

NCC Client Atlas: Immigration Insights

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Introduction

The New Canadians Centre (NCC), a non-profit organization established in 1979, plays a pivotal role in supporting immigrants, refugees, and newcomers across the City of Kawartha Lakes, Haliburton County, the City and County of Peterborough, and Northumberland County. By promoting community involvement, inclusiveness, and equitable access to resources, NCC serves as a cornerstone for individuals and families navigating the challenges of settling in Canada. This mission becomes particularly critical in rural areas, where newcomers often face additional barriers to accessing essential services and support.

To address these challenges, The NCC Client Atlas: Immigration Insights was developed to understand and visualize the geographic distribution of NCC's clients within its catchment area. Immigrants and refugees in rural regions encounter unique difficulties related to resource allocation and outreach, making it essential to identify patterns and service gaps. Geographic Information Systems (GIS) have emerged as transformative tools in this context, offering organizations like NCC the ability to map client distributions, analyze demographic trends, and make data-driven decisions to enhance service delivery.

The project's central objective is to create a dynamic, interactive mapping tool that integrates data on client demographics, registration trends, and geographic locations. By leveraging advanced visualization platforms such as ArcGIS, The NCC Client Atlas provides user-friendly, adaptable insights into client needs and service utilization. Designed with sustainability in mind, the system is built to update automatically as new data becomes available, minimizing the technical expertise required for its maintenance. This ensures that NCC can continually adapt its services to meet the evolving needs of its clients effectively.

Beyond its technical capabilities, the project aligns with broader goals of accessibility and equity in immigrant support services. By adopting a data-driven approach, NCC can enhance its communication efforts, streamline internal planning, and influence policy decisions. The visualizations produced through this initiative will serve as valuable tools for

stakeholders, fostering a deeper understanding of client needs and helping NCC optimize its resource allocation and outreach strategies.

Ultimately, the NCC Client Atlas: Immigration Insights represents more than just a mapping exercise—it is a step toward creating a comprehensive, adaptable, and inclusive framework for service delivery. By harnessing technology and data, the project empowers NCC to better serve its diverse community, paving the way for meaningful, lasting impacts on the lives of newcomers across its service area.

Literature Review

Canada's economic, social, and political development is deeply intertwined with its immigration history. Established on July 1, 1867, through an act of the British Parliament, Canada originally comprised English-speaking Upper Canada (now Ontario), French-speaking Lower Canada (now Quebec), and the provinces of New Brunswick and Nova Scotia. Immigration has played a pivotal role in shaping the nation. According to Tucker (1931), nearly all excess emigration from the British Islands in 1847 was directed towards North America, with approximately 45% of these emigrants settling in British colonies, including 35% in Canada.

In 1854, the Province of Canada made its first appropriation for immigration, emphasizing cost-effective strategies such as distributing pamphlets and advertising materials in England and Europe through existing agencies (Gates, 1934). Early immigration policies primarily sought to attract farmers, agricultural workers, and female domestics, targeting recruits from Britain, the United States, and Northwestern Europe (Green & David, 2004). Between 1870 and 1930, immigration policy became integral to a broader national strategy, including transcontinental railway construction, high tariffs on manufactured goods, and land settlement in the west (Green & Green, 1999).

Today, immigration remains a cornerstone of Canada's development, with a focus on fostering a skilled and adaptable workforce to meet the demands of a changing economy (Green & Green, 1999). However, regional variations in migration patterns, particularly in

smaller areas like Peterborough, ON, remain underexplored. This literature review provides a foundation for understanding these trends and their implications for the settlement and integration of immigrants, as reflected in the data analyzed for the NCC project. The literature review will now explore the shifting patterns of immigration before World War I, which were crucial in defining Canada's demographic landscape.

Immigration Trends Before World War I

Between 1896 and 1914, Canada experienced significant immigration, with 2.5 million newcomers drawn by opportunities in infrastructure development and agricultural expansion. This period saw the arrival of diverse groups, including Doukhobors, Jewish refugees from Russia, Hungarians, Mormons from the United States, Italians, and Ukrainians. Immigration remained high until the outbreak of World War I (Boyd & Vickers, 2000). However, despite Canada's efforts to encourage immigration, many immigrants passed through the country and ultimately settled in the United States, limiting the effectiveness of Canada's initiatives during the 19th century (Gates, 1934).

Prior to 1861, Canada was primarily a destination for immigration, but the late 19th century marked an unusual situation of simultaneous immigration and emigration on a large scale. This shift can be attributed to several factors, including the migration of large numbers of Canadians to the United States and the continued influx of Europeans, particularly from Britain to Canada (McInnis, 1994).

