Analysis of long-term care in senior housing.

Department: Data Analytics for Business.

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Abstract

As the modern technologies in healthcare and hospitality are emerging in the market, it is important for us to keep in mind the senior citizens of Canada. This project is to focus on the growing need for new plans for senior housing. We collected the data available on the internet and using tools like excel we cleaned the data and used tableau to analyze the data, visualize and conclude and present our findings. Our goal was to demonstrate the urgent need for constructing new senior housing using data cleaning and data visualization techniques to extract important information like the number of people moving the senior category using the age group data, incomes of individuals and the families and to figure out the how much the existing seniors are paying for studios, one bedroom and two bedrooms at a senior housing. Our work on this project resulted in visualization dashboards using tableau. These powerful tools not only make it easier for a commoner to understand the findings but also help us to communicate our results in a more interactive way.

ACKNOWLEDGEMENTS

We would like to express our heartfelt gratitude to St Clair College for providing me with the opportunity to pursue our capstone project to demonstrate our skill set and knowledge we gained throughout our course.

We are deeply grateful to our professor Hanan Swidan for her assistance and valuable feedback throughout this project. We would also like to thank our coordinator Manjari Maheshwari for her guidance and support throughout the course that helped us to complete this project successfully.

Finally, we extend our thanks to the MECP and Mr. Kamiar Tehrani for providing us with the necessary resources and support to complete this project. Thank you all for helping us to achieve our goals.

Contents

1 INTRODUCTION

Senior care housing includes a range of housing and care alternatives for senior citizens who need help with daily tasks, medical care, and other services. The housing consists of independent living communities, assisted living residences, nursing homes, and memory care institutions. Senior care homes are in greater demand as the elderly population in Canada continues to rise. Senior housing can give seniors access to caregivers, medical professionals, and other resources to help them maintain their independence and quality of life as they age. Seniors may need help with everyday tasks or medical care as they age.

To guarantee that seniors in Canada receive high-quality care and services, elder care housing is subject to government regulation.

As the number of seniors increases, there is a rising worry about the lack of senior housing in Canada. The shortage of senior housing is caused by several reasons, including the significant cost of launching innovative facilities, the scarcity of land for development, and the rising demand as the population ages.

Overall, the shortage of senior housing in Canada can have significant negative impacts on the health, wellbeing, and quality of life of older adults, their families, and their caregivers.

The population is continuously increasing, and it is important to have enough Senior Housing available for the elderly. Housing needs to be not only affordable but also well-equipped to meet their needs. To gain more insights into this issue, we conducted a study to explore the relationship between population growth, life expectancy, and the availability of senior housing.

This project is focused on representing the shortage of these senior homes, focusing mainly on southern Ontario. We collect public data from various sources such as government websites, census data, etc. Using data analytics techniques like data cleaning and data transformation we get cleaned data for analyzing the dataset and to make conclusions about the project. We use data visualization tools like Tableau to use the information and use them to present the findings in the most appropriate way that is easily understandable by humans.

The project is hoping to Answer the following questions:

1. What is the estimated growth of population of Canada for Seniors?
2. What is the current state of available beds and wait list in Ontario?
3. To ensure whether the available space is affordable, identify the average salary of seniors and the average rent of senior care housing in Ontario.
4. How long would an average Ontarian resident have to wait to get placed in a licensed bed?
5. Whether the current available senior house in Ontario is enough for the growing population of seniors?
6. How many licensed beds are available per 1000 population?

2 DESCRIPTION OF THE DATASET

The data for this project was sourced from multiple datasets, which were combined to provide a comprehensive analysis. By using multiple datasets, we were able to gather a broader range of information, which enabled us to develop a more detailed understanding of the subject. Overall, the use of multiple datasets was justified, as it provided a complete and more accurate picture of the phenomenon under study.

In the following sections we would describe the type of date we had, how it was collected, and how the data was intended to use,

2.1 Population estimates by age and sex of Ontario and Canada

Description: This data contains the population by age groups of males, females and both the sexes from the year 2018 to 2022 in Ontario as well as Canada. Throughout the project we decided to keep the focus on Ontario and hence filtered the data necessary.

