The Employment, Retention and Exit of Publicly Employed Nurses in New Brunswick

An Analysis Using Linked Administrative Data

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Project Title

The employment, retention and exit of publicly employed nurses in New Brunswick: An analysis using linked administrative data

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Publication Date

June 2024

Project Number

P0108: Nursing Retention in New Brunswick

Acknowledgements

This priority project was undertaken by the New Brunswick Institute for Research, Data and Training (NB-IRDT) at the request of the Government of New Brunswick, Department of Health. The opinions, results and conclusions reported in this paper are those of the authors and are independent from the funding sources. No endorsement by the Government of New Brunswick or their partners is intended or should be inferred.

This study was supported by the Maritime SPOR SUPPORT Unit (MSSU), which receives financial support from the Canadian Institutes of Health Research (CIHR), the New Brunswick Department of Health, the Nova Scotia Department of Health and Wellness, the Prince Edward Island Department of Health and Wellness, ResearchNB and Research NS. The opinions, results and conclusions reported in this paper are those of the authors and are independent from the funding sources. No endorsement by the MSSU or the named funding partners is intended or should be inferred.

Project Data

Research analytic outputs were produced using platform data accessed through NB-IRDT.

How to Cite This Product

Beykzadeh, A., McDonald, T., & Miah, P. (2024). The employment, retention and exit of publicly employed nurses in New Brunswick: An analysis using linked administrative data. Fredericton, NB: New Brunswick Institute for Research, Data and Training.

Table of Contents

List of Tables

List of Figures

Executive Summary

This study examines the recruitment, occupational retention and mobility of nurses in New Brunswick's (NB's) public health sector between the years 2016 and 2022. Using a unique linked administrative data set that combines individual-level payroll data of registered nurses (RNs) and licensed practical nurses (LPNs), university and college graduation data and Medicare health insurance registry data, we address three questions related to nurses' labour market decisions and transitions:

1) What proportion of nursing graduates from public post-secondary institutions in NB live in NB and work as nurses in its public hospitals?

2) What factors affect nurses' decisions to exit from employment in the NB public hospital system?

3) Among the nurses that leave the NB hospital system, do they stay in NB, or do they leave the province?

Highlight of Findings

Nursing Counts and Demographics

- The number of active RNs in the NB public health system steadily increased from 2016 to 2022, growing by 14% to reach 7,345 RNs by 2022.
- The number of LPNs surged by 39% between 2016 and 2022, reaching approximately 3,000 active LPNs by the end of the study period.
- At least 70% of active RNs were originally from NB, though there was a declining trend (from 77% in 2016 to 71% in 2022). Meanwhile, the share of RNs originally from outside the Maritime provinces ("Non-Maritime" RNs) actively working in NB gradually increased from 18% in 2016 to 22% in 2022.
- Compared to RNs, the share of LPNs originally from NB declined slightly more – from 77% in 2016 to 69% in 2022. Conversely, the proportion of Non-Maritime LPNs increased from 18% in 2016 to 25% in 2022.

Nursing Graduates' Transitions to the Public Health Sector

- Graduates from Bachelor of Nursing programs at NB's public universities exhibited high rates of transition to the NB public health sector, with 9 out of 10 graduates originally from NB working as RNs at some point post-graduation.

- Graduates from Practical Nursing programs at NB's public colleges showed more fluctuation in transition rates, with approximately three-quarters working as LPNs in the public health sector post-graduation.

Occupational Attrition and Retention Rates

- Annual occupational attrition rates for both RNs and LPNs generally ranged from 4% to 6% over the study period, with both groups seeing a more notable spike in 2018.

- RNs and LPNs in the 65+ age group demonstrated decreasing attrition rates with each year. Conversely, younger RNs (in the <25 and 25-34 age groups) showed increasing attrition rates, particularly post-2020.

- Occupational retention rates for newly hired RNs and LPNs were relatively high, with around 93% of new hires remaining after one year. However, most recently, retention rates dropped to 75% for RNs and 79% for LPNs five years after being hired.

Retention of Former Public Health Nurses in NB

- Provincial retention rates for RNs and LPNs who left the public health sector show a rising trend with age. Over 90% of former RNs and former LPNs aged 60 and above remained in NB five years after leaving the NB public health sector.

- Conversely, less than three-quarters (73%) of the youngest RNs and 78% of the youngest LPNs (aged 18-29 years) remained in the province one year after exiting the NB public health sector, with only around half remaining five years later.

Key Takeaways

Despite the growing number of active RNs and LPNs in NB's public health sector, our results emphasize a need to recruit and retain more nurses in the public hospital system, with a focus in particular on the retention of younger nurses and recent graduates. With an ongoing nursing shortage and a surge in population growth following the COVID-19 pandemic, it is estimated that NB will need 520 new nurses per year to maintain its nursing workforce, which is more than the number of nursing graduates NB currently produces on a yearly basis (New Brunswick Nurses Union [NBNU], 2020).

Although we observe some positive outcomes in nursing recruitment, we also observe challenges in retention. For instance, we see a large share of Bachlor of Nursing graduates transitioning to employment in the public hospital system. That being said, along with a relative shortage in the number of nursing graduates mentioned above, there is an increasing risk of recent graduates and new hires leaving the public sector shortly after joining.

An increase in attrition among RNs with less than five years of experience means that if this trend continues, there is a growing risk of recent Bachelor of Nursing graduates exiting the public health sector, specifically among those who did not obtain previous experience as an LPN. The younger age groups (with fewer years of experience) are not only increasingly likely to leave the public sector, but they are the most likely to leave the province altogether. The drop in 5-year provincial retention rates among the youngest age group suggests that approximately half of the youngest RNs and LPNs that leave the public health sector are not contributing to health care in NB through longer-term employment in other sectors such as nursing homes. Instead, these younger nurses are more likely to leave NB, either to pursue employment opportunities within the nursing field or in other professions.

With an aging workforce and an aging population in general, NB has more citizens nearing retirement who are likely to develop greater need for health services as they age. While some of this aging effect is being offset by the in-migration of working-age individuals and young families, this does not alleviate the growing demand for health services but rather contributes to it – emphasizing the importance of recruiting and retaining public health nurses even more.

By using the novel linkage of payroll, graduate and Medicare data to identify observable factors associated with decisions to enter and leave NB's public health sector, this study aims to provide evidence that can be used to inform and influence positive policies – including the development of strategies to recruit more nurses to NB's public health sector while encouraging those already employed in the sector to stay.

Introduction

The purpose of this retrospective study is to examine and better understand trends in the recruitment, retention and mobility of nurses in New Brunswick's (NB's) public health sector over the period 2016-2022 and to identify potential factors that may be influencing nurses' employment and mobility decisions. To do so, this study uses a unique linked administrative data set that combines individual-level payroll data of registered nurses (RNs) and licensed practical nurses (LPNs), university and college graduation data and provincial Medicare registry data.

Background

The task of recruiting and retaining nurses in NB is becoming more and more challenging. As NB's population continues to both age and grow, there is an increasing demand for health services from an already strained public health system – and because this situation is not unique to NB, there is heavy competition from other provinces to recruit new nursing graduates and currently employed nurses.

According to the NB Nurses Union (2020), 3,400 RNs (41% of the provincial workforce) will be eligible for retirement by the year 2025. The Department of Health projects that, overall, the NB healthcare system will face a deficit of approximately 1,300 RNs by the year 2028 (Government of New Brunswick [GNB], 2019). Meanwhile, NB has increased funding for LPN-RN bridging programs; and while this may help boost the number of RNs in the province, it could also contribute to a decrease in the number of LPNs (GNB, 2019).

A continuing nursing shortage is likely to have a growing impact on healthcare providers and patients across the province. With active nurses facing larger workloads, research shows associations between higher patient-to-nurse ratios and higher levels of patient mortality (Aiken et al., 2011). For instance, a study conducted across nine countries in Europe finds that patients had a 7% higher chance of dying within 30 days of admission when their nurse's workload increased by one patient (Aiken et al., 2014). Given the potential outcomes, it is crucial for the province of NB to address this shortage through both increased recruitment and retention.

In 2024, the Maritime Provinces Higher Education Commission (MPHEC) conducted a survey of graduates who obtained bachelor's degrees from Maritime universities. The findings indicate that nearly all nursing graduates who responded to the survey were employed two years after graduation and that the most common occupations among employed graduates were professional occupations in nursing, with 83-95% of graduates working in this category (MPHEC, 2024).

While this suggests relatively high rates of recent nursing graduates are being recruited as nurses, it is estimated that NB will need 520 new nurses per year to maintain its nursing workforce, which is more than the number of nursing graduates NB currently produces on a yearly basis (NBNU, 2020). Moreover, not all nursing graduates who graduated in NB will stay and work in NB.

A 2024 study by NB-IRDT (Beykzadeh et al., 2024) finds that nursing graduates have higher retention rates in the province compared to other fields of study, yet a significant proportion of recent NB graduates still leave the province. For example, Beykzadeh et al. (2024) find that, on average, about one-fifth (18%) of nursing graduates from NB universities leave the province within one year of graduation.[1] These findings align with data from the New Brunswick Nurses Union that show 20% of NB nursing graduates leaving for other provinces (NBNU, 2020).

Issues with retention impact more than recent graduates, however, and the recent COVID-19 pandemic has exacerbated many of the workplace stressors that may influence active nurses' decisions to leave the profession. The increased workloads and longer working hours caused by the COVID-19 pandemic have contributed to poor mental health, exhaustion and extreme stress for many nurses across Canada. In a survey conducted in Ontario (Lopez et al., 2022), 83% of RNs reported worsened mental health as a result of working on the front lines during the pandemic. Combined with the increased risks of contracting COVID-19 and the potentially long-lasting impacts of infection, this led many nurses to leave the profession. A review on the impact of COVID-19 on nurse turnover (Falatah, 2021) found that more nurses have had an intention to leave the profession since the start of the pandemic, with predictors of turnover intention shifting from measures like job satisfaction and leadership style to stress and anxiety.

Along with contributing to higher workloads and stress among active nurses, nursing turnover is costly to governments. In Canada, replacing a nurse who has left the public health system is estimated to cost roughly $24,000. This includes direct costs such as the costs of recruitment, temporary replacements and hiring, as well as indirect costs such as loss of productivity (Duffield et al., 2014). While recruitment is necessary to meet growing healthcare demands, an emphasis on retention is equally as important, with the potential to contribute to health system costs reduction as well.

To help inform strategies to boost nurse recruitment and retention in NB, this study investigates the retention and mobility of nurses in NB's public health system over the period 2016-2022, identifying factors that may be influencing nurses' decisions to stay or leave the public health sector. It investigates several facets of publicly employed nurses in NB, including:

- **Nursing graduates' employment and mobility** – At what rate do nursing graduates from NB post-secondary institutions live and work in NB? What personal characteristics of graduates are associated with a greater likelihood of remaining and working in the NB public health system as nurses after graduation?

- **Attrition** – At what rate are NB nurses leaving their careers in the NB public health system, and how does this vary by personal characteristics?

- **Retention** – At what rate are nurses who leave the NB public health system also leaving NB, and what characteristics are associated with a greater likelihood of leaving?

[1] In the same study (Beykzadeh et al., 2024), nursing graduates from NB colleges exhibit a 1-year retention rate of 89.3%.

Data and Methodology

Data

This report utilizes a data set that links individual-level administrative data from three different sources which are accessible through the New Brunswick Institute for Research, Data and Training (NB-IRDT).

Nursing Payroll Data

Excerpts from the Nursing Payroll Data are provided by the NB Department of Health. This data set only contains information on nurses who have worked or still work in the NB public hospital system and includes information on their entry and exit from employment (i.e., attrition). Individuals employed as nurses in other sectors (such as in nursing homes, special care homes or private practice clinics) are not included in the data extract. The data set (and this study) do not include travel nurses from other provinces.

The data cover nurses employed at some point during the years 2016-2022 and include variables such as start date, sex, contract type, payroll status (full-time, part-time, casual, other) and health zone.

Citizen Data

The Citizen Data at NB-IRDT is a comprehensive administrative database that includes basic demographic and geographic data on all NB residents who have (or had) a provincial Medicare card. The data set uses partial postal codes and Medicare status to determine where a person lives in NB and/or when they leave NB. This study utilizes the Citizen Data until December 2022 and links it with Nursing Payroll Data to identify former nurses who either moved out of the province or stayed in NB after exiting from their occupation in the public health system.

NB University/College Graduates

This study also utilizes data sets containing information on individuals who graduated from public universities and colleges in NB.

The **NB University Graduates** data used here are provided by the Maritime Provinces Higher Education Commission (MPHEC), which combines information from the province's four publicly funded universities[2] into one data source. The **CCNB Student Data** and **NBCC Student Data** used in this report come directly from those colleges.

[2] The four universities are Mount Allison University (MTA), St. Thomas University (STU), Université de Moncton (UdeM) and the University of New Brunswick (UNB).

These data sets contain information such as graduation dates, immigration status, sex, education level (undergraduate, graduate, certification), field of study, program completion status and permanent province of residence. We utilize the NB University Graduates data to identify Bachelor of Nursing graduates, and we use the CCNB and NBCC Student Data to flag graduates in these colleges' Practical Nursing programs.

These data sets only encompass graduates from public universities and colleges in NB and exclude graduates from other provinces or private institutions in NB (e.g., Oulton College). Our analysis only includes years for which these institutions collected one calendar year of data.

Methodology

Measuring Nursing Duration and Nurse Attrition

Records in the Nursing Payroll Data are used to identify nurses who exited their profession in the public hospital system after 2016. It is important to note that while we can see nurses who started working before 2016 (1980-2015), those who left the profession prior to 2016 are not observed in the Nursing Payroll Data. Therefore, our analysis only focuses on nurses who remained active or departed the public health system between 2016 and 2022. Further, we can only observe nurses' most recent occupational status. Therefore, those who transitioned from a Licensed Practical Nurse (LPN) to a Registered Nurse (RN), for instance, are flagged as RNs in our study.

We define the duration of nursing careers as the timeframe between the "hired-date" indicator and departure[3] from the Nursing Payroll Data. Nurses who remain employed as of the conclusion of our study period (end of 2022) are presented as being employed within the study duration. For 2022 LPN exits, there is a stark drop in attrition (to approximately 0%) compared to previous years. This could be due to data quality issues (e.g., incomplete data) and warrants further investigation based on updated data. Thus, LPN exits for 2022 are excluded from the study.

It is also important to note that if an individual exits and subsequently returns to the nursing profession, such as rejoining on a casual basis during the COVID-19 pandemic, this is regarded as one continuous tenure. The data provided do not allow gaps in tenure to be identified, and job status (e.g., full-time) is recorded only as of the most recent observed year.

Location of Residence After Exit From the Public Health Sector

The Nursing Payroll Data is matched[4] with the Medicare status of nurses in the Citizen Data to identify nurses' location of residence after they exit the public health sector. Nurses with an "Active" Medicare status are presumed to still reside in the province after leaving their

[3] A nurse's exit is flagged by the status of the termination/departure indicator in the Nursing Payroll Data. These terminated statuses include "involuntary," "voluntary," "laid off," "retirement" and "contract terminated." Any temporary leave, such as maternity leave, is not flagged as an exit from nursing.
[4] The matching rate between Nursing Payroll Data and Citizen Data is 98% for full-time nurses and 85% for part-time/casual nurses.

occupation. These individuals may still be working in another job or retired. If a nurse's Medicare status indicates "Left the Province" or "Left Country," we classify them as having left the province. Likewise, if a nurse's Medicare status is "Terminated" for any reason other than death and remains "Terminated" for at least six months, we consider them to have left the province. A "Terminated" Medicare status suggests that the individual moved out of NB after leaving their position in the public health sector, but due to data limitations, we are unable to determine their destination or employment status outside of NB.

To capture the "homing effect" – that is, the likelihood of remaining near one's home – on active and former nurses, we utilize the previous province of residence indicator in the Citizen Data and categorize individuals as "NB," "Maritime (Non-NB)" and "Non-Maritime." The "Non-Maritime" category includes nurses from other provinces and immigrants (regardless of place of education). We are unable to identify internationally educated nurses with the available data, but future work will include linkage with immigration landing records for permanent residents, available through NB-IRDT, which would allow further breakdown of this category.

Becoming a Nurse in the Public Health Sector in NB After Graduation in NB

We use the NB University Graduates data set and CCNB and NBCC Student Data to track graduates in Bachelor of Nursing and Practical Nursing programs at public post-secondary institutions in NB. These data sets are linked to the Nursing Payroll Data to identify whether Bachelor of Nursing graduates are employed as RNs, and whether Practical Nursing graduates are working as LPNs, within the hospital system in NB.

In some cases, individuals graduating with a Bachelor of Nursing degree would already be employed (pre-graduation as a nurse, as recorded in the payroll data). These are likely LPNs or students on seasonal contracts transitioning to an RN position with a bachelor's degree. Due to data limitations, we are unable to observe transitions from LPN to RN because we only observe the most recent classification of an individual's nursing credentials.

Bachelor of Nursing degrees obtained prior to 2004 and Practical Nursing diplomas obtained prior to 2014 cannot be observed. Table1 below shows the NB post-secondary institutions offering nursing programs along with available calendar years of data.

Table 1: Post-Secondary Institutions and Data Ranges*

Institution	Years Available
University of New Brunswick	2004-2020
Université de Moncton	2004-2020
NBCC	2014-2020
CCNB	2014-2020

**Calendar years*

To estimate the impact of place of residence prior to post-secondary education, we categorize graduates as "NB," "Province Outside NB" (i.e., domestic graduates) and "Outside Canada" (i.e., international graduates) based on stated residence in the earliest reporting cycle (i.e., during registration for a post-secondary institution) (Bhuiyan et al., 2020). The Outside Canada classification for international graduates is based on their student status, which would indicate they are not Canadian citizens or permanent residents (during registration for a post-secondary institution). To protect confidentiality, all counts in this study have been randomly rounded to the nearest 5.

