210	581	272	587
Total	15,010	16,163	16,797	17,791

Source: Author's calculation based on Northern Ontario's population projection model developed by the author.

Figure 14: Percentage Share of Indigenous Population by Age Group, Greater Sudbury

Source: Author's calculation based on Northern Ontario's population projection model developed by the author.

Greater Sudbury and Northeastern Ontario's Labour Force: Past, Present, and Future Trends

Demographic changes have a direct impact on the supply side of the economy through their influence on the labour force. Population aging and a declining share of working-age people can seriously restrain future economic development unless productivity growth accelerates or steps are taken to increase participation of older workers, youth, and other underrepresented groups in the labour force.

This report has shown that the Indigenous population represents a growing segment of the region's total population and its working-age population. A significant gap exists, however, between the level of educational achievement of Indigenous individuals and that of the general population, resulting in a severe labour market outcome disparity that affects the current and future

productive capacity of Northeastern Ontario's labour force.

Table 3 and Figure 15 show labour market trends among the population ages 15 to 64 in Greater Sudbury. As the table shows, both the total working-age population and the labour force rose in Greater Sudbury while they declined slightly in Northeastern Ontario between 2001 and 2016. Labour force participation and employment rates increased among men and women during the same period. Similarly, the unemployment rate declined for men and women between 2001 and 2016.

Labour force participation, employment, and unemployment rates for Francophones, immigrants and Indigenous peoples follow the same trends between 2001 and 2016.

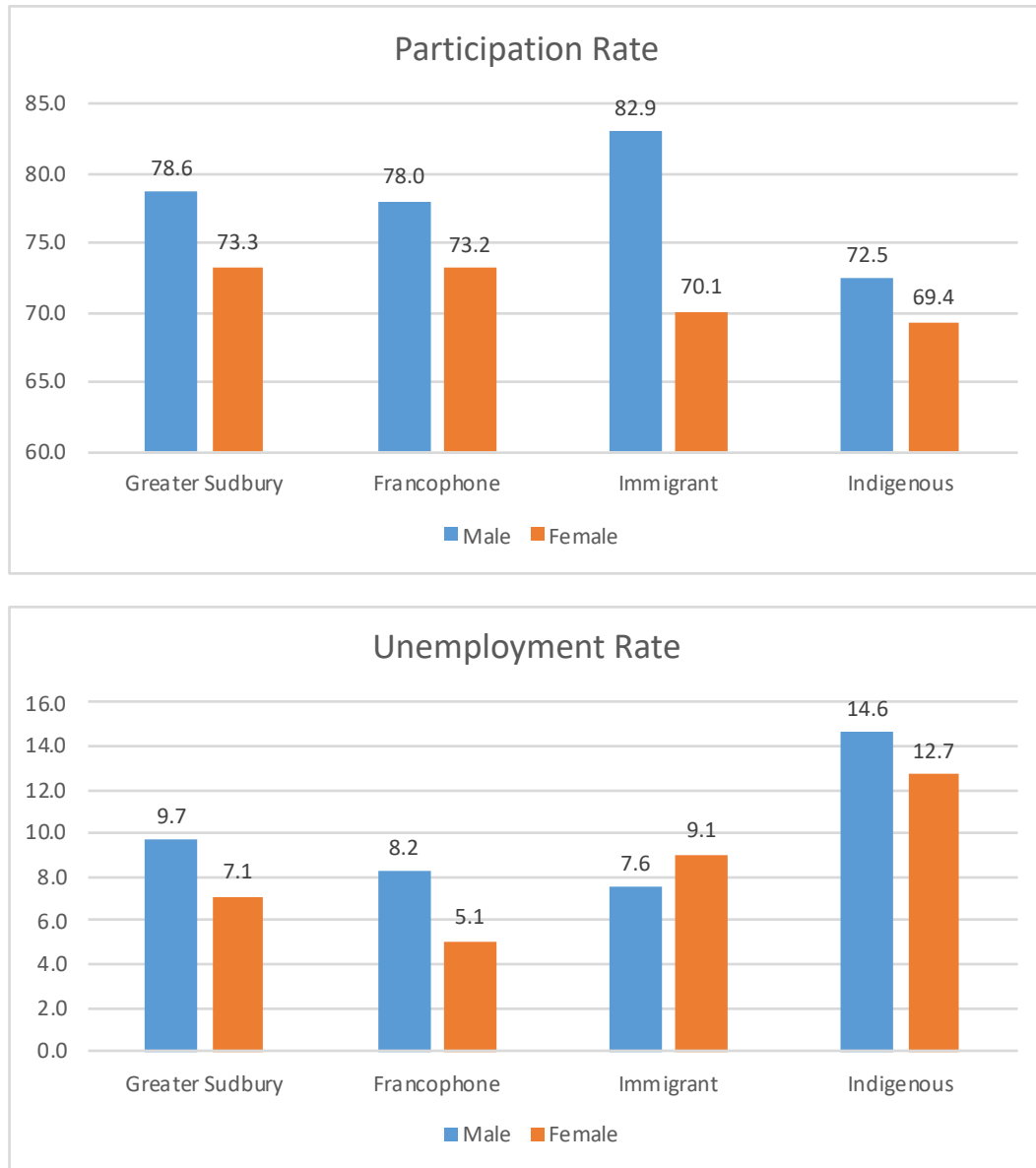
Table 3: Labour Market Trends, Population 15 to 64 Years of Age, Northeastern Ontario & Greater Sudbury, 2001-2016

Labour Market Outcome	Men	Men	Women	Women
Northeastern Ontario	2001	2016	2001	2016
Total population 15 to 64 years of age	179,755	173,055	185,265	176,265
In the labour force	137,045	130,865	123,265	124,360
Employed	122,290	116,340	112,320	114,965
Unemployed	14,760	14,520	10,945	9,400
Not in the labour force	42,705	42,200	61,995	51,905
Participation rate	76.20	75.62	66.53	70.55
Employment rate	68.00	67.23	60.63	65.22
Unemployment rate	10.80	11.10	8.88	7.56
Greater Sudbury	2001	2016	2001	2016
Total population 15 to 64 years of age	51,450	52,415	53,565	53,680
In the labour force	39,445	41,200	37,070	39,345
Employed	35,500	37,195	33,975	36,545
Unemployed	3,950	4,000	3,095	2,800
Not in the labour force	12,000	11,220	16,495	14,330
Participation rate	76.7	78.60	69.21	73.30
Employment rate	69	70.96	63.43	68.08
Unemployment rate	10	9.71	8.35	7.12

Labour Market Outcome	Men	Men	Women	Women
Francophone Population	2001	2016	2001	2016
Total population 15 to 64 years of age	14,460	13,640	15,950	14,925
In the labour force	10,910	10,635	10,735	10,925
Employed	9,850	9,755	9,965	10,370
Unemployed	1,065	875	765	555
Not in the labour force	3,545	3,005	5,215	3,993
Participation rate	75.5	78.0	67.3	73.2
Employment rate	68.1	71.5	62.5	69.5
Unemployment rate	9.8	8.2	7.1	5.1
Immigrant Population	2001	2016	2001	2016
Total population 15 to 64 years of age	3,165	2,315	3,150	2,440
In the labour force	2,310	1,920	2,035	1,710
Employed	2,130	1,780	1,940	1,550
Unemployed	180	145	100	155
Not in the labour force	860	390	1,110	730
Participation rate	72.8	82.9	64.6	70.1
Employment rate	67.1	76.9	61.6	63.5
Unemployment rate	7.8	7.6	4.9	9.1
Indigenous Population				
Total population 15 to 64 years of age	2,470	5,100	2,630	5,385
In the labour force	1,715	3,695	1,555	3,735
Employed	1,340	3,155	1,285	3,260
Unemployed	370	540	270	475
Not in the labour force	760	1,410	1,070	1,640
Participation rate	69.4	72.5	59.1	69.4
Employment rate	54.3	61.9	48.9	60.5
Unemployment rate	21.6	14.6	17.4	12.7

Source: Author's calculations based on Statistics Canada, various censuses, custom tabulation

Figure 15: Labour Force Participation and Unemployment Rates in Population 15 to 64 Years of Age, Greater Sudbury, 2016



Source: Author's calculations based on Statistics Canada, various censuses, custom tabulation.

Figure 15 shows that the labour force participation rate has been lower and the unemployment rate higher for the Indigenous labour force. In fact, the lower labour force participation rate is partly attributable to the high unemployment rate among the Indigenous workforce. It is also partly related to the fact that the level of educational attainment of the Indigenous labour force is below the regional average. Records show that per-student education funding of on-reserve Indigenous primary and secondary schools has been significantly lower than the

provincial average in Ontario.¹² Lack of adequate funding is partly responsible for the lower level of educational achievement of the Indigenous population. We will estimate the human capital composition index for the Indigenous labour force later in this report.

