20-Year Population Projection for the City of Thunder Bay

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Introduction

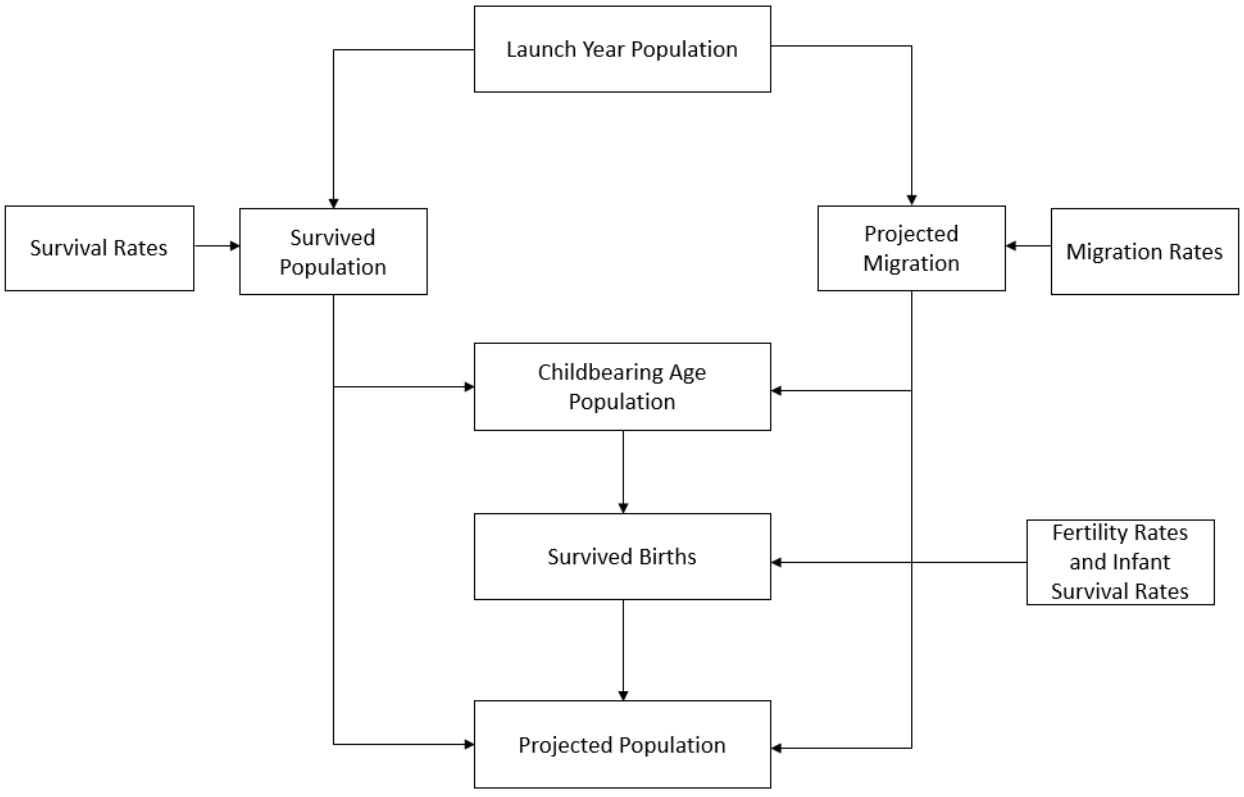
This study employs the Cohort-Component Method (Smith, Tayman, & Swanson, 2013) to estimate the growth of the population of the City of Thunder Bay over 20 years.

Our estimations consider previous research findings that the number of Indigenous People in Thunder Bay is under-reported in Statistics Canada's Census data (McConkey, Brar, Blais, Hardy, & Smylie, 2022).

Methodology

The Cohort-Component Method considers cohorts over five-year periods beginning with the surviving population (accounting for mortality rates), adding birth projections based on the childbearing age population and adjusting for net migration rates. Figure 1 presents a visualization of the Cohort-Component Method.