The early 20th century saw a surge in labor demand driven by the construction of the transcontinental railway, prairie settlement, and industrial growth. From 1901 to 1911, Canada recorded a net migration of 715,000 individuals, with substantial settlement in the western provinces: 111,000 in Manitoba, 283,000 in Saskatchewan, 218,000 in Alberta, and 164,000 in British Columbia (Buckley, 1965). By 1913, immigration reached a peak of 350,000 arrivals, contributing 5% to the population in just one year. Remarkably, over one-sixth of the population in 1913 had arrived in Canada within the preceding five years (Edmonston, 2016). These changes in immigration trends prepared Canada for the difficulties

and changes it would encounter in the ensuing decades, particularly in light of the sociopolitical climate shifts that followed World War I.

Shifts in Immigration Patterns: The Great Depression and Post-War Era

The Great Depression and the start of World War II were two major global economic and political changes that had an impact on immigration trends after World War I. Historians have argued that anti-alien sentiment in Canada intensified following World War I. This suspicion of foreigners was not solely a war legacy; it was deeply rooted in political, cultural, and economic factors and shaped by a racial ideology prevalent in government policies, media narratives, and various organizations (McLean, 2004). With the outbreak of the First World War, immigration to Canada quickly came to a near standstill. From a record high of over 400,000 arrivals in 1913, the number dropped sharply to fewer than 34,000 by 1915 (Boyd & Vickers, 2000). During the 1920s, the aftershocks of World War I and the Russian Revolution spurred migration from countries such as Germany, Russia, Ukraine, and Eastern European nations like Poland and Hungary. During the Great Depression, the majority of immigrants came from Great Britain, Germany, Austria, and Ukraine, with fewer than 6% originating from non-European countries (Boyd & Vickers, 2000).

The 1930s marked a period of net emigration from Canada, as economic hardship and global conflict reshaped migration patterns. However, following the declaration of World War II on Germany on September 10, 1939, Canada introduced new regulations prohibiting the entry of nationals from countries with which it was at war (Boyd & Vickers, 2000). After the war, immigration surged alongside economic recovery. Between 1946 and 1950, over 430,000 immigrants arrived in Canada, surpassing the total admissions of the previous 15 years (Boyd & Vickers, 2000). In the late 1950s, over 85% of Canada's immigration came from Europe, with approximately 30% arriving from Great Britain (Globerman & Fraser Institute, 1992). However, by 1958, immigration levels began to decline as economic conditions in Europe improved, and Canada introduced administrative measures to limit arrivals in response to a slowing domestic economy. By this time, the percentage of immigrants from Europe had decreased to around 50%, while the proportions from Asia and South and Central America had risen to 13.7% and 12.5%, respectively. This shift marked the

beginning of a significant change in Canada's immigration patterns, particularly with the increasing flow of immigrants from Asia. These changing dynamics, both in policy and migration flows, laid the foundation for the more inclusive and diverse Canadian immigration system that would emerge after World War II.

Immigration Policy in the Late 20th Century

The late 20th century was marked by significant changes in Canada's immigration policy. In 1971, Prime Minister Pierre Trudeau declared cultural pluralism as a cornerstone of Canadian identity, signaling a shift in the role of immigration in shaping the nation (Trebilcock, 2019). This was followed by the establishment of the Department of Manpower and Immigration in the 1970s, which aimed to align immigration levels and composition with labor market needs (Hawkins, 1972). The introduction of the Temporary Foreign Worker Program (TFWP) in 1973 further addressed temporary labor shortages by facilitating the entry of specialized workers, seasonal agricultural laborers, and live-in caregivers. During this period, the proportion of immigrants born in Asia and other regions of the world began to rise, initially slowly and then more rapidly through the 1980s. By 1996, 27% of the immigrant population in Canada was born in Asia, and another 21% came from regions outside the United States, the United Kingdom, and Europe (Boyd & Vickers, 2000). In 1990, immigration to Canada saw a significant rise, with almost 40% of all immigrants admitted under the skill category, compared to only 8% of legal immigrants in the United States (Antecol, Cobb-Clark, & Trejo, 2003).

Most immigrants settled in Canada's major cities, with the largest concentrations in the census metropolitan areas (CMAs) of Toronto, Montréal, and Vancouver. Since the 1940s, Ontario has housed a disproportionate share of immigrants, with this percentage continuing to rise over time. By 1996, 55% of all immigrants lived in Ontario, compared to 18% in British Columbia and 13% in Quebec (Boyd & Vickers, 2000).