Source: Statistics Canada

How the data was gathered: This data is readily available in Statistics Canada's website where region of interest can be provided, in our case Ontario and required data can be downloaded as a .csv

Data Usage: We used this data to get an overview of how many people would be available in each age group. And estimate the growth of population within the age group. We also wanted to understand the estimated life expectancy of the year in observation.

2.2 Housing markets data and research

Description: This data contains information about the standard space vacancy rate and average rent for standard space.

Source: CMHC

How the data was gathered: This data is readily available on CMHC's website where the choice of housing type can be selected, in our case Senior Housing, and

the data can be downloaded as a .csv. We generated data for Vacancy Rate and Average Rent.

Data Usage: Our intention to use this data was to identify how much an average senior citizen would be spending monthly to rent out a space. Would the rent be affordable for the citizen with their average income.

2.3 Population estimates of Canada from World bank.

Description: This is a part of open data published by the World Bank. It has various estimates and data about GDP, Sex ratio, Employment rate, etc. globally. We decided to keep our scope of usage specific to Canada with Population estimates.

Source: World Bank

How the data was gathered: This data is readily available to download in the World Bank data store.

Data Usage: We decided this data to be a perfect fit to forecast the population estimate of senior citizens for the next 5 - 10 years. This would provide us with valuable insights on how the Senior Citizen population would look like in the near future. With this we would relate the population and availability of senior housing.

2.4 Ontario LTC List

Description: This data contains information about the Long-Term Care houses in Ontario. It contains information such as the number of people in the waitlist, number of licensed beds, and region and location of the house.

Source: Ontario' Long Term Care Lookup

How the data was gathered: We had to write a data scraping utility in python to extract the list of LTC's available in Ontario and further use APIs from Google to identify the longitude and latitude of the house.

Data Usage: This data was used to identify the total number of houses, available beds, and the waitlist by region and top metropolitan cities. With the population estimation this data was helpful to identify the lack of beds in Ontario.

3 DATA ANALYSIS

3.1 DATA PREPROCESSING

The dataset available covers mostly all parts of Ontario but mainly focusing on southwestern. Categorical features which are defined sets of values and Numerical features where the values are continuous in our dataset. While focusing on data Quality assessment where we are handling missing values in the data.

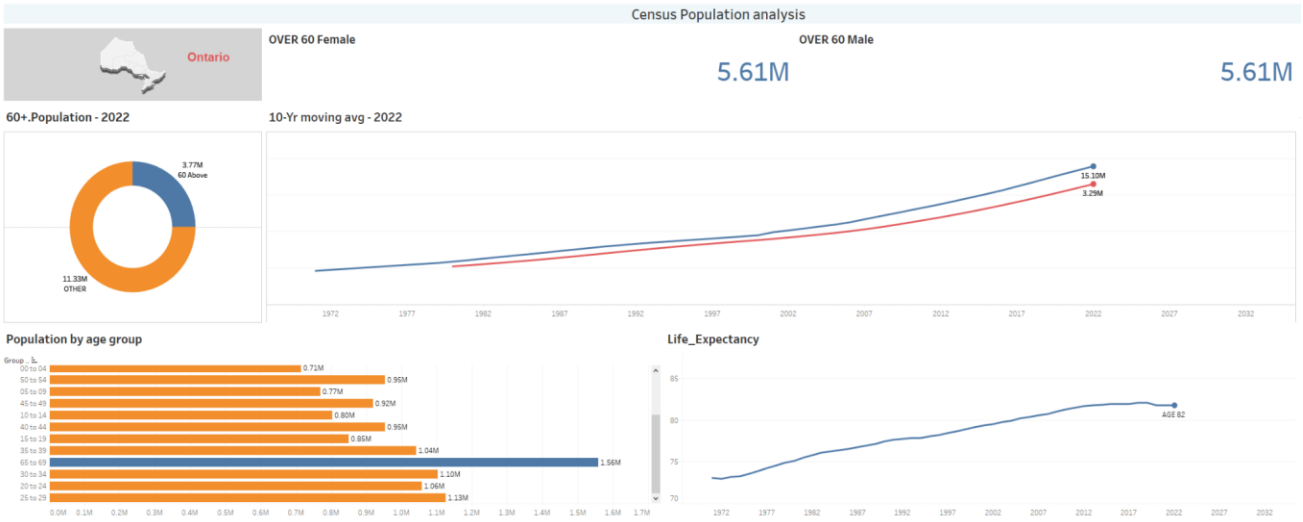
Few values are suppressed for confidentiality / statically reliability by taking as a zero count or no Universe. Data has few duplicate values of one another, in this case we are removing data objects as an advantage or bias in order to deal with duplicates.

