# Health and health service utilization outcomes associated with low access to and low continuity of physician care in New Brunswick

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**OBJECTIVE:**

**Estimate prevalence of low access to and low continuity of physician care in NB, characterize those affected, and examine associated health and health service utilization outcomes.**

## INTRODUCTION

- Although 91% of New Brunswickers have a primary care provider[1], only about half of those can get an appointment within 5 days[2], highlighting challenges with access to care.
- Both low access and low continuity have been associated with negative health consequences[3].
- Research is required to understand the extent and effects of low access to and continuity of physician care in NB.

## METHODS

- This study used administrative data accessed via the NB Institute for Research, Data and Training (NB-IRDT)
- Canadian Chronic Disease Surveillance System (CCDSS) data were used to identify a study population of NB residents aged 20 and older with one or more chronic conditions.
- Using NB Physician Billing data and criteria previously established in the literature[4], study participants were classified as having either high access or low access to care based on their frequency of physician encounters over a 2-year period (low access: less than 3 encounters).
- Continuity of care was investigated among high access population using the Usual Provider of Care Index[4].
- Multivariate regression models were used to characterize access and continuity groups by socioeconomic and demographic characteristics, and to examine associations between low access/continuity and health/ health service utilization outcomes:

**Regression Variables**

- Age, sex, rural/urban residence, health region of residence
- Preferred language (English/French)
- Social assistance use, income quintile
- Canadian Index of Multiple Deprivation
- Chronic health conditions (total number and by condition)
- Number of physician encounters (for continuity analyses) and hospitalizations (for post-discharge mortality analysis)

## RESULTS

### *Hospitalizations and Readmissions:*

**Low CONTINUITY of care was associated with:**

- Increased likelihood of both all-cause and ACSC-related non-elective **hospital admission**

(IRR= 1.587***, 95% CI [1.562 - 1.613], obs. = 309,570 ; IRR = 1.426***, 95% CI [1.335 – 1.524], obs. = 309,570)

- Increased likelihood of **readmission** within 30 days after discharge

(SHR = 1.318***, 95% CI [1.256 - 1.384], obs. = 138,660)

Adjusted incident rate ratio/subdistribution hazard ratio of event among low access group relative to high access group (Admissions: multivariate Poisson regression, admissions/person 2017-2018; Readmissions: multivariate Cox regression, readmissions/admission 2017-2018), *** p < 0.01

### *Immunizations, mammograms, and diabetes monitoring:*

**Low ACCESS to care was associated with:**

- Decreased likelihood of **mammogram screening**

(IRR = 0.504***, 95% CI [0.475 - 0.534], obs. =152,225 )

- Decreased likelihood of **monitoring glycemic control by HbA1c** blood tests among individuals with diabetes

(IRR = 0.261***, 95% CI [0.251 - 0.272], obs. = 70, 810)

Adjusted incident rate ratio of event among low access group relative to high access group (multivariate Poisson regression: mammograms/female 2015-2016; HbA1c tests/diabetic individual 2017-2018), *** p < 0.01

**Low ACCESS to and low CONTINUITY of care were associated with:**

- Decreased likelihood of **influenza and pneumonia immunization** among individuals aged 65+

| | INFLUENZA IMMUNIZATION | | PNEUMONIA IMMUNIZATION | |
|---|---|---|---|---|
| Variable | aIRR | 95% CI | aIRR | 95% CI |
| Low ACCESS (vs. High) | 0.0692*** | (0.0601 - 0.0796) | 0.102*** | (0.0706 - 0.149) |
| Observations | 119,065 | - | 119,065 | - |
| Low CONTINUITY (vs. High) | 0.708*** | (0.696 - 0.720) | 0.832*** | (0.787 - 0.879) |
| Observations | 113,285 | - | 113,282 | - |

Table 2: Multivariate Poisson regression – adjusted incident rate ratio of immunization, Dependent variable = immunizations/person aged 65+ in 2017-2018, *** p < 0.01

### *Length of Hospital Stay:*

**Older age was associated longer hospital stays, especially in low ACCESS group:**

| | Regression Coeff. - Length of Stay | |
|---|---|---|
| Variable | LOW ACCESS | HIGH ACCESS |
| 65+ (vs. 20-64) | +2.485 days *** (1.518 - 3.453) | +1.238 days*** (1.134 - 1.341) |
| Observations | 770 | 39,450 |