The average employment income of those who worked in Greater Sudbury in 2015 equaled \$49,603 compared with \$53,844 for immigrants, \$44,213 for Indigenous peoples, and \$49,850 for Francophones. The average employment income in Northeastern Ontario equaled \$45,283 in 2015.

¹² Office of the Parliamentary Budget Officer, "Federal Spending on Primary and Secondary Education on First Nations Reserves," December 6, 2016. www.pbo-dpb.gc.ca

Size and Composition of the Future Labour Force

To forecast the future labour force in Greater Sudbury, we use detailed population projections along with information regarding participation rates for men and women in different age groups. We have assumed that the participation rates during the projection period stay constant at their 2016 level. Different assumptions regarding the participation rates would alter the labour force estimates, but only to a limited extent. The main determinants of the future labour force are the size and age distribution of the population in each jurisdiction.

Table 4 provides labour supply projections for Greater Sudbury. The projections show that the labour force in the City is expected to decline from 83,674 in 2017 to 75,855 in 2030 – a decrease of approximately 9.3 per cent. During

the same period, the Indigenous labour force is expected to increase from 7,421 to 7,682 – a rise of approximately 3.5 per cent. As a result, the share of Indigenous peoples in the total regional labour force is expected to increase from 8.9 per cent in 2017 to 10.1 per cent in 2030. What are the implications of the declining labour force for the future economic performance of Greater Sudbury and Northeastern Ontario? What are the implications of the rising share of the Indigenous labour force? It is known that the level of educational achievement is lower among the Indigenous population. How would this affect the human capital composition of the regional labour force in the coming years? We will try to answer some of these questions in the next part of this report.

Table 4: Projected Labour Supply, Total and Indigenous, Greater Sudbury

Year	Total Labour Force	Indigenous Labour Force	Indigenous Share (%)
2017	83,674	7,421	8.87
2020	82,172	7,514	9.14
2025	79,181	7,587	9.58
2030	75,855	7,682	9.86

Source: Author's calculations based on his population projections

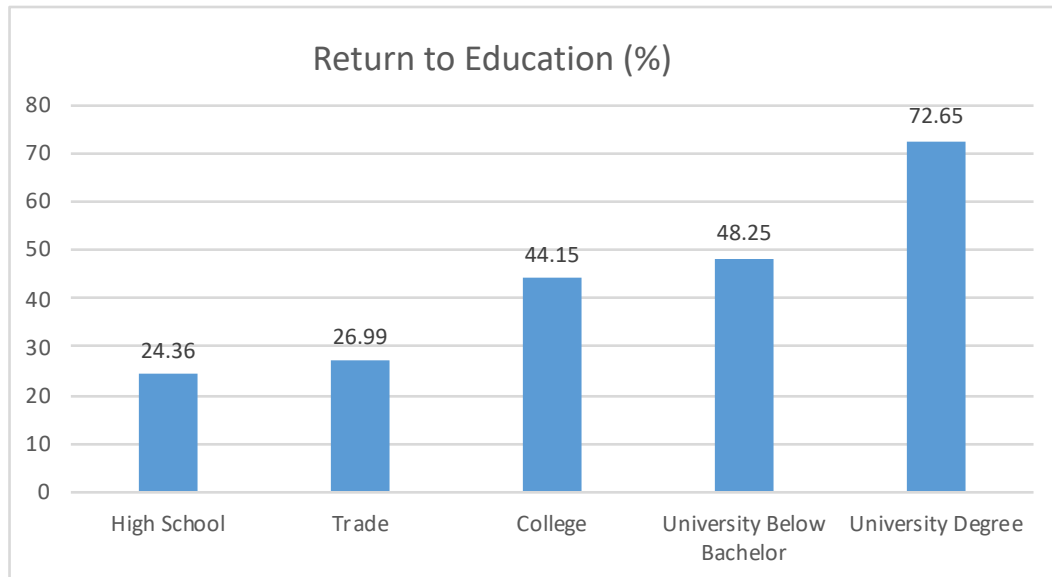
Productivity and Human Capital Composition of the Workforce in Greater Sudbury and Northeastern Ontario

Productivity growth is directly linked to the human capital composition of the workforce. We define human capital as the stock of knowledge, skills, and abilities embodied in individuals that directly affects their level of productivity. Human capital includes skills and knowledge acquired through education and experience. Investing in human capital represents an avenue through which Northern Ontario can enhance productivity and minimize the impact of the declining labour force.

In order to estimate the human capital composition of the regional workforce, one needs to specify and measure a

proxy for human capital that also reflects and incorporates a measure of productivity of the workforce in each of the districts in Northeastern Ontario. To obtain such an index, we first estimate a standard earnings model using the 2006 census microdata file.¹³ We used data pertaining to all working Canadians between the ages of 15 and 64 who were not attending school and whose employment earnings were greater than \$1,000 and less than \$1 million. Those with less than a high school diploma were the benchmark or reference group. The estimated return to schooling coefficients are shown in Figure 16.

¹³ The earnings model is as follows: $\ln Wage = \alpha + \sum \beta_i S_i + X_i \delta_i + \epsilon_i$, where S_i is the highest level of schooling, X_i is other control variables (which include age categories, marital status, etc.), and ϵ_i is an error term.

Figure 16: Return to Education in Canada (%)

Source: Author's estimates using 2006 census microdata files

The estimated return to schooling coefficients show the increased earnings, compared with the reference group, associated with different levels of education in Canada. Therefore, they represent the average rate of return to schooling at the national level. For example, obtaining a high school diploma increases a person's earnings by 24.4 per cent above the earnings of those without a high school diploma. Similarly, obtaining a trade or college diploma increases earnings by 27.0 per cent and 44.1 per cent respectively. A university degree increases earnings by an average of approximately 72.6 per cent. The return to schooling estimates reflect higher productivity resulting from an increased level of education. The estimated return to education coefficients increase as the level of schooling rises, reflecting higher earnings commensurate with higher productivity as the level of education increases.

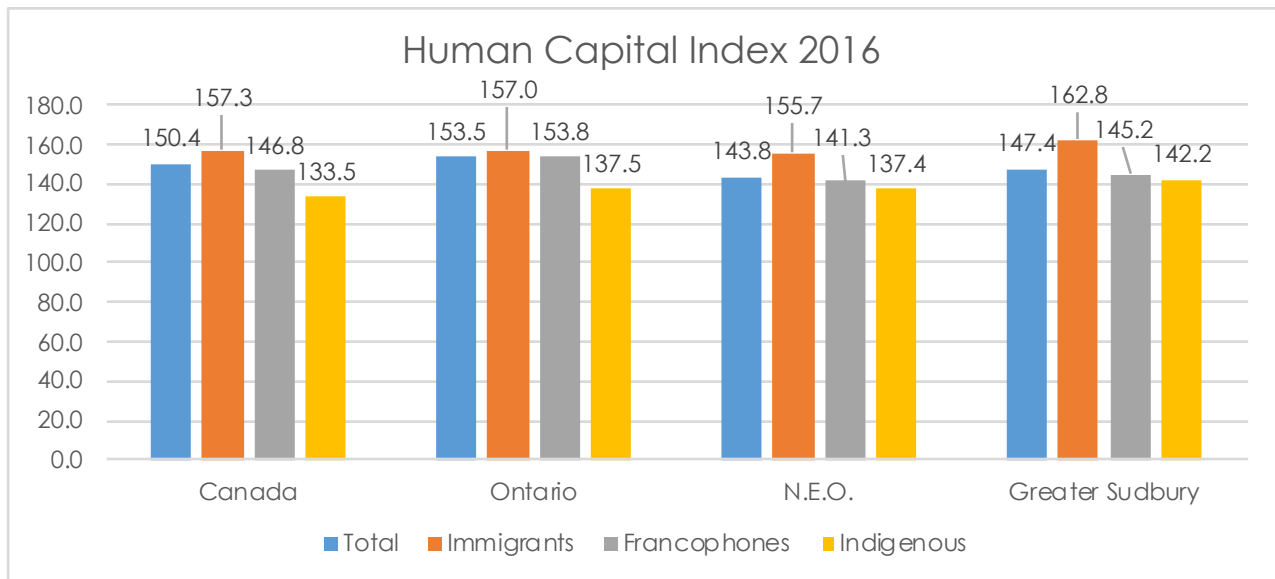
Then, we use the estimated return to schooling coefficients as weights to calculate a weighted average index of the share of individuals with different levels of schooling for various regions.¹⁴ The estimated index ranges from 100 if none of the area's residents have completed high school to approximately 200 if all residents have obtained a university degree.

The resulting index provides us with an estimate of the total employment and earnings potential in the region based on educational attainment. The index also allows

us to effectively compare across different regions. A higher human capital index indicates a higher stock of educational attainment, knowledge, skills, and abilities for the region in question, therefore resulting in higher earnings potential. Results are shown in Figure 17.

