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Linking the Nursing and Residential Care Facility Survey to tax and census data: A new data resource for health workforce research

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Abstract

Calls for comprehensive data collection on the health workforce and long-term care sector have been voiced by policy makers, researchers, and public health experts following the aftermath of the COVID-19 pandemic and ongoing health care worker shortages. This paper introduces a novel linked data resource that fills these critical data gaps and establishes a foundation for evidence-informed policy making and workforce planning to strengthen the nursing and residential care system in Canada. This data resource integrates the Nursing and Residential Care Facility Survey, the Canadian Employer–Employee Dynamic Database, and the 2021 Census of Population. The structure, coverage, and content of each component file are described, and the deterministic linkage methodology, response rate, and linkage rates are reported. Through an examination of the long-term care workforce across Canadian provinces, this work demonstrates the analytical potential of the integrated data resource for studying staffing patterns, employment characteristics, and economic outcomes. Strengths of this integrated dataset include its near-national scope, inclusion of administrative earnings data, and capacity to support equity-focused research, and limitations include restricted generalizability because of data gaps in certain jurisdictions. Overall, this linked data resource represents a significant advancement of the residential care data infrastructure, providing essential insights into the Canadian health workforce, including personal support workers, nurses, and other health care providers. By bringing together facility-level characteristics, employment and earning records, and detailed sociodemographic information on workers, in-depth analyses of the care economy across provinces can be conducted to improve Canada's health system, workforce, and patient care.

Keywords: health workforce, personal support worker (PSW), nursing homes, employment, data linkage, Canada

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Introduction

Calls for improved data to support evidence-informed decisions and policy-making processes in long-term care (LTC) have been raised by policy makers, researchers, and public health officials in Canada since the COVID-19 pandemic. As emphasized by national experts, “health human resources is the number one issue facing Canada’s health and long-term care sectors, yet... [there is a] lack of clear data about the existing workforce.”¹ High turnover rates among LTC direct care staff,² ongoing and worsening health care worker shortages,^{3 to 6} and their overall lower self-reported health status compared with those working in other health care settings,⁷ suggest a need to uncover why these phenomena are occurring and what strategies can be implemented to address them. The Pan-Canadian Health Data Strategy Expert Advisory Group (EAG) was formed to identify and address gaps in Canada’s health data systems to improve health care across the country.⁸ In 2022, the EAG proposed, “initial steps must focus on the highest priority areas identified during the pandemic—for example, in the collection of data addressing health equity, addressing data gaps in health workforce and LTC, and improving data for public health measures....”⁹

To address this urgent need for comprehensive workforce, staffing, and facility-level information, this article introduces a novel linked data resource that brings together three key Statistics Canada data sources, each contributing unique information: (1) the Nursing and Residential Care Facility Survey (NRCFS), (2) the Canadian Employer–Employee Dynamics Database (CEEDD), and (3) the 2021 Census of Population. The NRCFS includes detailed data on LTC facility structure and staffing characteristics. The CEEDD offers an understanding of longitudinal employment and business dynamics at the worker and facility levels. The census provides critical sociodemographic data of employees within the LTC sector. The linkage enables new insights into the relationships between facility characteristics, workforce composition, and worker outcomes across Canadian provinces.

The objective of this paper is to describe the structure, content, and methodological approach used to develop this linked data resource. Specifically, it explores the component datasets and their coverage, outlines the linkage methodology, and discusses potential applications of the resource for researchers and policy makers. As a supporting example, this report includes an analysis of the LTC workforce, including job characteristics, economic outcomes, and indicators of pandemic preparedness. The linked dataset supports efforts to improve Canada’s LTC data infrastructure. By constructing a comprehensive dataset, this initiative aims to inform improved LTC delivery, workforce planning, and health system resilience.

Data resource description

The following sections describe each component of the integrated NRCFS–CEEDD–census data, including coverage, sampling, linkage strategy, and response and linkage rates.

