

# Trends in hospital coding for people experiencing homelessness, 2015-2020, Canada: a descriptive study

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## Conflict of Interest

The authors have no competing interests to declare.

## Abstract

**Background:** People who experience homelessness (PEH) have elevated needs for health services due to higher rates of chronic disease, mental illness, and substance use disorders. In April 2018, the Canadian Institute for Health Information updated the Canadian Coding Standards to mandate the collection of the ICD-10-CA code Z59.0 Homelessness when noted on a patient record. This study described volumes of Z59.0 in Canada from the fiscal years 2015/16 to 2020/21 and examined the change in rates of Z59.0 before and after the 2018 coding mandate.

**Methods:** We described six fiscal years (2015/16 to 2020/21) of hospital administrative data from the Hospital Morbidity Database. Frequencies and proportions of hospitalizations with a Z59.0 diagnostic code were calculated while results were disaggregated by several types of Canadian geographies. Logistic regression models quantified the odds of Z59.0 coding during hospital stays. Interactions with time (by quarter) were included to assess potential seasonality.

**Results:** The frequency and proportion of PEH in hospitalization records across Canada increased 4.1 times from 6,934 (0.12%) in 2015/16 to 21,529 (0.41%) in 2020/21. Trends varied by province and territory. Adjusted logistic regression models displayed significant increases in recording of the Z59.0 code immediately following the mandate (AOR 1.58, 95% CI 1.52 – 1.65) relative to the pre-mandate period.

**Interpretation:** The 2018 coding mandate likely improved capture of homelessness in health care administrative data. However, these trends varied by province and territory. Future validation studies are warranted to understand utility of this code for research and health system planning.

## Introduction

Homelessness is a persistent challenge faced by Canada's healthcare and social systems. (1–3) In recent years, there have been increasing numbers and diversity of people experiencing homelessness (PEH) (4, 5) and a growing body of evidence now recognizes that homelessness also exists in small towns and rural communities, where it is often less visible and fewer formal services or infrastructure are available to support PEH. (6, 7)

PEH have an elevated need for health services due to high rates of chronic disease, comorbidity, substance use, and mental illness largely driven and exacerbated by poor living conditions. (8–10) These living conditions also contribute to increased vulnerability to infectious diseases such as influenza, tuberculosis, and COVID-19. (11) Consequently, PEH have comparatively high rates of emergency department (ED) visits and hospitalizations, particularly among chronically homeless individuals. (12–14, 11) Yet, because of unique challenges in engaging PEH in research (15) and the limited nature of point-in-time counts (16, 17), it is difficult to evaluate interventions aimed at improving health outcomes and access to quality care for PEH. Data collected routinely during health care ('health administrative data') could help fill some of this data gap as this data is readily available, cost-effective, protected through existing policies and procedures, and can be linked and monitored over time. (18)

The *International Statistical Classification of Diseases and Related Health Problems, 10th Revision, Canada* (ICD-10-CA), originally developed by WHO and adapted the Canadian Institute for Health Information (CIHI), is the Canadian standard for systematic recording, reporting, analysis, interpretation, and comparison of diagnoses and conditions that represent risk factors to health, such as occupational and environmental factors, and lifestyle and psychosocial circumstances. (19) CIHI, in consultation with the provinces and territories (PTs), maintains the Canadian Coding Standards (CCS) and they are regularly revised to keep pace with changing health care models, advancements in health care and technology, and health care information needs. (19) The ICD-10-CA codes Z55.0–65.0 capture the social determinants of health, with the code Z59.0 capturing homelessness status. To improve data capture of this population, it became mandatory in 2018 to record Z59.0 when noted on routine review of the patient record. (19) This directive has the potential to increase the consistency of PEH identification in hospital data, which can in turn be used to improve our understanding of how PEH interact with health care services and allow for the evaluation of policies and programs aimed at improving the health of and care for PEH.

The overall objective of this study is to describe the use of hospital diagnosis codes for homelessness in Canada from the fiscal years (FYs) 2015/16 to 2020/21. Specifically, at the national level, across PTs, and across types of census subdivisions, we will describe volumes of Z59.0 coding over time and examine the change in rates of hospital diagnosis codes for homelessness before and after the 2018 coding mandate change.

## Methods

### *Data sources*

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3 This analysis included six FYs (2015/16 to 2020/21) of hospitalization data from the Hospital  
4 Morbidity Database (HMDB). The HMDB captures pan-Canadian administrative, clinical, and  
5 demographic information on hospital discharges from acute care facilities. Inpatient and day  
6 surgery data from Quebec is submitted directly to the Canadian Institute for Health Information  
7 (CIHI) by the Ministère de la Santé et des Services sociaux du Québec. This data is appended  
8 to CIHI's Discharge Abstract Database (DAD) to create the HMDB.  
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11 For the HMDB, the unit of analysis was unique episodes of care, which refers to all contiguous  
12 acute inpatient hospitalizations and day procedure visits. (20) This eliminates the risk of double  
13 counting that may occur due to a patient transfer. Hospital records without a valid health card  
14 number in addition to missing admission date/times or discharge date/times were excluded as  
15 their episode sequence is not traceable. For the entire observation period, 3,068 (3.3%) out of  
16 92,922 Z59.0 coded records were not traceable (Figure 1).  
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### 19 *Definitions*

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21 Patients were classified as "homeless" if the ICD-10-CA code Z59.0 was recorded anywhere in  
22 the list of diagnostic codes attached to their record. The CCS manual cites a definition from the  
23 Canadian Observatory on Homelessness: "homelessness encompasses a range of physical  
24 living situations," including living on the streets or in places not intended for human habitation  
25 (e.g., sidewalks, parks, cars); staying in overnight shelters; and staying in temporary  
26 accommodations (e.g., motels, rooming houses, with friends/family, couch surfing, temporary  
27 housing for immigrants and refugees during settlement) (19, 21).  
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31 Three distinct time periods were identified that have perceived relevance for coding of Z59.0 are  
32 as follows: 1) *pre mandate* (FYs 2015/16 to 2017/18), 2) *post mandate* (FYs 2018/19 to  
33 2019/20), and 3) *pandemic* (FY 2020/21). Note that as these periods are assigned by FYs, the  
34 first day of the 2020/21 FY begins on April 1<sup>st</sup>, 2020, and closely aligned to the start of the  
35 COVID-19 related public health measures in Canada. The separation of the pandemic period  
36 from the post mandate period was done to discern any potential impact confounding the  
37 relationship between the 2018 coding mandate and hospital coding practices for homelessness.  
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40 In addition, we examined coding patterns by fiscal quarter or three-month period, which closely  
41 resembles the division of seasons. The fiscal quarters are numbered 1 through 4, with quarter 1  
42 (Q1) from April to June of the FY, quarter 2 (Q2) from July to September, quarter 3 (Q3) from  
43 October to December, and quarter 4 (Q4) from January to March of the following calendar year.  
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### 46 *Analysis*