The human capital index in Northeastern Ontario is below that of both Ontario and Canada. The total index is higher for Greater Sudbury than that of Northeastern Ontario. The human capital composition of the Indigenous population is generally lower than that of the general population, reflecting a lower level of educational achievement. The index for the prime working-age Indigenous population in Ontario equals 137.5, which is the same as the index for Northeastern Ontario but is lower than the index for Greater Sudbury. The average index for Sudbury's Indigenous population is approximately 5.2 points lower than that of the total regional population. We note that the human capital index for the Indigenous population in Northeastern Ontario (137.4) is greater than the index for Northwestern Ontario (126.1). A possible explanation for this could be due to better access to education due to transportation differences, such as more all-season highway grids, the operation of Ontario Northland Transportation Commission (ONTC) in Northeastern Ontario, as well as the number of regularly serviced airports.

¹⁴ $HCI = \exp(\sum b_i \cdot S_i \text{ shares})$, where HCI stands for human capital index, exp stands for exponential, and S_i shares stand for share of the population ages 15 to 64 with S_i level of education in a given CSD. The formulation of the human capital measure is based on R.E. Hall and C.I. Jones, "Why Do Some Countries Produce So Much More Output per Worker than Others?," *Quarterly Journal of Economics* 114 (1) (1999): 83–116. Also see Francesco Caselli, "Accounting for Cross-Country Income Differences," unpublished first draft (November 2003).

Figure 17: Human Capital Index for Prime Working-age Population (25-64)

Source: Author's estimates based on Statistics Canada, 2016 census, special tabulation

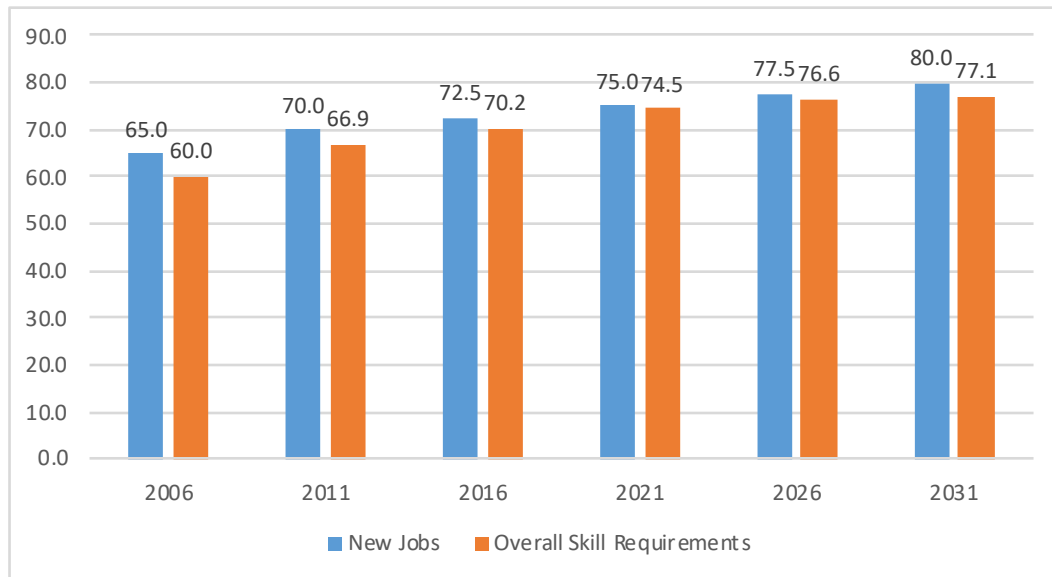
A Perfect Storm: Declining Labour Supply and Labour Productivity in Northeastern Ontario

The declining supply of labour and low labour productivity in Northeastern Ontario are only half of the bad news. Recent technological advances and the emergence of the knowledge economy have changed the requirements of the labour market. Various studies suggest that by 2031, approximately 80.0 per cent of the workforce must have postsecondary credentials such as an apprenticeship, college diploma, or university degree. Currently, 72.5 per cent of the new jobs and an average of 70.2 per cent of all

jobs require some postsecondary credentials.¹⁵ Based on various studies by the Ontario Ministry of Education, Human Resources and Skills Development Canada, BC Ministry of Skills, Training and Education, Ministry of Advanced Education and Labour Market Development in British Columbia and other government agencies, Miner Management Consultants provides estimates of the percentage of new jobs requiring postsecondary education in the coming years (Figure 18).

¹⁵ Miner Management Consultants, 'Ontario's Labour Market Future: People Without Jobs, Jobs Without People,' February 2010.

Figure 18: Percentage of Jobs in Ontario Requiring Postsecondary Education

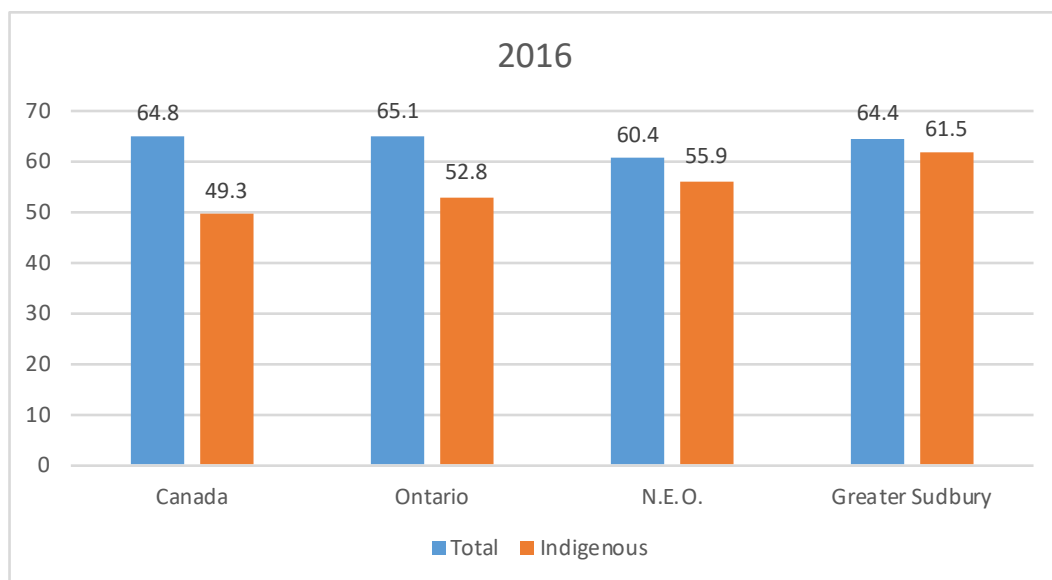


Source: Miner Management Consultants, 'Ontario's Labour Market Future: People Without Jobs, Jobs Without People,' February 2010.

What is the actual skill availability of Northern Ontario's labour force at the present time? Using the 2016 census and focusing on the prime working-age population ages 25 to 64, Figure 19 shows the percentage of the regional labour force who have postsecondary credentials. The skill levels of the prime working-age population in Northeastern Ontario regions are lower than the skill levels of both Ontario

and Canada. The average skill level in Northeastern Ontario is also significantly below the current estimated skill requirements of approximately 70.2 per cent of all jobs (Figure 18). Focusing on the prime working-age Indigenous workforce, Figure 19 shows that their skill level lags behind the current and future job requirements.

Figure 19: Percentage of the Labour Force Ages 25 to 64 with Postsecondary Credentials



Source: Author's calculations based on 2016 census, special tabulations.