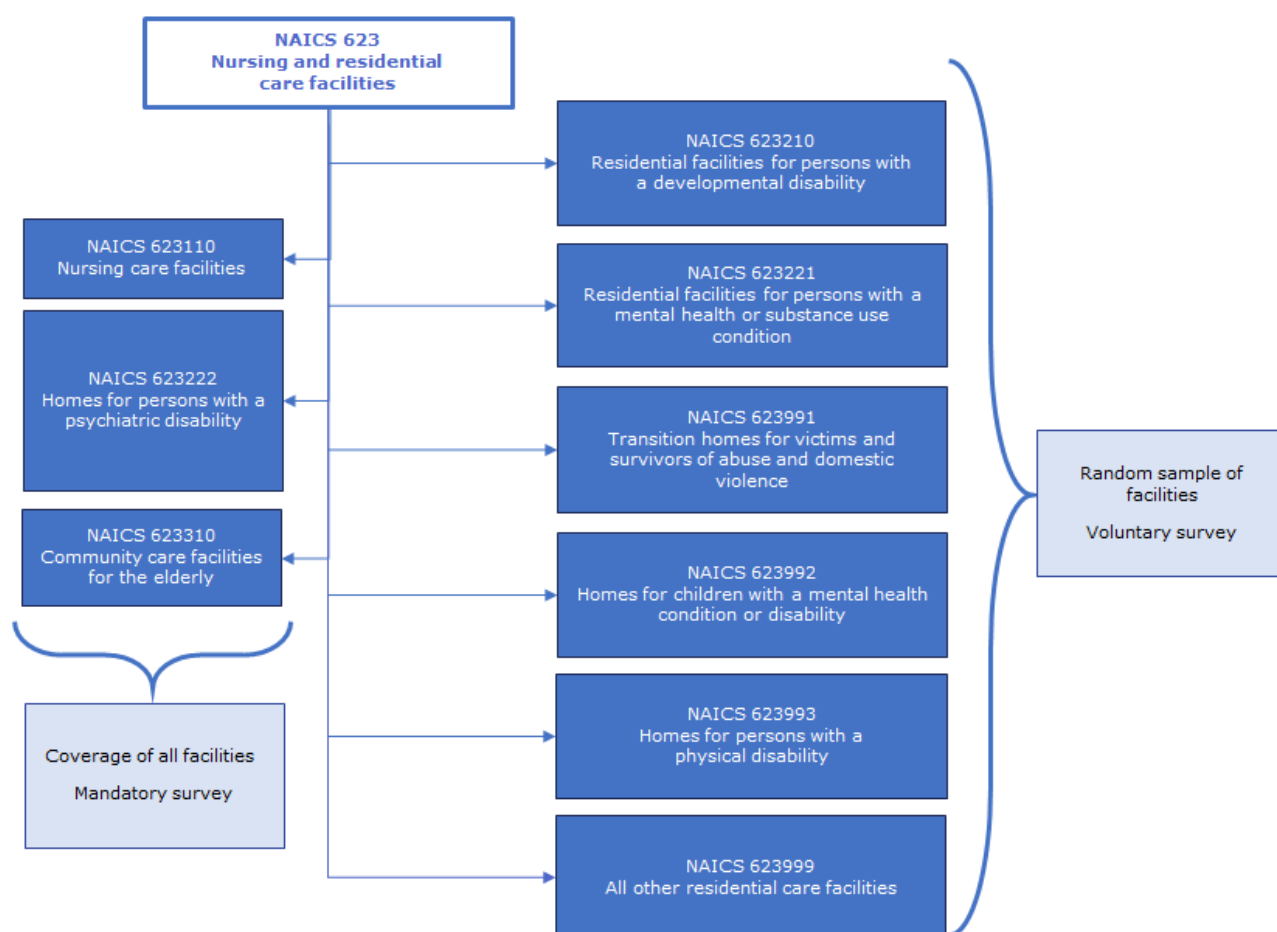
Nursing and Residential Care Facility Survey

The NRCFS gathers information on the revenues and expenses, personnel, services, selected resident demographics, and policy responses to the COVID-19 pandemic from residential facilities in Canada. Currently, two cycles of NRCFS data are available: 2020 and 2021.¹⁰ Data were collected from facility administrators from January to March 2021 for the 2020 cycle and from January to April 2022 for the 2021 cycle.¹⁰ The survey was not administered before 2020. The reference period for NRCFS responses varied by the type of information: calendar year for COVID-19 information and fiscal year for facility and personnel information. For example, the 2021 NRCFS collected staffing information for the period from

April 2020 to March 2021 and COVID-19 information for the period from January 2021 to December 2021.

The NRCFS is a cross-sectional survey of residential care facilities in Canada, among which LTC homes are one type (Figure 1). The NRCFS sampling frame included all public and private sector establishments classified to the 2017 North American Industry Classification System (NAICS) code 623, Nursing and residential care facilities (Figure 1).¹¹ The 2021 NRCFS was sent to all LTC homes (NAICS code 6231, Nursing care facilities) at the establishment-level, whereas the survey targeted a random sample of most other residential care facilities. Responding to the survey was mandatory for LTC homes, homes for persons with psychiatric disabilities, and community care facilities for the elderly and voluntary for most other residential care facilities (Figure 1).

Figure 1
Types of nursing and residential care facilities covered by the Nursing and Residential Care Facility Survey (2021) and their sampling methodology



Note: NAICS = North American Industry Classification System.
Source: Nursing and Residential Care Facility Survey, 2021.

Sampled facilities were contacted by telephone interviewers and offered electronic questionnaires in both English and French. Despite the survey being mandatory for some facilities, some LTC homes did not respond to the survey (non-responding), leading to full imputations of their records or missing values. The overall weighted collection response rate for all nursing and residential care facilities was 70% for the 2020 NRCFS cycle and 61% for the 2021 cycle.^{10,11} Response rates were generally higher in the private sector than in the public sector and varied by province, ranging from 79% in Nova Scotia and 53%

in Newfoundland and Labrador in 2020⁴ Despite the mandatory nature of the survey for the LTC sector, response rates for targeted LTC homes was 66% in 2020 and 60% in 2021. Non-responding LTC homes subsequently had their records fully imputed using an algorithm accounting for facility size, location, and profit status.

Where facilities had partially or completely missing financial data, administrative tax data were used to reduce any additional response burden and survey costs. As part of the Integrated Business Statistics Program at Statistics Canada, T1 Income Tax and Benefit Return data were used for financial information among unincorporated businesses and T2 Corporation Income Tax Return data were used for incorporated businesses. Additional information concerning the NRCFS is available elsewhere.¹¹

Canadian Employer–Employee Dynamics Database

The CEEDD is a longitudinal microdata platform developed by Statistics Canada to analyze interactions between workers and firms, the latter also known as enterprises.¹² The CEEDD has been used to estimate business ownership proportions by gender,^{13,14} age,¹⁴ immigrant status,^{14,15,16} disability status,¹⁷ and Indigenous identity.¹⁸

The CEEDD integrates several administrative datasets, providing information at various levels of detail (i.e., individual, family, job, enterprise) (Table 1). As the CEEDD links data from different administrative sources—including the Canada Revenue Agency and the Business Register—the CEEDD includes all tax-filing individuals (over 25 million) and the millions of enterprises within which they work in Canada. The CEEDD is updated annually and currently contains information from 2001 to 2022. Data at the individual, job and enterprise levels are linked using an individual's social insurance number and employers' Business Number. At the individual and job levels, the CEEDD provides information on each job held by an individual, including those who held more than one job in a given year. It is important to note that information on occupation type cannot be obtained from the CEEDD. However, the NRCFS provides facility-level information by occupation type, and the census contains individual-level data on occupations using the National Occupational Classification (NOC), demonstrating the utility of linking these datasets to provide a more comprehensive understanding of the workforce.