Statistical Analysis

To complement the descriptive statistics presented, we also undertook a statistical analysis of outcomes that allowed us to disentangle various factors potentially affecting the transitions of interest in this report – including starting work as a nurse, exiting the profession and duration employed. Technical details of the equations used to estimate results are in Appendix 2.

Limitations

Various factors contribute to nurses' decisions to leave their positions, including personal factors, workplace conditions and alternative job opportunities. This study focuses solely on personal characteristics observable in the data (such as age, sex, place of prior residence, duration of employment and geographical location of work) as determinants of nurses' decisions. It does not encompass broader aspects that could impact nurses' job satisfaction and motivation, such as teamwork dynamics, autonomy levels, opportunities for professional growth, compensation structures and benefits packages. We are also unable to track the employment status of nurses once they exit their profession within the NB public health sector.

Our investigation into the factors influencing the choice to pursue a nursing career in NB relies on data sourced from NB-IRDT. These linked data exclusively capture educational achievements of graduates from select NB public universities and colleges. Consequently, our analysis encompasses individuals who acquired a Bachelor of Nursing degree from either the University of New Brunswick (UNB) or Université de Moncton (UdeM) after 2004, or a Practical Nursing certificate from New Brunswick Community College (NBCC) or Collège communautaire du Nouveau-Brunswick (CCNB) after 2014.

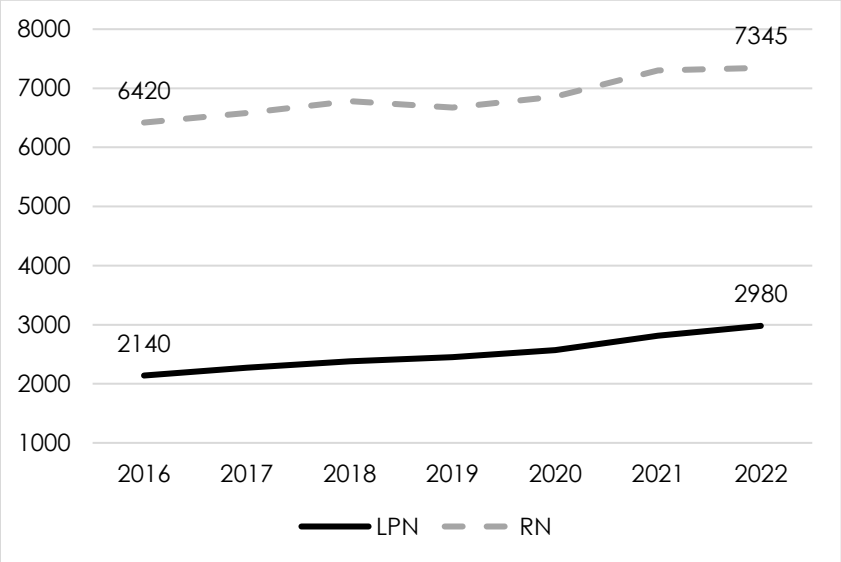
Only RNs and LPNs employed in the public hospital system are included in the Nursing Payroll Data. This excludes nurses employed in nursing homes and other assisted living facilities as well as privately funded clinics. Hereafter, when we refer to exit from the public nursing sector, we are specifically referring to nurses leaving the public hospital system. It is important to note that these individuals may still be working in nursing or special care homes, or in private practice clinics.

The data available at NB-IRDT do not allow us to track the employment status of nursing graduates who choose not to pursue a career in public sector nursing in NB. Therefore, we cannot assess the labour force status of this group of graduates at this time.

Results: Descriptive Statistics

Overall Counts (Annually, 2016-2022)

Figure 1: Number of Active Nurses by Year



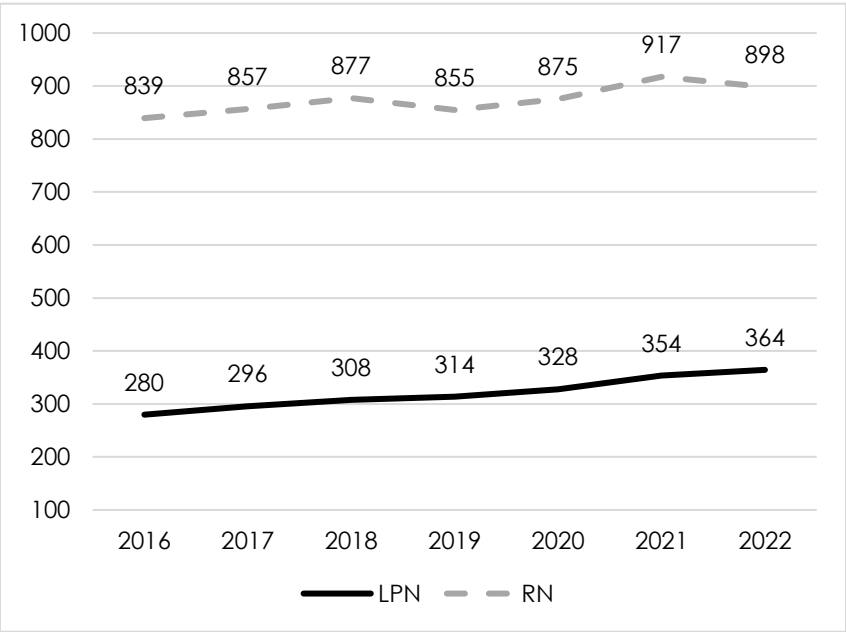
The number of active nurses in the public health system steadily increased from 2016 to 2022. During this time, the number of active RNs grew by 14%, reaching 7,345 in 2022 (compared to 6,420 in 2016).

Meanwhile, the number of active LPNs underwent an even more substantial increase of 39%, growing from 2,140 LPNs in 2016 to 2,980 in 2022.

Table 3 and Table 4 in Appendix 1 show the corresponding data for Figure 1.

Figure 2 illustrates the number of active nurses in the public health system per 100,000 population.

Figure 2: Number of Active Nurses per 100,000 Population



The number of active RNs per 100,000 population grew by 7%, from 839 RNs in 2016 to 898 in 2022.

During same period, the number of LPNs per 100,000 population increased by even more (30%), rising from 280 in 2016 to 364 in 2022.

While we see an overall positive trend in the number of both RNs and LPNs, the level of growth depicted in Figure 2 is not as large as that illustrated in Figure 1.

Note: Population estimates were taken from Statistics Canada (2024).

For instance, the total number of RNs and LPNs in Figure 1 grew by 14% and 39%, respectively, compared to the number per 100,000 population growing by 7% and 30%, respectively, in Figure 2.

Although the number of LPNs per 100,000 population increased each year, we see some variation in the number of RNs, with a slight decline occurring in 2019 and again at the end of the study period in 2022. As more years of data become available, it will be possible to see whether the overall positive trend in the number of RNs continues alongside the recent trends in population growth or if the decline observed in 2022 marks the beginning of a new trend.

Profile of NB Nurses (Pooled Years, 2016-2022)

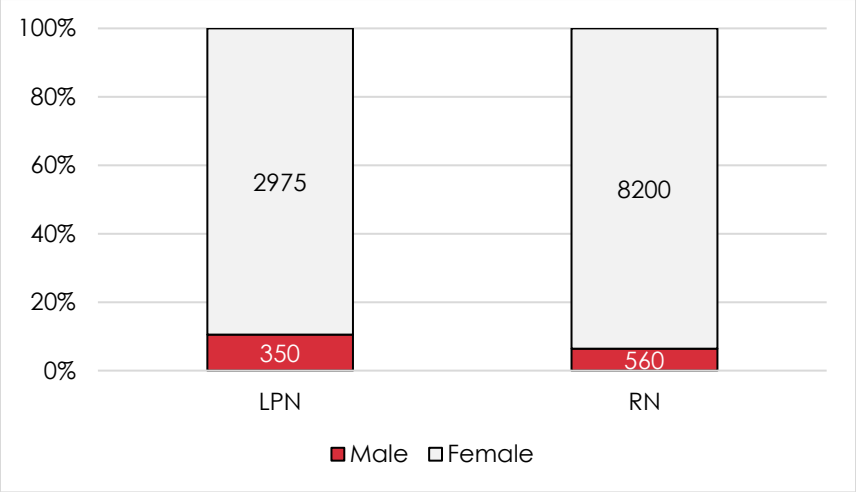
This section presents a demographic profile of nurses in NB's public health sector[5] who appear in the Nursing Payroll Data at any point between 2016 and 2022. This includes nurses who worked in the NB public health sector for only one year as well those who were employed multiple years. In this section, the years of data are pooled so that each nurse is counted only once, regardless of the number of years they were active.

Between 2016 and 2022, 8,760 individuals worked as RNs and 3,325 individuals worked as LPNs in the NB public health sector.

The average RN was in their mid-40s, married, working full-time and had 14 years of experience. The average LPN was younger (in their early 40s), not married and had 10 years of experience. A more detailed profile of NB nurses is available in Table 2 in Appendix 1.

Sex

Figure 3: Full Sample of NB Nurses by Sex



During the study period, most LPNs (~90%) were female, and only around 10% were male.

An even higher proportion of RNs (95%) were female (8,200 out of 8,760).

[5] Note: This study excludes travel nurses from other provinces.

Marital Status

Figure 4: Full Sample of NB Nurses by Marital Status

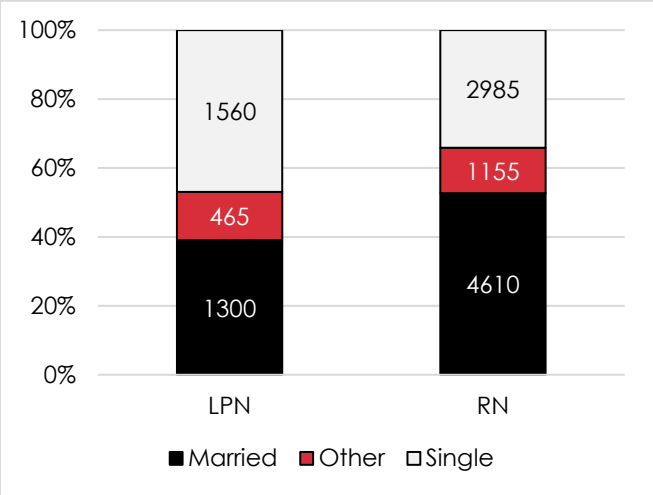


Figure 4 disaggregates the sample of NB nurses who were active in the province's public sector at some point between 2016 and 2022 according to their most recent marital status.

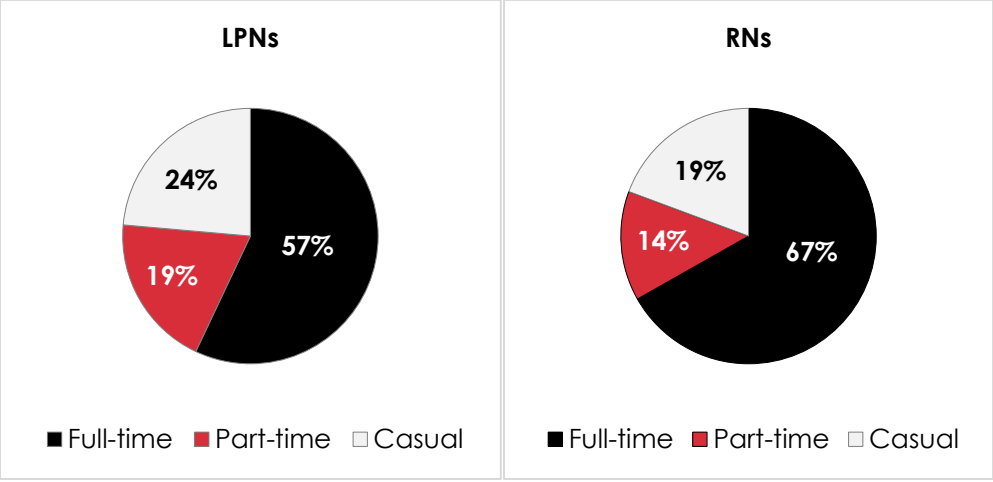
About 40% of LPNs were married while 47% reported single marital status.

The proportion of married individuals was higher among RNs, with close to 53% reporting they were married as opposed to 34% reporting single marital status.

Contract Type

Figure 5, which disaggregates the sample of NB nurses according to their most recent contract type, shows that almost two-thirds (67%) of RNs were on full-time contracts, and about one-fifth (19%) were employed on a casual basis. Meanwhile, approximately one-fourth (24%) of LPNs were on casual contracts, while 57% were employed on full-time contracts.

Figure 5: Full Sample of NB Nurses by Contract Type



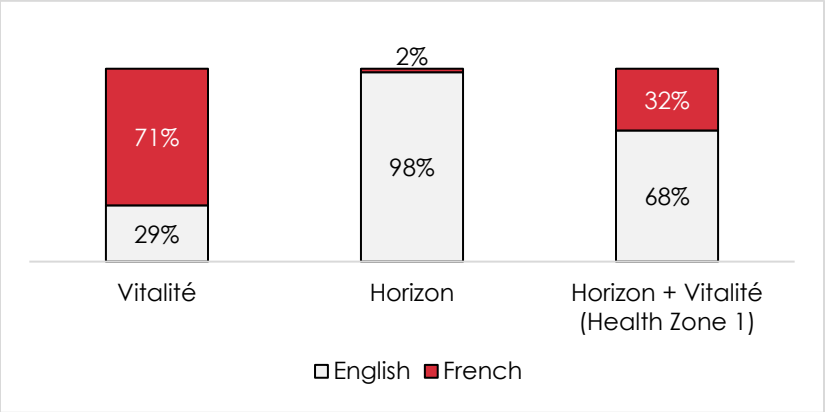
Language Preference

Figures 6 and 7 presents nurses' official language preferences (English or French) for language of communication for Medicare, as indicated in the Citizen Data, according to their employment

in the province's two Regional Health Authorities (RHAs): Horizon Health Network and Vitalité Health Network. Because the City of Moncton (located in Health Zone 1) has hospitals in both Horizon Health Network and Vitalité Health Network, we report nurses employed in Moncton in a separate category, labelled Health Zone 1 (Horizon + Vitalité). The remaining NB Health Zones contain hospitals in either Horizon or Vitalité Health Network – but not both.

In Figure 6, we see that almost all (98%) active RNs in Horizon Health Network preferred English as their language of communication. On other hand, a large proportion (71%) of active RNs in Vitalité Health Network and about one-third (32%) of active RNs in Health Zone 1 (Horizon + Vitalité) indicated French as their preferred language.

Figure 6: Language Preference Distribution Among Active Registered Nurses (RNs) by Regional Health Authority (RHA)

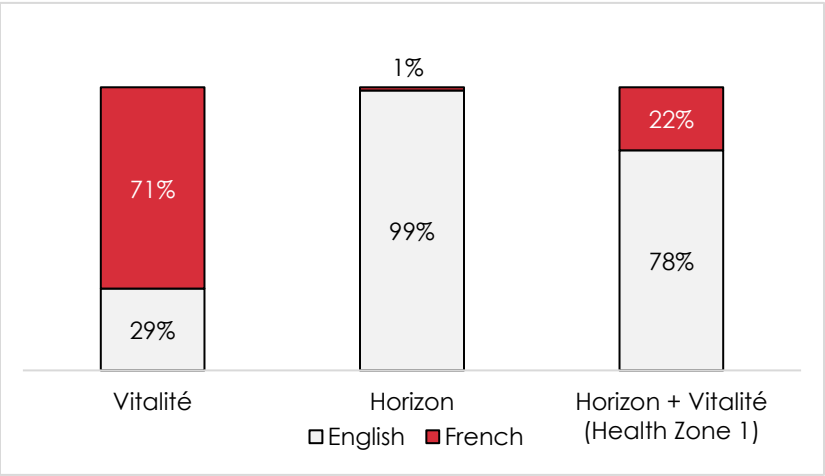


Note: Health Zone 1 (Moncton and South-East Area) is presented separately because it is the only Health Zone that includes hospitals in both the Horizon and Vitalité Health Networks.

The "Horizon" and " Vitalité" categories presented in this figure do not include results from Health Zone 1.

Figure 7 shows that nearly all (99%) active LPNs in Horizon Health Network indicated English as their preferred language, while 71% of active LPNs in Vitalité Health Network preferred French. In Health Zone 1, which encompasses both the Horizon and Vitalité Health Networks, 22% of active LPNs preferred French as their language of communication.

Figure 7: Language Preference Distribution Among Active Licensed Practical Nurses (LPNs) by RHA



Note: Health Zone 1 (Moncton and South-East Area) is presented separately because it is the only Health Zone that includes hospitals in both the Horizon and Vitalité Health Networks.

The "Horizon" and " Vitalité" categories presented in this figure do not include results from Health Zone 1.