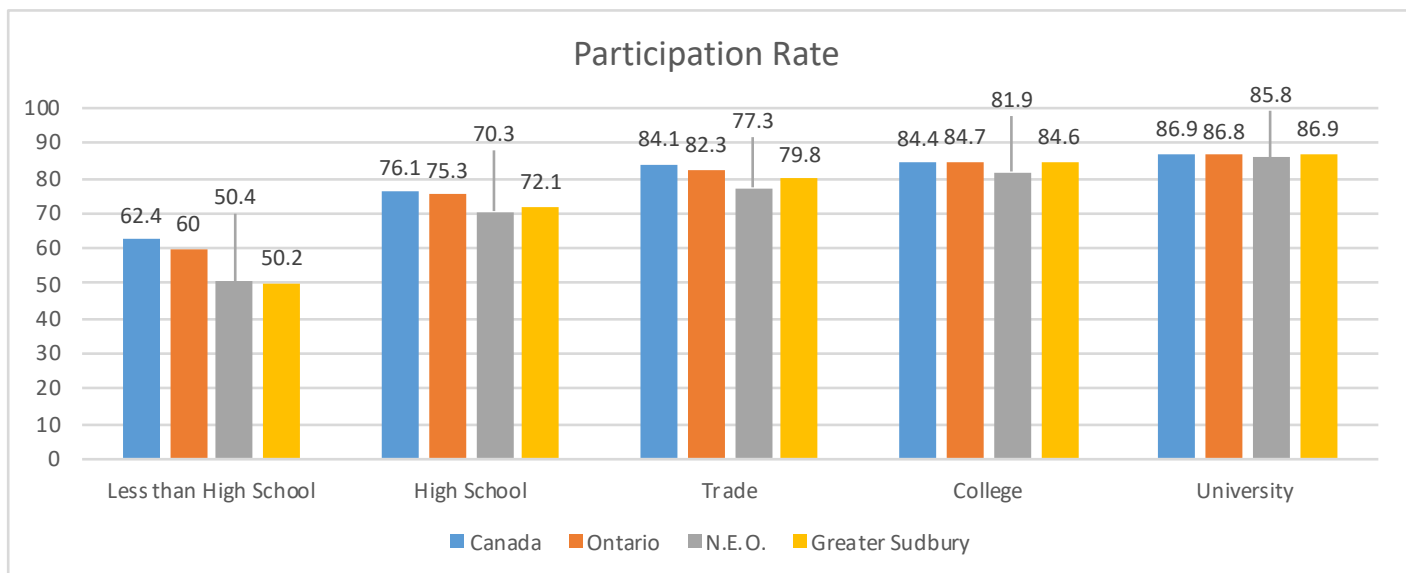
Given that the Indigenous labour force will account for a significant share of Northeastern Ontario's future workforce, it is vital to the social and economic viability of the region to adopt education policies that enable this growing segment of the regional labour force to meet the requirements of the future labour market.

Does the level of skills affect labour market performance (i.e., likelihood of employment, participation, and unemployment rates)? Figure 20 shows the likelihood of participation, employment, and unemployment by highest level of educational attainment among the prime working-age population ages 25 to 64. Persons without a high school diploma have the lowest labour force participation and employment rates. They also experience the highest unemployment rates in all regions. The participation rate increases by approximately 20.0 per cent in Greater Sudbury as the level of education increases to a high school diploma. The same trend holds true for other jurisdictions. In other words, one potential solution to the declining number and productivity of the region's workforce is to promote higher education either by increasing access for those living in remote regions or by adopting approaches

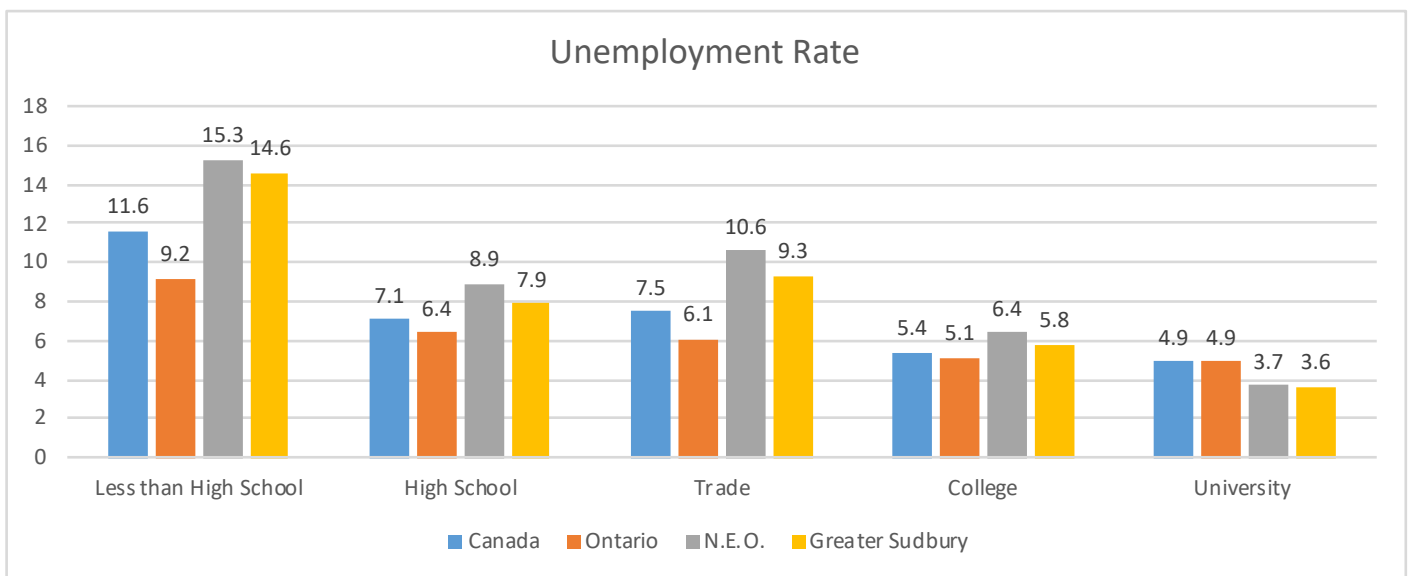
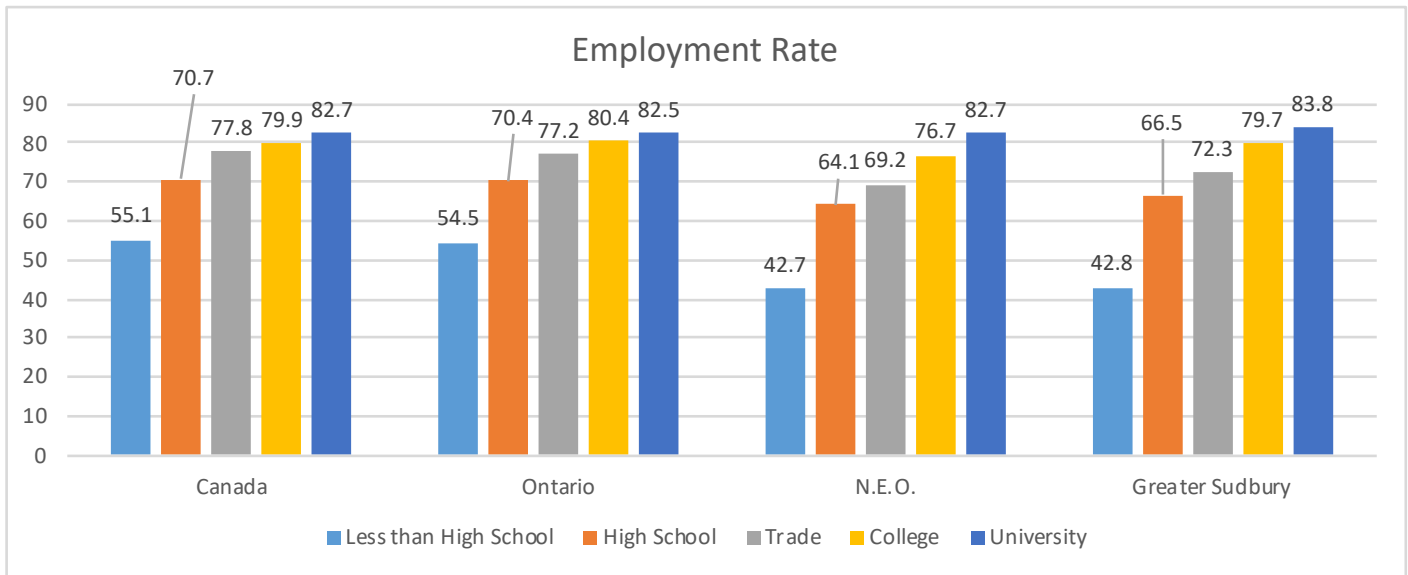
that result in higher completion rates at the secondary and postsecondary levels.

The existing evidence suggests that the individuals who do not have postsecondary credentials have a higher likelihood of non-participation and face a greater probability of unemployment. This will be more so in the coming years. Given that the skill level of the workforce in Northeastern Ontario and Greater Sudbury is below the estimated skill requirement needed for the emerging occupations, the region will face the challenges of workers whose qualifications do not match the existing jobs and jobs that cannot find qualified workers. Recently, 50 companies in advanced manufacturing, mining, and professional and scientific services were surveyed in Northern Ontario. Of the 50 companies surveyed, 22 had operations in Northern Ontario and other jurisdictions (multilocal) and 28 were multinationals operating in Northern Ontario. Of the 50 firms, 15 had their headquarters in Northern Ontario, 11 were located in Northwestern Ontario, and 39 were located in Northeastern Ontario.

Figure 20: Labour Force Performance by Education (%)



¹⁶ B. Moazzami, HDR Decision Economics Inc. and Oraclepoll Research Limited, "Multinational and Multi-local Enterprise Initiative, Survey of Northern Ontario Companies," 2012.



Source: Author's calculation based on Statistics Canada, 2016 census, special tabulation.