Figure 1: Overview of the Cohort-Component Method



Assumptions and Rationale

Launch Year Population

We begin by estimating the launch year population of Thunder Bay. We begin with the 2021 census data for the City of Thunder Bay (n.b.; this is the most recent data available in 2024). Next, we add the midpoint (average) estimate of the unreported Indigenous population in Thunder Bay.

We rely upon McConkey et al. (2022) to determine the unreported Indigenous population in Thunder Bay. McConkey et al. indicate that there were between 23,080 and 42,641 Indigenous adults in Thunder Bay, two to four times the 9,780 reported in the 2016 Census. Barring any more up-to-date and reliable information, we assume that McConkey et al.'s estimates are reflective of the unreported Indigenous population in 2021.

Our baseline projection uses the midpoint of McConkey et al.'s range. As a result, we estimate the launch year population in Thunder Bay, including the under-reported Indigenous population in 2021, to be approximately 131,826. Due to potential uncertainty with our launch year population, we present scenarios based on McConkey et al.'s high and low ranges in determining the launch year population.

Project Population

To project the future population using the Cohort-Component Method, we require estimates for the surviving populations, migration to (from) Thunder Bay, and survived births. We estimate each of these based on the following assumptions:

1. Survived population: we estimate the surviving population based on the 2021 survival rates per five-year age category. We assume the survival rates will remain constant across our forecasting period. Although there are slight variations over time, Canadian mortality rates have remained relatively stable in recent years (Statistics Canada, 2024). Therefore, we do not perform any scenario analysis around this assumption.

2. Projected migration: we estimate the projected migration based on the 2018 Statistics Canada data indicating that net migration in Thunder Bay was 91 per 1000 population (Immigration, Refugees and Citizenship Canada, 2020), or a net migration of 991 people. We assume migration remains constant in our baseline forecast period. However, we realize that a number of factors, including government policy, can influence migration patterns, and these factors are difficult to anticipate. Therefore, we present additional scenarios with higher and lower projected migration estimates.

3. Survived births: we estimate the birth rates for the Indigenous and Non-Indigenous populations based on the baseline number of births in 2021 for females aged 20 to 40. The birth rate is assumed to remain constant across our forecasting period. Our baseline estimations assume 1,119 births in 2021 (Statista, 2024), with scenarios based on a modest increase and decrease in the birth rate.

Baseline Estimation Results

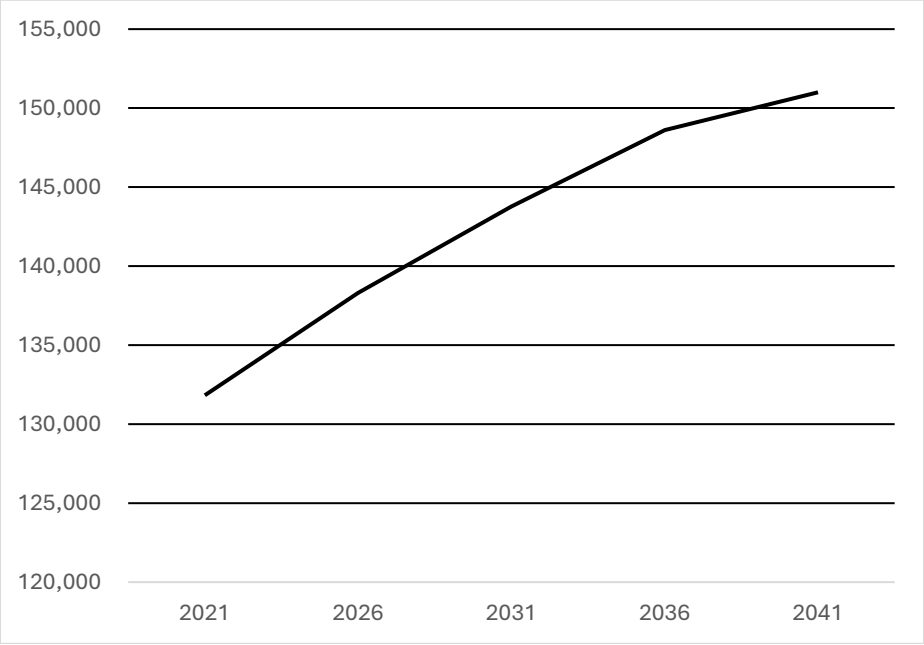
We project Thunder Bay's population in successive five-year increments by employing the Cohort-Component Method with the baseline assumptions noted above. Our results suggest that Thunder Bay's population will grow to 151,002 by 2041.