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48 Annual frequencies and proportions of total hospitalizations with a Z59.0 diagnostic code were  
49 calculated for FYs 2015/16 to 2020/21. Results were disaggregated by PTs, and groups of  
50 census subdivisions including major census metropolitan areas (CMA) (Toronto, Montreal, and  
51 Vancouver), all other CMAs, Census Agglomerations (CAs), as well as rural areas (non-CMA or  
52 CAs).  
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55 Logistic regression models were used to quantify the odds of PEH identification among hospital  
56 stays based on the three distinct time periods mentioned above. Logistic models with different  
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3 time definitions for the interactions were tried, with the final model selected measuring the effect  
4 of the period and adjusting for fiscal quarter, coded numerically as 1 to 24 to indicate each fiscal  
5 quarter of the observation period, and the interaction between fiscal quarter and period to  
6 assess for potential seasonality effects. In addition, the final model included PT to quantify  
7 within-jurisdiction effects and any variation between PTs. All statistical analyses were performed  
8 using SAS version 9.4.  
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### 11 *Ethics statement*

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13 CIHI is an independent not-for-profit organization that has been established to collect and report  
14 on health outcomes across Canada. CIHI is a prescribed entity under section 45 (1) of Ontario's  
15 personal Health Information Protection Act, allowing CIHI to hold personal health information for  
16 the purposes of compiling statistical information for the management of the health system. (22)  
17 As this study used routinely collected data that was analyzed at CIHI, in accordance with their  
18 institutional privacy policies, it was exempted from research ethics approval.  
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## 21 **Results**

### 22 *Inpatient stays*

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24 Across all years under the observation period, 85,607 (0.24%) hospitalizations out of  
25 35,750,684 total hospitalizations were assigned a Z59.0 diagnosis code. The frequency and  
26 proportion of PEH in hospitalization records across Canada increased from 6,934 (0.12%) in  
27 2015/16 to 21,529 (0.41%) in 2020/21 (Table 1 and Figure 2). The largest annual increase of  
28 54.2% occurred between 2017/18 and 2018/19.  
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### 32 *Provincial/Territorial Results*

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34 In 2020/21, facilities from 4 provinces accounted for 87% of recorded hospitalizations for PEH:  
35 Ontario (23%, n=4,993), British Columbia (31%, n=6,679), Alberta (21%, n=4,540) and Quebec  
36 (12%, n=2,546). From 2018/19 onward, the combined Territories had the largest proportions of  
37 hospitalizations attributable to PEH, which in 2020/21 was 2.2% compared to the smallest  
38 proportion of 0.2% in the combined Atlantic provinces. Although the proportions of  
39 hospitalizations attributable to PEH were relatively high in the Territories, their frequencies  
40 remain small (n=409 for FY 2020/21). Furthermore, there was variation in coding Z59.0 over  
41 time by PT (Figure 3). For example, in Alberta there were increases in the coding of Z59.0  
42 during the FY 2018/19, whereas coding of Z59.0 in British Columbia was proportionately more  
43 consistent throughout the observation period.  
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### 47 *CMA/CA Results*

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49 In the FY 2020/21, facilities in major CMAs (Vancouver, Toronto, and Montreal) and Other  
50 CMAs accounted for the largest proportions of recorded hospitalizations for PEH at 32%  
51 (n=6,828) and 45% (n=9,736), respectively. From 2018/19 to 2020/21, major CMAs exhibited a  
52 decline in the number and proportion of recorded PEH hospitalizations from 38% (n=6,977) to  
53 32% (n=6,828) whereas other CMAs and census agglomerations (CA) exhibited an increase  
54 from 41% (n=7,547) to 45% (n=9,736) and 18% (n=3,264) to 19% (n=4,167), respectively. From  
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3 2015/16 to 2020/21, less than 5% of all recorded PEH hospitalizations were from facilities in  
4 non-CMA/CA geographic areas (i.e., rural, and remote areas).  
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### 6 *Effect of the Mandate*

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8 Logistic regression models showed that during both the post-mandate and pandemic period  
9 there was a significant increase in the probability of PEH being recorded in the hospital setting.  
10 As a graph of trends by fiscal quarters over the observation period indicated potential  
11 seasonality, an interaction was applied between identified periods and fiscal quarters, which  
12 was significant. The odds of PEH identification increased by 60% (AOR 1.59, 95% CI 1.53 –  
13 1.65) immediately following the mandate and the pandemic period increased the odds by 100%  
14 (AOR 2.04, 95% CI 1.93 – 2.16) relative to the pre-mandate period (Table 2).  
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17 The odds of PEH being recorded in the post mandate period varied between PTs (Figure 5).  
18 The highest adjusted odds ratios (AOR) were in Ontario (AOR 4.29, 95% CI 3.72-4.96), Atlantic  
19 Canada (AOR 3.26, 95% CI 2.51-4.27), and Alberta (AOR 3.07, 95% CI 2.77-3.41).  
20 Interestingly, British Columbia exhibited a reduction in the odds of a PEH being recorded in the  
21 post mandate period (AOR 0.88, 95% CI 0.83-0.92) (Figure 5).  
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### 24 **Interpretation**

