Health Workforce Canada | Effectif de la santé Canada

Frequently Asked Questions: Personal Support Worker Microsimulation Model Prototype

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Getting Started:

How do I get started?

Please see our *User Guide Section 2.0: Getting Started* for complete guidance on how to get started.

What can I predict with this model?

This model can be used to predict the required supply of Personal Support Workers (PSWs) in Canada, by province/territory and care setting, up to the year 2048. You may generate projections in either full-time equivalents (FTEs) or headcounts. These predictions are based on the current (2024) ratios of PSWs to adults 75 years and older by province/territory and care setting. The number of PSWs is based on estimates from Statistics Canada's Labour Force Survey, and the population estimates for that age group come from the same agency's current population projections.

Who can I contact for technical support?

For any additional questions, please contact our team at HWCDataAndPlanning@healthworkforce.ca.

Model Background & Methodology:

What is microsimulation modelling and why was this approach used to predict the needed supply of Personal Support Workers in Canada?

Microsimulation modelling includes a range of technical implementations, all with the aim of simulating the behaviours and outcomes of individuals within a system to understand broader population-level patterns and their policy implications. In this model, PSWs are simulated as individuals based on province/territory of residence, and the care setting in which they work. Utilizing a microsimulation approach allows the model to use aggregated data to create a synthetic population of individuals evolving across time to better estimate the impact of policy decisions, as well as emergent effects of the individuals' interactions within a system. The approach avoids the need to account for the privacy and security

concerns associated with individual-level data. Population-level statistics are used to setup probability distributions, from which each PSW within the system draws their characteristics. By not relying on individual-level or microdata, this reduces barriers to model co-development and offers pathways for others to further improve on the base model.

What data was used to create the PSW microsimulation model?

To create the PSW microsimulation model, we used data from Statistics Canada's Labour Force Survey (LFS). The LFS provides PSW estimates of who is employed in which sector and in what capacity across Canada through key labour market indicators such as employment rate and workforce participation rate. The LFS also provides employment estimates by industry, occupation, and hours worked, which can further be stratified by personal and demographic characteristics. These employment-related estimates are available Canada-wide, for the provinces and territories, and for some sub-provincial regions.

To develop the model, we used LFS's PSW employment estimates specifically, these estimates were then validated against the provincial registry data from Alberta and administrative payroll records from Nova Scotia. For more detailed information on the data sources, please consult our *User Guide Section on Data Sources and Assumptions.*

Was the model validated and how?

The model underwent a series of internal and external validation procedures.

Internal validation steps included:

a) Conducting a code review to check the model source code for errors.
b) Checking input parameters in the model against the intended inputs provided.
c) Checking the model and website to ensure output data aligns with the model generated values and is presented correctly.

External validation steps included:

a) Comparing historical PSW estimates from the LFS against annual Alberta PSW counts from the HWC Provider Profile dashboard.
b) Comparing historical PSW estimates from the LFS against payroll data from the Government of Nova Scotia Department of Health and Wellness, report years 2022 to 2024. Note: The payroll data referenced is not currently publicly available.

c) Comparing PSW output data against existing publications including two publications by Kralj, Sweetman and AGE-WELL National Innovation Hub Advancing Policies and Practices in Technology and Aging (APPTA).[1,2]

What's next? How is the model evolving?

The current version of the PSW microsimulation model is released as an open-source foundation tool for the health workforce modelling community. Our goal is to provide a robust starting point that modellers, health system leaders, and education planners can adapt and enhance to meet their specific needs for projecting PSW supply across Canada.

Community-driven development:

Users and developers are encouraged to augment and adopt the model to the realities of their jurisdictions, potentially adding features such as:

- FTE and headcount comparison capabilities
- Context-specific policy scenarios
- Integration with alternative demand-side models

The model code and documentation are freely available for modification here. HWC intends on refreshing the model with 2025 Labour Force Survey estimates in the Winter of 2025 but does not plan on releasing further updates. The HWC modelling team remains available to provide walk-through sessions of the model to support community members in understanding the model's architecture and assumptions. We encourage users to share their enhancements with HWC and others to build a collaborative ecosystem of PSW workforce planning tools.