Table 1 and Figure 2 present the population projections in five-year intervals across the entire 20-year forecast period.

Table 1: Projected population for the City of Thunder Bay

Year	Projected Population
2021	131,826
2026	138,312
2031	143,764
2036	148,617
2041	151,002

Figure 2: Projected population for the City of Thunder Bay



Scenarios

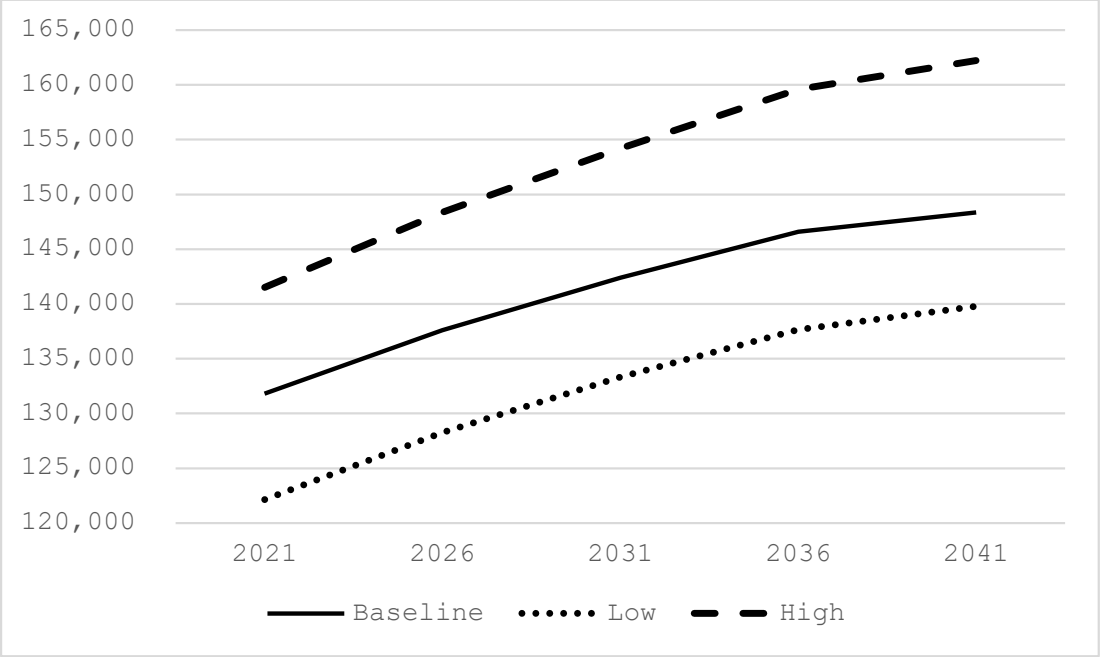
Launch Year Population Scenarios

Next, we estimate two scenarios by revising our estimate of the launch year population to reflect McConkey et al.'s low and high estimates for the unreported Indigenous population in Thunder Bay. We present the results in Table 2 and Figure 3.