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26 We examined patterns in coding ICD-10-CA Z59.0 from the 2015/16 through 2020/21 FYs  
27 across hospitals in Canada. There was an 84% increase in the proportion of coding Z59.0  
28 following the 2018 mandate at a national level (volumes increased from 10,014 in 2017 to  
29 18,489 in 2018). Over 20,000 hospitalizations in Canada in the 2020/21 FY included the code  
30 Z59.0. Given this substantial increase, Z59.0 has become a promising identifier that has the  
31 potential to provide a reliable source of information for health system planning and research.  
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34 There were notable differences in coding Z59.0 across PTs. For example, in British Columbia  
35 there was no discernable increase in coding volumes following the mandate, which suggests  
36 some facilities in BC were already using the code with some regularity before the new coding  
37 direction. There were proportionally more Z59.0 hospitalizations in the Territories, British  
38 Columbia and Manitoba compared to Saskatchewan, Quebec, Ontario, and the Atlantic  
39 provinces in the most recent year. However, it is important to note that the counts for the  
40 territories remain low, despite a large relative increase.  
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44 Differences could also be related to the number of reporting facilities and the concentration of  
45 urban populations in each PT. As facilities in major urban areas were regularly using the Z59.0  
46 code prior to the mandate, differences between provinces in terms of PEH proportions may be  
47 the result of a less urbanized population as opposed to a substantive difference in coding  
48 practices.  
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51 There was a significant increase in the odds of coding Z59.0 following the start of the pandemic  
52 in 2020. The increase may be in part due to care for COVID-19 given the heightened infection  
53 and complication rate requiring hospital care of this population. (11, 23–25) Furthermore,  
54 deferring hospital care can be more challenging for PEH as they have more acute needs and  
55 fewer options for care than their housed counterparts. (26) As more data becomes available that  
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3 covers the pandemic period, more research is needed to understand the societal and  
4 environmental factors that may have contributed to how PEH seek hospital services.  
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6 Depending on the FY, the highest volumes of admissions for PEH occurred in Q2 or Q3.  
7 Although previous studies on the seasonal patterns of PEH admissions are limited, seasonality  
8 for PEH emergency department (ED) admissions have been observed in Ontario (4) while some  
9 evidence suggests that low-acuity adult patients are more likely to visit the ED during warmer  
10 months (27). More investigation into the seasonal trends of hospitalizations regarding PEH is  
11 warranted as this information can be useful for health system planning. Further analysis into the  
12 seasonal patterns of PEH accessing acute care with data post mandate (2018 onwards) using  
13 time series is required in future studies.  
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### 16 *Limitations*

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18 This analysis only considers PEH who have accessed hospital services and were documented  
19 as homeless on their medical chart by their care provider. Therefore, the ability of this code to  
20 capture the entire population of PEH accessing hospital services (i.e., sensitivity) is unknown. A  
21 validation study looking at hospital administrative data before the 2018 mandate suggests  
22 hospital-based codes have low sensitivity to capture the full population of PEH, in part because  
23 of the lack of healthcare encounters during homeless episodes. (28) PEH can have significant  
24 barriers to accessing hospital care (29) and have also shown to seek care through outpatient  
25 physician clinics more than the general population (28). Furthermore, as we only included  
26 patients with a valid health card and complete admission and discharge information, this may  
27 influence who is captured in the analysis. More research is needed to understand differences in  
28 the characteristics of PEH accessing hospital-based health care vs. the broader population of  
29 PEH.  
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34 This analysis only addressed PEH who were identified in the HMDB using ICD-10-CA Z59.0.  
35 Data from the Ontario Mental Health Reporting System (OMHRS), which reports on information  
36 submitted to CIHI about all individuals receiving adult inpatient mental health services in  
37 Ontario, was not included in this analysis given the limited use of Z59.0 in the database.  
38 Information on residential status is available in OMHRS, which can be investigated in future  
39 studies.  
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42 Within or across hospitals, there may not be a systematic method for documenting residential  
43 status as part of the patient intake or assessment process. For example, those who seek shelter  
44 by couch surfing or staying with family and friends may not be considered homeless at the point  
45 of care. (7) Additional ICD-10-CA codes under Z59.X (i.e., Z59.1-Z59.9) capture elements of  
46 residential instability, like inadequate housing, unsuitable living conditions and extreme poverty,  
47 but these are not mandatory to code. Due to this nuance, a large subset of people experiencing  
48 homelessness are likely not captured in hospital administrative data.  
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### 51 *Conclusion*

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53 At the national level, recording of homelessness in health care administrative data increased  
54 following the 2018 coding mandate. This is the first study known to the authors to report levels  
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of homelessness captured in hospital data across Canada. Future research validating the capture of this code is warranted to understand comparability between jurisdictions, generalizability of results and utility of the data for health system improvement and planning.

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**The RECORD statement – checklist of items, extended from the STROBE statement, that should be reported in observational studies using routinely collected health data.**

	Item No.	STROBE items	Location in manuscript where items are reported	RECORD items	Location in manuscript where items are reported
<b>Title and abstract</b>					
	1	(a) Indicate the study’s design with a commonly used term in the title or the abstract (b) Provide in the abstract an informative and balanced summary of what was done and what was found	A) Page 1 B) Page 2	RECORD 1.1: The type of data used should be specified in the title or abstract. When possible, the name of the databases used should be included.  RECORD 1.2: If applicable, the geographic region and timeframe within which the study took place should be reported in the title or abstract.  RECORD 1.3: If linkage between databases was conducted for the study, this should be clearly stated in the title or abstract.	2
<b>Introduction</b>					
Background rationale	2	Explain the scientific background and rationale for the investigation being reported	3		
Objectives	3	State specific objectives, including any prespecified hypotheses	3		
<b>Methods</b>					
Study Design	4	Present key elements of study design early in the paper	4		
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	4		