This was a marked departure from the previous focus on primarily European immigration. The demographics of provinces like Ontario, British Columbia, and Quebec

started to reflect the international reach of Canadian immigration as these trends developed, and Canadian cities grew increasingly diversified.

Modern Immigration Policy and Settlement in Rural areas

Canada's immigration policy has undergone substantial changes to address evolving economic and societal needs. One of the most notable reforms occurred in 2015 with the introduction of the Express Entry system. This marked a departure from the earlier supply-driven, first-come-first-served model to a demand-driven approach focused on attracting highly skilled individuals. The system integrates key programs, including the Federal Skilled Worker Program (FSWP), Provincial Nominee Program (PNP), and Canadian Experience Class (CEC), enabling faster and more targeted processing of applications (Banerjee, 2023).

More recently, labor shortages exacerbated by the COVID-19 pandemic prompted Immigration, Refugees, and Citizenship Canada (IRCC) to temporarily lift the 20-hour weekly off-campus work limit for international students. This policy adjustment, implemented between November 2022 and April 2024, led to a significant rise in the number of study permit holders in Canada, from 443,605 in 2021 to 682,060 in 2023—a remarkable 54% increase in just two years (Immigration, 2014). Such measures underscore Canada's adaptability in leveraging immigration to address immediate labor market challenges.

However, while the country's immigration system has succeeded in attracting skilled individuals and international students, a notable challenge remains: encouraging settlement in rural areas. Research shows a persistent urban bias in immigrant settlement patterns. Radford (2007) reported that 74% of immigrants arriving during the 1990s settled in Canada's largest urban centers, and Houle (2007) found that only 23% of recent immigrants chose to live outside of the country's seven largest urban centers. These findings highlight the difficulty smaller communities face in attracting and retaining newcomers.

To address this imbalance, programs such as the Rural and Northern Immigration Pilot (RNIP) have been introduced. These initiatives aim to support smaller communities by facilitating immigration to areas outside of major urban centers. With the introduction of

systems like Express Entry, Canada has become more effective in attracting skilled immigrants, though significant efforts are still required to balance settlement patterns across both urban and rural areas.

Immigrants and Resource Allocation: Challenges and Opportunities

Despite various initiatives aimed at promoting immigration to smaller towns, resource allocation remains a critical factor in ensuring immigrant success. Understanding how resources like housing, transportation, and community services are distributed in rural and urban areas can shed light on common challenges and inform strategies for promoting sustainable, equitable growth.

Although skilled immigrants are often expected to integrate successfully with motivation and effort after a brief adjustment period (Hum & Simpson, 2004; Toronto Region Immigrant Employment Council [TRIEC], 2018a), many encounter significant barriers to full integration into Canadian society (Picot & Sweetman, 2012). For instance, access to affordable housing and reliable transportation, coupled with programs to ease their transition, are vital for ensuring long-term stability and inclusion.

In smaller cities like Peterborough, these challenges become even more pronounced. Smaller communities often lack the infrastructure and resources to meet the unique needs of newcomers. Careful planning and equitable distribution of immigration across regions can alleviate pressures on urban centers while bringing new vitality to rural areas. However, for these efforts to succeed, targeted policies and investments must address gaps in housing, transportation, and community services. By fostering a welcoming environment and ensuring a smooth transition, smaller cities can not only help immigrants integrate more effectively but also encourage them to build meaningful lives within these communities.

A closer look at Peterborough, Ontario, illustrates these dynamics. Immigrants in Peterborough account for over 8% of the population. Between 1980 and 2016, 47% of all immigrants to the region arrived as economic immigrants, while 37% were sponsored by family members, and 15% were refugees (Immigration, 2020). These figures reflect the

diverse pathways through which newcomers arrive but also reveal the relatively small scale of immigration to the area compared to larger cities.

Overall, Canada's immigration history reflects its ability to adapt to shifting global and domestic circumstances, emphasizing the crucial role of migrants in economic development and nation-building. However, achieving balanced regional growth remains a significant challenge. Addressing the urban-rural divide is essential to fostering sustainable settlement patterns and ensuring that smaller communities like Peterborough can fully benefit from immigration.

Dataset

The dataset provided by the New Canadians Center is Personal Identifiable Information (PII) free client data exported from their database on 10th October 2024. The dataset contains a total of 3,573 clients, 7 features and is in XLSX format.