Table 1
Summary of the Canadian Employer–Employee Dynamics Database file (2024 vintage)

Type of file (reporting level)	Output analytical files	Source files	2024 vintage
Tax files (individual level)	T1 personal master files	• T1 personal master file (T1PMF)	2001 to 2022
Tax files (family level)	T1 historical files T1 Family Files (T1FFs)	• T1 historical personal master file • T1FF master file (based on the T1PMF) • T4 Statement of Remuneration Paid (T4) files • Canada Child Tax Benefit (CCTB) files	2001 to 2022 2001 to 2022
Tax files (job level and individual level)	Linkage of edited T4 files, Records of Employment (ROEs) and the National Accounts Longitudinal Microdata File (NALMF)	• Edited T4 files • ROEs • NALMF	2001 to 2022
	Business owners' module	• Financial declaration file • T1 business declaration file	2005 to 2022
	Linkage of raw T4 files, ROEs and the Longitudinal Employment Analysis Program (LEAP)	• T2 Corporation Income Tax Return Schedule 50 • T4 files • ROEs • LEAP	2001 to 2022 2001 to 2022
Tax files (firm level)	NALMF	• Business Register • T2 Corporation Income Tax Return • T4 files • Payroll deductions • Goods and services tax	2001 to 2023
	Import files	• Trade by Importer Characteristics	2010 to 2022
	Export files	• Trade by Exporter Characteristics	2010 to 2022
Geographical data	Sub-provincial indicators	• Postal Code Conversion File	2001 to 2022
Immigration data	Longitudinal Immigration Database	• Integrated Permanent and Non-permanent Resident File • Non-permanent Resident File	1952 to 2022 1980 to 2022
Census Population data	Census of Population	• Census of Population (including the 2011 National Household Survey)	2006, 2011, 2016, 2021

Source: Statistics Canada, adapted from Canadian Employer–Employee Dynamics Database: Introduction.

An enterprise is a business organization, typically large and complex, with a defined operating structure and the ability to manage its resources and risks.^{19,20} It is a legal operating entity with a complete set of financial statements. An enterprise may be a corporation (or quasi-corporation), a non-profit institution, or an unincorporated business, and may consist of one or more establishments.¹⁹ An establishment is a single physical location where business or industrial activities are conducted. It may be an enterprise in and of itself, or one of many establishments that are part of an enterprise.²¹ Only a single productive activity is carried out in an establishment, whereas many different activities may be conducted in a multi-establishment enterprise.¹⁹ One limitation of the CEEDD is that for a multi-establishment enterprise with multiple industrial activities, only one NAICS code is kept at the enterprise level, reflecting the enterprise's primary activity. Notably, the CEEDD provides information about nursing and residential care facilities at the enterprise level, informing the data linkage strategy.

As a set of linkable files, the CEEDD allows researchers to add and process variables from different component files separately. Using the unique personal and enterprise identifiers available on each linkable file, information at the employee and employer levels can be linked across different component files over time. The CEEDD includes the Longitudinal Immigration Database, an administrative immigration database provided by Immigration, Refugees, Citizenship Canada and processed by Statistics Canada. This database contains landing records for all permanent resident immigrants since 1952 and non-permanent residents since 1980 (Table 1). As a result, the CEEDD includes landing files for permanent residents and non-permanent residents since 1980.¹²

Census of Population

The Census of Population is conducted every five years by Statistics Canada to provide comprehensive demographic, socioeconomic, housing, and educational data on the Canadian population.²² Under the Statistics Act and the Constitution Act, participation in the census is required by law. As such, all Canadian households receive either a short-form or long-form questionnaire. The short-form questionnaire collects basic demographic information from the Canadian population, while the long-form questionnaire, which is sent to approximately 25% of private households, captures more comprehensive information related to employment, education, housing, and other sociodemographic categories. For this data linkage, workers identified by the CEEDD were linked to data from the 2021 Census long-form questionnaire. The CEEDD has been previously linked to the 2001, 2006, and 2016 censuses and the 2011 National Household Survey.¹⁸ Statistics Canada methodologists have produced sample weights and bootstrap weights specifically for the linked CEEDD–census data, which can be used when analyzing workers using the integrated NRCFS–CEEDD–census dataset.

Data linkage methodology

Primary linkage

A deterministic linkage methodology was used, with the CEEDD files acting as “bridge” files for linking the 2021 NRCFS and the 2021 Census. The 2021 NRCFS was linked to the National Accounts Longitudinal Microdata File (NALMF), a file that resides within the 2021 CEEDD and was developed by the Economic, Social Analysis and Modelling Division at Statistics Canada. The NALMF is itself a linked file containing all Canadian enterprises (publicly and non-publicly traded) and comprises a select number of variables pertaining to accounting and economic information related to these enterprises derived from several data files (Table 1). Finally, the NALMF was directly linked to the 2021 NRCFS using a unique enterprise identifier (i.e., Enterprise ID).