Participants	6	<p>(a) <i>Cohort study</i> - Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up</p> <p><i>Case-control study</i> - Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls</p> <p><i>Cross-sectional study</i> - Give the eligibility criteria, and the sources and methods of selection of participants</p> <p>(b) <i>Cohort study</i> - For matched studies, give matching criteria and number of exposed and unexposed</p> <p><i>Case-control study</i> - For matched studies, give matching criteria and the number of controls per case</p>	4	<p>RECORD 6.1: The methods of study population selection (such as codes or algorithms used to identify subjects) should be listed in detail. If this is not possible, an explanation should be provided.</p> <p>RECORD 6.2: Any validation studies of the codes or algorithms used to select the population should be referenced. If validation was conducted for this study and not published elsewhere, detailed methods and results should be provided.</p> <p>RECORD 6.3: If the study involved linkage of databases, consider use of a flow diagram or other graphical display to demonstrate the data linkage process, including the number of individuals with linked data at each stage.</p>	<p>4</p> <p>Richard et al 2019, a validation study that uses Z59.0 as a component to their ascertainment algorithm was cited. However, this study used pre-mandate data.</p> <p>N/A</p>
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable.	4	RECORD 7.1: A complete list of codes and algorithms used to classify exposures, outcomes, confounders, and effect modifiers should be provided. If these cannot be reported, an explanation should be provided.	4
Data sources/ measurement	8	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	4		

1 2 3 4 5 6 7 8 9 10	Bias	9	Describe any efforts to address potential sources of bias		
11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34	Study size	10	Explain how the study size was arrived at	Page 4 for exclusions Page 5 for study size	
35 36 37 38 39 40 41 42 43 44 45 46 47	Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen, and why	4	
	Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding (b) Describe any methods used to examine subgroups and interactions (c) Explain how missing data were addressed (d) <i>Cohort study</i> - If applicable, explain how loss to follow-up was addressed <i>Case-control study</i> - If applicable, explain how matching of cases and controls was addressed <i>Cross-sectional study</i> - If applicable, describe analytical methods taking account of sampling strategy (e) Describe any sensitivity analyses	4 - 5	
	Data access and cleaning methods		..		RECORD 12.1: Authors should describe the extent to which the investigators had access to the database population used to create the study population.  N/A as the study population is the database population

				RECORD 12.2: Authors should provide information on the data cleaning methods used in the study.	N/A
Linkage		..		RECORD 12.3: State whether the study included person-level, institutional-level, or other data linkage across two or more databases. The methods of linkage and methods of linkage quality evaluation should be provided.	N/A, as all data that is used is within the database
<b>Results</b>					
Participants	13	(a) Report the numbers of individuals at each stage of the study ( <i>e.g.</i> , numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed) (b) Give reasons for non-participation at each stage. (c) Consider use of a flow diagram	Page 4. Flow chart in Figure 1	RECORD 13.1: Describe in detail the selection of the persons included in the study ( <i>i.e.</i> , study population selection) including filtering based on data quality, data availability and linkage. The selection of included persons can be described in the text and/or by means of the study flow diagram.	Page 4. Flow chart in Figure 1
Descriptive data	14	(a) Give characteristics of study participants ( <i>e.g.</i> , demographic, clinical, social) and information on exposures and potential confounders (b) Indicate the number of participants with missing data for each variable of interest (c) <i>Cohort study</i> - summarise follow-up time ( <i>e.g.</i> , average and total amount)	5		
Outcome data	15	<i>Cohort study</i> - Report numbers of outcome events or summary measures over time <i>Case-control study</i> - Report numbers in each exposure	5		

		category, or summary measures of exposure <i>Cross-sectional study</i> - Report numbers of outcome events or summary measures			
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (e.g., 95% confidence interval). Make clear which confounders were adjusted for and why they were included (b) Report category boundaries when continuous variables were categorized (c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	6		
Other analyses	17	Report other analyses done— e.g., analyses of subgroups and interactions, and sensitivity analyses	6		
<b>Discussion</b>					
Key results	18	Summarise key results with reference to study objectives	6		
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	7	RECORD 19.1: Discuss the implications of using data that were not created or collected to answer the specific research question(s). Include discussion of misclassification bias, unmeasured confounding, missing data, and changing eligibility over time, as they pertain to the study being reported.	7
Interpretation	20	Give a cautious overall interpretation of results considering objectives,	6		



		limitations, multiplicity of analyses, results from similar studies, and other relevant evidence			
Generalisability	21	Discuss the generalisability (external validity) of the study results	N/A as this isn't a sample, but all hospitalizations with Z59.0		
<b>Other Information</b>					
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	8		
Accessibility of protocol, raw data, and programming code		..		RECORD 22.1: Authors should provide information on how to access any supplemental information such as the study protocol, raw data, or programming code.	N/A as data is not publically available

\*Reference: Benchimol EI, Smeeth L, Guttman A, Harron K, Moher D, Petersen I, Sørensen HT, von Elm E, Langan SM, the RECORD Working Committee. The REporting of studies Conducted using Observational Routinely-collected health Data (RECORD) Statement. *PLoS Medicine* 2015; in press.

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Figure 1: Hospitalization Records and Episode Building, 2015 – 2020, Canada, Analytic Flow Chart