Profile of NB Nurses (Annually, 2016-2022)

Regional Health Authority (RHA)

Figure 8: Active RNs by RHA

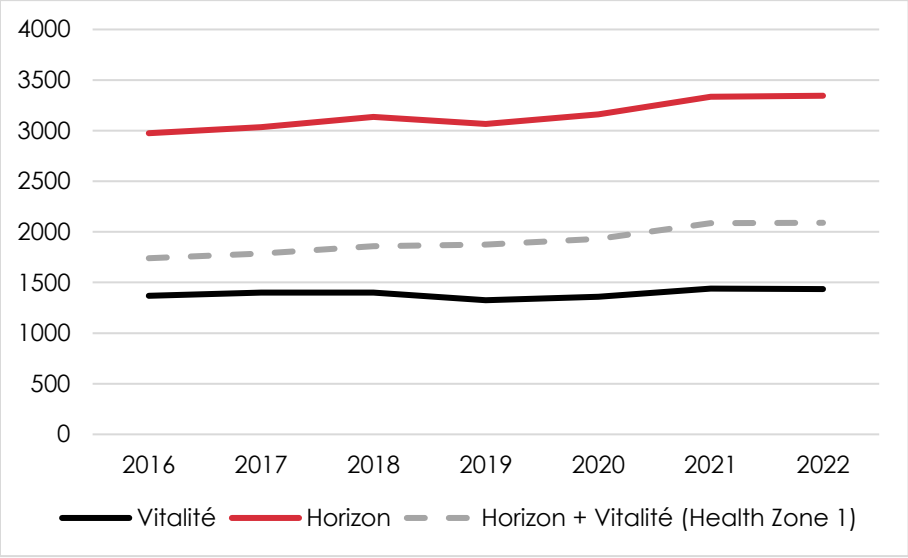
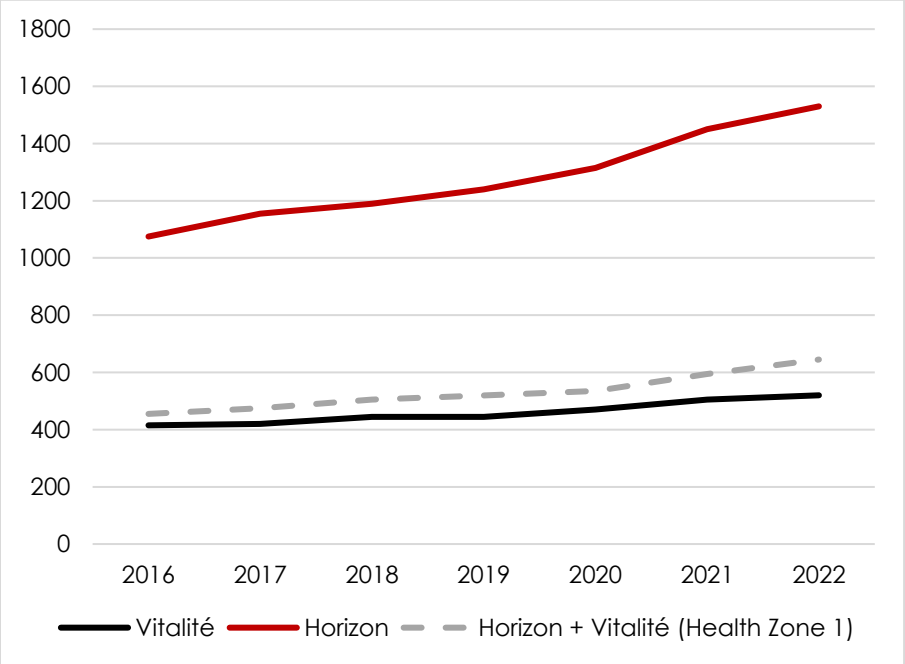


Figure 8 shows that all three RHA categories experienced an increase in the number of active RNs between 2016 and 2022.

However, Health Zone 1 (Horizon + Vitalité) saw a steeper increase, with 20% more RNs employed in 2022 (~2,100) compared to 2016 (~1,700).

Note: Health Zone 1 (Moncton and South-East Area) is presented separately because it is the only Health Zone that includes hospitals in both the Horizon and Vitalité Health Networks. The "Horizon" and " Vitalité" categories presented in this figure do not include results from Health Zone 1.

Figure 9: Active LPNs by RHA



The number of LPNs has also been increasing across the RHAs. In 2022, there were more than 1,500 LPNs working in Horizon Health Network – a 42% increase from 2016 (1,075).

Similarly, Health Zone 1 (with hospitals in both Horizon and Vitalité Health Networks) also saw a 42% increase in active LPNs in 2022 (~650) compared to 2016 (450).

Note: Health Zone 1 (Moncton and South-East Area) is presented separately because it is the only Health Zone that includes hospitals in both the Horizon and Vitalité Health Networks. The "Horizon" and " Vitalité" categories presented in this figure do not include results from Health Zone 1.

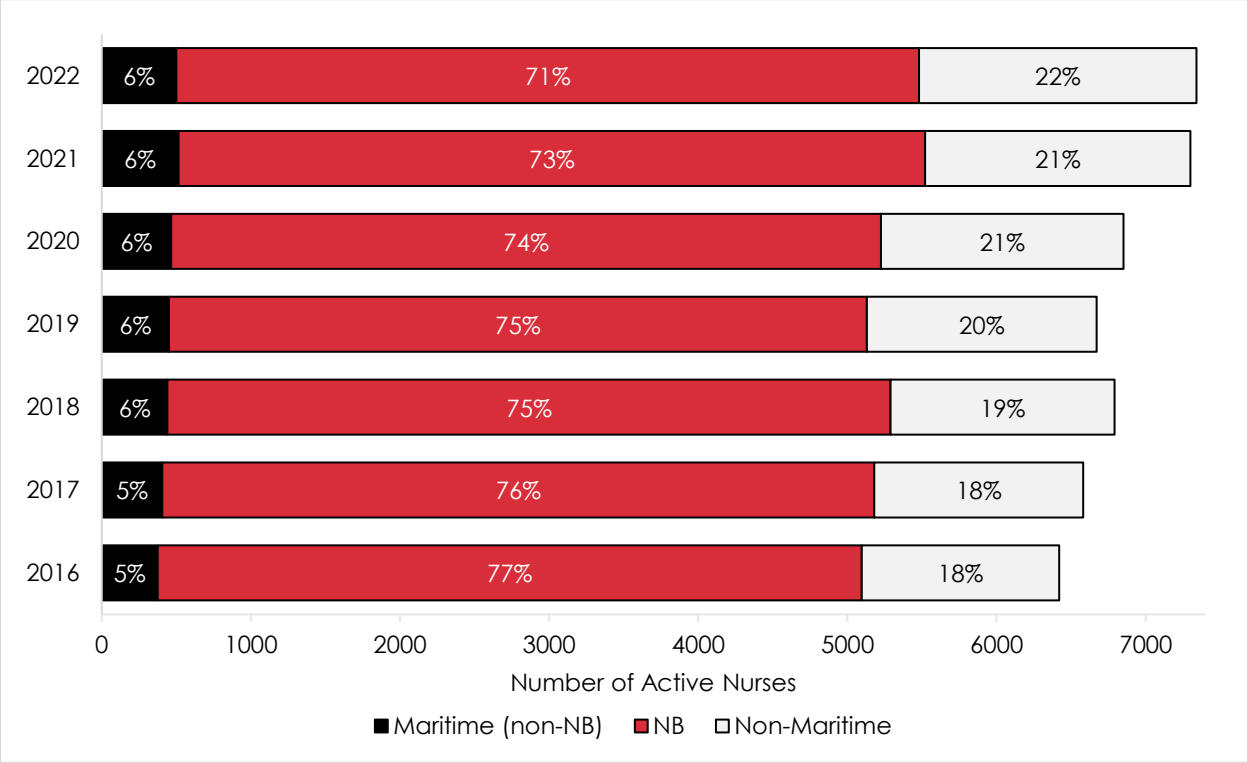
Previous Residence

Figure 10 and Figure 11 present active nurses according to their previous residence as indicated in the Citizen Data (Medicare registry).

Nurses not originally from NB are categorized as "Maritime (Non-NB)"[6] and "Non-Maritime,"[7] while nurses originally from NB are categorized as "NB."

Figure 10 shows that in each year between 2016 and 2022, at least 70% of active RNs were originally from NB, but with a declining trend. The proportion of RNs from other Maritime provinces remained steady at about 6% while the share of RNs originally from other provinces or outside Canada gradually increased by four percentage points from 2016 (18%) to 2022 (22%).

Figure 10: Active RNs by Previous Residence

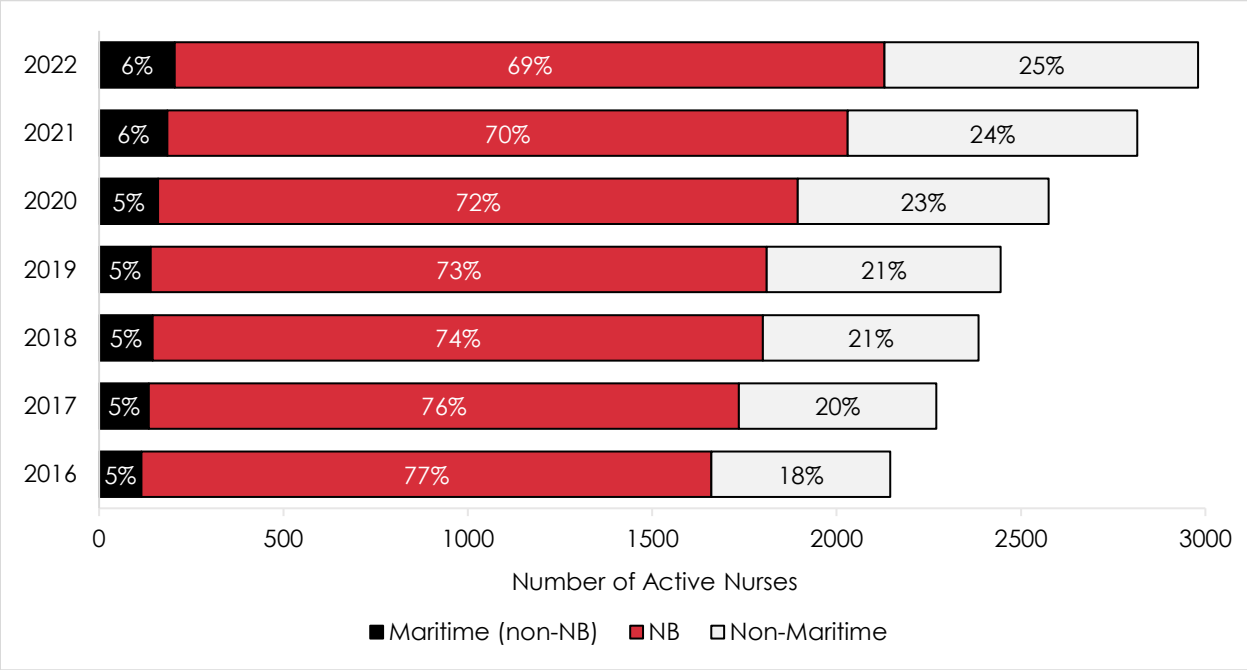


Similar to the RNs presented in Figure 10, Figure 11 shows that the share of LPNs originally from NB slowly declined between 2016 (77%) and 2022 (69%). Likewise, the percentage of Non-Maritime LPNs increased from 18% in 2016 to 25% in 2022, growing by 7 percentage points over the period. The proportion of individuals from other Maritime provinces (which includes individuals from outside Canada) remained relatively unchanged, at approximately 6%.

[6] The category "Maritime (non-NB)" includes nurses who moved to NB from one of the other Maritime provinces of Nova Scotia and Prince Edward Island.

[7] The category "Non-Maritime" includes permanent residents and internationally educated nurses as well as nurses originally from other Canadian provinces outside the Maritime provinces of Nova Scotia and Prince Edward Island.

Figure 11: Active LPNs by Previous Residence



Payroll Status

In Figure 12, we see that the proportion of RNs on a casual contract increased over the study period. By 2022, 20% of active RNs were on a casual contract as opposed to 12% in 2016.

Approximately 70% of RNs were employed on full-time basis between 2016 and 2020 before the proportion dropped to 67% in more recent years. The decline in full-time employment in 2021 and 2022 could be due to full-time RNs changing their status to casual to allow for more work flexibility, or an increase in temporarily employed nurses through the pandemic period.

The share of part-time RNs on the active roster has also been declining over the years – from 18% in 2016 to 12% in 2022.

Figure 12: Active RNs by Payroll Status

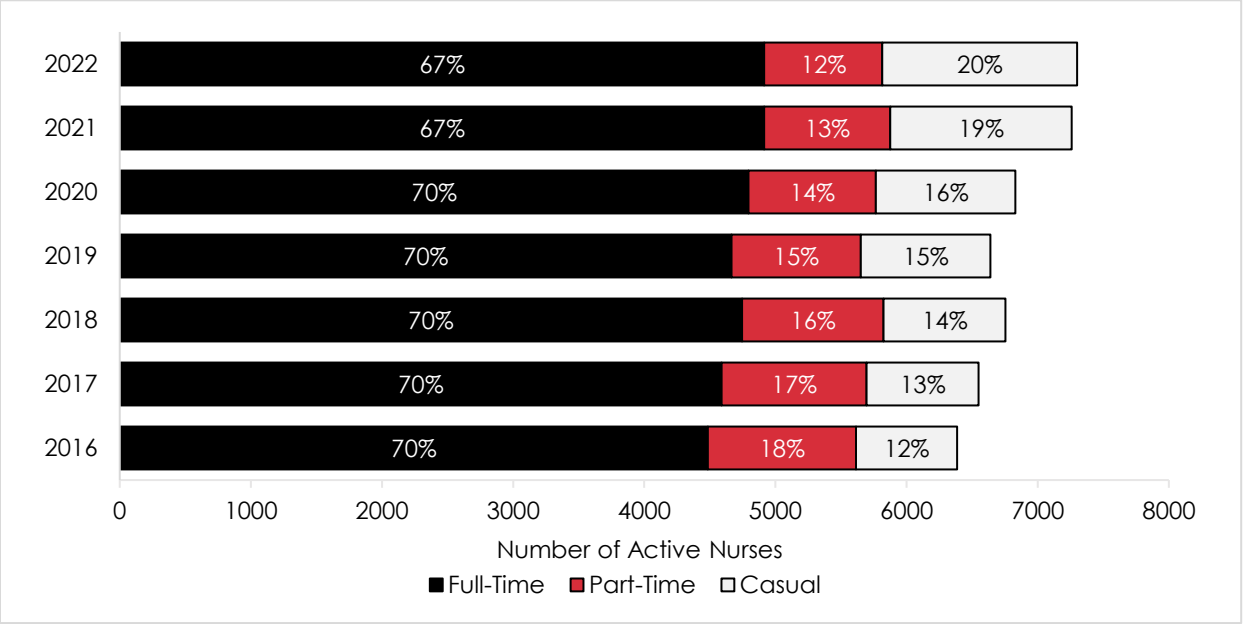


Figure 13 shows the breakdown of active LPNs by payroll status. In 2016, 63% of LPNs had full-time status; however, by 2022, that share had dropped to 55%. The proportion of LPNs working part-time also declined gradually between 2016 and 2022. In contrast, 26% of active LPNs were on casual contracts by 2022, compared to only 13% in 2016.

The declining trend of full-time status and increasing trend of casual contracts could be a refection of full-time LPNs switching to casual status, allowing for more flexibility in work schedules, or pandemic-related short-term labour force adjustments.

Figure 13: Active LPNs by Payroll Status

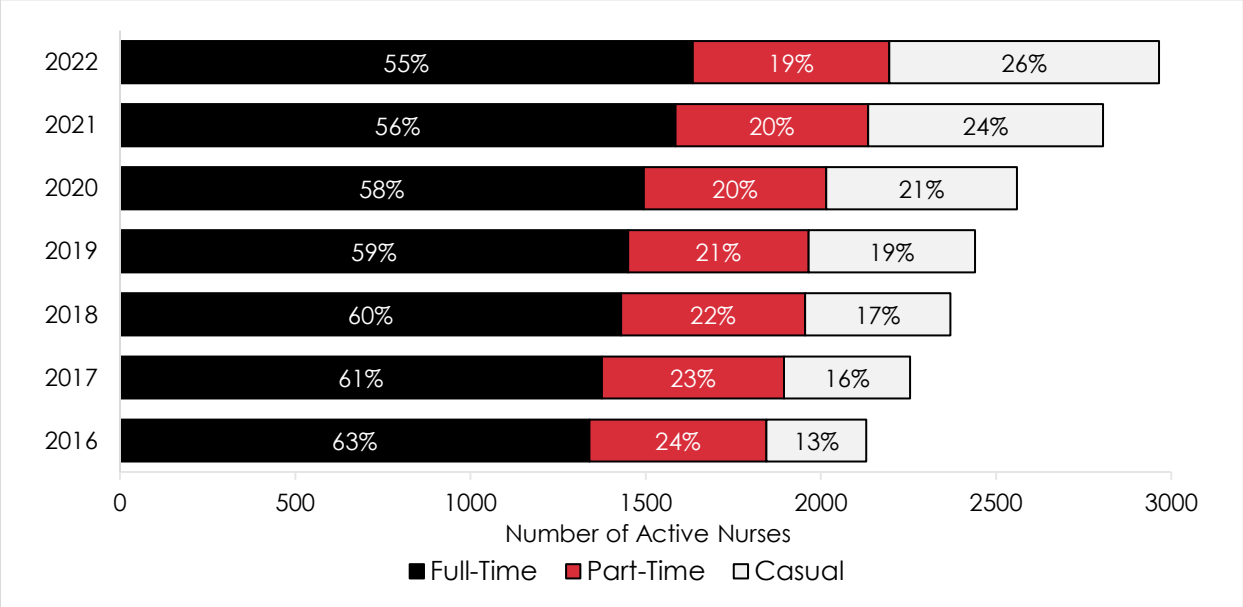
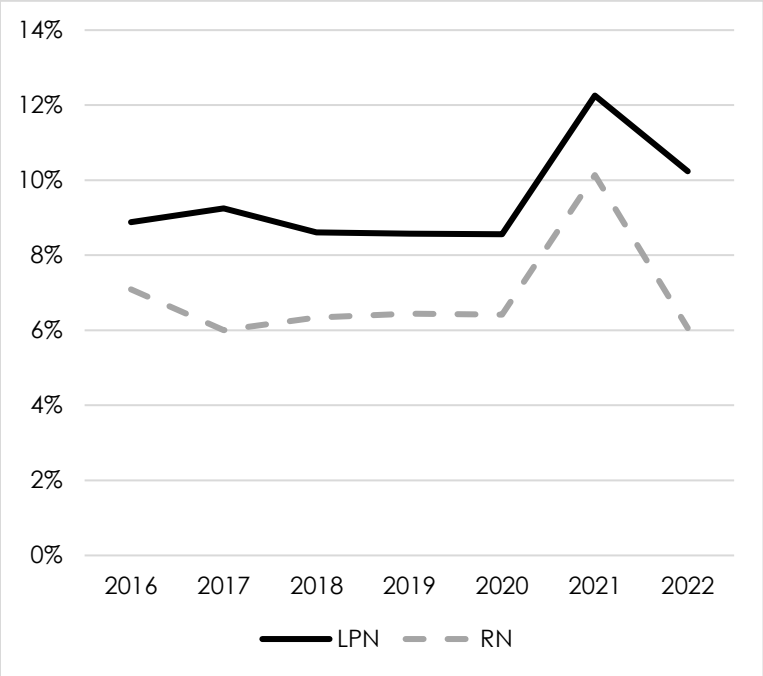


Figure 14: Share of New Hires in the Active Roster



Between 2016 and 2020, around 6% of active RNs were new hires each year. That proportion jumped to 10% in 2021 before dropping to 6% once more.