Various data sources were utilized for the analysis, which required thorough data cleaning to ensure accuracy and consistency of the information. Additional cleaning was required for the web-scraped data to remove errors and inconsistencies. The datasets were merged based on city and region names to align the information accurately. Null values were removed from the datasets to avoid any discrepancies in the analysis.

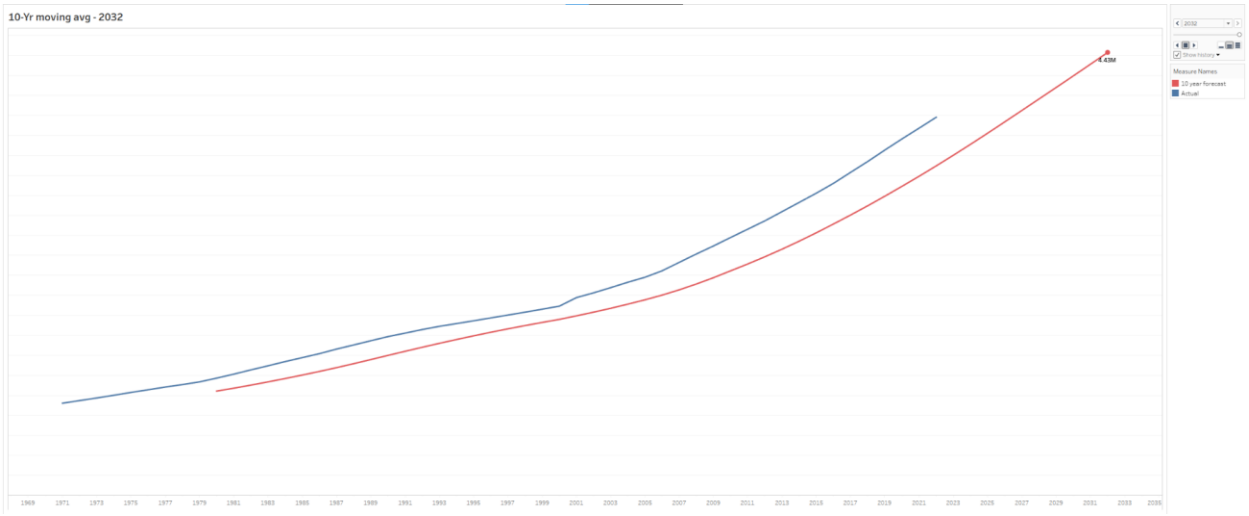
Geographical data was used to create longitude and latitude coordinates for each long-term care facility. The data under analysis pertained to all of Canada, but only the data specific to the Ontario region was utilized. To comply with ethical data usage principles, any private data was removed from the datasets. Also, unknown regions with null values were removed to ensure that only reliable and accurate data was utilized for the analysis.