Secondary linkage

The CEEDD tax files for workers, including their T4 Statements of Remuneration Paid (T4s) and Record of Employment (ROE), were integrated with data from the 2021 Census long-form questionnaire using linkage keys created in previous linkage projects, resulting in a secondary linkage. The individual-level linkage to the census was conducted within the Social Data Linkage Environment at Statistics Canada, a secure environment designed for integrating administrative and survey data while protecting privacy through anonymized identifiers. The CEEDD–census linkage was first used and reported by Gueye and colleagues¹⁸ to address limitations in administrative data sources that lack information on Indigenous identity. Specifically, the linkage improved the identification of Indigenous business owners by linking CEEDD business ownership data with self-reported Indigenous identity from the census. The linkage process involved matching multiple years of the long-form census questionnaire (2001 to 2016) and the 2011 National Household Survey using a deterministic approach based on unique identifiers, such as names and addresses. In the CEEDD, the NALMF is linked to T4s and ROEs using the Business Number, bringing the primary and secondary linkages together.

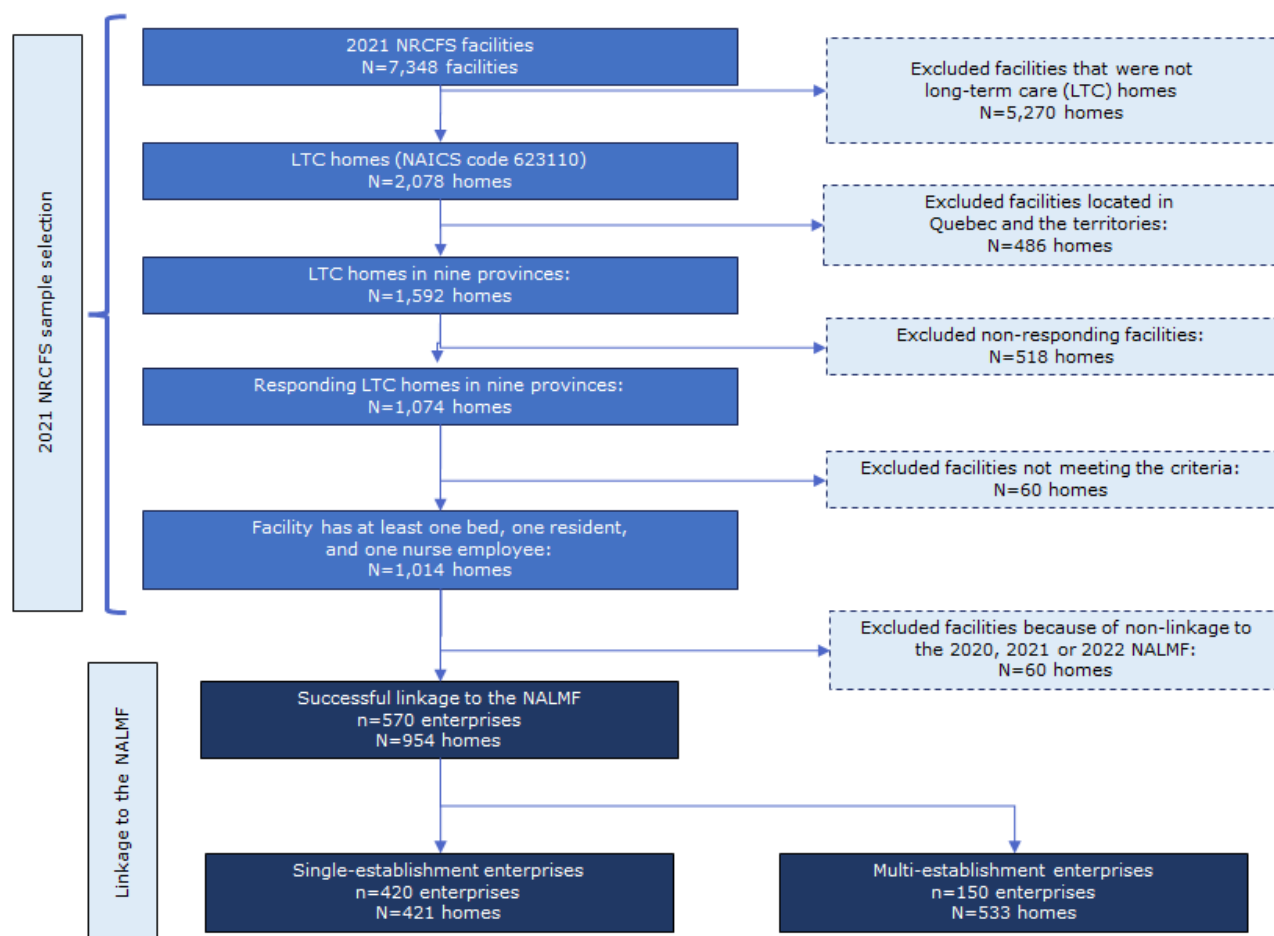
Example of linked data use: Examining the long-term care workforce

This section discusses how the integrated NRCFS–CEEDD–census dataset can be used by presenting an example analysis of the LTC workforce, with a focus on analytical techniques and considerations.

Enterprise-level component file: Linkage of the Nursing and Residential Care Facility Survey with the National Accounts Longitudinal Microdata File

The present analytic example of the 2021 NRCFS–CEEDD–census data focuses on LTC homes (i.e., NAICS code 623110, nursing care facilities) across 9 of Canada's 10 provinces. LTC homes in the three territories that responded to the NRCFS were excluded because of their insufficient number for a jurisdictionally specific analysis. Furthermore, as public homes in Quebec did not participate in either NRCFS cycle (2020 or 2021), all LTC homes in Quebec were excluded owing to the lack of comparable data (Figure 2).