When asked to rank barriers or factors negatively affecting their firm's growth and/or investment, companies surveyed typically identified the difficulty of finding qualified employees as their top concern. Approximately 29.0 per cent of multilocal and 24.0 per cent of multinational firms identified it as their main barrier. Finding qualified employees ranked well ahead of transportation costs (11 per cent), government regulations (9 per cent), poor infrastructure (7 per cent), energy costs (7 per cent), and shipping costs (5 per cent). Another report by the Canadian Council of Chief Executives surveyed more than 100 of Canada's largest employers in all industrial sectors and

regions of the country in March 2014. More than 70.0 per cent of the companies identified scarcity of skilled workers as the primary barrier to filling the available positions.¹⁷

It appears that, if the skill levels of the workforce in Greater Sudbury and Northeastern Ontario stay constant as skill requirements rise, the region will end up with people without jobs and jobs without people. Even if markets adjust to bring demand and supply of labour into balance, the social impact of having many unemployable people will be enormous.

¹⁷ The Canadian Council of Chief Executives, "Taking Action for Canada: Jobs and Skills for the 21st Century," March 2014.

The Consequences of Shifting the Composition of the Employed Labour Force

The structure of Northeastern Ontario's workforce is changing due to a population that is simultaneously changing and aging. At the same time, the industrial and occupational composition of the workforce is shifting due to changing market conditions as well as technological advances. As a result, the size and industrial makeup of the workforce in Northeastern Ontario has changed during the past three decades. There has been a continuous shift away from the goods-producing sector, which is dominated by private businesses, to the service-producing sector, which is predominately publicly funded. Using data from various censuses of Canada, Table 5 shows the changing industrial composition of the employed workforce in Greater Sudbury between 2001 and 2016.

Between 2001 and 2016, total regional employment rose from 69,480 to 73,735 – a rise of approximately 6.1 per cent. Total employment in the goods-producing sector rose from 13,540 in 2001 to 15,285 in 2016 – an increase of 12.9 per cent. The major contributors to the employment increase in the goods-producing sector are mining and construction industries. Employment in the manufacturing industries declined by approximately 23.9 per cent between 2001 and 2016. During the same time, the service-producing sector grew by approximately 4.5 per cent. The major contributors to this growth are professional, scientific, and technical services linked to the mining sector, education services, and healthcare and social services industries.

Table 5: Changing the Industrial Composition of the Employed Workforce (15+) in Greater Sudbury

	2001	2016	Percentage Change (%)
Goods-producing Sector	13,540	15,285	12.89
11 Agriculture, forestry, fishing, and hunting	390	330	(15.38)
21 Mining and oil and gas extraction	4,600	6,295	36.85
22 Utilities	435	450	3.45
23 Construction	3,745	4,885	30.44
31-33 Manufacturing	4,370	3,325	(23.91)
Service-producing Sector	55,940	58,450	4.49
41 Wholesale trade	2,285	2,405	5.25
44-45 Retail trade	9,430	9,025	(4.29)
48-49 Transportation and warehousing	3,505	2,880	(17.83)
51 Information and cultural industries	1,410	1,075	(23.76)
52 Finance and insurance	1,935	2,130	10.08
53 Real estate and rental and leasing	950	1,195	25.79
54 Professional, scientific, and technical services	2,620	3,385	29.20
55 Management of companies and enterprises	10	75	650.00
56 Administrative and support, waste management, and remediation services	4,385	2,930	(33.18)
61 Educational services	5,620	6,515	15.93
62 Health care and social assistance	8,300	11,525	38.86
71 Arts, entertainment, and recreation	1,325	1,115	(15.85)
72 Accommodation and foodservices	4,780	5,200	8.79
81 Other services (except public administration)	3,595	3,045	(15.30)
91 Public administration	5,790	5,950	2.76
Total Employed Workforce	69,480	73,735	6.12

Source: Author's calculation based on Statistics Canada, 2001 and 2016 censuses, special tabulation.

A shift in the industrial structure of the workforce is accompanied by a change in the occupational distribution of the labour force (Table 6). Employment in management, business, finance, and administration, as well as sales

occupations and those unique to primary industries, declined between 2001 and 2016. All other sectors experienced employment growth during the above period.

Table 6: Occupational Distribution of Employed Workforce (15 to 64) in Greater Sudbury

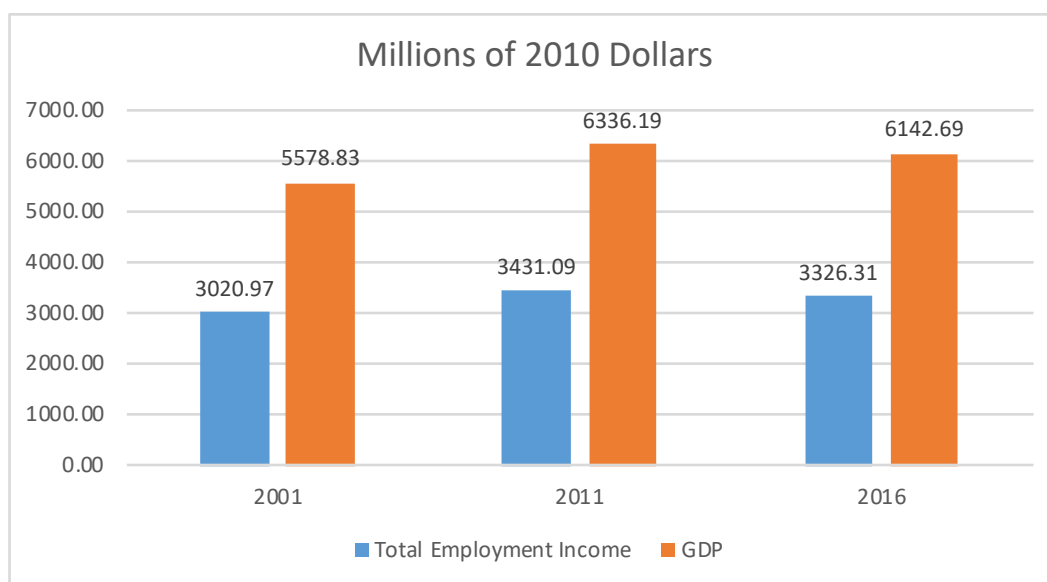
2001 National Occupational Classification	2001	2016	Percentage Change (%)
A Management occupations	6,930	6,770	(2.31)
B Business, finance, and administrative occupations	12,935	11,830	(8.54)
C Natural and applied sciences and related occupations	3,220	4,300	33.54
D Health occupations	4,205	6,900	64.09
E Occupations in social science, education, government service, and religion	5,880	8,940	52.04
F Occupations in art, culture, recreation, and sport	1,145	1,350	17.90
G Sales and service occupations	19,165	17,285	(9.81)
H Trades, transport and equipment operators, and related occupations	11,265	11,485	1.95
I Occupations unique to primary industry	3,015	3,550	17.74
J Occupations unique to processing, manufacturing, and utilities	1,705	1,340	(21.41)
Total	69,465	73,750	6.17

Source: Author's calculation based on Statistics Canada, 2001 and 2016 censuses, special tabulation.

Figure 21 shows that total regional employment income increased between 2001 and 2011 as employment rose from 69,355 to 75,200 during that time but it declined slightly

as employment declined to 73,735 in 2016. The total GDP in Greater Sudbury followed the same trend between 2001 and 2016.

Figure 21: Labour Income and GDP Estimate for Greater Sudbury



Source: Author's calculations based on various censuses, special tabulations

Looking Ahead

An aging population influences demand for government program expenditures such as health care and education. What healthcare-related services will be necessary to meet the requirements of a rapidly aging regional population? How many doctors, nurses, and other types of healthcare providers do we need to train and/or attract to replace the aging healthcare providers while satisfying the growing demand for healthcare services?

An aging population also affects student enrolments, revenues, and therefore demand for various educational services in Northeastern Ontario. What would be the impact of demographic change on demand for teachers and educators, and therefore employment and income in that sector of the regional economy?

Population Aging and Demand for Healthcare Occupations: Future Trends

Demand for healthcare services consists of two components. The first component relates to the expected population growth or decline due to birth, death, age, and migration. These changes, which affect demand for healthcare services, are referred to as the growth component. The second component, which relates to the need to replace retiring service providers, is often referred to as the retirement-replacement component.

To estimate the growth component of total demand for healthcare services, we use the detailed Ministry of Finance's population projections for Northeastern Ontario between 2017 and 2041.