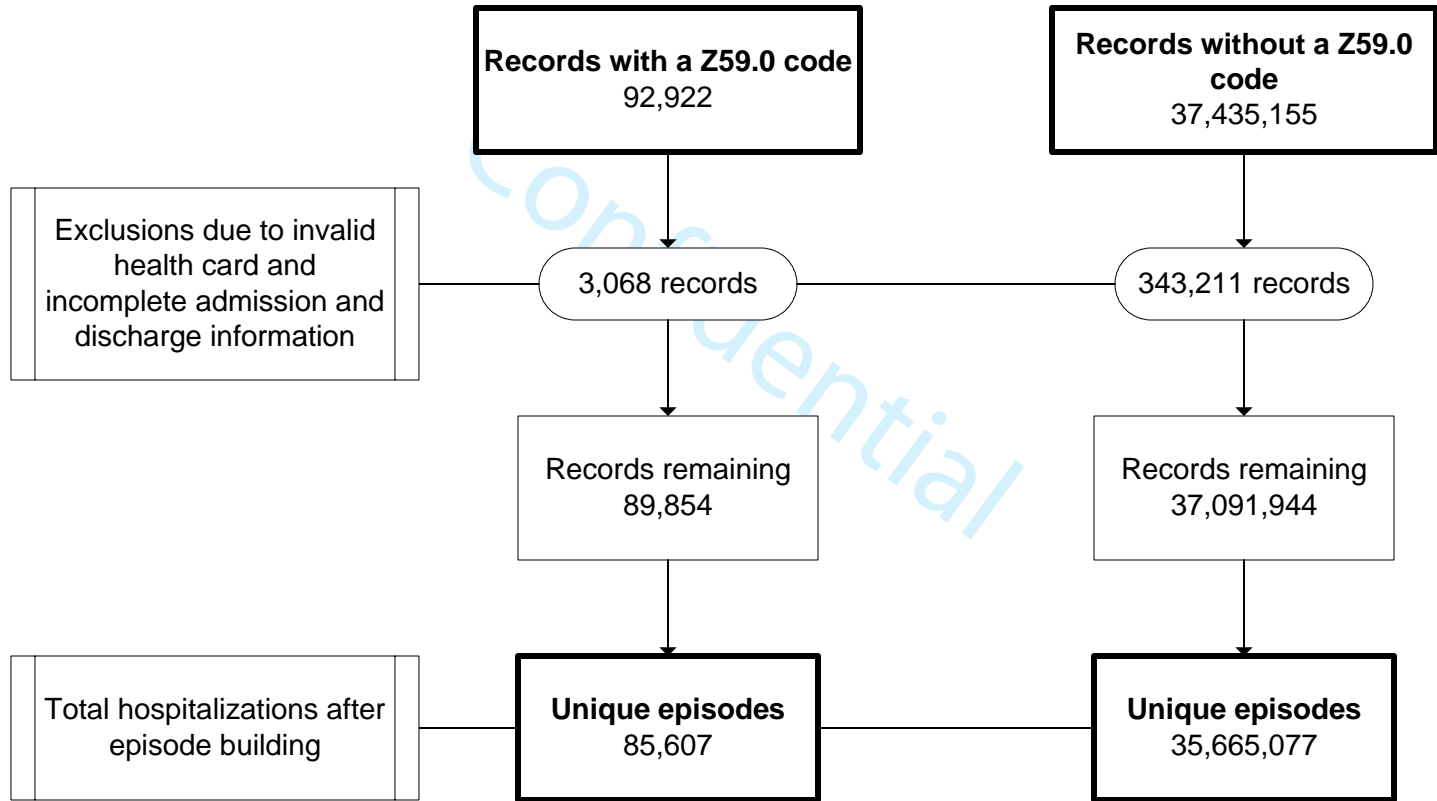


Table 1: Frequency and Proportion of Hospitalizations\* for People Experiencing Homelessness by Fiscal Year and Province/ Territory, HMDB, FY 2015-2020

		2015	2016	2017	2018	2019	2020
Canada	Frequency	6,934	7,896	10,014	18,489	20,745	21,529
	Proportion (%)	0.12	0.13	0.16	0.3	0.34	0.41
Alberta	Frequency	1,211	1,215	1,340	3,620	4,219	4,540
	Proportion (%)	0.19	0.17	0.19	0.5	0.61	0.75
British Columbia	Frequency	3,961	4,648	5,894	6,724	6,943	6,679
	Proportion (%)	0.47	0.53	0.67	0.74	0.77	0.79
Manitoba	Frequency	197	268	397	785	923	994
	Proportion (%)	0.09	0.12	0.17	0.34	0.4	0.51
New Brunswick	Frequency	47	50	62	182	320	294
	Proportion (%)	0.04	0.04	0.05	0.15	0.28	0.28
Newfoundland and Labrador	Frequency	35	33	27	33	45	52
	Proportion (%)	0.02	0.02	0.02	0.02	0.03	0.05
Nova Scotia	Frequency	99	81	83	216	248	355
	Proportion (%)	0.05	0.04	0.04	0.11	0.13	0.22
Ontario	Frequency	436	570	717	4,057	4,791	4,993
	Proportion (%)	0.02	0.02	0.03	0.16	0.2	0.24
Prince Edward Island	Frequency	17	16	36	48	71	36
	Proportion (%)	0.06	0.06	0.12	0.16	0.24	0.14
Quebec	Frequency	772	816	1,210	2,176	2,404	2,546
	Proportion (%)	0.07	0.07	0.11	0.19	0.22	0.28
Saskatchewan	Frequency	127	154	167	438	554	631
	Proportion (%)	0.05	0.06	0.07	0.18	0.22	0.31
Territories	Frequency	32	45	81	210	227	409
	Proportion (%)	0.18	0.27	0.45	1.1	1.24	2.22

## Source:

Hospital Morbidity Database (HMDB), 2015–2016 to 2020–2021, Canadian Institute for Health Information.

## Notes:

\* The unit of analysis is a unique episode of care, which is constructed by linking contiguous acute inpatient hospitalizations and day procedure visits. Hospitalization frequencies for individual Territories not shown due to small cell counts increasing the risk of identification.

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Table for figure 2: Frequency and Proportion of PEH (ICD-10-CA Z59.0) Hospitalizations, HMDB, 2015 - 2020

Fiscal Quarter	PEH Frequency	Total Hospitalizations	Percent PEH
2015Q1	1,618	1,530,802	0.105696
2015Q2	1,854	1,432,912	0.129387
2015Q3	1,881	1,474,212	0.127594
2015Q4	1,581	1,463,492	0.108029
2016Q1	1,781	1,586,362	0.112269
2016Q2	2,103	1,457,133	0.144325
2016Q3	2,054	1,507,421	0.136259
2016Q4	1,958	1,549,004	0.126404
2017Q1	2,272	1,575,285	0.144228
2017Q2	2,557	1,468,265	0.174151
2017Q3	2,667	1,537,309	0.173485
2017Q4	2,518	1,555,462	0.161881
2018Q1	4,321	1,605,952	0.269062
2018Q2	4,768	1,484,701	0.321142
2018Q3	5,034	1,570,624	0.32051
2018Q4	4,366	1,560,174	0.279841
2019Q1	4,764	1,608,733	0.296134
2019Q2	5,276	1,513,756	0.348537
2019Q3	5,292	1,549,578	0.341512
2019Q4	5,413	1,452,110	0.372768
2020Q1	5,188	959,019	0.540969
2020Q2	5,402	1,437,509	0.375789
2020Q3	5,574	1,440,191	0.387032
2020Q4	5,365	1,430,678	0.374997

Source:  
Hospital Morbidity Database (HMDB), 2015–2016 to 2020–2021, Canadian Institute for Health Information.