3.2 DATA VISUALIZATION

3.2.1 CENSUS POPULATION ANALYSIS



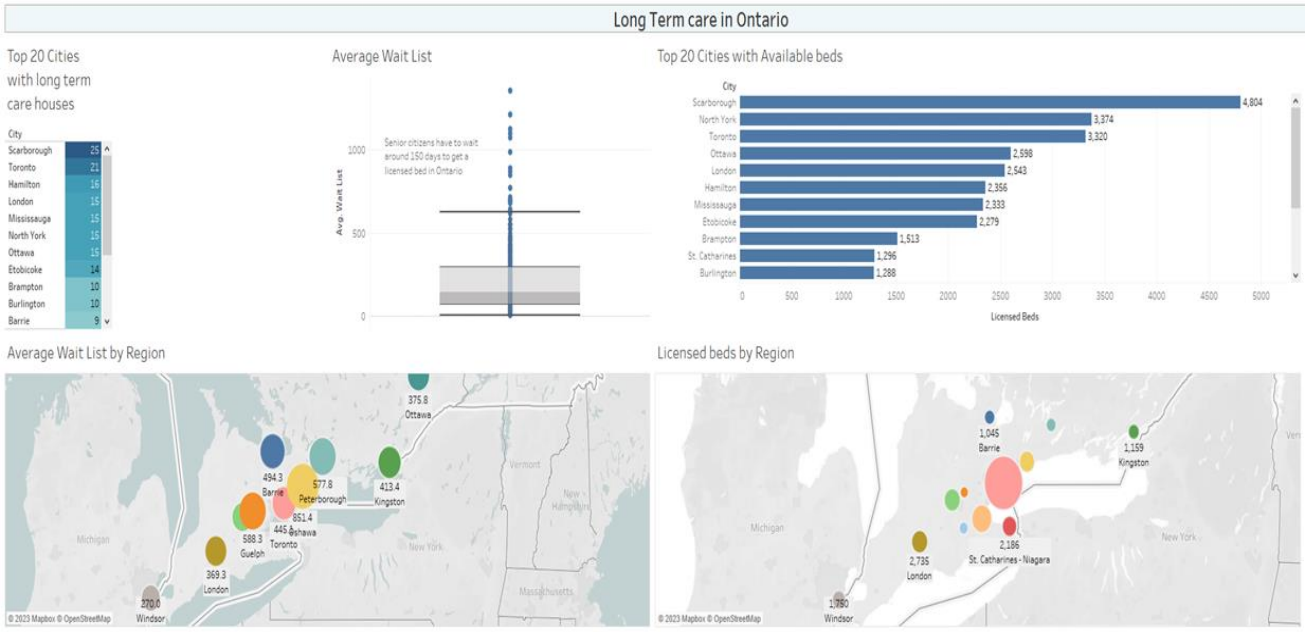
Based on our analysis of population data, it is clear that the population of individuals aged 60 and above in Ontario is significant, with approximately 3.77 million individuals falling into this age group. Furthermore, our forecasting suggests that this population is expected to increase significantly in the coming years. The actual value is already higher than the forecasted value for 2022 based on census data, indicating that the trend of an aging population is likely to continue.



Additionally, we found that the 65 to 69 age group is the most populated in Ontario, with approximately 1.5 million individuals falling into this category based on 2022 census data. It is worth noting that life expectancy has also increased significantly in the past 50 years, with individuals now living on average from 73 to 82 years.

Overall, these findings suggest that the demand for senior housing and long-term care services is likely to continue to grow in Ontario. It is essential that policymakers and other stakeholders pay close attention to this trend to ensure that adequate services and facilities are available to support the needs of aging individuals in the province.

3.2.2 Summary of long-term care in Ontario



Based on our analysis, Scarborough and Toronto have the highest number of long-term care homes in southern Ontario. This suggests that these areas have a higher demand for long-term care services compared to other areas in the region.