According to the 2012 report by North West Local Health Integrated Network (LHIN), the demand for healthcare services in Northwestern Ontario is expected to increase in all sectors. Services associated with the elderly, such as long-term care, complex continuing care, and inpatient rehabilitation, are expected to experience the highest growth rates.¹⁸

To estimate the growth component of demand, we need to estimate indicators that track demand for healthcare workers in Northeastern Ontario. The growth-demand component reflects the need for more workers to accommodate the rising demand for healthcare services caused by changes in the size and age distribution of the population. We assume that the ratio of workers to patients/

Various regional and national surveys indicate a shortage of skilled tradespeople in various regions of Ontario and other regions of Canada. How has aging population affected the supply and availability of tradespeople in Northeastern Ontario? Are we training enough tradespeople to satisfy our current needs and prepare for the upcoming mining and forestry renewal? Otherwise, importing such expertise will seriously reduce the economic benefits of any resource development in Northeastern Ontario. These are questions that we will address in the last part of this report.

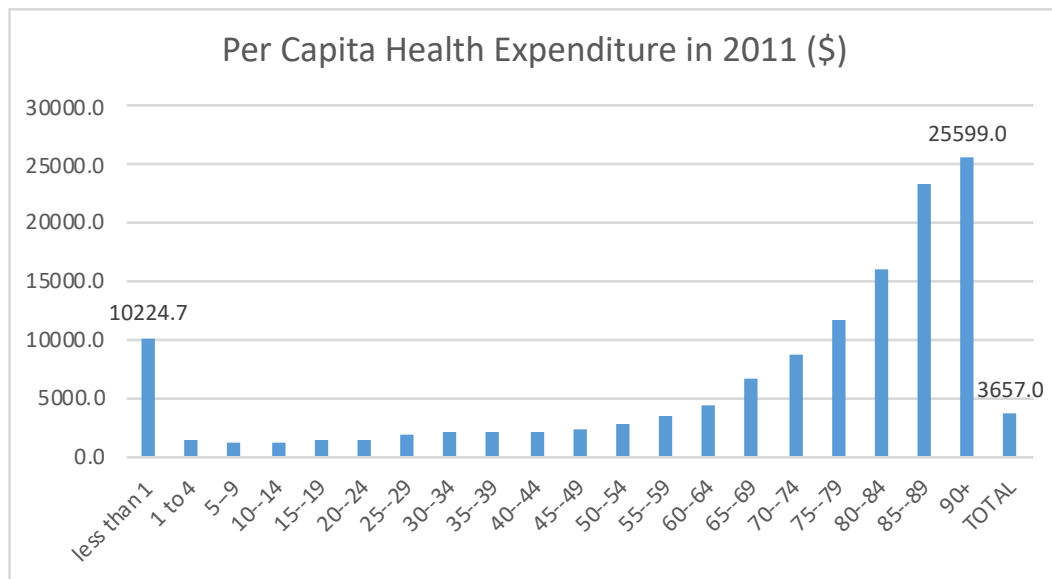
residents/clients remains the same during the forecast period. It is important to note that the aging profile of the population affects demand for different occupations differently. For example, the demand for workers employed in long-term care services is expected to rise rapidly as a result of relatively faster growth of the population age 60 and older. The aging of the population may not affect demand for healthcare workers serving a younger population cohort.

The indicators developed in this part of the report address the need to quantitatively measure the impact of demographic changes on demand for healthcare workers in Northeastern Ontario. A recent study by the Canadian Institute for Health Information provides estimates of per capita provincial health expenditures by age in Ontario for 2011.¹⁹ This is shown in Figure 22. It shows that per capita health expenditures increase significantly as the population ages. In other words, demand for healthcare resources is positively correlated with age. Thus, per capita health expenditures by age can be used as a proxy for demand for healthcare services by different age groups. Therefore, using size and age distribution of the population in Northeastern Ontario, we can estimate an index that tracks changes in demand for healthcare services between 2017 and 2041. These healthcare demand indicators measure expected growth in demand for healthcare services, and therefore healthcare providers in the region.

¹⁸ Health Services Blueprint: "Building our Future," (PriceWaterhouseCoopers, February 2012).

¹⁹ Canadian Institute for Health Information, "National Health Expenditure Trends, 1975 to 2013," 2013.

Figure 22: Per Capita Health Expenditures in Ontario by Age Category



Source: Canadian Institute for Health Information, "National Health Expenditure Trends, 1975 to 2013," 2013.

Using the information provided in Figure 22 and the Ministry of Finance's population projections for Greater Sudbury, Figure 23 shows the estimated growth-demand indicator

for healthcare services in Greater Sudbury between 2017 and 2041. We have used demand for healthcare services in 2017 as the benchmark against which we measure growth.

Figure 23: Projected Growth of Health Care Demand in Greater Sudbury

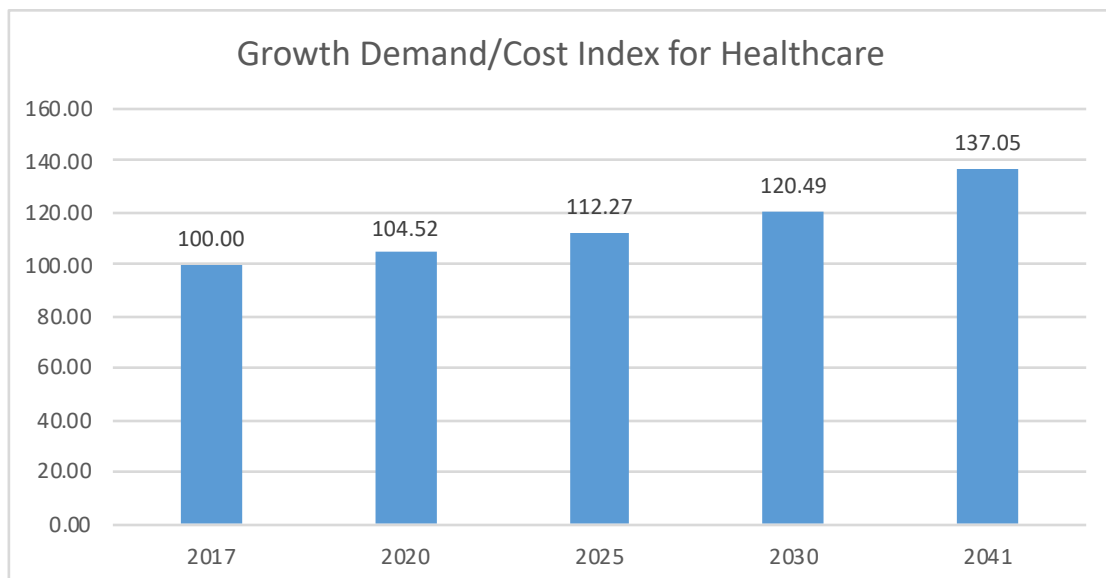
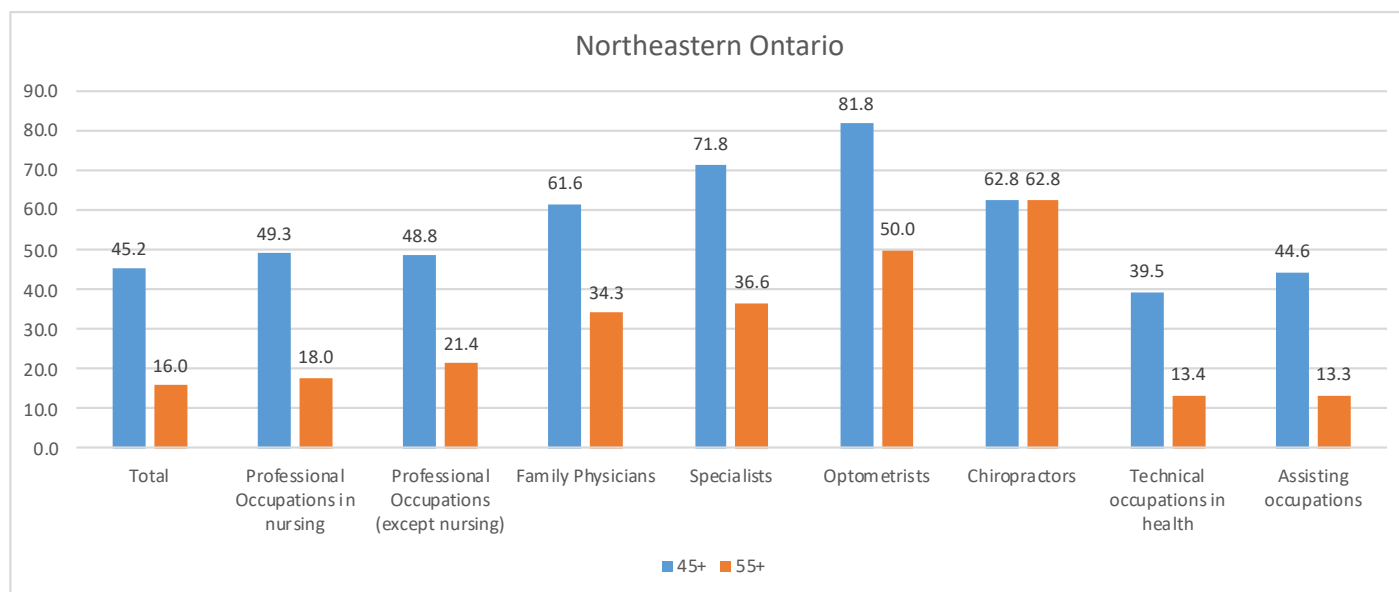


Figure 23 shows that demand/cost for healthcare services is expected to increase significantly between 2017 and 2041. The reason is that the regional population is aging and demand for healthcare services rises by age. In fact, the existing data reveal that demand by seniors age 65 and older is approximately three times greater than the overall average demand.