Figure 2
Creation of the enterprise-level file linking the 2021 Nursing and Residential Care Facility Survey with the National Accounts Longitudinal Microdata File



Notes: NAICS = North American Industry Classification System. NALMF = National Accounts Longitudinal Microdata File. NRCFS = Nursing and Residential Care Facility Survey.

Source: Nursing and Residential Care Facility Survey, 2021 and National Accounts Longitudinal Microdata File.

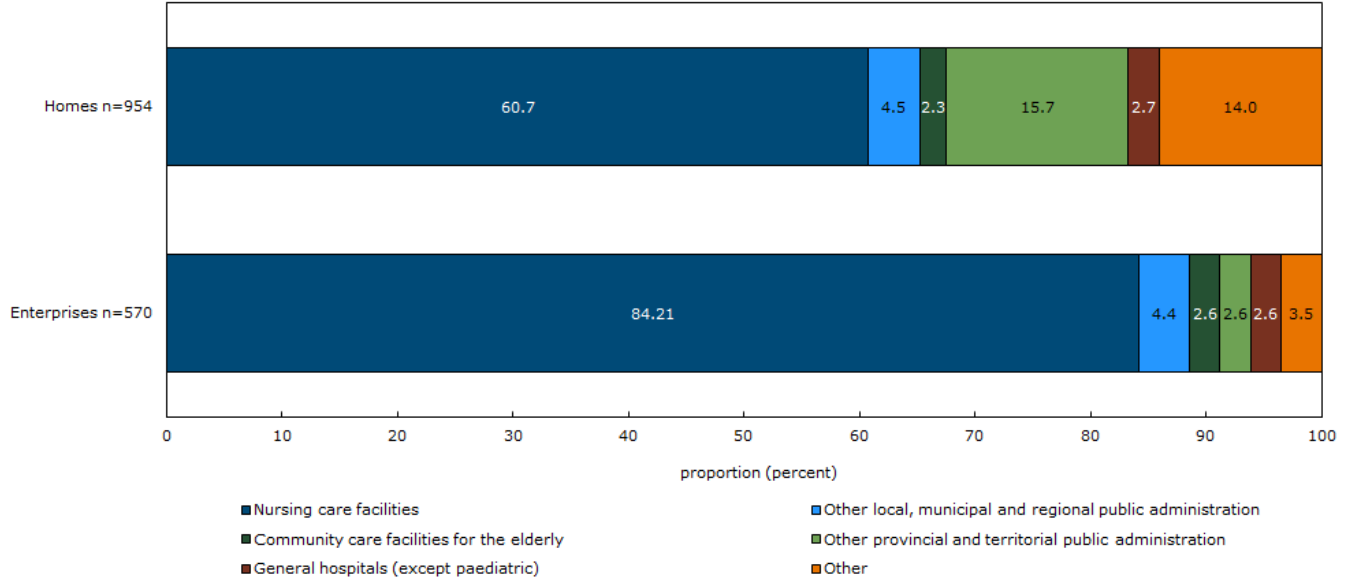
Furthermore, approximately 40% of all LTC homes that were sent the 2021 NRCFS questionnaire did not respond, including public homes in Quebec. For these non-responding facilities, survey responses were fully imputed. Although the imputation algorithm accounted for facility size, location, and profit status, responses for non-responding non-profit private homes were imputed based on values of for-profit rather than non-profit private homes because of Business Register limitations. Therefore, if profit status is a key variable in proposed research—as in the current analytic example—it is recommended that imputed records be excluded from analysis. Among responding LTC homes, the analytic sample was

further limited to facilities reporting at least one bed, one resident, and one nurse employee. Approximately 6% of reporting LTC facilities were excluded because they did not satisfy these criteria.²³ The final sample included 1,014 facilities that responded to the 2021 NRCFS and met the definition of LTC homes in 9 of the 10 Canadian provinces (Figure 2).

From the 2021 NRCFS sample of LTC facilities, approximately 6% of homes (n=60) could not be identified in the 2020, 2021, or 2022 NALMF tax files, despite having a valid enterprise ID, resulting in their exclusion (Figure 2). Given that the CEEDD contains enterprise-level rather than facility- or establishment-level observations, the remaining NRCFS LTC homes (representing unique establishments) were linked to enterprises using enterprise IDs. The 954 LTC homes were linked to 420 single-establishment enterprises and 150 multi-establishment enterprises (Figure 2). To generate enterprise-level estimates within multi-establishment enterprises, facility-level characteristics (as per the NRCFS) were averaged, summed, or otherwise estimated, depending on the variable. For example, to determine hours of care per resident day (HPRD) among multi-establishment enterprises, HPRD was first calculated by direct care worker occupation for each home (i.e., establishment), representing hours worked per resident day by direct care staff, and subsequently averaged across establishments nested within these enterprises to determine the average total of HPRD at the enterprise-level. The 570 enterprise observations of the 2021 NRCFS were matched to their counterparts in the 2021 NALMF to create the enterprise-level component file of the integrated NRCFS–CEEDD–census dataset.

An examination of the linked enterprise-level file gives insight into the industry sectors in which LTC homes are found. LTC home establishments identified by the NRCFS may be within non-nursing care industries, as revealed through linkage to the NALMF. Among the 2021 NRCFS–NALMF analytic sample, only 61% of LTC homes were within enterprises that belonged to the nursing care industry (i.e., NAICS code 623110) (Chart 1). The remaining 39% of LTC homes were housed within enterprises of non-nursing care sectors. The classification of an enterprise’s sector will have an effect on an analyst’s ability to identify workers within a specific type of facility.