Table 2: Projected population for the City of Thunder Bay considering high and low estimates of underreported Indigenous population

	Projected Population		
Year	Low	Baseline	High
2021	122,135	131,826	141,516
2026	128,264	138,312	148,360
2031	133,337	143,764	154,194
2036	137,657	148,617	159,587
2041	139,784	151,002	162,222

Figure 3: Projected population for the City of Thunder Bay, under low, average, and high estimates of underreported Indigenous population



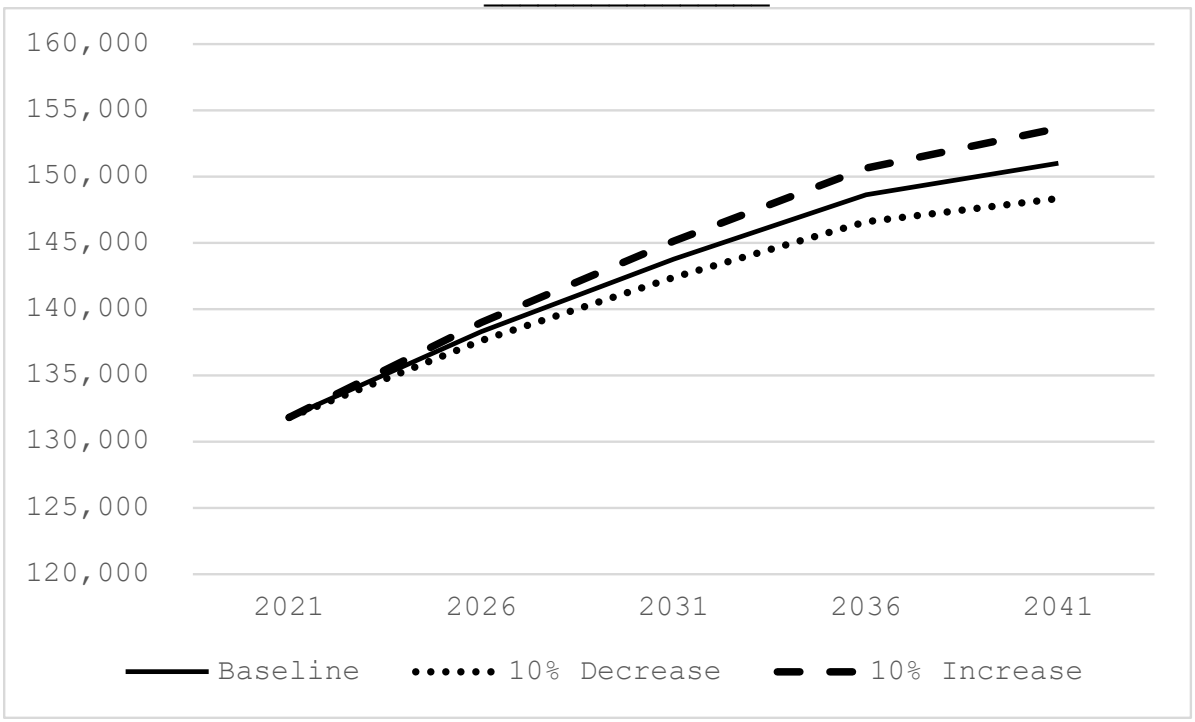
Births

We base our second set of scenarios on differing birth rates. We estimate two scenarios by revising our birth rate estimate up and down by 10%. We present the results in Table 3 and Figure 4.

Table 3: Projected population for the City of Thunder Bay with 10% lower, constant, and 10% higher birth rates

	Projected Population		
Year	10% decline	Constant	10% increase
2021	131,826	131,826	131,826
2026	137,619	138,312	139,005
2031	142,404	143,764	145,124
2036	146,592	148,617	150,642
2041	148,344	151,002	153,660

Figure 4: Projected population for the City of Thunder Bay with 10% lower, constant, and 10% higher birth rates