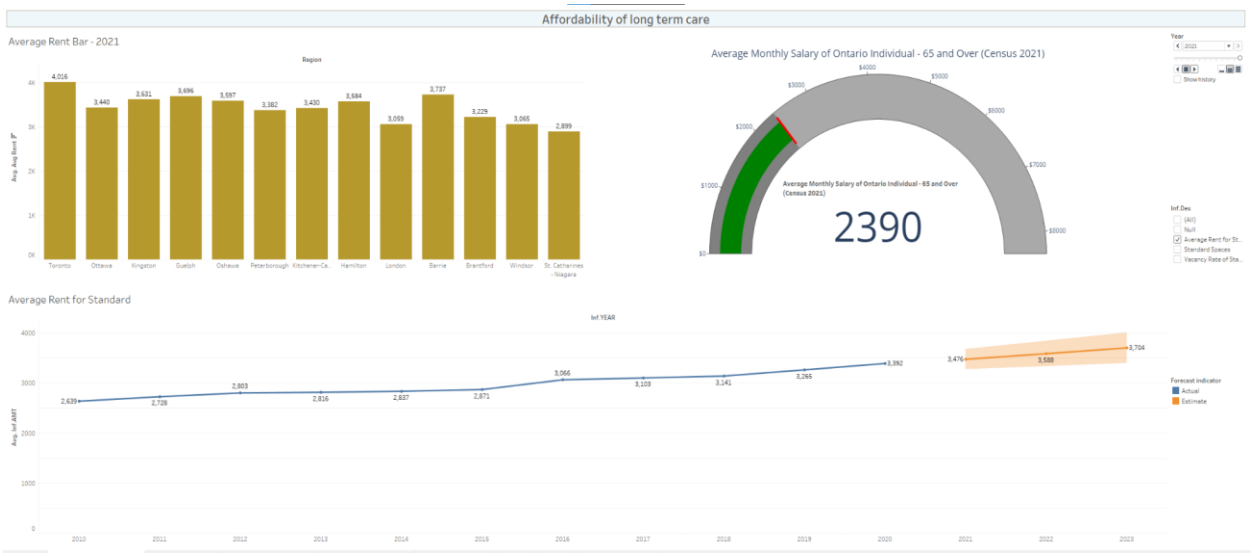
On average, 288 senior citizens are waiting to get a licensed bed in Ontario, indicating a critical need to increase the number of licensed beds in long-term care facilities.

When it comes to the availability of long-term care beds, Scarborough, North York, and Toronto are the cities with the highest number of beds available in southern Ontario. This could be due to a higher demand for long-term care services in these areas, resulting in the need for more facilities.

On the other hand, Oshawa has the highest number of waiting lists for long-term care beds. This suggests that there is a greater demand for long-term care services in this area than the available supply.

There is a need for more long-term care facilities in Ontario to meet the growing demand for services. Scarborough and Toronto are the areas with the highest number of long-term care homes, while Scarborough, North York, and Toronto have the highest number of available beds. Oshawa has the highest number of waiting lists, indicating a need for more facilities in that area.

3.2.3 Affordability of Long-Term Care In Ontario



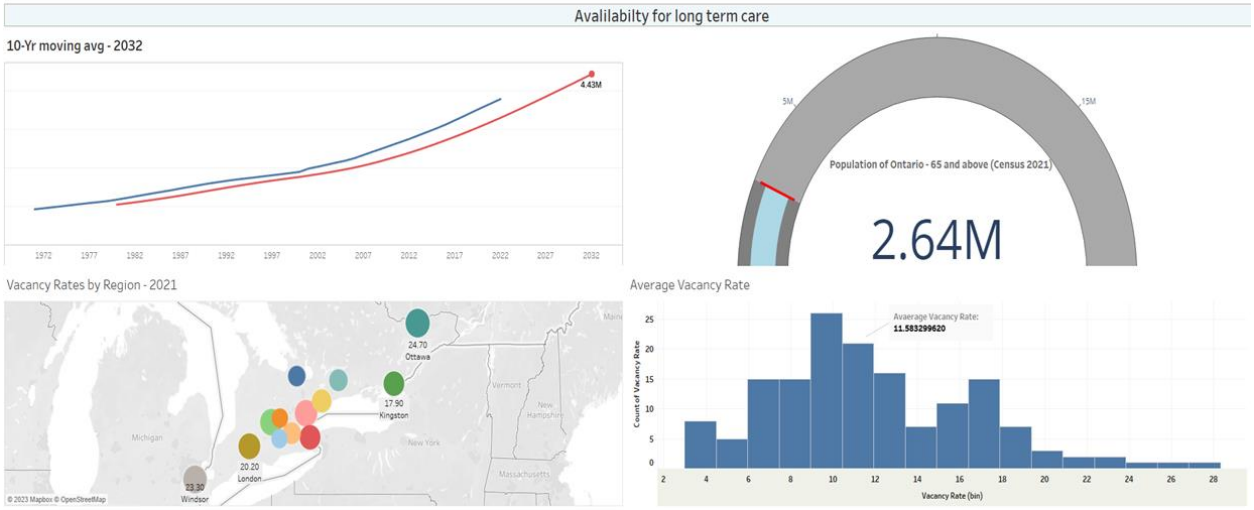
The affordability of long-term care homes in Ontario, we found that the average monthly income of an individual aged 65 and over is $2390 in 2022. On the other