Similarly, around 9% of LPNs in each year were new hires, with the same exception of 2021, when the proportion jumped to 12%.

The spike in 2021 for both RNs and LPNs could be related to retired nurses re-entering the profession during the COVID-19 pandemic due to pronounced shortages owing to illness and quarantines in some areas.

Table 3 and Table 4 in Appendix 1 show the corresponding data for Figure 14.

Becoming a Nurse in NB After Graduation

Two public universities in NB offer Bachelor of Nursing degrees: Université de Moncton (UdeM) and the University of New Brunswick (UNB). Two public community colleges in NB offer Practical Nursing programs: Collège communautaire du Nouveau-Brunswick (CCNB) and New Brunswick Community College (NBCC).[8]

This section utilizes the NB University Graduates data set and CCNB and NBCC Student Data to explore the number and proportion of graduates from the nursing programs at UdeM, UNB, CCNB and NBCC that ended up working as nurses in the province's public health sector between 2016 and 2022. It presents results according to graduate cohort (2016-2020 graduation years) and graduates' origins as indicated in the graduate data at the time of their enrolment (i.e., Origin = "NB," "Province Outside NB" or "Outside Canada").

Bachelor of Nursing Graduates

Figure 15 presents the annual count of Bachelor of Nursing graduates originally from NB who graduated from UNB or UdeM between 2016 and 2020, along with their subsequent employment outcomes as RNs in the province's public health sector (until the end of 2022).

[8] Nursing programs offered by private institutions such as Oulton College are not covered in this study.

The number of Bachelor of Nursing graduates from NB declined between 2016 (275 graduates) and 2019 (145 graduates) before rebounding to just over 200 graduates in 2020.

Notably, among these graduates, approximately 9 out of 10 from each graduate cohort ended up working as RNs in the NB hospital system post-graduation. This highlights a strong correlation between graduates being from the home province and staying in the province for work after completing their studies.

It is worth noting that approximately 14% of these graduates were already employed by the public health sector prior to graduation (see Table 5 in Appendix 1). These individuals likely held positions as LPNs before transitioning to RN positions upon obtaining their bachelor's degrees.

Figure 15: Employment Outcomes of Bachelor of Nursing Graduates From NB Institutions by Graduation Year and Origin = NB

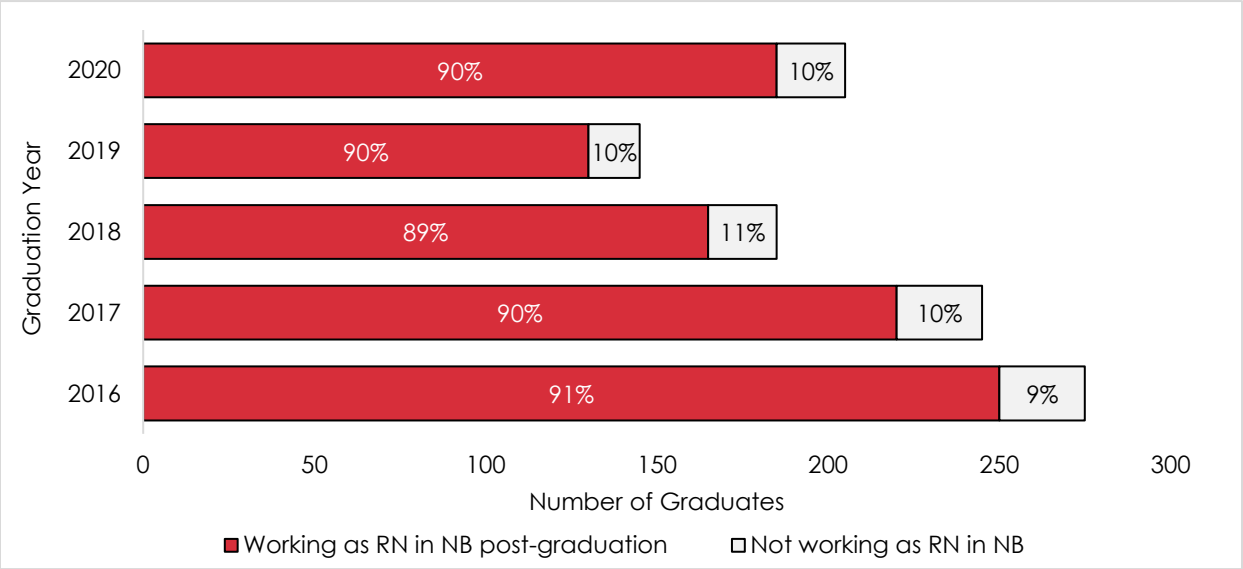


Figure 16 below shows that a much smaller number of Bachlor of Nursing graduates were from outside the province of NB prior to enrolling in their programs, with counts ranging from 10-20 graduates per calendar year.

Due to small counts, we see substantial yearly variation in the share of these graduates working as RNs after graduation. However, on average, about 80% of graduates originally from other provinces ended up working as registered nurses in NB between their year of graduation and the end of 2022.

Figure 16: Employment Outcomes of Bachelor of Nursing Graduates From NB Institutions by Graduation Year and Origin = Province Outside NB

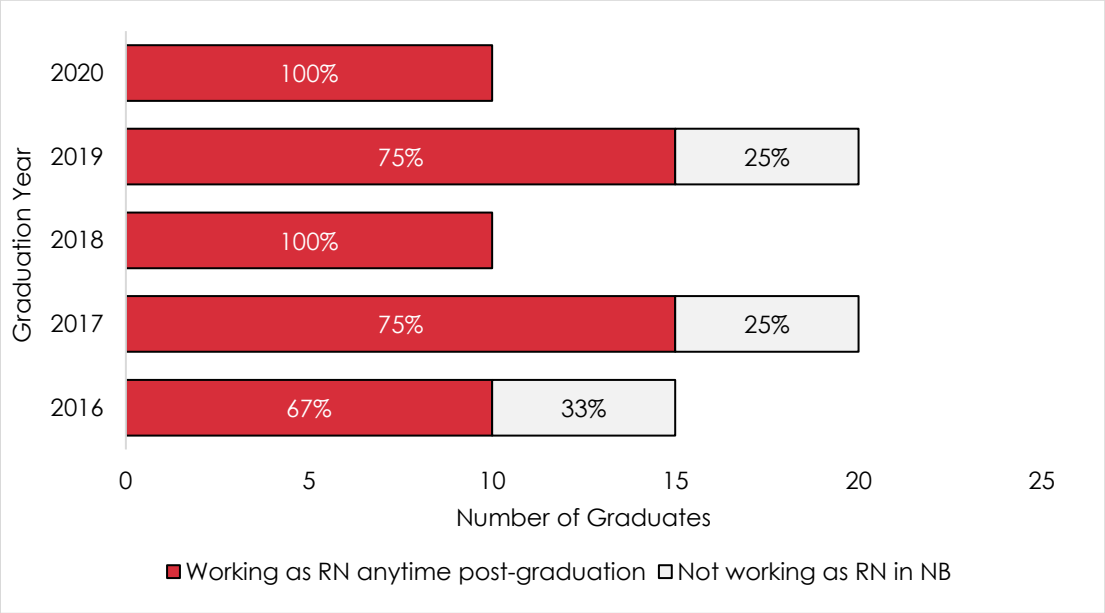
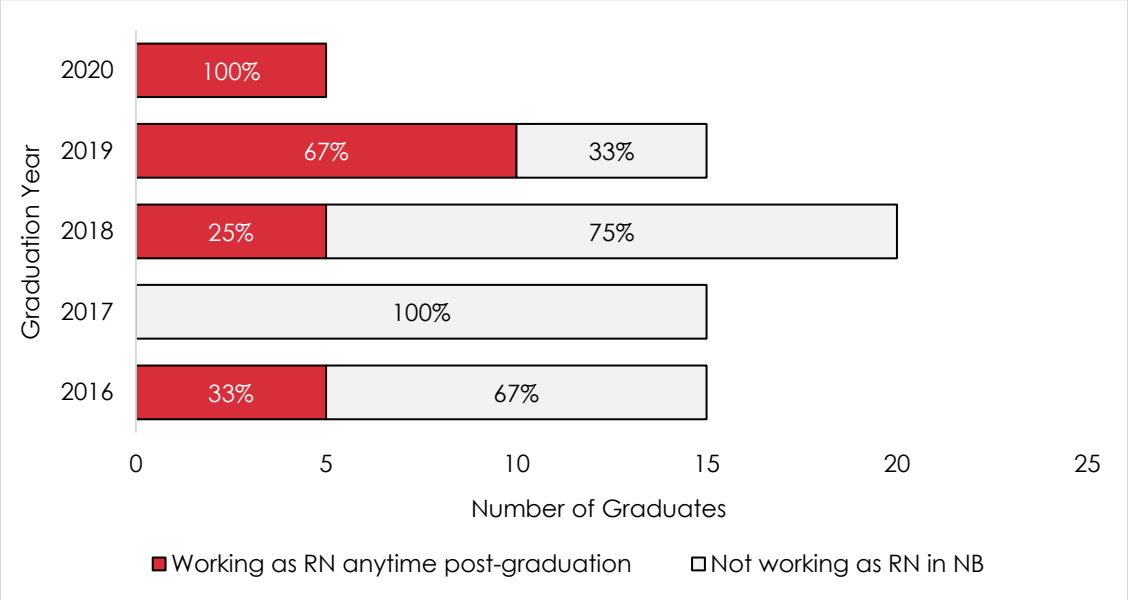


Figure 17 shows the annual number of Bachelor of Nursing graduates from outside Canada (i.e., international students) and their post-graduation employment status in the NB public health system.

Among the small number of international graduates (15-20 per year between 2016-2020), nearly two-thirds (64%) did not end up working as RNs in the NB hospital system.

Figure 17: Employment Outcomes of Bachelor of Nursing Graduates From NB Institutions by Graduation Year and Origin = Outside Canada



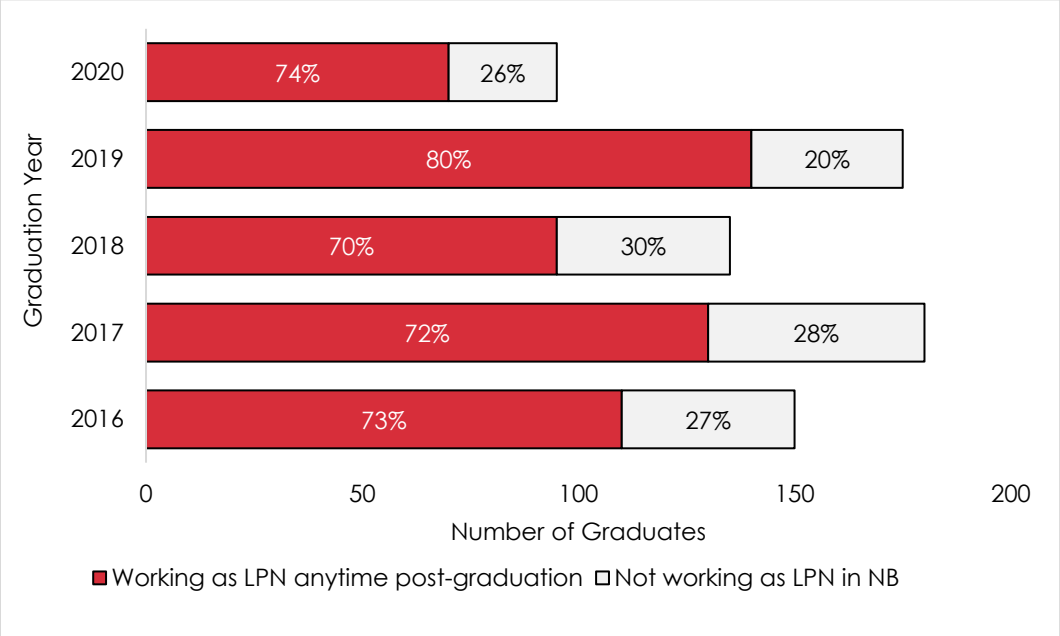
Practical Nursing Graduates

It should be noted that all Practical Nursing graduates in the 2016-2020 graduate cohorts were originally from NB. As such, the counts presented Figure 18 below represent all Practical Nursing graduates over the study period.

The number of individuals who received diplomas from NB colleges has varied over the years. Annual counts of college graduates in the Practical Nursing programs at CCNB and NBCC fluctuated between 135 and 180 for the period 2016-2019 before dropping to fewer than 100 graduates in 2020 – the lowest number of the examined graduating cohorts.

Among these college graduates, approximately three-quarters were working as LPNs in the NB public health sector at some point before the end of 2022. In the 2019 cohort, 80% of graduates were working as LPNs, representing the highest share of NB public sector employment among all college graduate cohorts.

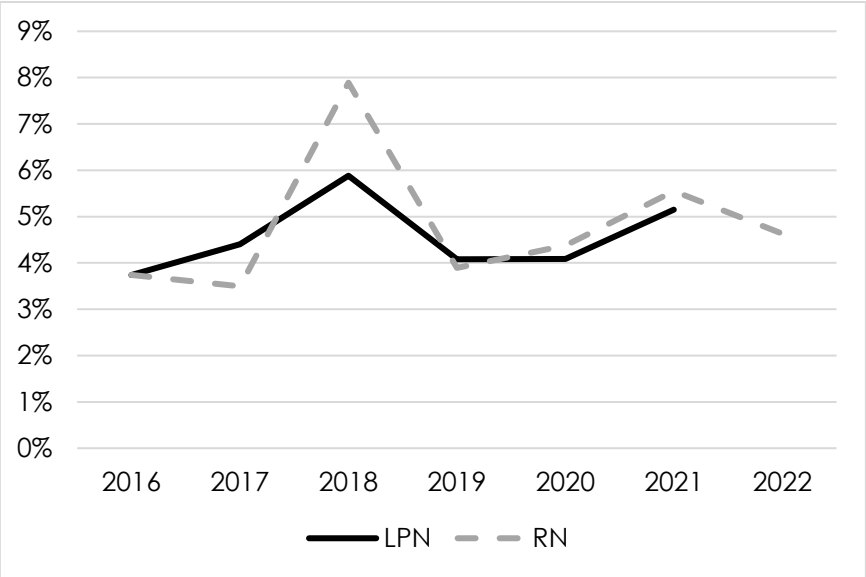
Figure 18: Employment Outcomes of Practical Nursing Graduates From NB Institutions (CCNB & NBCC) by Graduation Year and Origin = NB



Nursing Employment: Attrition and Duration

This section utilizes Nursing Payroll Data records to examine nurses' rates of attrition – that is, rates of departure – from employment in the NB public health sector between 2016 and 2022 for RNs and between 2016 and 2021 for LPNs. Nurses who exited the public health sector before 2016 are not observed in this study. This section also examines duration of nursing employment, defined as the period between the "hired-date" indicator and departure from the Nursing Payroll Data.

Figure 19: Yearly Attrition Rate of NB Nurses



In general, the attrition rate for RNs ranges from 4% to 6%. However, this rate jumped to 8% in 2018, followed by drop to 4% the following year.

The attrition rate for LPNs is similar (~4-6%, with a spike in 2018).

The reason for this increase in 2018 requires further investigation.

Note: 2022 LPN exits are excluded from the study.

Table 3 and Table 4 in Appendix 1 show the corresponding data for Figure 19.

Age

Disaggregating attrition rates by age (at exit) in Figure 20 reveals that RNs in the 55-64 and 65+ age groups had the highest attrition rates of the study period.

However, there is a noticeable decline in attrition rates among the 65+ age group over time, with only 9% of RNs leaving their profession in 2022 compared to 28% in 2016. This indicates that more nurses in the older age categories are choosing to remain in the profession in some capacity (full-time, part-time or casual).

Conversely, younger age groups, specifically the <25 and 25-34 age groups, experienced an upward trend in attrition rates that was particularly evident after 2020, indicating that greater proportions of younger RNs have been leaving employment as nurses working in public hospitals in recent years.