[1] Kralj, B., Sweetman, A. and AGE-WELL National Innovation Hub. Personal Support Worker (PSW) Workforce Characteristics, Trends and Projections: Focus on the Home Care and Hospital Sectors. 2024. Fredericton, NB: AGE-WELL National Innovation Hub, APPTA.

[2] Kralj, B., Sweetman, A. and AGE-WELL National Innovation Hub. Residential Care Sector Personal Support Worker (PSW) Workforce: Characteristics, Trends and Projection. 2022. Fredericton, NB: AGE-WELL National Innovation Hub, APPTA.

Model Outputs & Metrics:

Why use both headcounts and Full-Time Equivalents (FTEs) in workforce modelling?

Headcounts show the actual number of individuals employed, which is useful for human resources reporting and demographic analysis. FTEs standardize workload by converting hours worked into a common measure, making it ideal for capacity planning and resource allocation. Using both measures provides a complete picture—headcount for people, FTE for service capacity.

How are FTEs calculated?

FTEs are calculated by dividing total weekly hours worked by the standard full-time benchmark (usually 37.5 hours/week). For example, if 10 employees work 22.5 hours/week, their combined hours (225) divided by 37.5 equals 6 FTEs. This metric accounts for part-time, overtime, and multiple job holdings.

What are the limitations of using headcounts alone?

Headcounts do not reflect workload differences. Two employees counted equally may work vastly different hours. It also ignores overtime and multiple job holdings, making it less accurate for forecasting service capacity.

What are the limitations of using FTEs alone?

FTEs focus on hours, not individuals. It cannot show how work is distributed amongst people, which matters for human resource planning, benefits, and training. It also requires accurate data on hours worked, which may not always be available.

How do multiple job holdings affect modelling?

Headcounts count one person even if they hold multiple jobs, while FTEs aggregate hours across positions. This means FTE better captures total workload, but headcount is needed to understand unique individuals for human resource and policy purposes.

Which metric should I use for forecasting demand?

Use FTEs for demand forecasting because it reflects actual service capacity. Headcount can complement this by showing how many individuals are needed to meet that capacity, considering part-time and overtime patterns.

How do assumptions about hours affect FTE estimates?

FTEs as estimates depend on assumptions about standard hours and future work patterns. Changes in preferences (e.g., more part-time work) or demographic shifts can alter FTE projections, so scenario modelling is recommended.

Can I compare FTEs and headcounts of PSWs?

At this time, comparisons between FTEs and headcounts of PSWs cannot be made using our microsimulation model. Our microsimulation model tracks workforce supply using a single unit of measurement – either FTEs or headcounts – but does not simultaneously model both metrics or the relationship between them.