hand, the average monthly rent of a standard room in Ontario is $3588 in the same year, which is significantly higher than the average income. This implies that long-term care homes in Ontario are not affordable for seniors with an average income.

Furthermore, we found that Toronto has the highest amount of rent for long-term care homes in Ontario, making it even more difficult for seniors with limited income to afford such homes. It is important to note that the high cost of long-term care homes can be a major barrier for seniors in accessing necessary care and support, which could impact their health and wellbeing.

Our analysis suggests that affordability of long-term care homes in Ontario is a major issue, particularly for seniors with limited income. Policymakers and stakeholders in the healthcare industry should work together to address this issue and find ways to improve the accessibility and affordability of long-term care homes for seniors.

3.2.4 Availability of Long-Term Care In Ontario

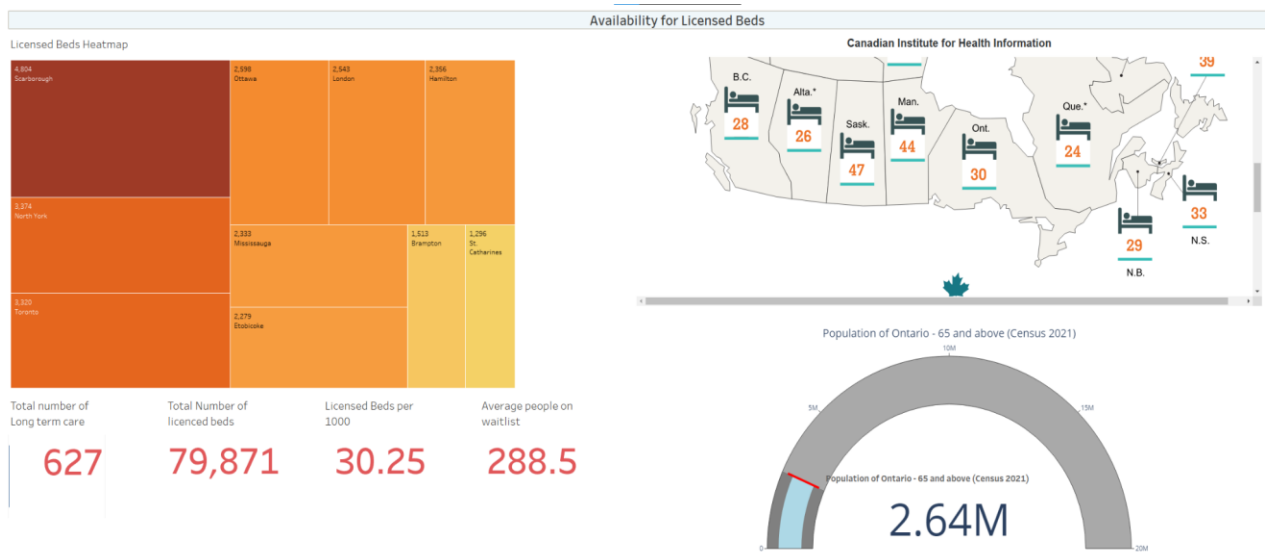


The population of senior citizens in Ontario has been increasing over the years. According to the 2021 census, the current number of senior citizens in Ontario is around 2.64 million. It has become crucial to ensure the availability of long-term care for this growing population. Therefore, we conducted an analysis of the

overall availability of long-term care in Ontario in terms of vacancy rates in different regions.