Feature	Datatype	Description
Client #	String	Unique identifier for each client.
Registration Date	String	The date when the client registered with the NCC in YYYY-MM-DD format.
Gender	String	Gender of the client.
Date of Arrival	String	The date when the client arrived in Canada in YYYY-MM-DD format.
Country of Origin	String	The client's nationality.
City	String	The Canadian city where the client currently resides.
Postal Code	String	The Canadian postal code of the client's current address.

Table 2: Dataset Description

Methodology

Data Cleaning

During the data review, we identified missing values and inconsistencies, particularly within the City and Postal Code fields. Given that Gender and Country of Origin were validated through the backend system, no modifications were made to these columns. To address the Postal Code data, we utilized Excel's geographic tool, which successfully validated the majority of the codes. For the remaining unrecognized postal codes, we cross-referenced them using the city feature and the Canada Post Find a Postal Code tool. In instances where multiple potential matches existed, we documented all viable options. Since access to street addresses was unavailable (due to the removal of all PII), we requested the New Canadians Center (NCC) to verify and update the final 30 postal codes using the Canada Post tool. Lastly, we reviewed and corrected any postal codes that were inaccurately validated and ensured that the city names corresponded correctly to the postal codes.

We also removed 20 clients from the analysis as they were missing all features except their client IDs and gender, which made their data unsuitable for further processing.

These meticulous steps were taken to ensure the accuracy of the data, offering an opportunity to resolve inconsistencies and address issues originating from human error in the NCC's dataset. Additionally, a changelog was maintained to document all modifications, including the original and revised data, ensuring that the data cleaning process could be replicated within the NCC's database.

Data Preprocessing

With the data now cleaned, we proceeded to create additional features to facilitate mapping the data. We introduced three new features: FSA (Forward Sortation Area), which represents the first three characters of a Canadian postal code—necessary for any available Geographic Information System (GIS) to map a Canadian postal code; LDU (Local Delivery Unit), representing the last three characters of the postal code; and Country, which in this

case is set to Canada, to ensure the geographic system recognizes the data as pertaining to Canadian locations.

To map the data, we used ArcGIS, the best tool available to us. We also gathered the latest census data from Statistics Canada for the Forward Sortation Areas. By joining our dataset with the Stats Canada shapefile, we created a base map layer that displayed all the NCC clients within their respective Forward Sortation Areas. We then performed a self-join with the base map layer to create a new feature called Client Count, which showed how many clients were part of each sortation area. Finally, we created a final map layer that integrated all the data into one comprehensive layer.

Data Visualization

Using the final map layer, we customized the colors to showcase the number of clients in each respective Forward Sortation Area (FSA) on the map. We then developed an interactive dashboard and imported the map into it. The dashboard included several supporting visualizations: a line chart showing registration trends, a bar chart displaying the number of clients by city, and another bar chart showing the countries of origin of the clients. Each of these visualizations acted as a filter, allowing users to interact with them to update the map and other charts.

For example, clicking on "Peterborough" in the city chart would filter the data to display only clients from Peterborough. All other charts and the map would update to show statistics for that city, including the number of clients, their registration trends, and their country of origin. Similarly, selecting a country from the country-of-origin chart would filter the data to show information about clients from that country, including the cities they reside in and their registration trends.

Additionally, the dashboard featured a global filter, enabling users to focus on trends from only selected cities, countries of origin, and genders. This interactive approach provided a dynamic and engaging way for stakeholders to explore the data.