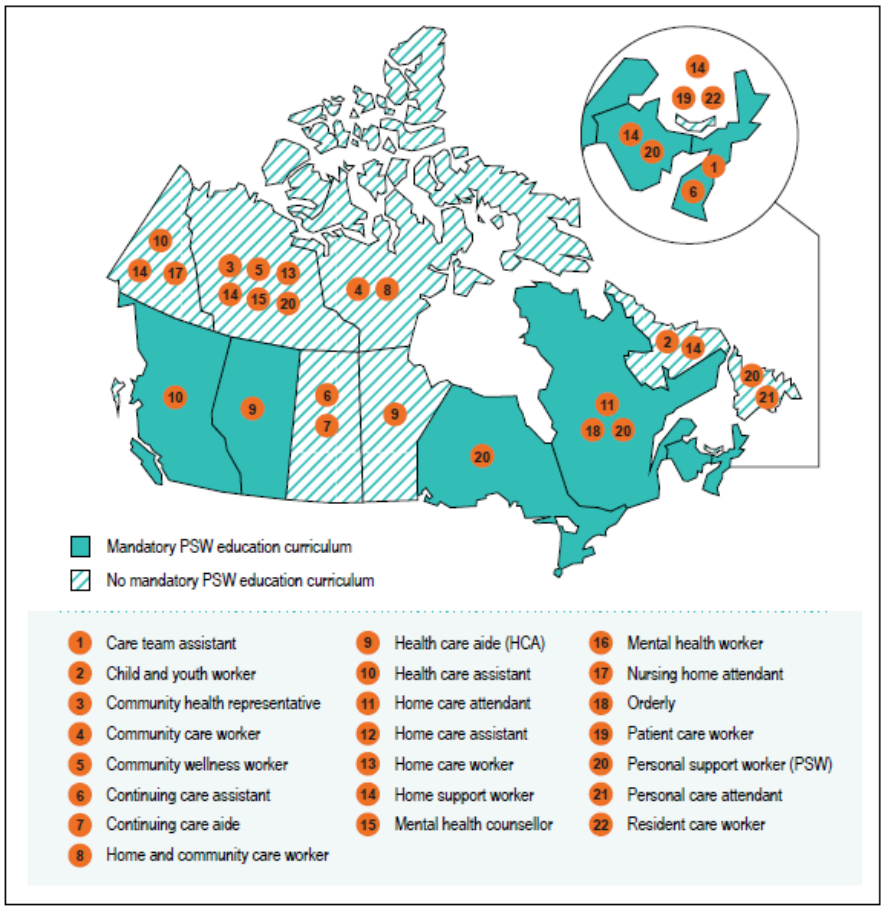
When interpreting model outputs, users should note whether projections represent FTEs or headcounts and avoid direct comparisons with data sources using the alternative metric. For workforce planning purposes, we recommend selecting the metric that best aligns with your jurisdiction's data collection practices and policy frameworks. Datasets for both metrics are available to download on our website

Scope & Applicability:

My province does not use the term 'Personal Support Worker', does this model apply to occupations doing similar work?

Yes, the term ‘Personal Support Worker’ was chosen by Health Workforce Canada to represent a range of health professionals who are “employed/paid to provide personal care, such as assistance with activities of daily living, instrumental activities of daily living and

Figure A1 PSW-related job titles and education curriculums, by province and territory



Note
This map includes PSW-related job titles used across Canada, as found in an environmental scan completed in 2018. These titles might be present in the health and/or social services sectors. For those provinces that have mandatory education curriculums, only PSW-related job titles that are obtained through the mandatory education curriculums are reflected in this map. Therefore, not all titles present in the workforce are captured in this map.

Source
Canadian Institute for Health Information. *Environmental Scan of Unregulated Healthcare Providers in Canada* [unpublished document]. 2018.

related health services".[3] Examples of other titles that are represented by the model are "Health care aide", "Continuing care aide", and "Nursing home attendant". A 2023 report by the Canadian Institute for Health Information summarizes terminology variations for PSWs, see Figure A1 from their publication.[3]

Your method is based on adults 75 years and older, does that mean that it excludes PSWs who work with younger people?

No, it does not exclude PSWs who work with individuals under the age of 75 years. It simply means that the total count of PSWs estimated from the LFS in a calendar year (our numerator) is used to create ratios based on the subset of the Canadian population aged 75 years and older (denominator) in the same year. In other words, we identified how many PSWs there are relative to the number of Canadians in this age group, even if some of these PSWs are supporting people in other age categories.

We selected the 75 years and older age group as our baseline because this subpopulation has the greatest need for PSW services and is experiencing dramatic growth—projected to more than double from 3.1 million to 6.8 million over the next 30 years.[2] Using this group as our baseline helps project future PSW workforce needs more accurately. Future iterations of the model may refine the current methodology to align with the reality that PSWs provide care to Canadians of all age groups.

What are the limitations of this model?

The PSW microsimulation model has several key limitations:

- **Geographic scope**: Estimates for certain provinces and territories may be prone to a lower degree of precision, higher variability, due to limited sample sizes in the underlying LFS data.
- **Care delivery assumptions:** While the model incorporates different population growth scenarios (see below for more details), the model does not allow the user to adjust care setting ratios at different points in time (i.e., assign a different PSW to Population ratio in 2026 and after 2030). This assumes that the relative proportion of PSWs across care settings will not vary over time, which may not account for changes in workplace preferences, policy, or care approaches.