Figure 20: Yearly Attrition Rate of RNs by Age

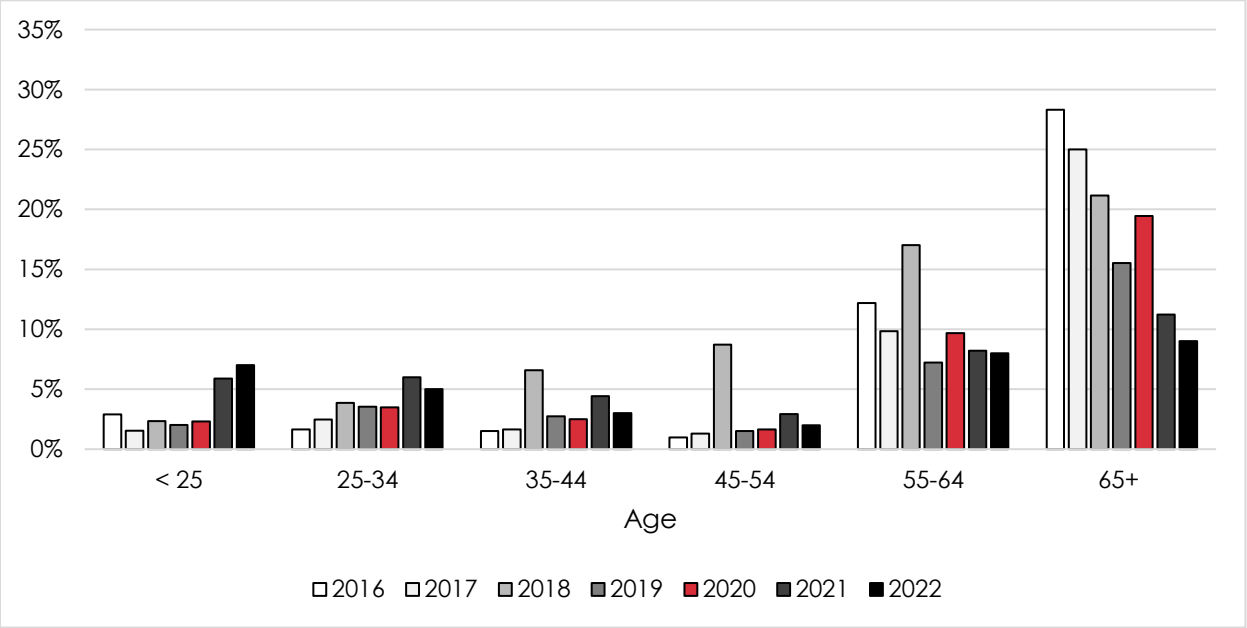
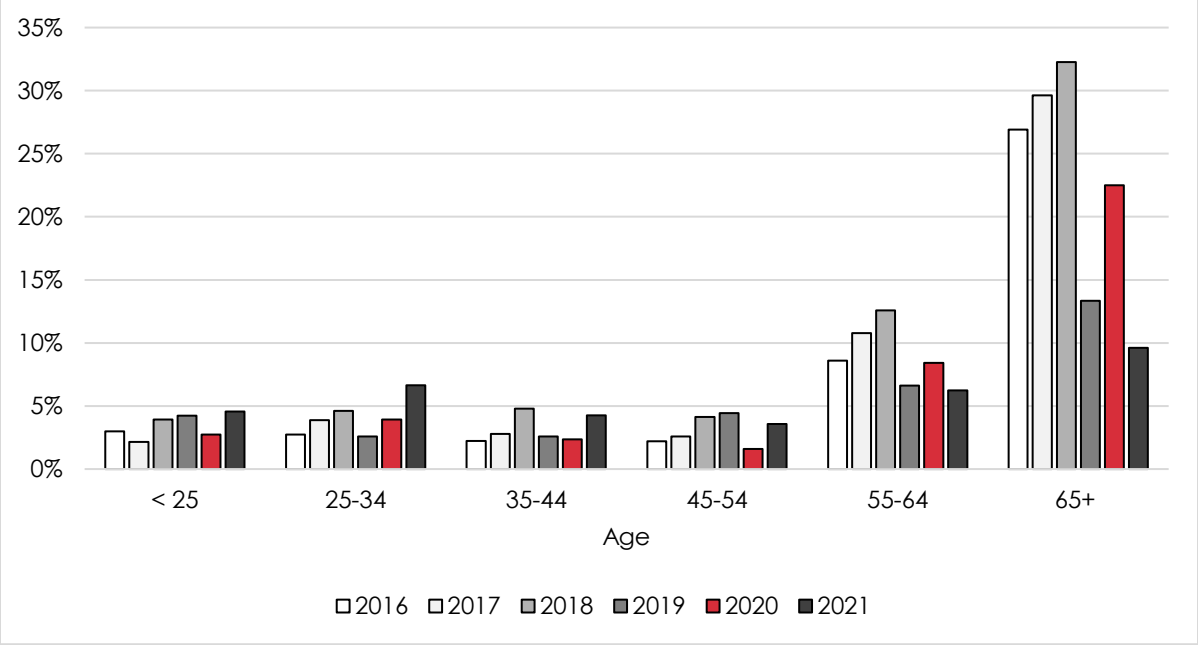


Figure 21 depicts similar results among LPNs, with LPNs in the 55-64 and 65+ age groups exhibiting the highest attrition rates until 2021.

Likewise, both of these age groups demonstrate a declining trend over time, with a more pronounced decrease in attrition rates observed for the 65+ age group. The attrition rate for this group decreased by 25 percentage points from 27% in 2016 to only 10% in 2022.

Figure 21: Yearly Attrition Rate of LPNs by Age



Note: 2022 LPN exits are excluded from the study.

Years of Experience

This section also presents attrition rates based on nurses' years of experience, which are calculated based on the "hired-date" indicator in the Nursing Payroll Data until nurses' exit from the data set.

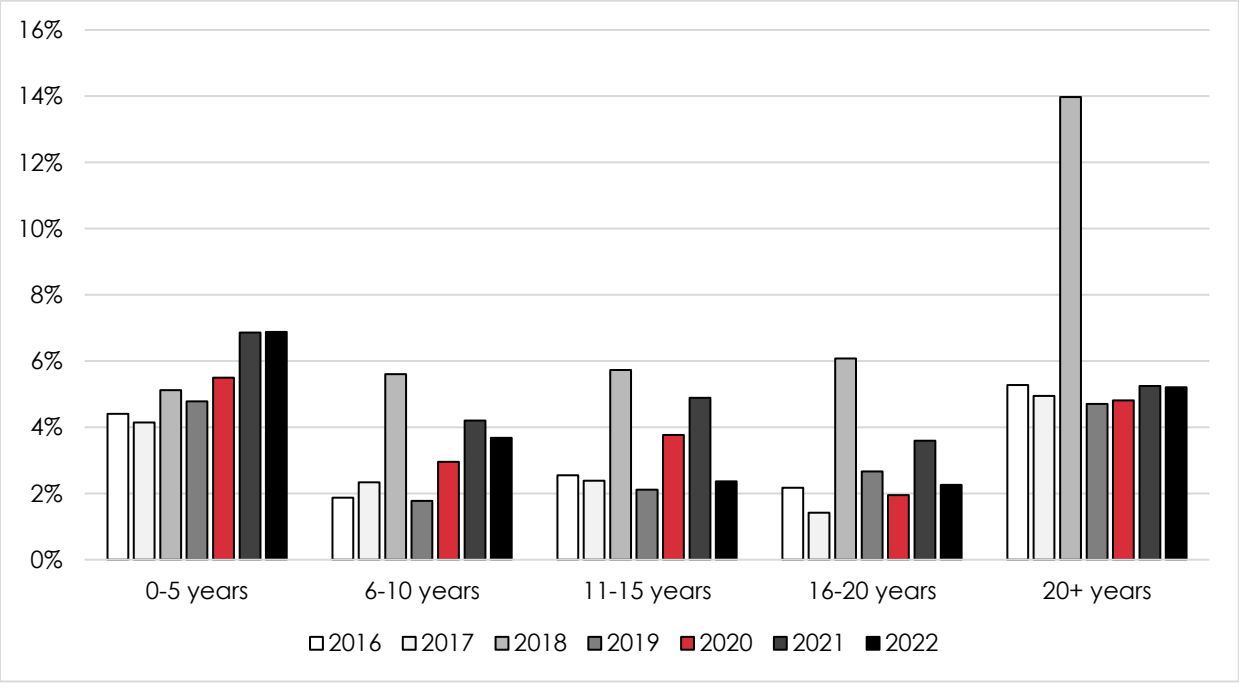
It is important to note that experience refers to the total duration (years) of employment in the public health sector, which may involve working in multiple different positions. For instance, if an individual left the profession as an RN but had initially started as an LPN, their experience would represent the total duration of time spent in each role.

Additionally, if an individual exits and later returns to the nursing profession, such as rejoining on a casual basis during the COVID-19 pandemic, the time between their first hired date and final departure is considered to be one continuous tenure because any potential gaps in nurses' tenures cannot be identified in the data.

In Figure 22, the yearly attrition rates of RNs by years of experience reveal an upward trend of individuals leaving their profession, particularly among those with 0-5 years of experience.

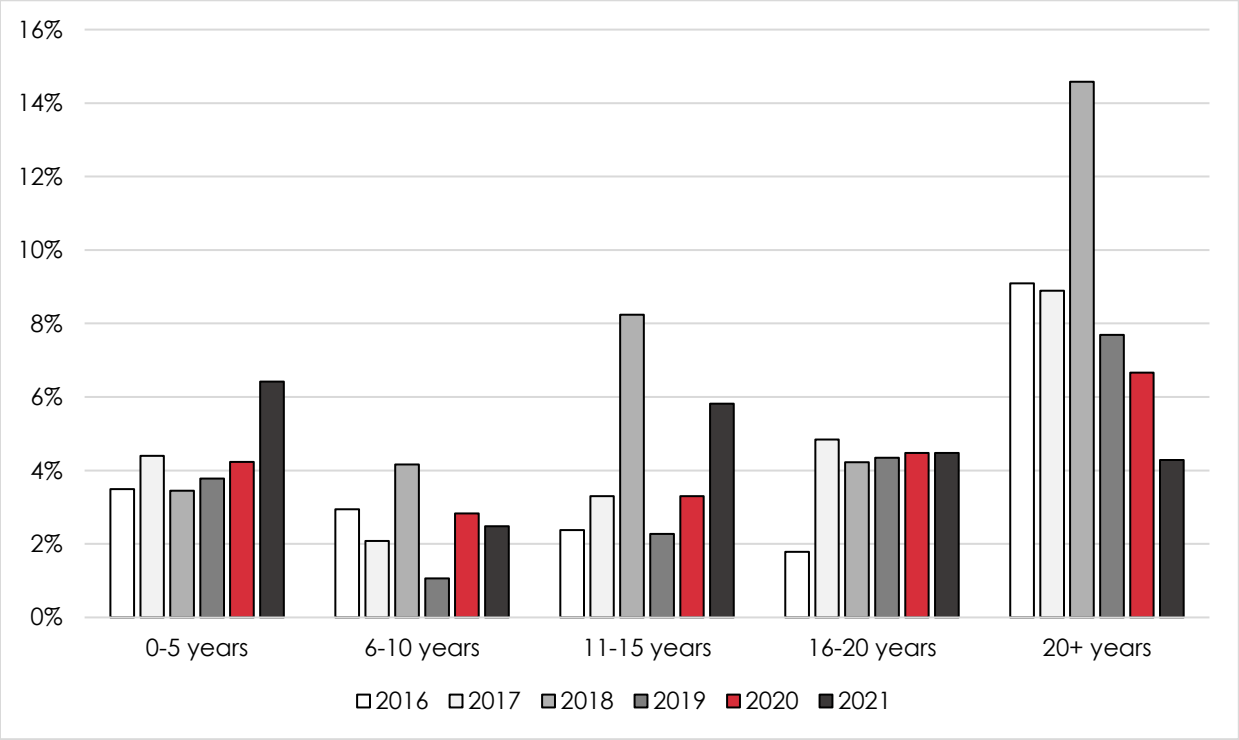
In 2016, approximately 4% of RNs with 0-5 years of experience exited their roles, but by 2022 the annual attrition rate had reached 7%. Conversely, the annual attrition rate for those with 20+ of experience remained relatively stable, hovering around 5%, with an exception noted in 2018 when the rate spiked to 14%.

Figure 22: Yearly Attrition Rate of RNs by Years of Experience



Among LPNs (Figure 23), the group with 0-5 years of experience shows an upward trend in attrition between 2019 and 2021. During the same period, the annual attrition rates for the most experienced group (20+ years of experience) seem to be decreasing. After a surge in 2018 (15%), the attrition rate continued to decline, reaching 4% in 2021.

Figure 23: Yearly Attrition Rate of LPNs by Years of Experience



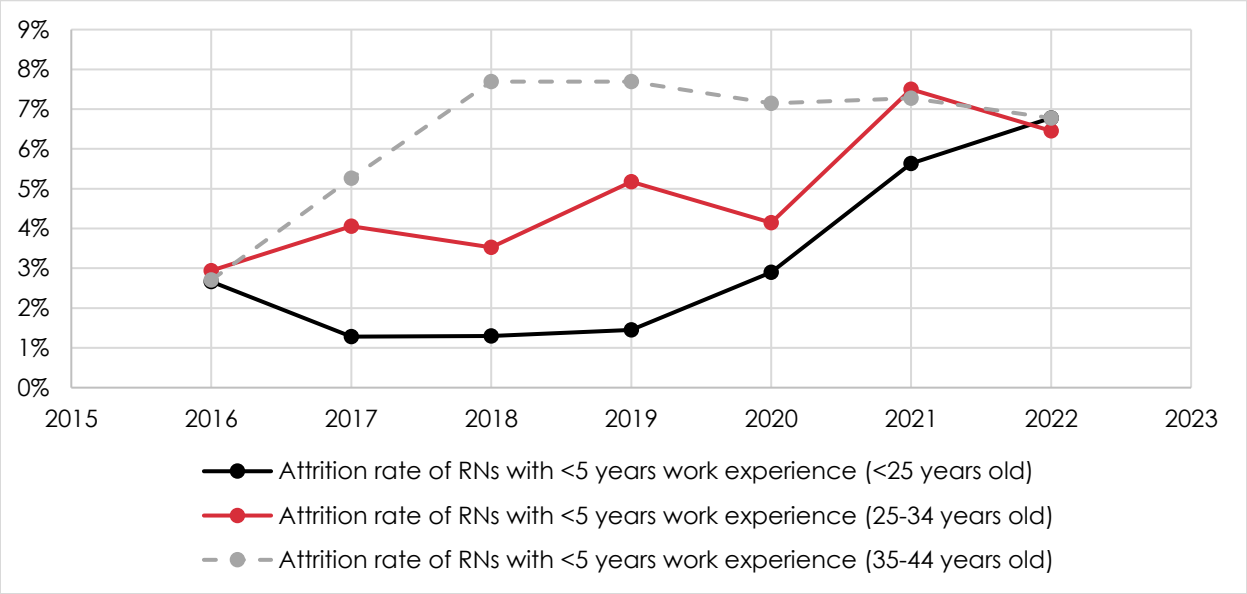
Note: 2022 LPN exits are excluded from the study.

Figure 24 further analyzes the attrition rates of RNs with 0-5 years of experience, breaking the group down by age. This breakdown reveals that although the youngest RNs (<25 years old) initially had the lowest attrition rates, these rates increased steadily from 2019 onward, eventually aligning with other age groups (25-34 and 35-44) in 2022.

In 2016, approximately 3% of RNs aged 35-44 left the public health system within 0-5 years of starting as RNs. This rate increased by 5 percentage points (reaching 8%) by 2018 and then stabilized for the following four years.

While initially the upward trend in attrition rates can be attributed to the 35-44 age group with <5 years of experience, in later years the <25 age group has the steepest increase in attrition rates.

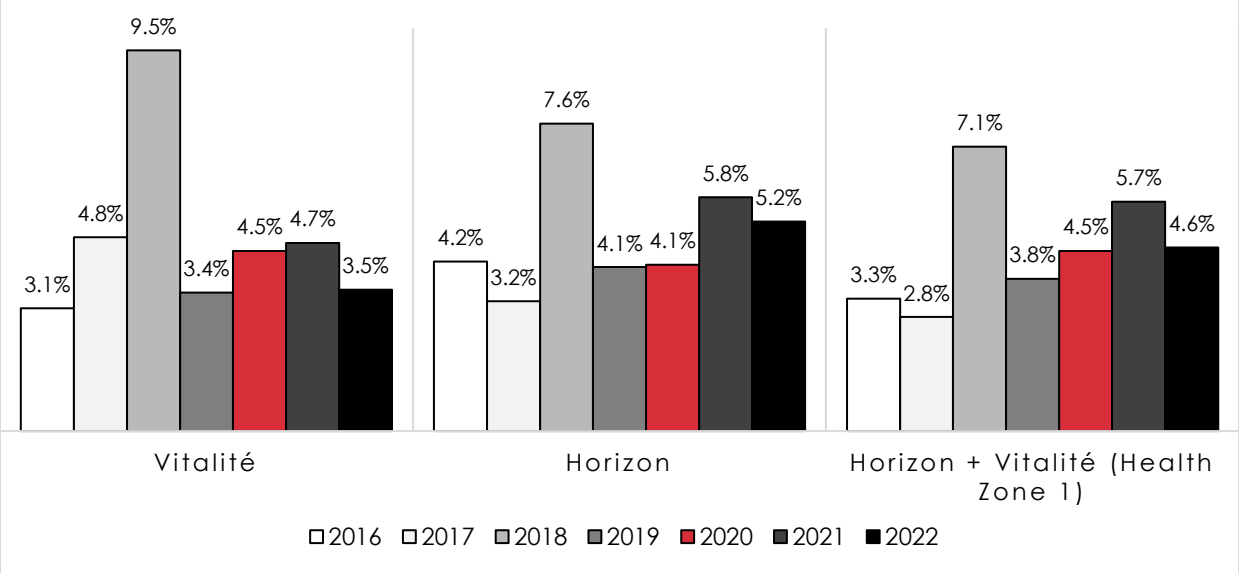
Figure 24: Attrition Rate of RNs with Less Than 5 Years of Experience



Regional Health Authority

The breakdown of RN attrition rates according to employment with the Regional Health Authorities (RHAs) in Figure 25 shows little variation between the RHAs. In general, each RHA category has an RN attrition rate of 3-5%, with a spike in 2018 that matches the overall increase in yearly attrition rates presented in Figure 19.