Table 3: Multivariate GLM regression, Dependent variable = average length of non-elective hospital admission (days) in 2017-2018, *** p < 0.01

### *Hospital-Associated Mortality:*

**Low ACCESS to care was associated with:**

- Increased likelihood of **mortality in hospital**

(OR = 1.672***, 95% CI [1.445 – 1.935], obs. = 145,710)

- Increased likelihood of **mortality within one year** of hospital discharge

(HR = 1.536***, 95% CI [1.316 – 1.793], obs. = 83,610)

Adjusted odds ratio/hazard ratio of event among low access group relative to high access group (multivariate logistic regression: deaths/ admission; multivariate Cox regression: deaths/index admission, 2019-2020), *** p < 0.01

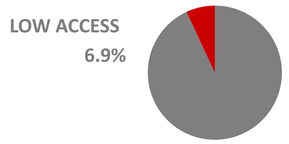
**Age, heart failure, Parkinson's disease were associated with increased likelihood of mortality in hospital, especially in low ACCESS group:**

| | LOW ACCESS | | HIGH ACCESS | |
|---|---|---|---|---|
| Variable | aOR | 95% CI | aOR | 95% CI |
| Heart Failure (vs. None) | 2.866*** | (1.616 - 5.082) | 1.807*** | (1.679 - 1.945) |
| Parkinson's (vs. None) | 11.12*** | (1.987 - 62.23) | 1.372** | (1.020 - 1.845) |
| 65+ (vs. 20-64) | 5.147*** | (3.456 - 7.666) | 3.466*** | (3.203 - 3.750) |
| Observations | 4,015 | - | 141,695 | - |

Table 4: Multivariate logistic regression – adjusted odds ratio of mortality in hospital, Dependent variable = in-hospital deaths/ admission in 2019-2020, *** p < 0.01, ** p < 0.05

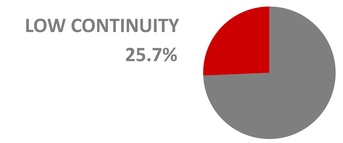
### *Prevalence of Low Access to Care*

- **6.9% of New Brunswickers with chronic conditions were classified as having low access to care** (n = 338,400, p < .01)




### *Prevalence of Low Continuity of Care*

- **25.7% of individuals with high access to care had low continuity of care** (n = 309,600, p < .01)




### *Characteristics Associated with Low ACCESS to Care:*

- Male
- Aged 20-64
- Rural area of residence
- Preferred language English
- Individuals with dementia

### *Characteristics Associated with Low CONTINUITY of Care:*

- Urban area of residence

| | LOW ACCESS | | LOW CONTINUITY | |
|---|---|---|---|---|
| Variable | aOR | 95% CI | aOR | 95% CI |
| Female (vs. Male) | 0.453*** | (0.440 – 0.467) | 1.083*** | (1.065 – 1.103) |
| 65+ (vs. 20-64) | 0.453*** | (0.436 – 0.471) | 0.952*** | (0.933 – 0.971) |
| Rural (vs. Urban) | 1.164*** | (1.122 – 1.207) | 0.769*** | (0.751 – 0.787) |
| English (vs. French) | 1.154*** | (1.100 – 1.210) | 0.952*** | (0.928 – 0.977) |
| Dementia (vs. None) | 17.69*** | (15.95 – 19.61) | 0.853*** | (0.770 – 0.944) |
| Observations | 338,385 | - | 309,570 | - |

Table 1: Multivariate logistic regression – adjusted odds ratio of having low access/ continuity in 2017-2018, *** p < 0.01 (selected variables shown)

## SUMMARY

**Low access** to physician care in NB is associated with decreased likelihood of immunization, preventive screening and chronic disease monitoring, longer hospital stays, and increased likelihood of hospital-associated mortality.

**Low continuity of care** is associated with decreased likelihood of immunization and increased likelihood of all-cause hospital admission, hospitalization for ambulatory care-sensitive conditions, and readmission within 30 days of discharge.

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