Results

Interactive Dashboard

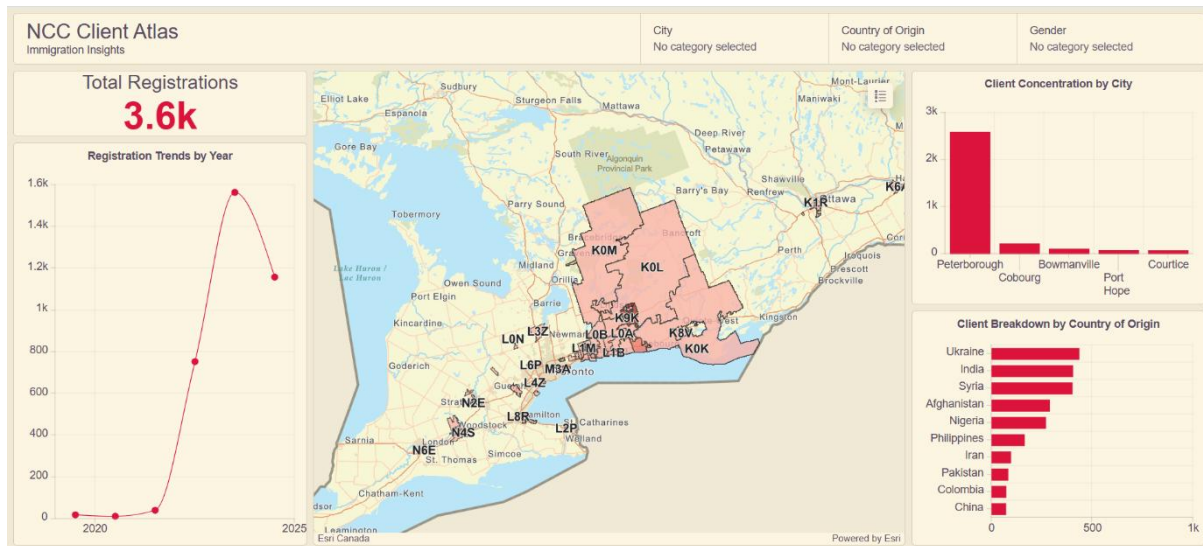


Figure 1: Interactive Dashboard Overview

The centerpiece of our project is an interactive dashboard designed using ArcGIS (see Figure 1), which serves as a dynamic tool for visualizing and analyzing client data. The dashboard integrates registration trends by year, client concentration by city, and client breakdown by country of origin with a centralized interactive map. A total registrations counter displays the overall client count, as of October 9th 2024 at 3,553.

The dashboard is equipped with global filters for city, country of origin, and gender, enabling users to customize the visualizations and the map based on specific criteria. These filters allow for seamless interactivity: selecting a city, country, or gender through the filter options or clicking on a bar in any of the charts automatically updates the map and other charts to reflect data specific to the selected criteria. These filters provide users with the ability to explore different subsets of the data, facilitating more detailed analysis of trends and distributions.

At the core of the dashboard, the interactive map provides a geographic overview of client distribution across Canada. Users can click on specific regions to reveal pop-ups

containing detailed information about the clients in those areas, such as counts and other attributes. The map is color-coded by Forward Sortation Areas (FSAs) using a colorblind-friendly palette, visually representing the concentration of clients.

Registration Trends by Year

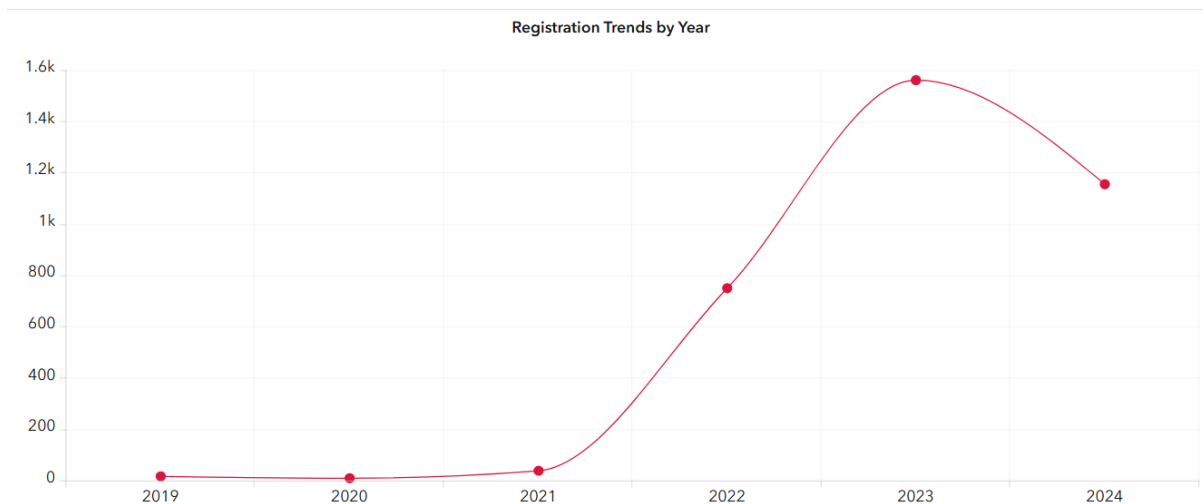


Figure 2: Registration Trends by Year

The Registration Trends by Year chart (see Figure 2) highlights the growth in client registrations from 2019 to 2024. Registrations surged in 2023 with approximately 1,600 new clients, marking the most significant annual increase. By September 2024, another 1,200 clients had registered, demonstrating sustained demand for NCC's services. This chart allows users to examine registration patterns and evaluate how demand has evolved over time.