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[3] Canadian Institute for Health Information. Recommendations for Advancing Pan-Canadian Data Capture for Personal Support Workers (Updated July 2023). Ottawa, ON: CIHI; July 2023.

- **Scope of validation activities:** While validated against data from Alberta and Nova Scotia, there are no accepted gold standards for estimating PSW supply counts. For instance, registry and government payroll data are better at capturing PSWs working in certain settings (i.e., public versus private care provision), and Labour Force Survey estimates would be expected to underestimate total PSW counts by excluding workers for whom being a PSW is not their primary source of employment.
- **PSW Case Selection:** There are differing opinions on which combination of National Occupation Codes (NOC) and North American Industry Classification System (NAICS) yields the most accurate PSWs estimates (lowest proportion of false negatives and false positives). We selected a combination of 2 NOC (44101, 33102) and 4 NAICS (6216, 6241, 622, 623) to identify individuals whose primary occupation is a PSW per the Labour Force Survey. Others have suggested the inclusion of an additional NOC (33109), which we excluded after consulting with experts.

Using Scenarios:

What are the differences between the population projection scenarios?

We used ten projection scenarios to account for uncertainty about the future. These scenarios were developed by Statistics Canada and combine different assumptions about population growth and demographic trends to show a range of possible outcomes.

Medium growth (6 scenarios): These scenarios illustrate a medium level of population growth, reflecting a continuation of current trends in the short term and plausible trajectories in the long term. Each scenario assumes different levels of interprovincial migration to capture the volatility of this component.

Low-growth and high-growth (2 scenarios): These scenarios assume either lower or higher population growth compared to the medium-growth scenarios at the national level. The high-growth scenario, for example, assumes high fertility, low mortality, high immigration, low emigration and high numbers of non-permanent residents.

Fast-aging and slow-aging (2 scenarios): These scenarios include assumptions associated with faster or slower population aging compared to the medium-growth scenarios. The slow-aging scenario, for example, assumes high fertility, high mortality, high immigration and high numbers of non-permanent residents.

For a more detailed explanation of the scenarios and their methodology, please visit: Statistics Canada Population Projection Technical Report.

Which population projection scenarios should I use?

The current recommended population projection scenario is “Medium-Growth 4”. Any of the “Medium-Growth” scenarios can be utilized for baseline population growth and only differ in the level of interprovincial migration over the projection period.

How many scenarios can I compare at once?

You may directly compare up to four scenarios at once, including the baseline scenario.

How should I interpret the model outputs?

The PSW microsimulation model provides projections of future PSW workforce needs based on demographic changes and different population growth scenarios. Here's how you can interpret the outputs:

- **Understanding the numbers:** The outputs show a plot illustrating the estimated PSW workforce requirements up to 2048. This represents the number of PSWs that would be needed to maintain current service levels (existing ratios of PSWs per 100 persons aged 75 years or older in each care setting and jurisdiction based on 2024 estimates) given the projected population growth scenario selected.
- **Comparing scenarios:** When viewing multiple population projection scenarios, the differences illustrate how varying assumptions about the distribution of the population by age, fertility rates, mortality rates, and immigration affect PSW demand. Higher population growth scenarios and an increasing proportion of older adults would translate into greater demand for PSW care.
- **Planning perspective:** Use the projections as relative measures rather than precise estimates. Repeating a simulation using the same parameters could produce minor differences in estimates due to the algorithm's reliance on probabilistic (random and stochastic) processes. Our modelling outputs aim to indicate trends and may help identify potential workforce gaps, but actual needs may vary based on policy changes or shifts in service delivery over time.

Technical Use & Customization

Is it possible to modify the model to build other functionalities and consider other parameters?

Yes! You can add new functionalities or parameters through two possible approaches:

1. **Request new features:** Propose new functionalities to the Health Workforce Canada team for consideration in future versions. We will evaluate timeline and feasibility.
2. **Modify the model yourself:** Download the complete source code, input files, and documentation from the Health Workforce Canada website. The model is implemented using *Anylogic* software, which offers a free trial version that allows you to open, edit, and run the model. We encourage further development of the PSW model as part of commitment to open-source modelling and welcome you to share any improvements with our team.