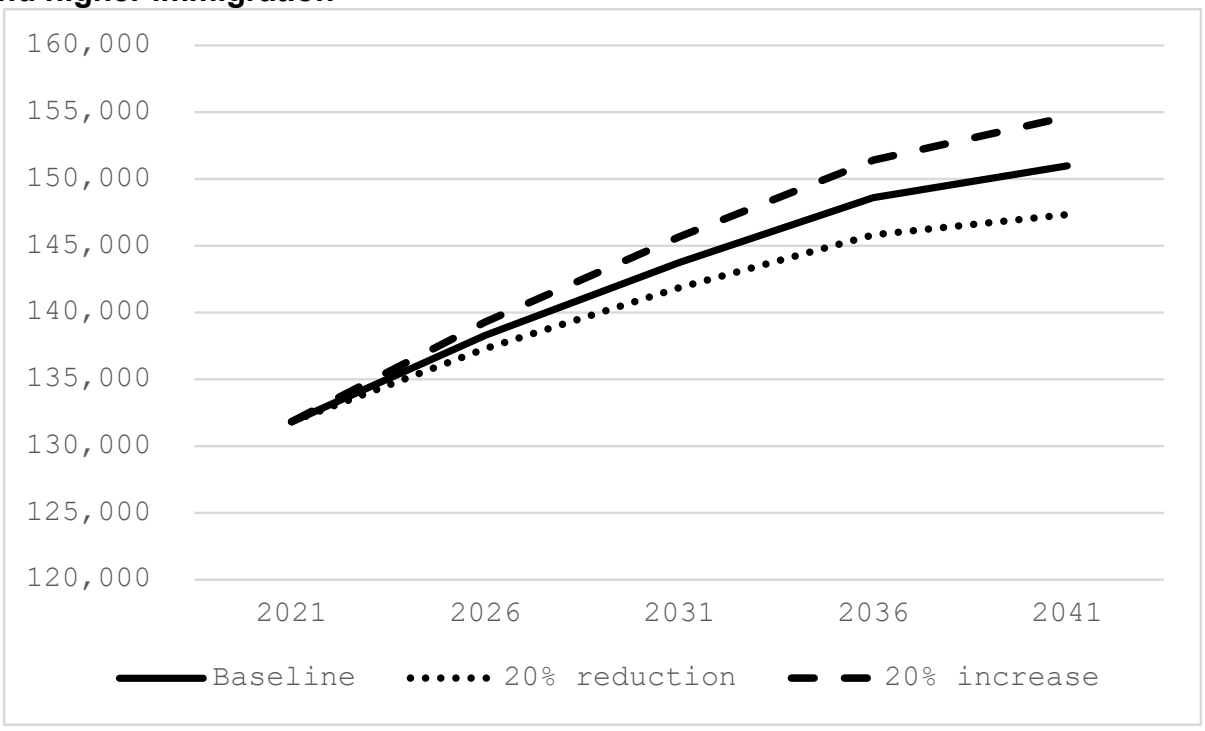
Immigration

We base our third set of scenarios on differing migration rates. We estimate two scenarios by revising our birth rate estimate up and down by 10%. We present the results in Table 4 and Figure 5.

Table 4: Projected population for the City of Thunder Bay with 10% lower, constant, and 10% higher net immigration

	Projected Population		
Year	Low	Constant	High
2021	131,826	131,826	131,826
2026	137,321	138,312	139,303
2031	141,859	143,764	145,669
2036	145,820	148,617	151,413
2041	147,343	151,002	154,660

Figure 5: Projected population for the City of Thunder Bay with lower, estimated, and higher immigration



Population Pyramids

We further visualize the data by presenting population pyramids to highlight the distribution of the population by gender and age. Figure 6 presents the information for 2021 and Figure 7 shows the projected distribution in 2041.

The wider the band indicates greater population in each age category. The widening of the bands at the top of the pyramid over 20 years indicates that there will continue to be an aging population in the the City of Thunder Bay based on our current model and baseline assumptions.