Client Concentration by City

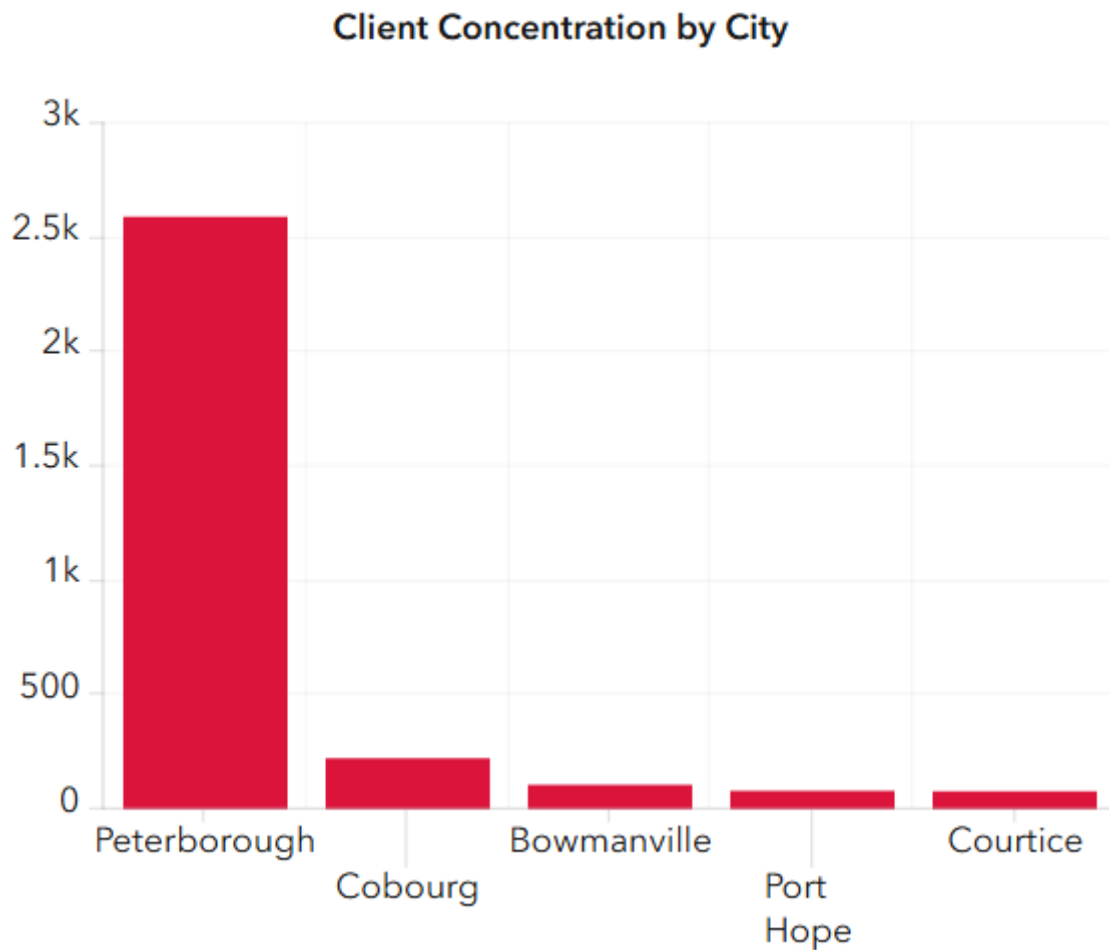


Figure 3: Client Concentration by City

The Client Concentration by City chart (see Figure 3) reveals that 73% of clients reside in Peterborough, highlighting the influence of NCC's main office in the area. Cobourg, home to another NCC office, follows with just 6% of the client base, while the remaining clients are distributed across various Canadian cities. This visualization showcases the geographic scope of NCC's services and identifies areas for potential outreach.