Chart 1
Distribution of long-term care homes in the Nursing and Residential Care Facility Survey and their corresponding enterprises by enterprise-level North American Industry Classification System category, 2021



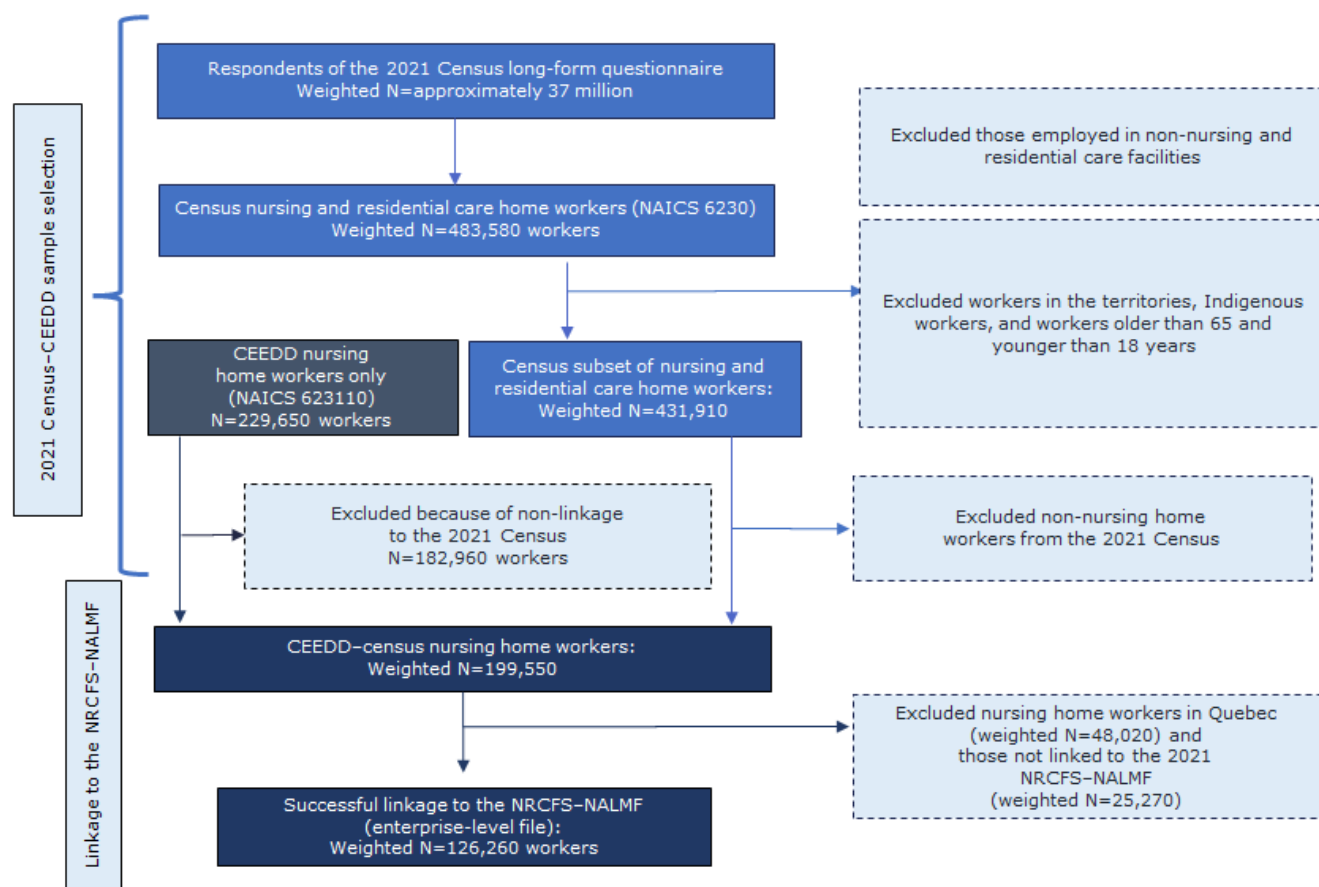
Source: Statistics Canada, linkage of the Nursing and Residential Care Facility Survey and the National Accounts Longitudinal Microdata File, 2021.

Worker-level component file: Linkage of the Canadian Employer–Employee Dynamics Database with the Census of Population

To create the worker-level component file for the present analytic example, individual-level tax data from the 2021 CEEDD, such as T4s and ROEs, were linked with data from the 2021 Census long-form questionnaire (Figure 3). Given that individuals may hold multiple jobs across industries, only individuals whose primary job (i.e., the job with their highest annual earnings as determined by the CEEDD) was in the LTC sector were included in the sample. Workers were also included if, according to the census, they were employed in 1 of the 10 provinces, aged 18 to 65 years, and self-identified as non-Indigenous. According to the CEEDD, approximately 230,000 individuals were employed in the nursing care sector in 2021 (Figure 3). The sample of workers was subsequently limited to those employed in enterprises classified within the nursing care industry in the CEEDD (NAICS code 623110), as the LTC enterprise-level file (2021 NRCFS–NALMF) has shown that not all LTC homes are associated with enterprises classified in the nursing care sector (Chart 1). As such, limiting the sample of workers to those employed by nursing care enterprises excludes those employed in LTC facilities that are part of enterprises outside the nursing care sector (e.g., LTC homes that are part of hospital enterprises), or those who may be employed by entities such as third-party agencies. As it is difficult to ascertain within non-nursing care enterprises which employees work in LTC establishments versus non-LTC establishments, workers in non-nursing care enterprises were excluded. This yielded a weighted sample of approximately 200,000 individuals employed in nursing care enterprises (Figure 3).