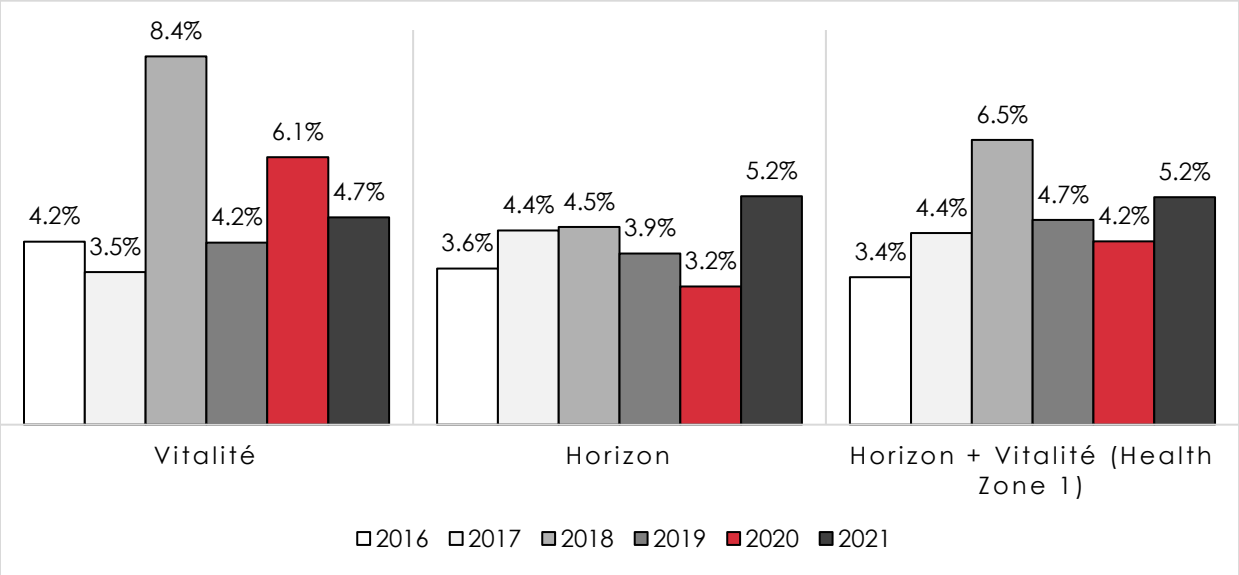
Figure 25: Yearly Attrition Rate of RNs by RHA



Note: Health Zone 1 (Moncton and South-East Area) is presented separately because it is the only Health Zone that includes hospitals in both the Horizon and Vitalité Health Networks. The "Horizon" and " Vitalité" categories presented in this figure do not include results from Health Zone 1.

Similarly, the breakdown of LPN attrition rates by RHA (presented in Figure 26) shows minimal variation between the RHAs. Across all RHA categories, the LPN attrition rates range from 3-5%. However, only LPNs in the Vitalité Health Work had a notable rate increase in 2018.

Figure 26: Yearly Attrition Rate of LPNs by RHA



Notes: (1) Health Zone 1 (Moncton and South-East Area) is presented separately because it is the only Health Zone that includes hospitals in both the Horizon and Vitalité Health Networks. The "Horizon" and " Vitalité" categories presented in this figure do not include results from Health Zone 1.
(2) 2022 LPN exits are excluded from the study.

Previous Residence

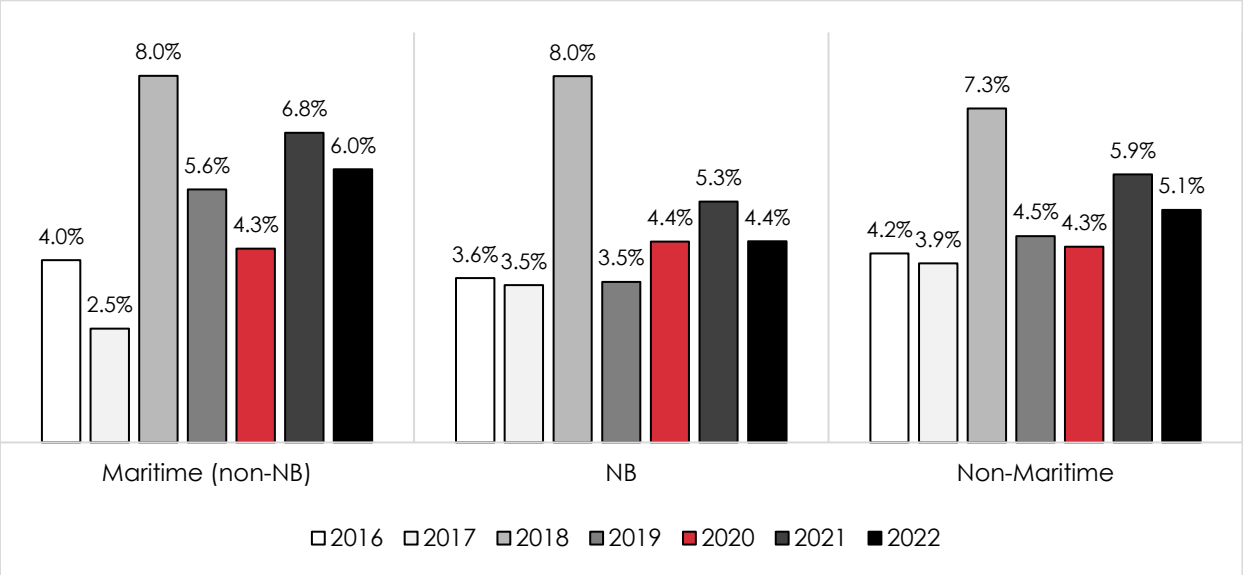
To estimate the impact that originally being from NB may have on occupational attrition rates, we categorize individuals as "NB," "Maritime (Non-NB)" and "Non-Maritime" based on their previous residence indicated in the Citizen Data (Medicare registry).

Figure 27 illustrates little variation in yearly occupational attrition rates for RNs based on their previous place of residence. The attrition rates for RNs originally from NB are below 5%, while the attrition rates for RNs from other Maritime provinces and non-Maritime locations are only slightly higher, at approximately 5%.

It is notable that once they are employed, RNs' location of previous residence does not appear to have a major impact on their attrition rates.

Similar to the overall yearly attrition rates presented earlier (Figure 19), we observe a spike in attrition rates in 2018, and more investigation may be required to understand the reason behind this increase

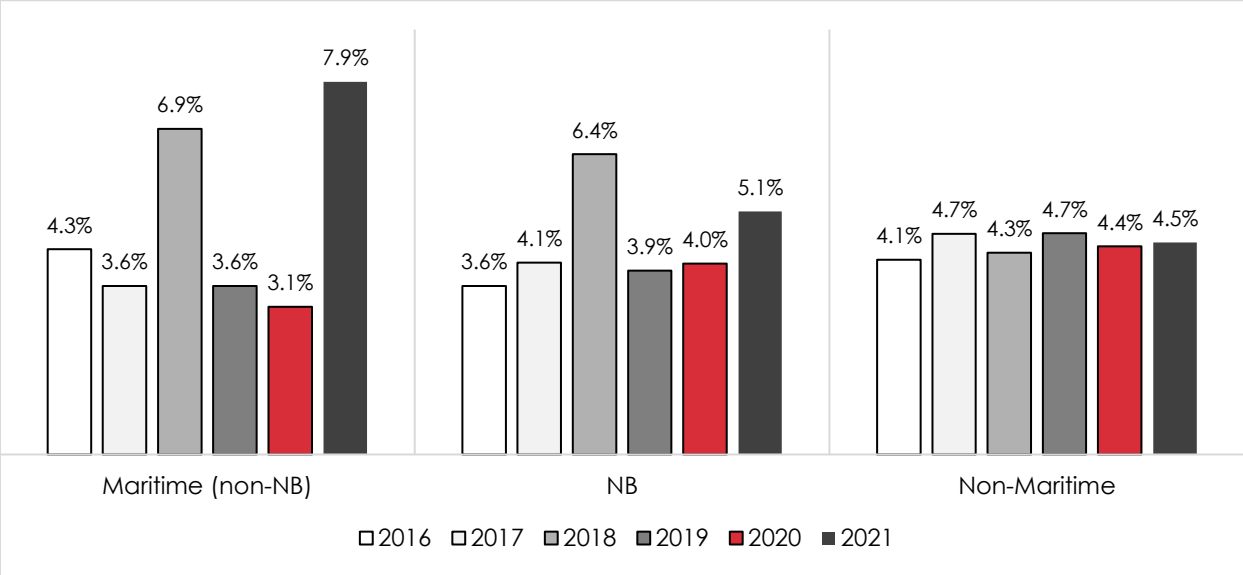
Figure 27: Yearly Attrition Rate of RNs by Previous Residence



As seen among RNs in Figure 27, there is also minimal variation in yearly occupational attrition rates for LPNs based on their previous place of residence (Figure 28).

The attrition rates for LPNs originally from NB are about 4%, which is similar to the attrition rates of LPNs from other Maritime provinces and from outside the Maritimes. The fluctuations seen among the Maritime (non-NB) group are due to the small number of exits within that category.

Figure 28: Yearly Attrition Rate of LPNs by Previous Residence



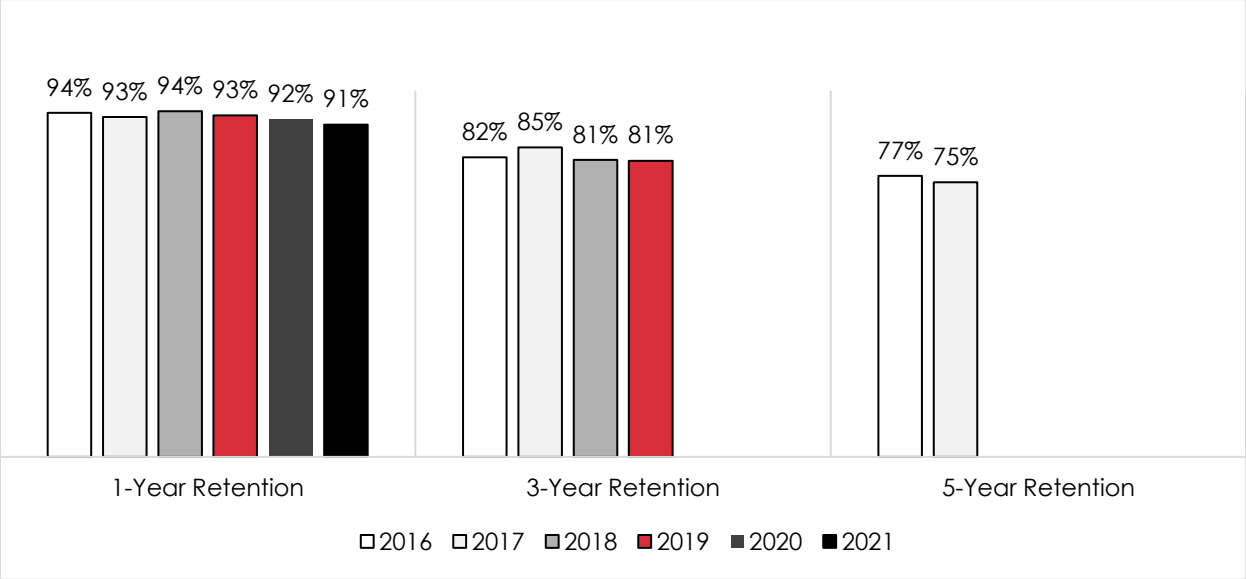
Note: 2022 LPN exits are excluded from the study.

Retention of Newly Hired Nurses

This section presents the 1-, 3- and 5-year occupational retention rates of nurses hired to work in the NB public health system.

Figure 29 shows that one year after being hired, around 93% of RNs are still working in the public health sector. Three years after starting, about 82% of RNs remain. After five years, the proportion of RNs who remain in the system drops to about 75%.

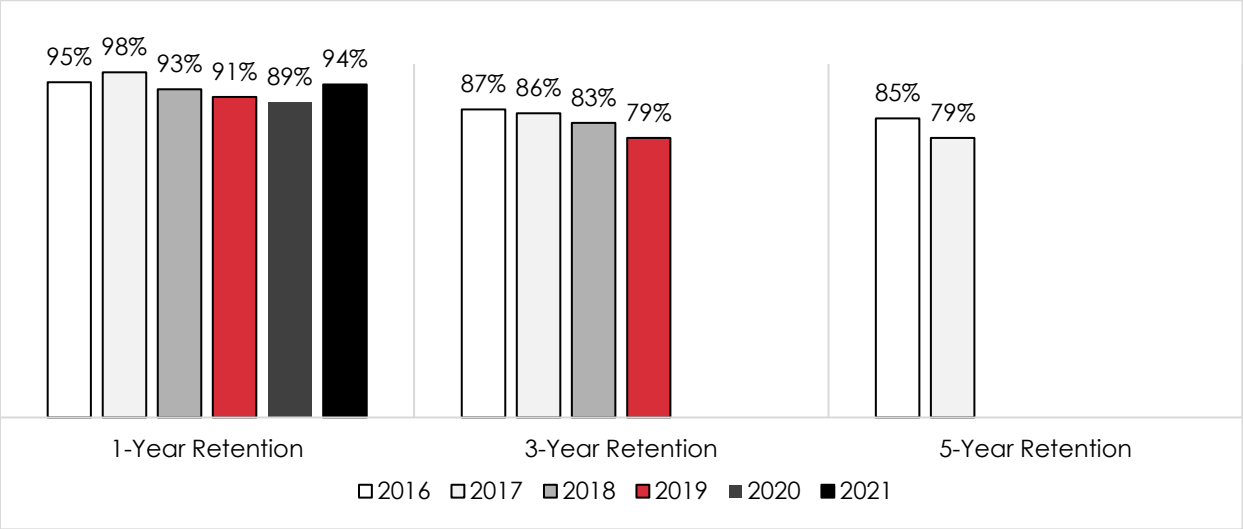
Figure 29: Occupational Retention Rates of Newly Hired RNs



Among LPNs, we see slightly higher occupational retention rates over time (Figure 30).

One year after being hired, around 93% of LPNs are still working in the public health sector. After three years, the proportion drops to around 84% – though, we see a declining trend over the years, with the 3-year retention rate reaching 79% in 2019. Five years after being hired, about 82% of LPNs are retained in the public health sector.

Figure 30: Occupational Retention Rates of Newly Hired LPNs



Previous Residence (Pooled Years, 2016-2022)

Figure 31 shows a breakdown of occupational retention rates by RNs' previous residence pooled across the years 2016-2022. Years are pooled owing to small cell counts by year for some statistics. Estimates show that 1-year occupational retention is highest among newly hired RNs originally from NB, at 94%. After three years, about 84% of RNs from NB remain in their profession, and this rate drops to 76% five years after starting.

For RNs from other Maritime provinces and Non-Maritime areas outside of NB, the 1-year occupational retention rates are 86% and 90%, respectively. After three years, the Non-Maritime RNs experience a notable drop to 76%, followed by another 4 percentage point decline after five years.

For newly hired RNs originating from other Maritime provinces, a retention rate of around 75% is observed both three years and five years after entering the profession.

Based on these results, it appears as though location of previous residence may impact occupational retention in the short term (i.e., one year after being newly hired), with RNs originally from NB having higher occupational retention rates. However, in the longer-term (five years after being hired), previous residence appears to have less of an effect, suggesting that nurses from outside NB may be "settled" at that point.

It is interesting to note that, just as we observe similarities in 5-year occupational retention rates among newly hired RNs regardless of previous residence, we also observed similarities in RNs' attrition rates (Figure 27), with previous residence having little impact on outcomes. The attrition rates reflect a combination of both new and experienced RNs, suggesting that, on average, previous residence may be less of a factor influencing nurses' decisions to exit or stay in the public health sector.

Figure 31: Occupational Retention Rates of Newly Hired RNs (Pooled) by Previous Residence

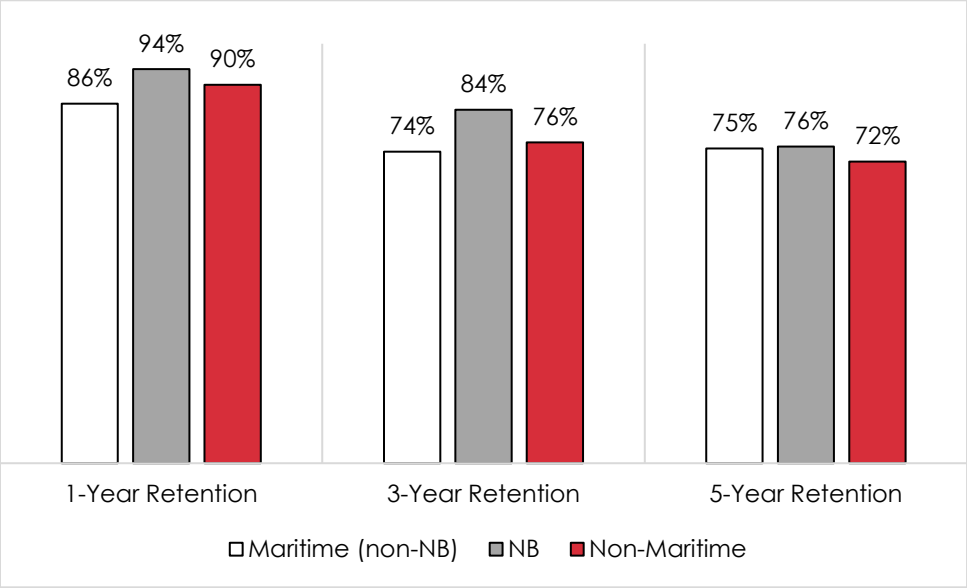
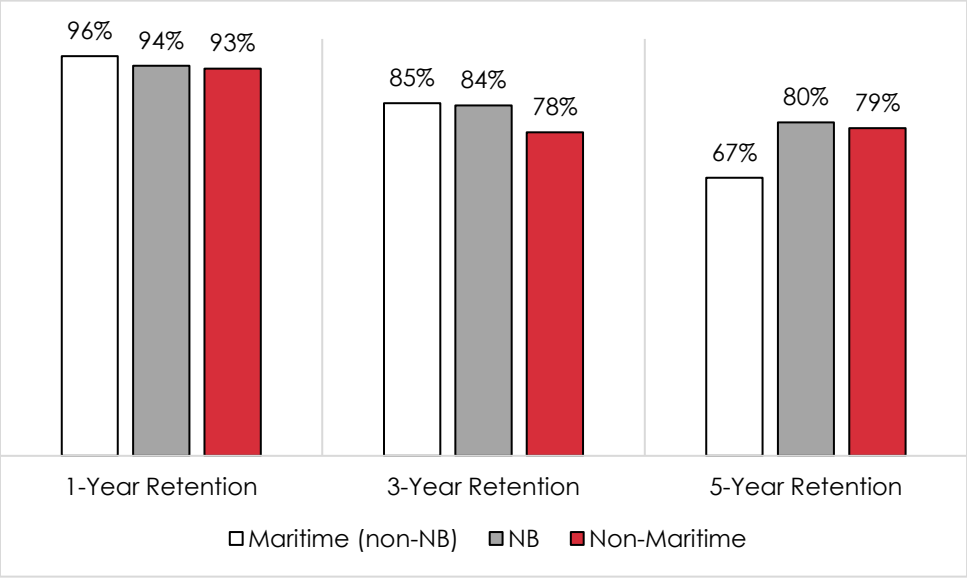


Figure 32 illustrates a similar breakdown of occupational retention rates among LPNs based on previous residence, with results aggregated from 2016 to 2022. LPNs originally from NB exhibit a 1-year retention rate of 94%. Over a span of three years, approximately 84% of LPNs from NB continue in the profession, and this rate decreases to 80% after five years.