Notes:  
\* The unit of analysis is a unique episode of care, which is constructed by linking contiguous acute inpatient hospitalizations and day procedure visits.  
† Time points are displayed in fiscal quarters. For example, "2015Q1" represents the period April 1, 2015 through June 30, 2015.  
PEH - People experiencing homelessness

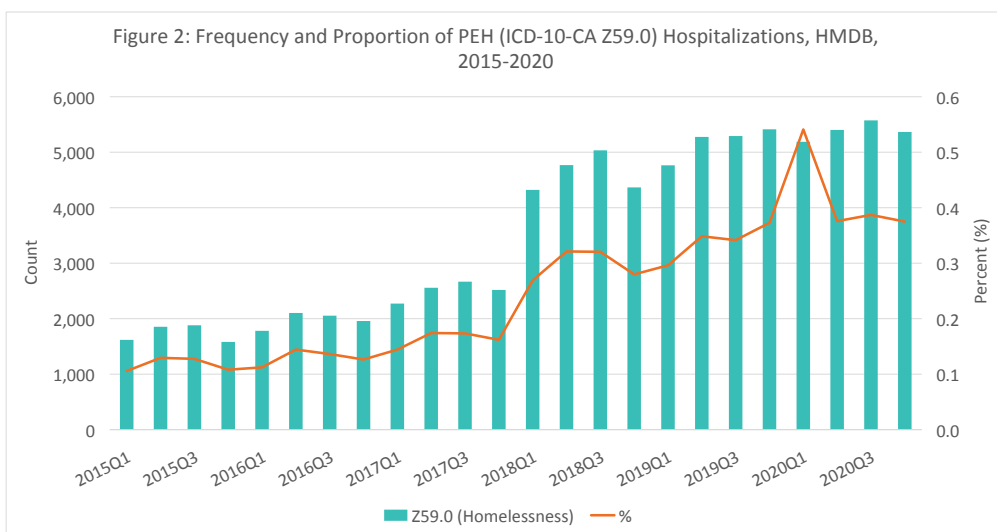


Table for Figure 3: Province Stratified Trends of PEH (Z59.0) by Fiscal Quarter, 2015-2020

	2015Q1	2015Q2	2015Q3	2015Q4	2016Q1	2016Q2	2016Q3	2016Q4	2017Q1	2017Q2	2017Q3	2017Q4	2018Q1	2018Q2	2018Q3	2018Q4	2019Q1	2019Q2	2019Q3	2019Q4	2020Q1	2020Q2	2020Q3	2020Q4	
Alberta	PEH Frequency	271	374	314	252	289	335	309	282	289	312	411	328	817	914	982	907	930	1,032	1,065	1,192	1,189	1,107	1,182	1,062
	Total Hospitalizations	169,674	155,555	162,663	162,977	183,455	166,816	173,224	178,525	183,787	167,359	176,536	180,244	188,052	171,137	182,027	181,876	189,575	175,247	165,479	159,086	124,430	158,646	158,883	167,024
	Percent (%)	0.16	0.24	0.19	0.15	0.16	0.2	0.18	0.16	0.16	0.19	0.23	0.18	0.43	0.53	0.54	0.5	0.49	0.59	0.64	0.75	0.96	0.7	0.74	0.64
British Columbia	PEH Frequency	926	1,016	1,094	925	1,029	1,127	1,241	1,141	1,384	1,487	1,529	1,494	1,667	1,735	1,772	1,550	1,608	1,848	1,739	1,748	1,528	1,664	1,749	1,738
	Total Hospitalizations	217,927	206,668	210,577	209,589	225,827	210,168	212,818	222,903	224,939	210,883	216,126	224,510	229,915	217,666	229,932	239,926	234,133	227,045	227,672	216,872	162,961	225,013	224,845	232,733
	Percent (%)	0.42	0.49	0.52	0.44	0.46	0.59	0.58	0.51	0.62	0.71	0.71	0.67	0.73	0.8	0.78	0.67	0.69	0.81	0.76	0.81	0.94	0.74	0.78	0.75
Manitoba	PEH Frequency	39	63	55	40	65	51	71	81	74	126	108	89	203	200	203	179	217	237	239	230	213	261	252	268
	Total Hospitalizations	57,205	54,465	55,905	54,355	59,073	55,356	56,327	58,004	58,711	56,127	57,879	58,422	59,741	55,931	58,410	57,638	60,687	57,758	59,515	55,693	42,524	57,073	47,519	49,192
	Percent (%)	0.07	0.12	0.1	0.07	0.11	0.09	0.13	0.14	0.13	0.22	0.19	0.15	0.34	0.36	0.35	0.31	0.36	0.41	0.4	0.41	0.5	0.46	0.53	0.54
Atlantic Canada	PEH Frequency	47	67	41	43	45	60	46	29	52	57	48	51	113	139	133	94	170	165	180	169	186	192	189	170
	Total Hospitalizations	122,867	114,027	117,816	117,069	127,905	114,858	119,842	123,368	124,953	113,198	118,949	123,497	127,335	115,368	121,366	123,438	124,162	113,981	119,687	112,066	67,337	109,775	116,468	113,510
	Percent (%)	0.04	0.06	0.03	0.04	0.04	0.05	0.04	0.02	0.04	0.05	0.04	0.04	0.09	0.12	0.11	0.08	0.14	0.14	0.15	0.15	0.28	0.17	0.16	0.15
Ontario	PEH Frequency	105	105	128	98	112	157	148	153	133	192	199	193	871	1,053	1,167	966	1,125	1,173	1,264	1,229	1,282	1,251	1,243	1,217
	Total Hospitalizations	618,578	575,425	586,804	585,881	633,019	579,572	599,110	607,448	629,186	582,245	613,732	610,732	640,429	588,711	624,217	613,630	642,359	602,241	622,834	575,526	333,610	576,629	586,860	572,864
	Percent (%)	0.02	0.02	0.02	0.02	0.02	0.03	0.02	0.03	0.02	0.03	0.03	0.03	0.14	0.18	0.19	0.16	0.18	0.19	0.2	0.21	0.38	0.22	0.21	0.21
Territories	PEH Frequency	*	*	*	12	16	*	12	29	25	16	11	56	67	45	42	48	68	48	63	91	102	124	92	
	Total Hospitalizations	4,530	4,370	4,326	4,211	4,583	4,179	3,836	4,200	4,510	4,477	4,294	4,789	4,806	4,603	4,773	4,935	4,788	4,827	4,577	4,175	3,992	5,185	4,656	4,620
	Percent (%)	*	*	*	*	0.26	0.38	*	0.29	0.64	0.56	0.37	0.23	1.17	1.46	0.94	0.85	1	1.41	1.05	1.51	2.28	1.97	2.66	1.93
Quebec	PEH Frequency	190	193	206	183	189	203	203	221	268	322	311	368	475	552	628	521	556	604	614	630	587	671	653	635
	Total Hospitalizations	276,844	262,542	275,649	269,523	287,795	265,438	279,903	289,698	285,443	271,708	287,501	290,512	290,817	271,409	291,516	285,264	288,488	270,963	287,220	269,194	188,427	247,243	243,814	236,152
	Percent (%)	0.07	0.07	0.07	0.07	0.08	0.07	0.08	0.09	0.12	0.11	0.11	0.16	0.2	0.22	0.22	0.18	0.19	0.22	0.21	0.23	0.31	0.27	0.27	0.27
Saskatchewan	PEH Frequency	30	24	39	34	40	44	31	39	43	36	45	43	119	108	104	107	110	149	143	152	112	154	182	183
	Total Hospitalizations	63,097	59,767	60,378	59,799	64,661	60,699	62,304	64,799	63,755	61,268	62,292	62,755	64,656	59,686	62,175	62,328	64,462	60,605	62,449	59,398	36,638	57,939	57,144	54,583
	Percent (%)	0.05	0.04	0.06	0.06	0.06	0.07	0.05	0.06	0.07	0.06	0.07	0.07	0.18	0.18	0.17	0.17	0.17	0.25	0.23	0.26	0.31	0.27	0.32	0.34