Turning our attention to the retirement-replacement component of demand for healthcare providers, Figure

24 shows the age structure of healthcare providers in Northeastern Ontario in 2011. Overall, 16.0 per cent of the regional healthcare providers are older than 55. Approximately 34.3 per cent of the family physicians and 18.0 per cent of those in nursing occupations are older than 55. The youngest group appears to be those in the technical and assisting occupations in health, with 13.0 per cent older than 45. Overall, optometrists, specialists, and family physicians appear to be older than other health providers in Northeastern Ontario.

Figure 24: Age Structure of Healthcare Providers in 2011 (%)



Source: Statistics Canada, 2011 National Household Survey (NHS), custom tabulation.

Assuming an average retirement age of 65, Table 7 shows the retirement replacement and expansion demand for healthcare providers in Northeastern Ontario.



Table 7: Total Demand for Healthcare Providers in Northeastern Ontario

	Expansion Demand 2011-2020	Replacement Demand 2011-2020	Total Demand 2011-2020	Expansion Demand 2011-2030	Replacement Demand 2011-2030	Total Demand 2011-2030
Professional occupations in nursing	560	1,050	1,610	1,447	2,865	4,312
Professional occupations (except nursing)	299	665	964	773	1,515	2,288
Family physicians	48	170	218	123	305	428
Specialists	34	130	164	88	255	343
Optometrists	11	55	66	27	90	117
Chiropractors	21	135	156	54	135	189
Technical occupations	516	715	1,231	1,334	2,115	3,449
Assisting occupations	469	650	1,119	1,213	2,170	3,383
Total Numbers	1,845	3,080	4,925	4,768	8,665	13,433
Percentage Demand (per cent)	37.46	62.54	100	35.49	64.51	100.00

Source: Author's estimate based on population projections and 2011 NHS.

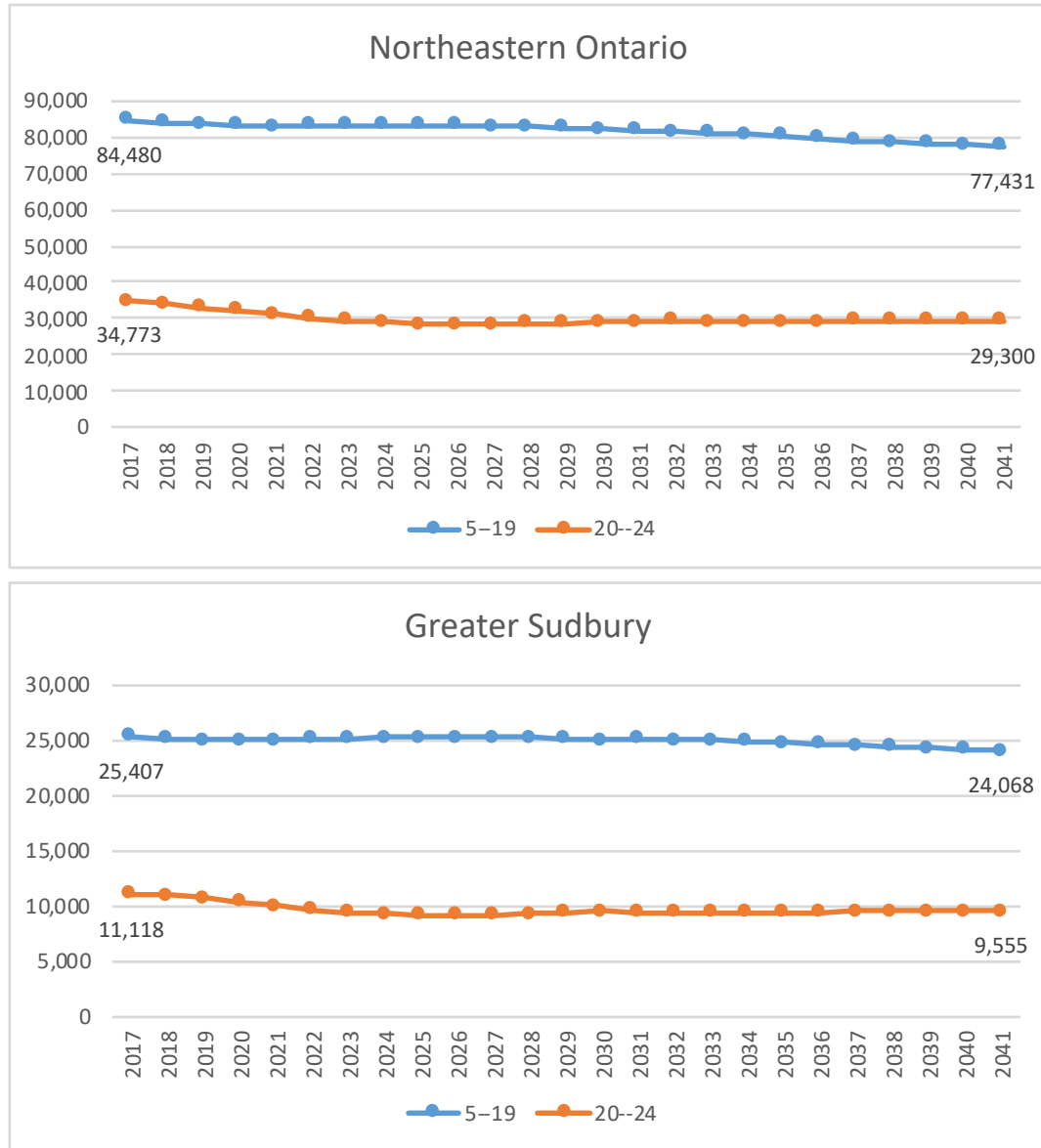
Table 7 shows that approximately 62.5 per cent of the total demand for healthcare providers between 2011 and 2020 relates to replacing those who are expected to retire during the above period. The rest (37.5 per cent) of the healthcare

providers are needed to satisfy the growing demand for healthcare services due to the aging population in Northeastern Ontario. Total demand rises significantly when we extend the projection period to the 2011 to 2030 range.

Population Aging and Demand Projections for Educators in Northeastern Ontario

Using Ontario's Ministry of Finance population projections, Figure 25 shows projections for different age groups in Northeastern Ontario and Greater Sudbury. It shows that the population ages five to 19 years is expected to decline by 5.3 per cent in Northeastern Ontario and 8.3 per cent in Greater Sudbury between 2017 and 2041. This trend

primarily affects primary and secondary schools. Similarly, the total population ages 20 to 24 years is expected to decline by 14.1 per cent in Northeastern Ontario and 15.7 per cent in Greater Sudbury between 2017 and 2041. Declining youth population influences demand for postsecondary education in Northeastern Ontario.

Figure 25: Northeastern Ontario's Population Projection by Age Category

Source: Author's estimate based on Ministry of Finance population projections and census data

To estimate demand for teachers and instructors in Northeastern Ontario, we need to make two assumptions. First, we assume an average retirement age of 65. We note that even though the normal retirement age is 65, one cannot be forced to retire at that age. Second, we

assume that, in the long-term, the number of educators in the region is proportional to the number of students. Based on these two assumptions, Table 8 shows the retirement replacement and expansion/contraction demand for educators in Northeastern Ontario.²⁰

²⁰ We have ignored the fact that postsecondary institutions attract students from outside Northeastern Ontario.