Client Breakdown by Country of Origin

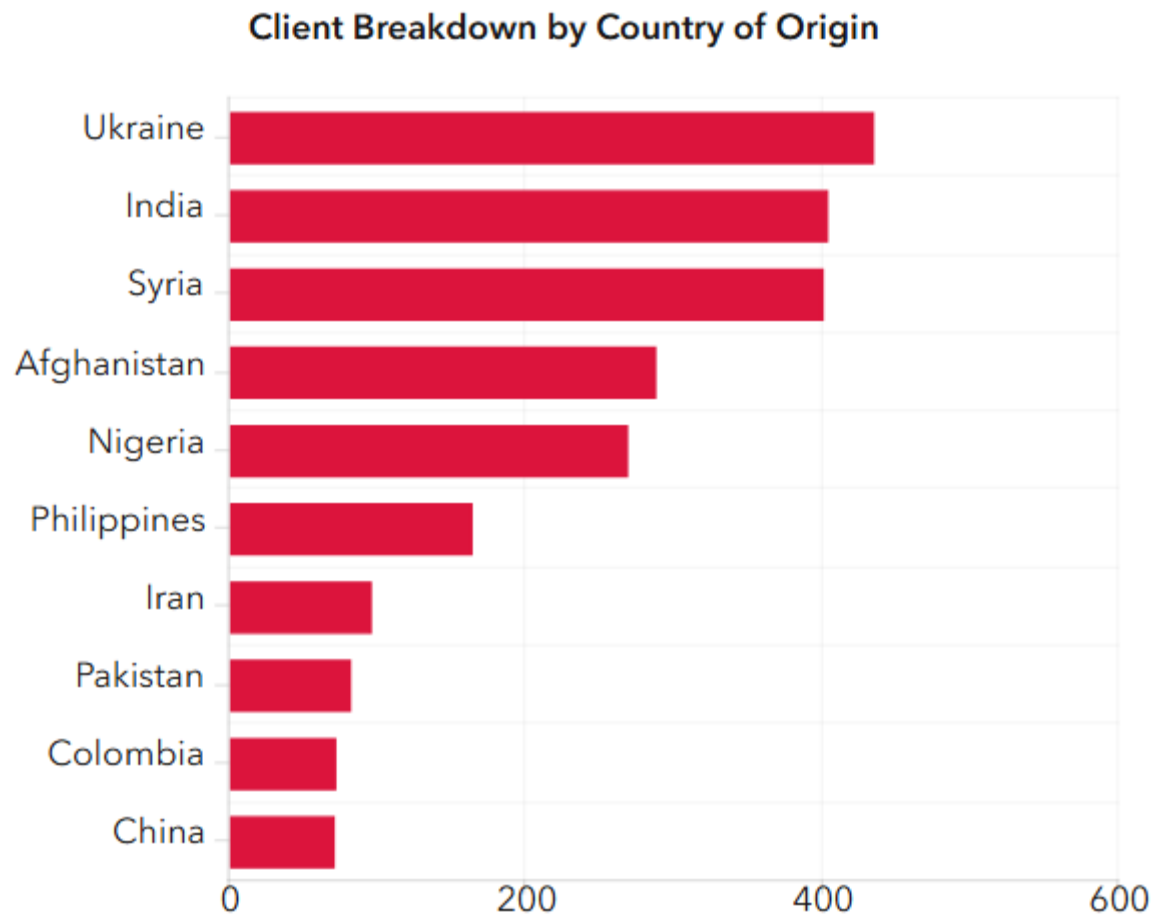


Figure 4: Client Breakdown by Country of Origin

The Client Breakdown by Country of Origin chart (see Figure 4) emphasizes the diversity among NCC's clients. The top three countries of origin—Ukraine, India, and Syria—each account for approximately 11-12% of the total client base. While no single country dominates, regional trends are evident; for instance, Ukrainians represent 55% of clients in Port Hope. This chart provides insights into demographic patterns, helping NCC tailor its services to meet the unique needs of various communities.