Figure 6: Population pyramid for the City of Thunder Bay in 2021

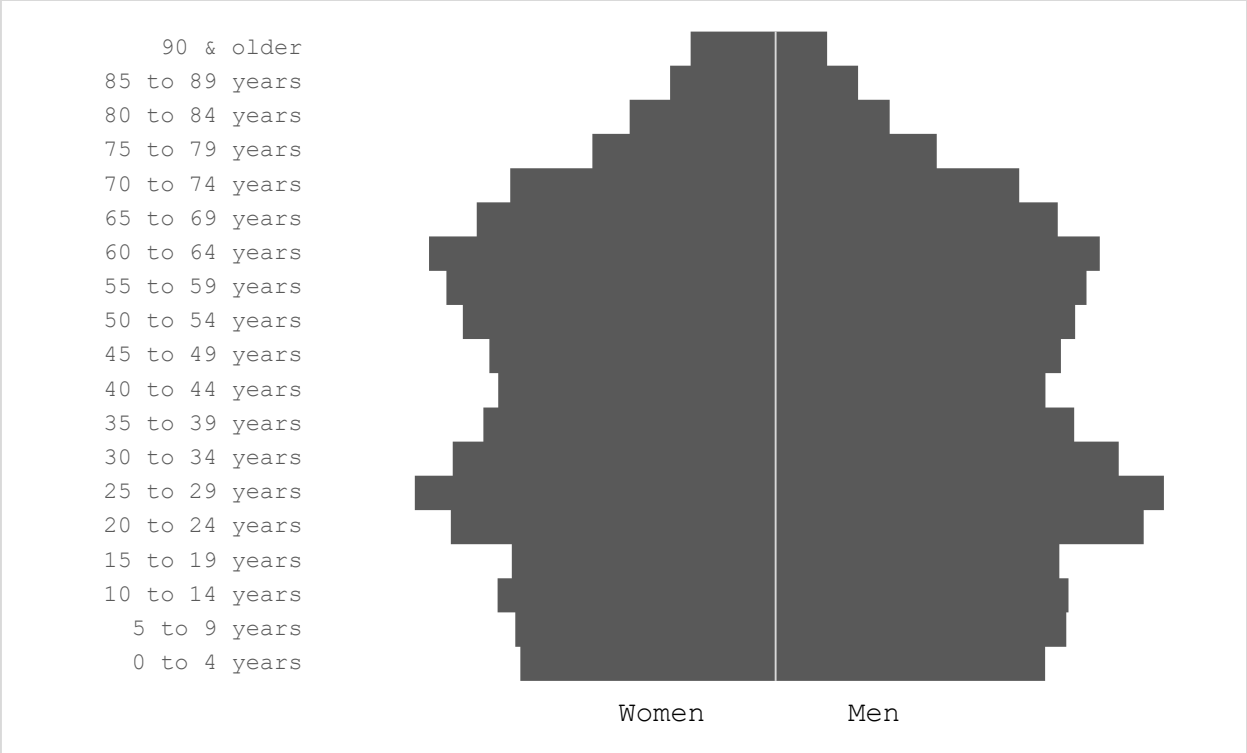
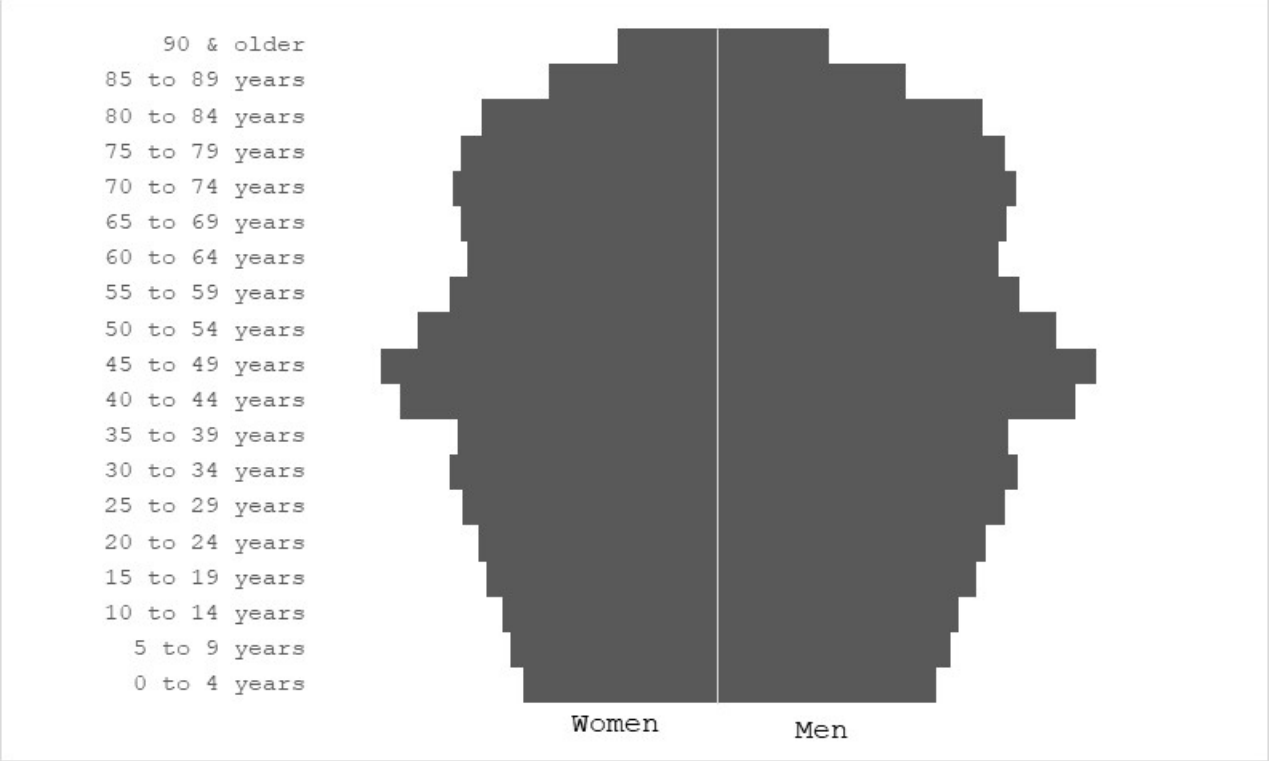