Table 8: Demand for Educators in Northeastern Ontario

Occupations	2011-2020 Replacement Demand	2011-2020 Expansion Demand	2011-2020 Total Demand	2011-2030 Replacement Demand	2011-2030 Expansion Demand	2011-2030 Total Demand
40 Professional occupations in education services	1,575	(1,155)	420	4,800	(1,373)	3,427
401 University professors and postsecondary assistants	195	(172)	23	505	(259)	246
4011 University professors and lecturers	185	(112)	73	455	(169)	286
4012 Postsecondary teaching and research assistants	15	(59)	(44)	25	(90)	(65)
402 College and other vocational instructors	495	(242)	253	1,095	(366)	729
4021 College and other vocational instructors	500	(242)	258	1,100	(366)	734
403 Secondary and elementary school teachers and educational counsellors	870	(741)	129	3,180	(749)	2,431
4031 Secondary school teachers	270	(266)	4	1,230	(269)	961
4032 Elementary school and kindergarten teachers	505	(442)	63	1,755	(447)	1,308
4033 Educational counsellors	45	(32)	13	155	(33)	122

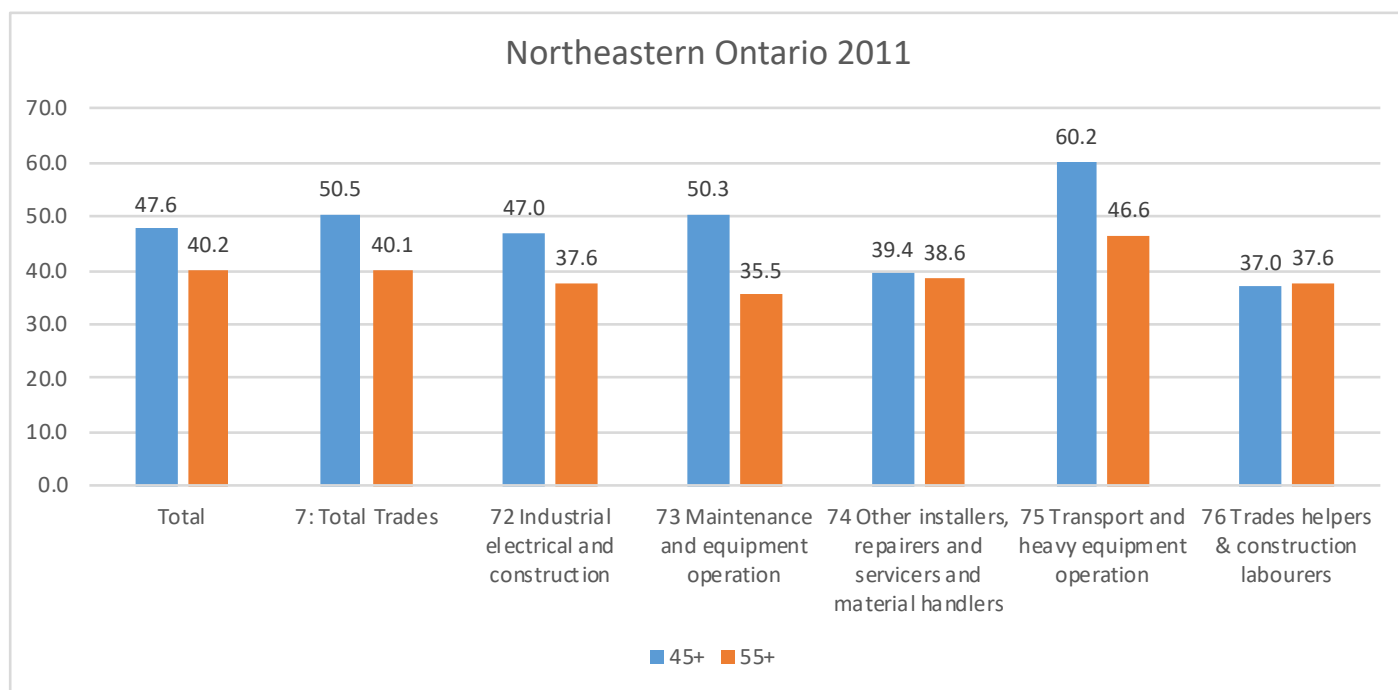
Source: Author's estimate based on Ministry of Finance population projections and census data

Demand for Trades Occupations in Northeastern Ontario

Assuming demand for trades occupations stays at its current level implies that the future demand is solely related to retirement replacement needs of different employers. Figure 26 shows the age structure of trades workers in Northeastern Ontario in 2011. On average, 40.1 per cent of all workers engaged in trades occupations are age 55 and older. This is similar to the percentage of all

workers in the region who are 55 and older. Approximately 50.5 per cent of them are 45 and older. Transportation equipment operators and related workers have the highest percentage of people older than 55 and maintenance and equipment operators have the lowest share of people older than 55.

Figure 26: Percentage Age Structure of Workers in Trades Occupations



Source: Author's calculations based on Statistics Canada, 2011 NHS, custom tabulation.

Assuming no future employment growth, Table 9 shows the retirement replacement demand for trades occupations in Northeastern Ontario.

Table 9: Retirement Replacement Demand for Trades Occupations in Northeastern Ontario

NOC 2011 Classification	Replacement Demand 2011-2020	Replacement Demand 2011-2030
72 Industrial, electrical, and construction	2,460	9,010
73 Maintenance and equipment operation	2,015	7,690
74 Other installers, repairers and servicers, and material handlers	330	1,185
75 Transport and heavy equipment operation and related maintenance occupations	3,420	10,765
76 Trades helpers & construction labourers, and related occupations	460	1,685
All Trades	8,690	30,345

Source: Author's calculations based on 2011 NHS, special tabulations

Table 9 shows that there is a need for 8,690 or 20.2 per cent of all trades workers to replace the retiring tradespeople between 2011 and 2020. Transport and heavy equipment operators (3,420) represent the largest number of potential retirees between 2011 and 2020, followed by

industrial, electrical, and construction trades workers (2,460), and maintenance and equipment operators (2,015). Approximately 71.0 per cent of trades workers will potentially retire between 2011 and 2030 and need to be replaced by new entrants to the market.



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Glossary of Terms

Census Agglomeration (CA): adjacent communities that have strong workplace commuting flows to a population centre 'core.' The core must have a population of at least 10,000 in the most recent census.

Census division (CD): is the general term for provincially legislated areas (such as county, municipalité régionale de comté and regional district) or their equivalents. Census divisions are intermediate geographic areas between the province/territory level and the municipality (census subdivision).

Census Metropolitan Area (CMA): adjacent communities that have strong workplace commuting flows to a population centre 'core.' A CMA must have a total population of at least 100,000, at least half of which must live in the core.

Census Sub-Division (CSD): Municipalities or equivalent areas for census purposes. First Nations and unincorporated territories are both counted as CSDs.

Economic Region (ER): A grouping of census divisions aggregated into a standard geographic unit in order to analyze regional economic activity.

Emigrant: a person who moves from their country to permanently settle in another.

Employment Rate: The per cent of the total population over the age of 15 that is working for pay.

Human Capital: The stock of knowledge, skills, and abilities an individual acquires through education and experience that directly affects their level of productivity.

Immigrant: A person who currently is, or ever has been, a landed immigrant or permanent resident, including those who have received Canadian citizenship through naturalization.

Indigenous and Northern Affairs Canada (INAC): The name of the federal ministry that oversaw the federal government's obligations to Indigenous treaty partners. Formerly was Indian and Northern Affairs. INAC was dissolved in 2017 and restructured into two departments: Indigenous Services Canada and Crown-Indigenous Relations and Northern Affairs Canada.

Interprovincial Migration: the movement of people from one province to another.

Intra-provincial Migration: The number of people who move from one region (CD or ER) to elsewhere in the same province.

Metropolitan Influenced Zone (MIZ): A measure of the effect an urban area has on rural CSDs, based on commuter flows.

Strong MIZ: Rural CSDs where at least 30 per cent of the employed labour force commutes to any CMA or CA.

Moderate MIZ: Rural CSDs where five to less than 30 per cent of the employed labour force commutes to any CMA or CA.

Weak MIZ: Rural CSDs where more than 0 but less than five per cent of the employed labour force commutes to any CMA or CA.

No MIZ: Rural CSDs where none of the employed labour force commutes to any CMA or CA, including CSDs with an employed labour force smaller than 40 total people.

Net Immigration: The number of immigrants who came to settle permanently in a region (CD or ER) minus the number of immigrants who left that region.

Net Interprovincial Migration: The total number of people who came from other provinces or territories to settle permanently in a region (CD or ER) minus the total number of people who left that region to settle permanently in any other province or territory.

Net Intra-Provincial Migration: The total number of people who came from other parts of the same province to settle permanently in a region (CD or ER) minus the total number of people who left that region to settle in other parts of the same province.

Net Migration: The total number of people who relocated to a region (CD or ER) minus the total number of people who left that region.

Participation Rate: The per cent of the working age population employed or unemployed and actively seeking work.

Rural and Small Town (RST): CSDs that are not part of a CMA or a CA, meaning they do not have strong commuter flows to a nearby population centre 'core' of at least 10,000 people.

Total Fertility Rate: the average number of children a woman will have in her lifetime.

Unemployment Rate: The per cent of those participating in the labour force who are not working but are actively seeking paid work.

About Northern Policy Institute

Northern Policy Institute is Northern Ontario's independent think tank. We perform research, collect and disseminate evidence, and identify policy opportunities to support the growth of sustainable Northern Communities. Our operations are located in Thunder Bay, Sudbury, and Sault Ste. Marie. We seek to enhance Northern Ontario's capacity to take the lead position on socio-economic policy that impacts Northern Ontario, Ontario, and Canada as a whole.

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