Figure 3

Creation of the worker-level file linking the 2021 Census of Population long-form questionnaire with the Canadian Employer–Employee Dynamics Database, and its linkage to the enterprise-level file (linkage of the 2021 Nursing and Residential Care Facility Survey with the National Accounts Longitudinal Microdata File)



Notes: CEEDD = Canadian Employer–Employee Dynamics Database. NAICS = North American Industry Classification System.

NALMF = National Accounts Longitudinal Microdata File. NRCFS = Nursing and Residential Care Facility Survey.

Source: Canadian Employer–Employee Dynamics Database, 2021 Census of Population, and linkage of the 2021 Nursing and Residential Care Facility Survey with the National Accounts Longitudinal Microdata File

Linked facility–worker file: Linkage of the Nursing and Residential Care Facility Survey, the Canadian Employer–Employee Dynamics Database, and the Census of Population

The final weighted sample of 126,260 CEEDD–census worker records represents 63% of all worker records linked to the LTC enterprise-level component file (NRCFS–NALMF). This attrition is partly attributable to the exclusion of Quebec LTC homes from the NRCFS, as worker records from Quebec in the CEEDD–census could not be matched to the enterprises included in the NRCFS–NALMF. Furthermore, the sample attrition is also a result of the linkage to data from the census long-form questionnaire, which is a sample (25%) of the Canadian population (Figure 3).

Distributions of age groups, gender, immigrant status, occupation, and working conditions, including annual wages earned and weekly hours worked, were similar between the CEEDD–census cohort and the NRCFS–CEEDD–census cohort (Table 2). Occupational group was determined according to the 2021 Census NOC categories. Analyzing the LTC workforce by occupational group (personal support workers [PSWs], nurses, cleaners, etc.) (Table 3) is essential as each worker has distinct roles and responsibilities, working conditions, and workplace risks.²⁴ For example, PSWs provide personal care

services, undertaking more physically demanding tasks, such as bathing and feeding patients, whereas nurses manage clinical care and supervision, and cleaners are key to infection control. These differences impact recruitment and retention,^{25,26} safety,²⁷ and policy responses,^{25,27} making occupation-specific data crucial for effective workforce planning. Occupational group is classified into four categories—PSW, nurse, cleaner, and other—with the first three occupations defined using the 2021 NOC (Table 3).

Table 2

Comparison of the characteristics of the worker component file (linkage of the Canadian Employer–Employee Dynamics Database with the Census of Population) and of the Nursing and Residential Care Facility Survey, the Canadian Employer–Employee Dynamics Database and the Census of Population

Characteristics	CEEDD–census cohort (weighted n=199,550)	NRCFS–CEEDD–census cohort (weighted n=126,260)
	weighted %	
Age group		
18 to 24	13.0	13.2
25 to 34	21.8	21.5
35 to 44	22.4	21.8
45 to 54	22.9	22.6
55 and older	20.0	20.9
Gender		
Woman +	83.9	86.1
Man +	16.1	13.9
Occupation		
Nurse	17.4	18.3
Personal support worker	36.0	39.0
Cleaner	9.5	10.4
Other	37.2	32.3
Immigrant status		
Non-immigrant	55.6	54.2
Immigrant	44.4	45.8
	Mean	
Average annual wages earned	32,600	31,700
Average weekly hours worked	28.5	28.7

Notes: CEEDD = Canadian Employer–Employee Dynamics Database. NRCFS = Nursing and Residential Care Facility Survey. The category “men+” includes men, boys and some non-binary people, while the category “women+” includes women, girls and some non-binary people.

Source: Statistics Canada, linked CEEDD and Census of Population, 2021; and linked NRCFS, CEEDD and Census of Population, 2021.

Table 3

National Occupational Classification categories of long-term care workers

Occupation	2021 National Occupational Classification
Nurses (registered nurses and licensed or registered practical nurses)	31301 – Registered nurses and registered psychiatric nurses 32101 – Licensed practical nurses
Personal support workers	33102 – Nurse aides, orderlies and patient service associates 33109 – Other assisting occupations in support of health services 44101 – Home support workers, caregivers and related occupations
Cleaners and housekeepers	65201 – Food counter attendants, kitchen helpers and related support 65310 – Light duty cleaners

Source: Statistics Canada, Census of Population, 2021.

Overall, 78% of enterprises (n=450; 390 single-establishment enterprises and 60 multi-establishment enterprises) from the NRCFS–NALMF cohort were retained (Table 4), and 63% of workers from the CEEDD–census cohort were retained in the final integrated NRCFS–CEEDD–census dataset following linkage of workers to their corresponding enterprises. Descriptive analyses revealed a higher proportion of single-establishment enterprises in the NRCFS–CEEDD–census (87%) compared with the enterprise-level component file (i.e., NRCFS–NALMF) (74%). This increase may reflect the exclusion of non-nursing

care industry enterprises that typically have multiple establishments—each performing a different activity—from the enterprise-level component file. The lower retention rate for employees may be because multi-establishment enterprises hire more employees than single-establishment enterprises, and many of the former were excluded, as they were non-nursing care enterprises. The proportion of publicly owned enterprises was lower in the linked NRCFS–CEEDD–census file (19%) than in the NRCFS–NALMF file (26%), with a corresponding increase in privately owned (non-profit or for-profit) enterprises in the former (Table 4). Despite these differences, the distribution of LTC enterprises across provinces was similar between the two cohorts, i.e., the enterprise-level component file (NRCFS–NALMF) and the fully linked data resource (NRCFS–CEEDD–census). The average intra-enterprise facility size and HPRD data, whether provided for direct care workers overall or by occupational group, were similar between the cohorts as well (Table 4).