LPNs from other Maritime provinces and non-Maritime regions show similarly high 1-year retention rates of 96% and 93%, respectively. Both three and five years after being hired, about 79% of non-Maritime LPNs are retained. Meanwhile, LPNs from other Maritime provinces experience a notable downward trend from a 1-year retention rate of 96% to a 3-year retention rate of 85%, followed by a further 18 percentage point decrease to a 5-year retention rate of 67%.

Figure 32: Occupational Retention Rates of Newly Hired LPNs (Pooled) by Previous Residence



Location of Residence After Exiting the NB Public Health Sector

The location of nurses who leave their profession in the NB public health sector is determined based on their "Active" Medicare status in the Citizen Data. A former nurse is assumed to have left the province if their Medicare status is either "Left the Province" or "Left Country," or if it is "Terminated" for more than six months for other reasons (excluding death).

Figure 33 shows the proportion of former RNs living in NB (as of 2021) based on the year they exited nursing. It indicates that, in general, about 90% of former RNs reside in the province one year after leaving the public health system.

Meanwhile, around 78% of RNs who leave public sector employment remain in the province five years after exiting their position.

Figure 33: Former RNs Living in NB by Year of Exit From the Public Health Sector

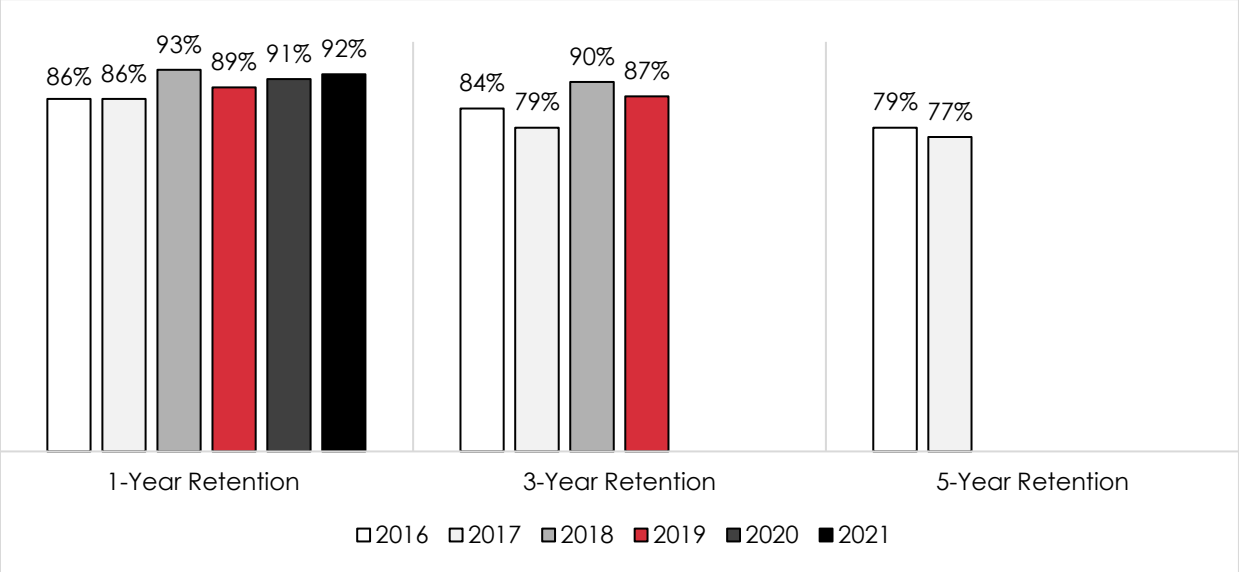
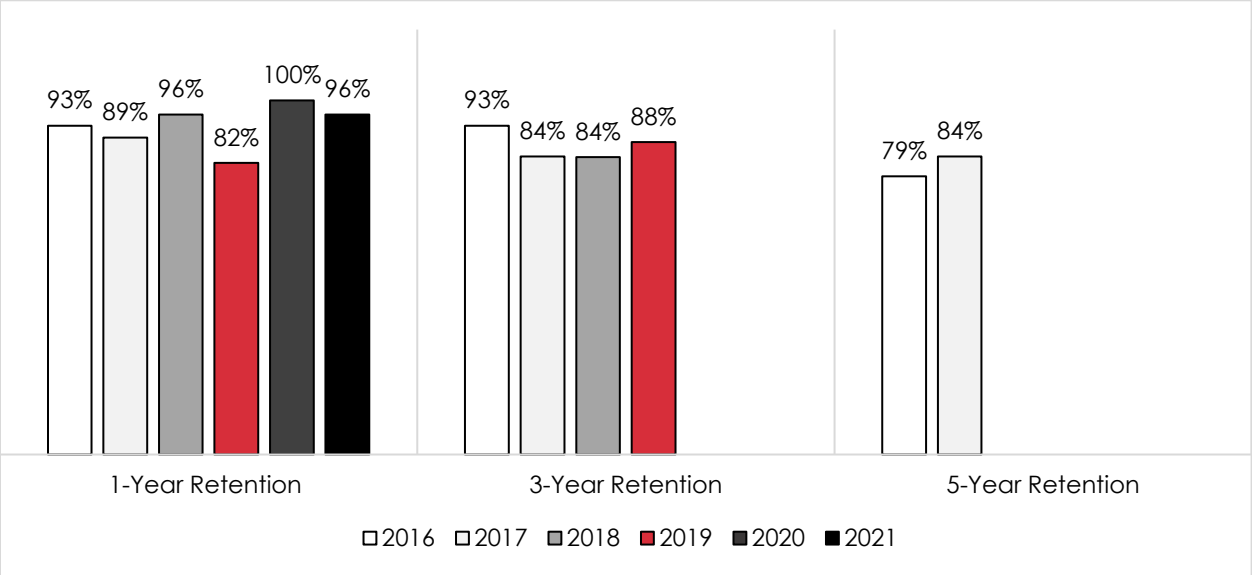


Figure 34 shows that, on average, 93% of former LPNs continue to live in the province one year after leaving their profession in the public health sector. Roughly 82% of former LPNs continue to reside in NB five years after departing from the public health sector.

Figure 34: Former LPNs Living in NB by Year of Exit From the Public Health Sector



Age

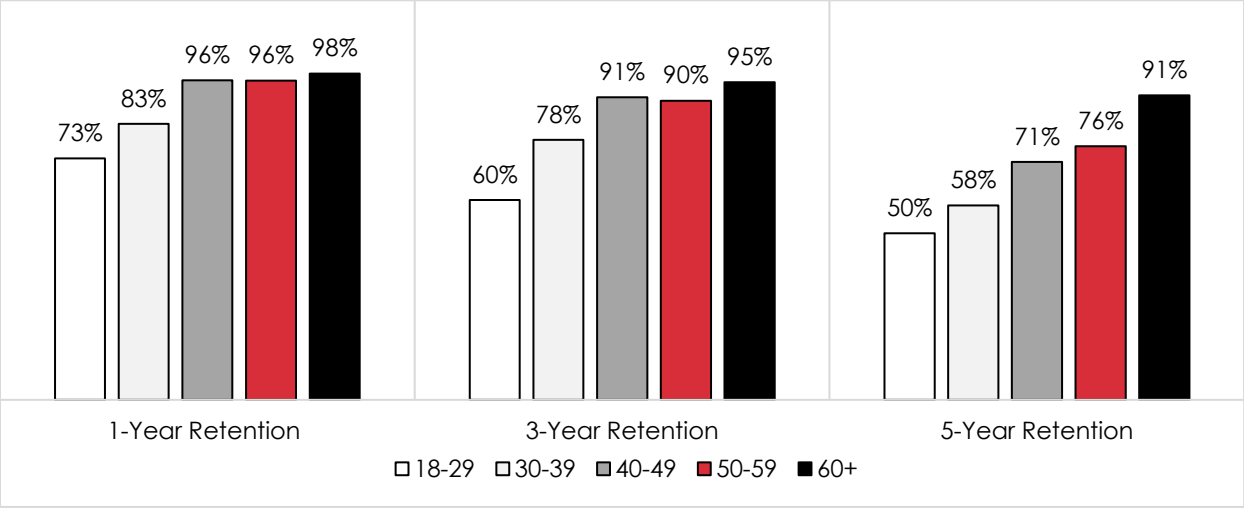
Further disaggregating the retention rates of former RNs by age (Figure 35) reveals a rising trend in retention as age increases. In other words, the older an RN is when they exit the public health sector, the higher their retention rate is likely to be.

The results show that over 90% of former RNs over the age of 60 reside in NB five years after leaving their profession.

On the contrary, less than three-quarters (73%) of the youngest RNs (18-29 years) who exit nursing in the public health system remain in the province after one year. After three and five years, the retention rate for this group is 60% and 50%, respectively.

The lower retention rate for younger age groups implies that these nurses likely leave NB in search of employment (in nursing or in other professions).

Figure 35: Former RNs Living in NB After Exit From Public Sector Nursing (Pooled Years), by Age

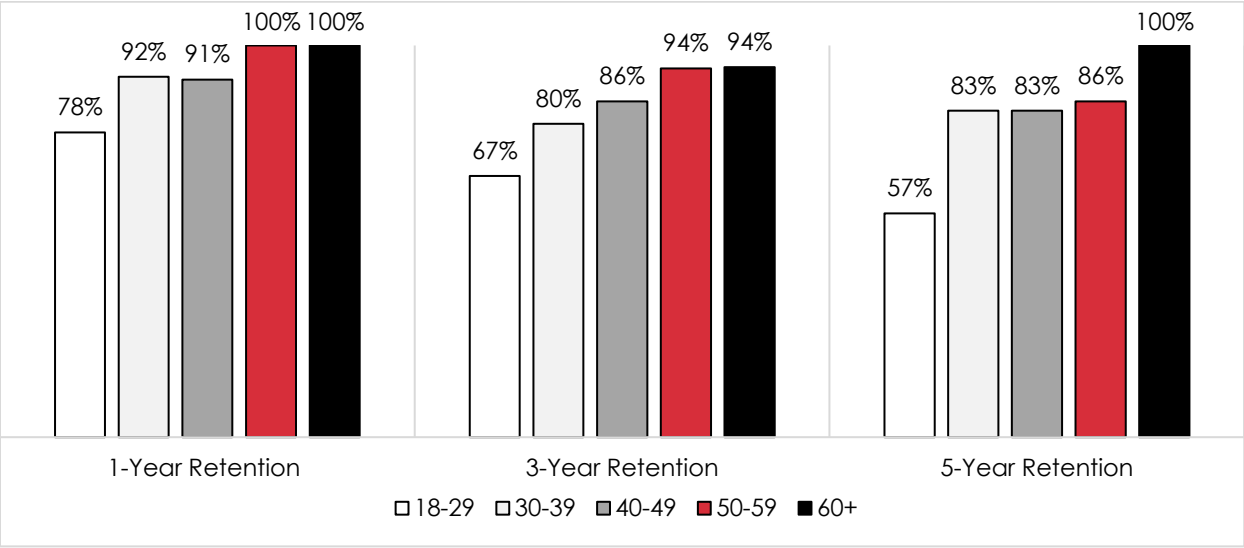


Note: In this figure, 1-year retention rates reflect results for the 2016-2022 cohort of nurses, 3-year retention rates reflect results for the 2016-2019 cohort and 5-year rates reflect results for the 2016-2017 cohort.

The breakdown of retention rates of LPNs leaving the public health system by age shows a similar pattern – that is, retention rates in NB increase with age. The findings indicate that 100% of LPNs leaving the public health system aged 60 and above remain in NB five years after exit.

Conversely, 78% of the youngest LPNs (aged 18-29) who exit the public health sector remain in the province after one year. After three and five years, the retention rate for this age group drops to 67% and 57%, respectively. Similar to the RNs discussed above, the lower retention rate among younger age groups suggests that these nurses leave NB in pursuit of employment opportunities, either within the nursing field or in other professions.

Figure 36: Former LPNs Living in NB After Exit From Nursing (Pooled Years), by Age



Note: In this figure, 1-year retention rates reflect results for the 2016-2022 cohort of nurses, 3-year retention rates reflect results for the 2016-2019 cohort, and 5-year rates reflect results for the 2016-2017 cohort.

Results: Statistical Analysis

To complement the descriptive statistics presented in the previous section, we have conducted a statistical analysis that allows us to disentangle various factors potentially affecting the transitions of interest in this report – including becoming a nurse in NB, exiting the profession and duration employed.

Technical details of the equations used to estimate these results are available in Appendix 2.

Factors Associated With NB Nursing Graduates Becoming Nurses in NB

We conducted a logistic regression aimed at estimating the factors influencing the likelihood that an NB nursing graduate (from either a Bachelor of Nursing program or a Practical Nursing program) will enter the public health sector in NB.

The full results of this logistic regression are available in Table 9 (see Appendix 1).

When other factors are held constant, the findings reveal that:

- Nursing graduates with a married marital status have approximately 1.61 higher odds than graduates with a single marital status of becoming a nurse in the NB public health sector.
- UdeM nursing graduates exhibit a higher likelihood, or 1.55 times higher odds, of becoming nurses in NB compared to UNB graduates.
- Graduates from outside Canada (international graduates from NB institutions) have 0.26 lower odds of becoming nurses compared to individuals originally from NB.

Factors Associated With Nursing Duration

We also ran a Cox Proportional Hazard mode (see Appendix 2) to estimate the likelihood that a nurse will exit their profession in the NB public health system, with a Hazard ratio estimate of greater than 1 implying higher risk of exit, while a ratio lower than 1 signifies lower risk (i.e., longer duration working as a nurse in the public health sector).

The full results of this model are available in Table 9 (see Appendix 1).

Other things equal, our findings indicate the following (overall):

- Nurses originally from other Maritime provinces and non-Maritime provinces (i.e. not from NB) exhibit a higher likelihood of leaving the NB public health sector compared to those who are from NB.

- Individuals with a single marital status are more likely to leave the public nursing profession in NB relative to their married counterparts.

- Nurses employed on a casual or part-time basis are significantly more likely to exit the nursing profession compared to individuals with a full-time contract.

To allow for variations in nursing tenure by location of education (in NB vs. non-NB), we estimated another model that restricted the sample of nurses to individuals born after 1982 (see Table 7) and further restricted to individuals born after 1992 (in which we are confident we can identify whether an individual was educated in NB) (see Table 8) and included a similar set of observable factors.

The results of this model are similar to those of the initial model presented in Table 6, and the association between location of education and nursing duration is not statistically significant after accounting for location of previous residence. However, the results also indicate that:

- Among younger nurses, LPNs exhibit a higher likelihood of remaining in the profession in the NB public health sector than RNs, other things equal.

We also find that RNs are more likely to leave the NB public health sector (see Table 7 and Table 8). This may indicate that those with Bachelor of Nursing degrees (i.e., RNs) are more mobile in terms of greater labour market opportunities across employment locations (hospitals, nursing homes, doctors' offices, private companies, etc.) and across provinces in Canada.

Discussion and Conclusion

This study considers the dynamics surrounding the recruitment, retention and mobility patterns of nurses within New Brunswick's public health sector from 2016 to 2022. Using linked Nursing Payroll Data, NB University Graduates data, CCNB and NBCC Student Data and Citizen Data (Medicare Registry) available through NB-IRDT, we conducted a longitudinal analysis to examine individual-level transition decisions among nurses.

Overall, we observe a need to recruit and retain more nurses in NB's public hospital system, with a focus in particular on the retention of younger nurses and recent graduates.

Our findings show that the number of active RNs and LPNs working in the public health system grew steadily over the study period with a larger number of nurses entering the profession than leaving the profession each year (with the exception of RNs in 2018). The number of active RNs rose by 14%, reaching 7,345 in 2022. Meanwhile, the number of LPNs had a notable 39% increase, totaling approximately 3,000 in 2022. Even when considering the number of active RNs and LPNs per 100,000 population, we observed a positive (albeit slower) trend of growth.

That being said, there are some important considerations to keep in mind.

For one, NB is struggling with an ongoing nursing shortage that has been growing in magnitude. As mentioned in the Introduction, the NB Department of Health projects a deficit of approximately 1,300 RNs in the NB healthcare system by the year 2028 (GNB, 2019), and the increase in funding for LPN-RN bridging programs may in turn contribute to a provincial decrease in LPNs (GNB, 2019). It is estimated that NB will need 520 new nurses per year to maintain its nursing workforce, which is more than the number of nursing graduates NB currently produces on a yearly basis (NBNU, 2020). If NB continues to experience the trend of population growth that began after the COVID-19 pandemic, this could exacerbate the nursing shortage even more.

It is also important to consider the impact of employment factors beyond the number of active nurses. For instance, while the number of RNs and LPNs has been increasing, the proportion of RNs and LPNs on full-time contracts consistently declined over the study period.

It should be noted that a switch from full-time to casual status does not necessarily reflect an intention to work fewer hours. It may instead reflect a desire for greater scheduling flexibility or may be due to system-level contract changes rather than individual preferences. While the reasons for the declining share of full-time contracts are not observed in this study, our statistical analysis finds nurses on casual contracts to be at a higher risk of exiting the public health system compared to nurses on full-time contracts. This implies that higher casualization rates may be contributing to increasing attrition rates.

Previous residence, years of experience and age of nurses entering and exiting the public health system are also important to note.