We found that the average vacancy rate in long-term care facilities in Ontario is approximately 11.58. Notably, Ottawa has the highest vacancy rate of 24.7%, indicating a relatively higher availability of long-term care facilities in the region. This information is crucial in developing strategies to address the needs of the aging population in Ontario, including access to long-term care services.

3.2.5 Availability of Licensed beds



In addition to analyzing the vacancy rates in long-term care facilities, we also investigated the availability of licensed beds in such facilities to understand if the current capacity can accommodate the increasing population of Ontario.

We explored the distribution of licensed beds across different regions in Ontario. Our research showed that Scarborough has the highest number of licensed beds in long-term care facilities, with a total of 4,804 beds. This data is significant as it highlights areas with higher capacity and can guide policymakers in targeting resources and interventions to meet the needs of the elderly population.

Additionally, we found that there are currently 627 long-term care facilities in Ontario with approximately 79,871 licensed beds. When considering the population of 2.64 million senior citizens in Ontario, this translates to approximately 30.25 licensed beds per 1,000 people. While this ratio may seem adequate, there are still challenges in meeting the growing demand for long-term care services.

Our research also revealed that there is a high demand for licensed beds, as on average, 288 senior citizens are waiting to get a licensed bed in Ontario. This highlights the need for measures to address the shortage of licensed beds in long-term care facilities and to improve the accessibility and quality of care for senior citizens in Ontario.

Overall, our analysis provides valuable insights into the availability and distribution of long-term care facilities and licensed beds in Ontario. To ensure the accuracy of our findings, we cross-checked our data with the Canadian Institute of Health Information and found that the numbers were in line with their records. These findings are essential for policymakers to make informed decisions regarding the allocation of resources in the long-term care sector. This information can guide policymakers, stakeholders, and the public in developing strategies to address the needs of the growing elderly population in the province.

		
627 LTC Homes	**79,870 LTC Beds**	**2.64M Population Age 65+**

4 CONCLUSIONS

Based on our findings, it is evident that there is a significant population of elderly people in Ontario, with **2.64 million** individuals aged 65 and above. The number of senior citizens is increasing in the province, which highlights the need for more long-term care facilities in the future. Currently, there are **627 long-term care homes** in Ontario, providing **79,870 licensed beds**. However, 288 Senior citizens are waiting to get a licensed bed in Ontario, indicating a shortage of long-term care homes.

The estimated average rent of long-term care in Ontario is $3588, which might not be affordable for all senior citizens. The average monthly salary of an individual in Ontario 65 and above is $2390, which is significantly lower than the estimated rent.

These findings indicate that Ontario needs to increase its investment in long-term care in the coming years to meet the needs of the growing elderly population. This includes increasing the number of licensed beds, improving the quality of care, and providing more financial support for senior citizens who require long-term care.

In conclusion, the population of elderly people in Ontario is increasing, and there is a critical need to improve the availability and accessibility of long-term care services. Based on our analysis and findings, we recommend that policymakers, stakeholders, and the public prioritize investing in the long-term care sector to ensure that senior citizens receive the care they need and deserve.

5 FUTURE WORK

To begin with, the biggest challenge we faced was data gathering. Due to multiple confidentiality reasons, most of the important and project focused data was hidden. We highly recommend the continuous improvement in gathering more data from more reliable and open sources.

To gain a better understanding of the medical needs of individuals residing in long-term care homes, several steps can be taken. Contacting long-term care homes to collect additional data on their residents' medical conditions is one approach. Conducting research on the diseases and medical conditions commonly found among seniors in Ontario can also provide valuable insights.

Furthermore, performing a comprehensive analysis of the medical facilities and resources available in long-term care homes can provide further context for the data collected. By taking these steps, a more complete understanding of the medical needs of individuals in long-term care homes can be obtained, which can inform decision-making and improve the quality of care provided to these vulnerable populations.

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