Table 4

Comparison of the characteristics of the enterprise-level component file (linkage of the Nursing and Residential Care Facility Survey with the National Accounts Longitudinal Microdata File) and the linkage of the Nursing and Residential Care Facility Survey, the Canadian Employer–Employee Dynamics Database and the Census of Population

Characteristics	NRCFS–NALMF file cohort (n=570)		NRCFS–CEEDD–census cohort (n=450)	
	n	%	n	%
Multiple establishments (long-term care homes)				
No	420	74	390	87
Yes	145	26	60	13
Region				
Atlantic provinces	135	23	115	26
Ontario	235	41	180	40
Prairie provinces	100	17	75	17
British Columbia	105	18	80	18
Ownership status				
For-profit (private)	240	43	210	46
Non-profit (private)	180	32	85	35
Public	145	26	160	19
	Mean	SE	Mean	SE
Average enterprise size (average number of beds per facility per enterprise)	96	3.1	93	3.4
Averaged HPRD by occupation				
Personal support worker (PSW)	2.3	0.1	2.2	0.1
Registered nurse (RN)	0.4	0.0	0.4	0.0
Registered practical nurse (RPN)	0.6	0.0	0.5	0.0
Total direct care staff (PSW, RPN, RN)	3.2	0.1	3.1	0.1

Notes: CEEDD = Canadian Employer–Employee Dynamics Database. HPRD = hours of care per resident day. NALMF = National Accounts Longitudinal Microdata File. NRCFS = Nursing and Residential Facility Survey. SE = standard error. Numbers may not add to totals because of rounding.

Sources: Statistics Canada, linkage of the NRCFS and NALMF, 2021; and linkage of the NRCFS, the CEEDD and the Census of Population, 2021.

Strengths and weaknesses

The novel integration of the 2021 NRCFS–CEEDD–census dataset offers a powerful tool for analyzing the employment dynamics of Canada's health workforce in the residential care sector. One of the strengths of this innovative data resource is its multi-level structure, enabling researchers to conduct analyses of workers while accounting for clustering effects at the enterprise-level. The CEEDD offers annual data from 2001 onward, allowing users to examine job mobility into and out of the nursing care sector, as well as income progression over time, while incorporating enterprise-level controls.^{28,29} Furthermore, integrating the CEEDD administrative records minimizes self-reporting bias for key

economic variables, including annual wages earned. Linkage to the census expands the comprehensiveness of the data resource, allowing users to conduct equity-focused research using key sociodemographic variables, such as immigrant status, Indigenous identity, and population group categories, which are not available in the NRCFS alone.

Despite its strengths, this new data resource has its limitations. First, the generalizability of findings using the NRCFS–CEEDD–census file may be limited because homes in the territories are excluded and, depending on the research question, homes in Quebec are also excluded if imputed NRCFS records are not used. Furthermore, differences in LTC system organization across Canadian jurisdictions, such as ownership, facility size, administrative capacity, and governance arrangements, may have affected facilities' participation in the NRCFS, contributing to the observed provincial variation in response rates, particularly during the pandemic period when operational pressures were heightened. Second, while non-response bias from the NRCFS may be mitigated through the imputation of missing responses, this bias may still occur if those that responded to the survey are systematically different across certain characteristics from non-responders. Third, while the CEEDD is a full administrative coverage of LTC enterprises, sample weights were not available in the 2020 and 2021 NRCFS cycles for LTC homes, resulting in further generalizability limitations. Currently, the NRCFS has only two cycles (2020 and 2021), which may limit long-term trend analyses of facility and enterprise characteristics. However, if subsequent NRCFS cycles are administered, this integrated data resource could be expanded in the future.

Gaps in data collection are particularly pronounced for PSWs, an unregulated workforce in Canada that is not monitored by provincial regulatory bodies. Statistics Canada's Survey on Health Care Workers' Experiences During the Pandemic (SHCWEP)³⁰ is an alternative data resource to the NRCFS, as it also provides information on health care workers, including PSWs, in Canada's nursing and residential care sector, particularly regarding their experiences during the COVID-19 pandemic; however, the SHCWEP has several limitations. The survey's smaller sample size, restricted to one year, limits data disaggregation and intersectional analyses. In addition, the SHCWEP does not differentiate between workers employed in LTC homes and those employed in homes for seniors, which are different in their funding models, care delivery, and level of acuity among residents.³¹ Statistics Canada's Labour Force Survey can also be used to examine the health workforce by providing monthly estimates of employment characteristics.³² However, its capacity to analyze the residential care workforce and working conditions is limited by broad industry classification (NAICS code 62 or 623), the lack of enterprise-level information, and small analytic samples of workers, such as PSWs and nurses. Another Statistics Canada dataset, the Survey of Labour and Income Dynamics (SLID), has been used in previous research on PSWs in LTC; however, the data are over a decade old and do not reflect current working conditions. The SLID continues to be used because of the absence of alternative health workforce data sources for PSWs with comparable levels of detail.³³ As such, the integrated NRCFS–CEEDD–census dataset provides updated, comprehensive data of PSWs, as well as other workers in the nursing and residential care sector.

Data resource access

At present, access to the integrated NRCFS–CEEDD–census dataset is restricted and not publicly available, as worker and enterprise observations contained within the CEEDD are considered confidential under the *Statistics Act*. However, an extract of linkable microdata files derived from the CEEDD component files is available through Statistics Canada's Research Data Centres on a cost-recovery basis.

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