Postal Code Analysis

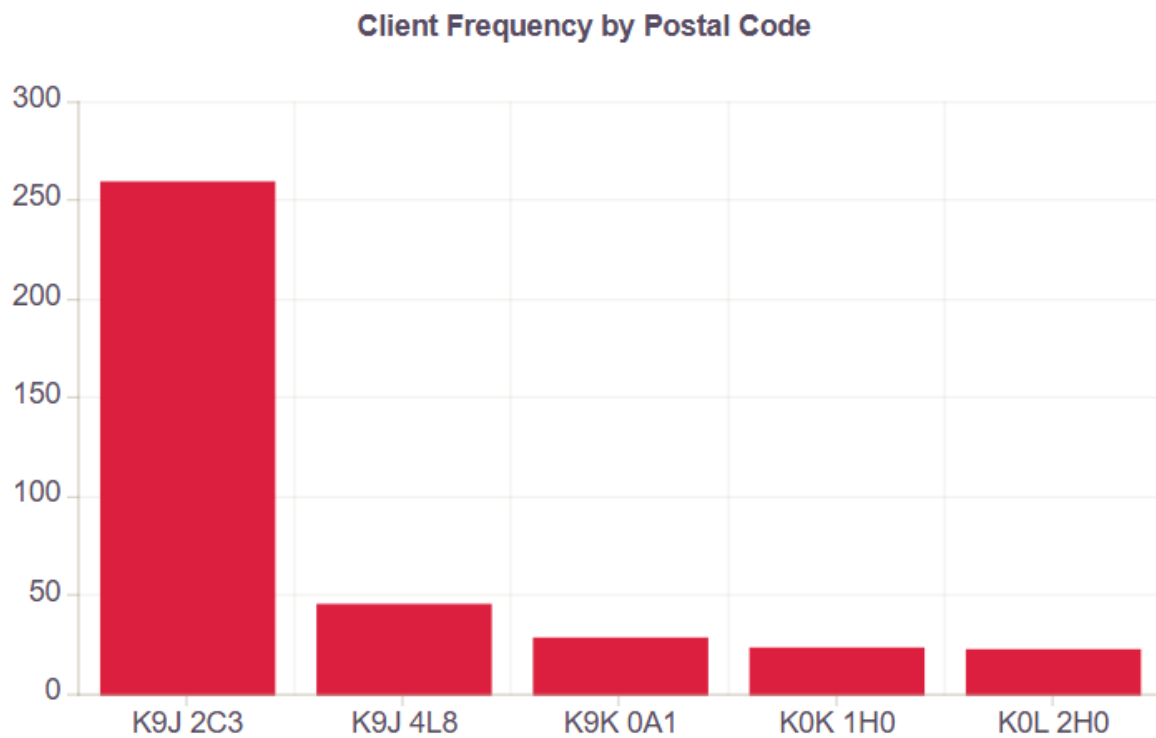


Figure 5: Client Frequency by Postal Code

An additional analysis of postal codes (see Figure 5) identified a notable anomaly. The postal code K9J 2C3, corresponding to NCC's Peterborough office, appears 260 times, representing 7% of the dataset. Cross-referencing with city information revealed mismatches, suggesting this could be a data entry error where the office's postal code was recorded instead of clients' actual addresses.

Resolving these discrepancies would require access to client street addresses or direct verification. While outside the scope of this project, addressing this issue in the future would enhance the accuracy of NCC's geographic data.

Discussion and Future Work

This project has illuminated the complex dynamics of immigration and settlement in rural areas, offering actionable insights and a data-driven framework to enhance the services of the New Canadians Centre (NCC). By developing an interactive dashboard using ArcGIS, we have provided NCC with a powerful tool for visualizing registration trends, geographic distribution, and client diversity. The dashboard's interactivity and user-friendly design enable stakeholders to make informed decisions, focusing on significant findings such as the rapid growth in client registrations and the concentrated presence of immigrants in Peterborough. These insights provide a solid foundation for NCC to refine its operations and explore opportunities for strategic expansion.

Building on these findings, the analysis revealed both strengths and challenges. For instance, while the dashboard effectively highlights key client demographics—such as the diversity of origins from Ukraine, India, and Syria—it also brought to light data inconsistencies, particularly in postal code accuracy. Addressing these inconsistencies is crucial for improving the reliability of analyses. Implementing digital tools for data collection at the source would minimize human error and ensure cleaner datasets. Furthermore, integrating these tools with the dashboard would allow new client information to be automatically updated, ensuring the system remains accurate and current for decision-making.

Improving data reliability would also enhance comparative analyses, a promising area for future research. By comparing NCC's client data with broader immigration trends using census data, and dividing Forward Sortation Areas (FSAs) into Dissemination Areas, we could better understand demographic characteristics at a granular level. This approach would help identify underserved regions or communities, enabling NCC to tailor its services more effectively and prioritize areas for growth.

Beyond geographic insights, understanding client engagement offers another avenue for refinement. Analyzing factors influencing client participation—such as satisfaction with services, ongoing needs, or community connections—can provide valuable feedback to

improve program offerings. Such insights could help NCC adapt its services to support long-term engagement, ensuring clients continue to benefit from its resources while fostering stronger community ties.

Another key focus for future work is the analysis and prediction of registration trends. Temporal analysis could reveal seasonal patterns in client registrations, while predictive modeling could forecast future needs based on historical data. These insights would enable NCC to allocate resources more effectively, plan for peak periods, and explore temporary service setups, such as kiosks, to address surges in demand. This predictive capacity would also guide strategic discussions about expanding physical offices or extending outreach in areas without direct NCC representation.

By addressing these opportunities, NCC can further leverage the insights gained from this project to refine its strategic direction. Enhanced data collection methods, deeper geographic analyses, and predictive tools would not only improve operational efficiency but also support the organization's mission to bridge gaps in rural settlement services. Ultimately, this integrated approach positions NCC to respond proactively to the evolving needs of newcomers, ensuring equitable access to resources and fostering sustainable growth for immigrant communities across Canada.

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