Figure 7: Projected population pyramid for the City of Thunder Bay in 2041



Conclusion and Limitations

It is important to note that forecasts and any future-oriented estimates are subject to forecasting risks. Rarely do actual results exactly match the forecasted expectation. We used a number of assumptions with respect to the factors affecting the population projection. Significant changes in one or more of these factors could result in an over or underestimation of the population in successive cohorts.

However, the purpose of this forecast is not to determine the exact population figure for a particular year but to provide a general idea of the direction of the population and how changes in various factors (e.g., birth rate and migration patterns) can impact the population.

Additionally, we gathered data from different sources and periods (e.g., 2016 and 2021 census, birth data from July 2021 to June 2022, migration data from 2018). Furthermore, we needed to combine some data (e.g., age categories for those over 90) to complete the calculations. This could have a minor effect on the results; however, given the estimated range of the underreported Indigenous population, these variances will not have a material effect on the overall result.

References

Immigration, Refugees and Citizenship Canada (2020). Economic Profile Series: Thunder Bay, Ontario. *#Immigration Matters.* https://www.canada.ca/content/dam/ircc/migration/ircc/english/pdf/immigration-matters/economicprofile-thunderbay-ontario-en-final.pdf

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Statista (2024). Number of births in Canada from July 2021 to June 2022 by metropolitan area. https://www.statista.com/statistics/446744/births-in-canada-by-metropolitan-area/

Statistics Canada (2024). Table 13-10-0710-01 Mortality rates, by age group