Source: Hospital Morbidity Database (HMD8), 2015–2016 to 2020–2021, Canadian Institute for Health Information.

Notes: \* The unit of analysis is a unique episode of care, which is constructed by linking contiguous acute inpatient hospitalizations and day procedure visits. † Time points are displayed in fiscal quarters. For example, "2015Q1" represents the period April 1, 2015 through June 30, 2015. PEH - People experiencing homelessness. Atlantic provinces (Nova Scotia, New Brunswick, Newfoundland and Labrador, and Prince Edward Island) and the Territories (Northwest Territories, Nunavut, Yukon) have been combined due to geographic similarities and to avoid data suppression. The Territories have been left out of the figure due to relatively small PEH frequencies.

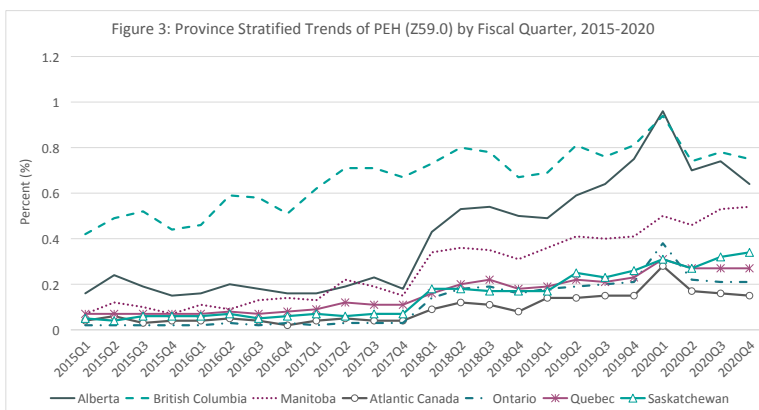
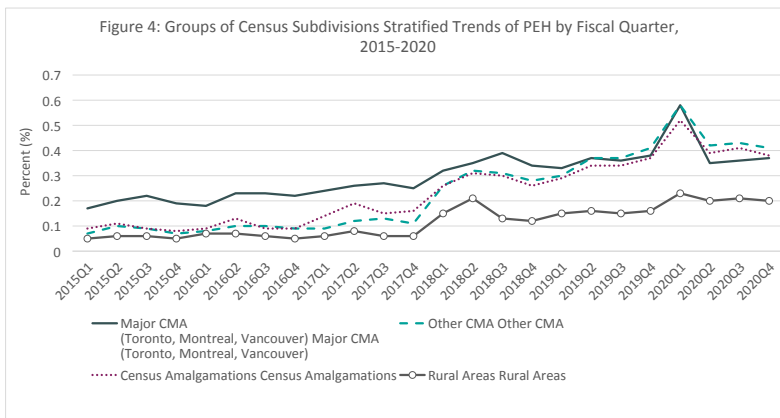


Table for Figure 4: Groups of Census Subdivisions Stratified Trends of PEH by Fiscal Quarter, 2015-2020