For graduates entering the nursing profession, we see that around 90% of individuals from NB who received a Bachlor of Nursing degree[9] between 2016 and 2020 transitioned to employment in the public sector – highlighting the significance of previous place of residence and a strong association between being from NB and staying to work in NB after graduation. These results are similar to those of a 2024 MPHEC survey, which found that over 90% of Bachelor of Nursing graduates from the 2018 and 2020 cohorts resided and worked as nurses in the Maritimes two years post-graduation (MPHEC, 2024).[10]

We find that graduates from provinces outside NB and from outside Canada (i.e., international graduates) exhibit lower graduation counts and lower rates of working as RNs in the NB public sector post-graduation, which suggests there may be challenges in retaining non-local graduates. One implication is that the growing share of active RNs and LPNs from outside the Maritime provinces arising in part from recruitment efforts for nurses outside of NB may be creating greater retention challenges among those nurses who move here to work.

Since the majority Bachelor of Nursing graduates are originally from NB, their high rates of transition to the public health sector reflect a large share of recent graduates finding employment in the public hospital system. However, there is an increasing risk of recent graduates such as these leaving the public sector shortly after joining.

We see that the exit, or attrition, rate of RNs with less than five years of experience increased steadily over the study period, meaning there is a growing risk of recent Bachlor of Nursing graduates exiting the public health sector relatively soon after starting, specifically among those who did not obtain previous nursing experience working as an LPN.

We observe a growing need to focus on occupational retention not only among newer hires but also among younger nurses. The highest levels of growth in exit rates have most recently been driven by RNs under 25 years of age, suggesting there may be more challenges in retaining younger nurses within the public health sector.

The younger age groups (with fewer years of experience) are not only increasingly likely to leave the public sector, but they are the most likely to leave the province altogether. While approximately 75% of nurses aged 18-29 remain in NB one year after leaving the public health sector, their retention rate drops to around 50% five years after leaving the profession. This suggests that approximately half of RNs and LPNs that leave the public health sector are not contributing to health care in NB through long-term employment in the private sector. Instead, these younger nurses are more likely to leave NB altogether, either to pursue employment opportunities within the nursing field or in other professions.

Conversely, retention rates are high among former nurses in the older age categories, with over 90% of former RNs and 100% of LPNs aged 60 and above remaining in NB five years after leaving the public health sector.

[9] We are only able to observe Bachelor of Nursing graduates from UdeM and UNB.
[10] This includes Registered Nurses and Registered Psychiatric Nurses and Nursing Co-ordinators and Supervisors.

Notably, while attrition rates have been increasing among the youngest age groups, they have been declining among nurses in the older age categories, especially those aged 65 and older. It is important to note, though, that these groups are either at or nearing retirement age and are likely to leave the profession in the near future.

With an aging workforce and an aging population in general, NB has more citizens nearing retirement who are likely to develop greater need for health services as they age. While some of this aging effect is being offset by the in-migration of working-age individuals and young families, this does not alleviate the growing demand for health services but rather contributes to it – emphasizing the importance of recruiting and retaining nurses even more.

By identifying observable factors associated with higher and lower levels of entering and leaving NB's public health sector, this report aims to provide decision makers with evidence that can be used to inform and influence positive policies – including the development of strategies to recruit more nurses to NB's public health sector while encouraging those already employed in the sector to stay.

This study's novel linkage of payroll data with Medicare and graduate records demonstrates the powerful ability of linked data to shed light on occupational and mobility decisions across populations, and future research incorporating additional administrative data sets could explore the topic of nurse recruitment and retention even further.

Future studies in this area could include the following:

- A study specifically on the retention of internationally educated nurses in the NB public health system that utilizes Nursing Payroll Data linked with Permanent Landing Records provided by Immigration, Refugees and Citizenship Canada.

- An evaluation of LPN-RN bridging programs for LPNs and internationally educated nurses that utilizes data sets provided by the Nurses Association of New Brunswick and Association of New Brunswick Licensed Practical Nurses.

References

Aiken, L. H., Cimiotti, J. P., Sloane, D. M., Smith, H. L., Flynn, L., & Neff, D. F. (2011). Effects of nurse staffing and nurse education on patient deaths in hospitals with different nurse work environments. *Medical Care, 49*(12), 1047-1053. https://doi.org/10.1097/MLR.0b013e3182330b6e

Aiken, L. H., Sloane, D. M., Bruyneel, L., Heede, K. V., Griffiths, P., Busse, R., Diomidous, M., Kinnunen, J., Kózka, M., Lesaffre, E., McHugh, M. D., Moreno-Casbas, M. T., Rafferty, A. M., Schwendimann, R., Scott, P. A., Tishelman, C., van Achterberg, T., & Sermeus, W. (2014). Nurse staffing and education and hospital mortality in nine European countries: A retrospective observational study. *The Lancet, 383*(9931), 1824-1830. https://doi.org/10.1016/S0140-6736(13)62631-8

Beykzadeh, A., Gorman-Asal, M., McDonald, T., & Miah, P. (2024). *Graduate retention in New Brunswick: 2021 graduate cohort update*. Fredericton, NB: New Brunswick Institute for Research, Data and Training. https://www.unb.ca/nbirdt/research/publications/graduate-retention-in-new-brunswick-2021-cohort-update.html

Bhuiyan, E. M., Daigle, B., McDonald, T., & Miah, P. (2020). *College & university graduate retention in New Brunswick: 2010 - 2018.* Fredericton: New Brunswick Institute for Research, Data and Training. https://www.unb.ca/nbirdt/research/publications/college-and-university-graduate-retention-in-new-brunswick-2010--2018.html

Duffield, C. M., Roche, M. A., Homer, C., & Dimitrelis, J. B. (2014). A comparative review of nurse turnover rates and costs across countries. *Journal of Advanced Nursing, 70*(12), 2703-2712. https://doi.org/10.1111/jan.12483

Falatah, R. (2021). The impact of the Coronavirus disease (COVID-19) pandemic on nurses' turnover intention: An integrative review. *Nursing Reports, 11*(4), 787-819. https://doi.org/10.3390/nursrep11040075

Government of New Brunswick. (2019). *New Brunswick nursing resource strategy*. Government of New Brunswick. https://www2.gnb.ca/content/dam/gnb/Departments/h-s/pdf/en/nursing/nursing_resource_strategy.pdf

Lopez, V., Anderson, J., West, S., & Cleary, M. (2022). Does the COVID-19 pandemic further impact nursing shortages? *Issues in Mental Health Nursing, 43*(3), 293-295. https://doi.org/10.1080/01612840.2021.1977875

Maritime Provinces Higher Education Commission. (2024). *Profile, employment outcomes, and retention of Maritime university bachelor's graduates: Nursing*. Fredericton, NB: Maritime Provinces Higher Education Commission. https://www.mphec.ca/media/228865/Profile-Employment-Outcomes-and-Retention-of-Bachelor%E2%80%99s-Graduates_Nursing.pdf

New Brunswick Nurses Union (2020). *The forgotten generation: An urgent call for reform in New Brunswick's long¬-term care sector.* New Brunswick Nurses Union. https://nbmediacoop.org/wp-content/uploads/2020/10/The-Forgotten-Generation.pdf

Statistics Canada. (2024, June 19). Population estimates, quarterly (Table 17-10-0009-01). Retrieved June 24, 2024, from https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1710000901

Appendix 1 – Supplementary Results

Table 2: Profile of Nurses in the NB Public Health System

	LPN	RN
N (active at some point 2016 – 2022)	3,325	8,760
Female	2,975 (89.5%)	8,200 (93.6%)
Average Age - Most Recent (sd)	41.4 (13.2)	45.2 (13.6)
Marital Status		
Married	1,300 (39.1%)	4,610 (52.6%)
Other	4,651(14.0%)	1,155 (13.2%)
Single	1,560 (46.9%)	2,985 (34.1%)
Preferred Language		
English	2,665 (80.2%)	6,565 (69.4%)
French	655 (19.7%)	2,185 (27.8%)
Average Years of Experience (sd)	10.2 (9.3)	14.0 (11.6)
Payroll Status (most recent)		
Full-Time	1,885 (56.7%)	5,805 (66.3%)
Part - Time	640 (19.2%)	1,205 (13.8%)
Casual	780 (23.5%)	1,680 (19.2%)
Other	20 (0.6%)	65 (0.7%)
University Attended (since 2004/2014)		
UNB	40 (1.2%)	2,265 (25.9%)
UdeM	10 (0.3%)	1,430 (16.3%)
NBCC	555 (16.7%)	25 (0.3%)
CCNB	230 (6.9%)	5 (0.1%)
Health Zone (Regional Authority)- Most Recent		
Zone 1 - Moncton (Vitalité)	275 (8.3%)	1,155 (13.2%)
Zone 1 - Moncton (Horizon)	525 (15.8%)	1,460 (16.7%)
Zone 2 - Saint John (Horizon)	970 (29.2%)	2,205 (25.2%)
Zone 3 - Fredericton (Horizon)	730 (22.0%)	1,720 (19.6%)
Zone 4 - Edmundston (Vitalité)	180 (5.4%)	600 (6.8%)
Zone 5 - Campbellton (Vitalité)	170 (5.1%)	430 (4.9%)
Zone 6 - Bathurst (Vitalité)	315 (9.5%)	825 (9.4%)
Zone 7 - Miramichi (Horizon)	160 (4.8%)	365 (4.2%)

Table 3: Annual Registered Nurse Counts – Active, New Hires and Exit From Nursing

Year	Active RNs	New Hires	Exit From Nursing
2016	6420	455	240
2017	6580	395	230
2018	6780	430	535
2019	6675	430	260
2020	6860	440	300
2021	7300	740	405
2022	7345	445	340

Table 4: Annual Licensed Practical Nurse Counts – Active, New Hires and Exit From Nursing

Year	Active RNs	New Hires	Exit from Nursing
2016	2140	190	80
2017	2270	210	100
2018	2380	205	140
2019	2450	210	100
2020	2570	220	105
2021	2815	345	145
2022	2980	305	NA

Note: 2022 LPN exits are excluded from the study.

Table 5: Bachelor of Nursing Graduates Who Were Working as Nurses Before Graduation

Graduation Year	Total Graduates (A)	Working before graduation (B)	Share of B = (B/A)
2016	305	40	13%
2017	280	35	13%
2018	215	20	9%
2019	180	30	17%
2020	220	45	20%
Total	**1200**	**170**	**14%**

Table 6: Factors Associated With Nursing Duration

Variables	Hazard Ratio	Standard Error	P-Value
Comparison Category: Previous Residence = NB			
Maritime (Non-NB)	1.71	0.0763	0.0001
Non-Maritime	1.46	0.0523	0.0001
Comparison Category: Sex = Female			
Male	0.92	0.0762	0.2607
Comparison Category: Marital Status = Married			
Other	1.09	0.0518	0.1086
Single	2.16	0.0459	0.0001
Comparison Category: Age Group at the start = 35-44			
<25	0.52	0.0947	0.0001
25-34	0.72	0.0767	0.0001
55-64	1.62	0.0813	0.0001
65+	2.06	0.0938	0.0001
Comparison Category: Payroll Status = Full-Time			
Casual	3.24	0.0567	0.0001
Other	8.29	0.1593	0.0001
Part-Time	1.92	0.0466	0.0001
Comparison Category: Job Class = Registered Nurse (RN)			
LPN	1.01	0.0473	0.8619
Comparison Category: Regional Health Authority = Horizon			
Vitalité	0.99	0.0496	0.7995
Horizon + Vitalité	0.98	0.0448	0.6374

Table 7: Factors Associated With Nursing Duration With NB Nursing Degree (Born >=1982)

Variables	Hazard Ratio	Standard Error	P-Value
Comparison Category: Previous Residence = NB			
Maritime (Non-NB)	1.63	0.1112	0.0001
Non-Maritime	1.58	0.0841	0.0001
Comparison Category: Province of Nursing Degree = NB			
Non-NB Nursing Graduate	1.01	0.0790	0.878
Comparison Category: Sex = Female			
Male	1.02	0.1292	0.8752
Comparison Category: Marital Status = Married			
Other	1.07	0.1675	0.6991
Single	1.90	0.0761	0.0001
Comparison Category: Age Group at the start = 35-44			
<25	0.61	0.2182	0.0221
25-34	0.75	0.2036	0.1649
Comparison Category: Payroll Status = Full-Time			
Casual	3.90	0.0852	0.0001
Other	13.05	0.2037	0.0001
Part-Time	3.63	0.0840	0.0001
Comparison Category: Job Class = Registered Nurse (RN)			
LPN	0.77	0.0829	0.0019
Comparison Category: Regional Health Authority = Horizon			
Vitalité	0.82	0.0981	0.0465
Horizon + Vitalité	1.15	0.0748	0.0694

Table 8: Factors Associated With Nursing Duration With NB Nursing Degree (Born >=1992)

Variables	Hazard Ratio	Standard Error	P-Value
Comparison Category: Previous Residence = NB			
Maritime (Non-NB)	1.50	0.1704	0.0174
Non-Maritime	1.53	0.1310	0.0013
Comparison Category: Province of Nursing Degree = NB			
Non-NB Nursing Graduate	1.08	0.1192	0.5334
Comparison Category: Sex = Female			
Male	1.29	0.1960	0.1888
Comparison Category: Marital Status = Married			
Other	1.58	0.3386	0.1773
Single	1.56	0.1575	0.0049
Comparison Category: Age Group at the start = 25-34			
<25	0.68	0.1326	0.003
Comparison Category: Payroll Status = Full-Time			
Casual	3.04	0.1249	0.0001
Other	8.86	0.2707	0.0001
Part-Time	3.52	0.1459	0.0001
Comparison Category: Job Class = Registered Nurse (RN)			
LPN	0.61	0.1182	0.0001
Comparison Category: Regional Health Authority = Horizon			
Vitalité	1.00	0.1550	0.9729
Horizon + Vitalité	1.19	0.1179	0.1474

Table 9: Factors Associated With NB Nursing Graduates Becoming Nurses in NB

Variables	Odds Ratio	Standard Error	P-Value
Comparison Category: Sex = Female			
Male	0.81	0.0569	0.0594
Comparison Category: Marital Status = Married			
Other	0.77	0.0739	0.8538
Single	0.62	0.0521	0.0001
Comparison Category: Institute = UNB			
CCNB	1.01	0.0969	0.4901
NBCC	0.88	0.0691	0.0028
UdeM	1.55	0.0594	0.0001
Age at the Start	0.835	0.0536	0.0007
Age at the Start (Square)	5.86	0.6224	0.0045
Comparison Category: Previous Residence = NB			
Province Outside NB (Domestic)	0.26	0.122	0.0001
Outside Canada (International)	0.4	0.1019	0.1265

Appendix 2 – Statistical Analysis Methodology

Factors Associated With NB Nursing Graduates Becoming Nurses in NB

The logistic regression model we used to estimate factors associated with graduates of public NB nursing programs becoming a nurse in the NB public health sector is as follows:

$$\log\left(\frac{p(\text{Becoming a Nurse})}{1-p(\text{Becoming a Nurse})}\right) = \beta_1 \text{Sex} + + \beta_2 \text{MarStat} + \beta_3 \text{Instit} + \beta_4 \text{PO} + \beta_5 \text{Age} + \varepsilon$$

where

- *Sex* is a binary variable with *Female* as the reference category.
- *MarStat* refers to most recent marital status of the individual.
- *PO* (province of origin) represents the previous province of living at enrollment for NB nursing graduates. There are three categories for this variable: 1. NB, 2. Province outside NB, 3. Outside Canada. The reference group in the model is NB.
- *Age* is a continuous variable at the start of nursing occupation or graduation (for those who did not become nurses).
- *Instit* represents the post-secondary institute from which the individual graduated.

Binary logistic regression was used to estimate covariates affecting the probability of an NB nursing graduate becoming a nurse in the NB public health system. In the equation above, $\log\left(\frac{p(\text{Becoming a Nurse})}{1-p(\text{Becoming a Nurse})}\right)$ is the probability of an NB nursing graduate becoming a nurse in the public health system in the province.

The regression accounts for covariates, including sex, marital status, age at the start of nursing or graduation (for those not in the Nursing Payroll Data), province of origin prior to enrolling in an NB university or college and graduating institution (for a Bachelor of Nursing or Practical Nursing program).

Factors Associated With Nursing Duration

We estimated factors associated with nursing duration in the NB public health sector in the following form:

$$h(t) = h_0(t) \times \exp(b_1 x_1 + \cdots + b_p x_p),$$

where

- t represents the time until an event occurs.
- $h(t)$ is the hazard function determined by a set of covariates $(x_1, \cdots, x_p)$. It represents the risk of the event occurring at time t, given that the individual has survived up to time t.
- The coefficients $(b_1, \cdots, b_p)$ measure the impact of covariates. A positive coefficient indicates an increased hazard (and thus a decreased survival time), while a negative coefficient indicates a decreased hazard (and thus an increased survival time).
- h_0 is the baseline hazard if all the x_i are zero, representing the risk of the event at time t when all covariates are zero.
- $\exp(b_i)$ are hazard ratios. They represent the multiplicative effect on the hazard for a one-unit increase in the corresponding covariate.

We used the Cox Proportional Hazard model to examine how nursing duration and its predictors are related. This model lets us include observable factors (called covariates) that may influence the probability of leaving the profession and thus the length of time working as a nurse.

We treat nurses who are still working at the end of the study period (2022) as censored in the analysis. The hazard rate is the chance of a nurse leaving the profession in the public health system, given that they have not left until that point. A hazard ratio above 1 means a higher chance of leaving, while a hazard ratio below 1 means a lower chance than the base category.

We conducted an additional duration model, restricting the sample to individuals born after 1982 for those with a Bachelor of Nursing degree from NB universities[11] and after 1992 for those with a Practical Nursing diploma[12] or a Bachelor of Nursing degree.

For our analysis, the observable factors or covariates (base categories in parentheses) include previous residence (NB), sex (female), marital status (married), age group (35-44), payroll status (full-time), job classification (Registered Nurse) and Regional Health Authority (Horizon).

[11] Anyone born after 1982 who obtained a Bachelor of Nursing degree that was not from a public university in NB can be assumed to have obtained it from other jurisdictions or from a private university in NB.
[12] College data are available from 2014. Thus, anyone born after 1992 who obtained a Practical Nursing diploma that was not from a public college in NB is assumed to have obtained it from other jurisdictions or a private college in NB.