		2015Q1	2015Q2	2015Q3	2015Q4	2016Q1	2016Q2	2016Q3	2016Q4	2017Q1	2017Q2	2017Q3	2017Q4	2018Q1	2018Q2	2018Q3	2018Q4	2019Q1	2019Q2	2019Q3	2019Q4	2020Q1	2020Q2	2020Q3	2020Q4
Major CMA (Toronto, Montreal, Vancouver)	PEH Frequency	840	923	1,014	860	911	1,074	1,112	1,084	1,187	1,233	1,315	1,250	1,542	1,699	1,962	1,674	1,696	1,820	1,814	1,791	1,769	1,685	1,705	1,669
	Total Hospitalizations	484,921	459,618	467,591	464,659	502,081	470,424	482,300	491,929	502,642	474,149	493,001	495,368	513,358	481,844	507,499	499,702	515,668	493,959	509,793	471,316	303,674	483,913	471,298	450,006
	Percent (%)	0.17	0.2	0.22	0.19	0.18	0.23	0.23	0.22	0.24	0.26	0.27	0.25	0.32	0.35	0.39	0.34	0.33	0.37	0.36	0.38	0.58	0.58	0.35	0.36
Other CMA	PEH Frequency	469	561	555	434	526	600	606	552	607	700	844	722	1,722	1,980	2,047	1,798	2,013	2,323	2,337	2,440	2,300	2,455	2,534	2,447
	Total Hospitalizations	626,797	582,437	607,093	601,043	656,675	598,182	624,126	640,992	652,921	604,177	638,849	646,898	670,383	614,040	654,799	652,427	673,508	628,946	636,803	599,312	399,914	578,051	591,458	601,846
	Percent (%)	0.07	0.1	0.09	0.07	0.08	0.1	0.1	0.09	0.09	0.12	0.13	0.11	0.26	0.32	0.31	0.28	0.3	0.37	0.37	0.41	0.58	0.42	0.43	0.41
Census Amalgamations	PEH Frequency	251	307	243	234	260	349	264	257	402	532	440	476	775	857	876	756	872	959	970	1,012	959	1,053	1,113	1,042
	Total Hospitalizations	293,520	274,472	281,132	279,295	300,551	274,407	283,150	293,981	296,070	277,075	288,247	293,941	300,290	277,371	290,303	289,777	297,441	278,440	288,292	273,515	183,402	268,798	270,021	272,451
	Percent (%)	0.09	0.11	0.09	0.08	0.09	0.13	0.09	0.09	0.14	0.19	0.15	0.16	0.26	0.31	0.3	0.26	0.29	0.34	0.34	0.37	0.52	0.39	0.41	0.38
Rural Areas	PEH Frequency	58	63	69	53	84	80	72	65	76	92	68	70	182	232	149	138	183	174	171	170	160	209	222	207
	Total Hospitalizations	122,253	113,713	115,459	115,692	123,694	111,404	114,901	119,071	120,482	110,461	114,317	116,530	118,592	109,040	114,930	115,388	118,711	109,759	111,583	105,305	71,026	104,540	104,698	104,960
	Percent (%)	0.05	0.06	0.06	0.05	0.07	0.07	0.06	0.05	0.06	0.08	0.06	0.06	0.15	0.21	0.13	0.12	0.15	0.16	0.15	0.16	0.23	0.2	0.21	0.2

Source:  
Hospital Morbidity Database (HMD8), 2015–2016 to 2020–2021, Canadian Institute for Health Information.

Notes:  
\* The unit of analysis is a unique episode of care, which is constructed by linking contiguous acute inpatient hospitalizations and day procedure visits.  
† Time points are displayed in fiscal quarters. For example, "2015Q1" represents the period April 1, 2015 through June 30, 2015.  
See here for an additional aid for geographic breakdowns: <https://www12.statcan.gc.ca/census-recensement/2011/ref/dict/figures/figure3-dict-eng.cfm>  
PEH - People experiencing homelessness



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Table 2: Adjusted Odds Ratios (AOR) from Logistic Regression Models on PEH Identification, HMDB 2015 to 2020

Variable	Level	Primary Model				Primary + PT Adjusted				Primary + CMA Adjusted			
		AOR	Lower 95% CI	Upper 95% CI	P value	AOR	Lower 95% CI	Upper 95% CI	P value	AOR	Lower 95% CI	Upper 95% CI	P value
Period	Pre-Mandate	ref	ref	ref	ref	ref	ref	ref	ref	ref	ref	ref	ref
	Post-Mandate (at Quarter 17)	1.589	1.527	1.653	<0.0001	1.585	1.524	1.649	<0.0001	1.589	1.527	1.653	<0.1
	Pandemic (at Quarter 21)	2.039	1.926	2.158	<0.0001	1.935	1.828	2.049	<0.0001	2.037	1.924	2.156	<0.1

Source:

Hospital Morbidity Database (HMDB), 2015–2016 to 2020–2021, Canadian Institute for Health Information.

**Notes:**

Primary logistic regression model adjusted for period, fiscal quarter, and their interaction effect

PEH - People experiencing homelessness

Confidential

Table for figure 5: Adjusted Odds Ratios (AOR) from PT-specific logistic regression models on PEH identification, HMDB 2015 to 2020

Province/ Territory	Period	AOR	Lower 95	Upper 95	P value
Alberta	Pre-Mandate	ref	ref	ref	ref
	Post-Mandate (at Quarter 17)	3.074	2.771	3.409	<0.0001
	Pandemic (at Quarter 21)	4.806	4.157	5.557	<0.0001
Atlantic Canada	Pre-Mandate	ref	ref	ref	ref
	Post-Mandate (at Quarter 17)	3.275	2.512	4.271	<0.0001
	Pandemic (at Quarter 21)	6.618	4.571	9.58	<0.0001
British Columbia	Pre-Mandate	ref	ref	ref	ref
	Post-Mandate (at Quarter 17)	0.876	0.831	0.923	0.0104
	Pandemic (at Quarter 21)	0.851	0.785	0.922	<0.0001
Manitoba	Pre-Mandate	ref	ref	ref	ref
	Post-Mandate (at Quarter 17)	1.396	1.138	1.712	0.1543
	Pandemic (at Quarter 21)	1.33	0.991	1.786	0.7932
Ontario	Pre-Mandate	ref	ref	ref	ref
	Post-Mandate (at Quarter 17)	4.293	3.717	4.96	<0.0001
	Pandemic (at Quarter 21)	5.962	4.876	7.291	<0.0001
Quebec	Pre-Mandate	ref	ref	ref	ref
	Post-Mandate (at Quarter 17)	1.513	1.347	1.7	0.0045
	Pandemic (at Quarter 21)	1.814	1.534	2.145	<0.0001
Saskatchewan	Pre-Mandate	ref	ref	ref	ref
	Post-Mandate (at Quarter 17)	2.532	1.886	3.399	0.5314
	Pandemic (at Quarter 21)	3.081	2.028	4.681	0.7369
Territories	Pre-Mandate	ref	ref	ref	ref
	Post-Mandate (at Quarter 17)	1.856	1.157	2.976	0.632
	Pandemic (at Quarter 21)	2.644	1.369	5.107	0.2862

Source: Hospital Morbidity Database (HMDB), 2015–2016 to 2020–2021, Canadian Institute for Health Information.

Notes: Primary logistic regression model adjusted for period, fiscal quarter, and their interaction effect  
 Each province/territory specific logistic regression model adjusted for period, quarters, and their interaction effect  
 PEH - People experiencing homelessness

