Frequently Asked Questions: Education-to-Workforce Medical Radiation Technology Microsimulation Model Prototype

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Getting Started:

What can I predict with this model?

This model can be used to predict the domestic supply of Medical Radiation Technologists (MRTs) in Canada by year, province/territory, and MRT specialization (radiation therapy, radiological technology, nuclear medicine technology, and magnetic resonance imaging), up to the year 2036. These predictions are based on tracked MRT cohorts from post-secondary enrolment to employment using data from Statistics Canada's Postsecondary Student Information System (PSIS) and Education and Labour Market Longitudinal Platform (ELMLP). The ELMLP integrates Canada Revenue Agency (CRA) tax-filer data with student records from the PSIS. Employment status is determined by whether an individual had employment income based on T4s from the Canada Revenue Agency (CRA) AND was not registered in full-time studies

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 domestically trained supply of Medical Radiation Technologists 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, MRTs are simulated as individuals based on province of training, the specialization and province/territory 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. This 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 MRT 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 MRT microsimulation model?

To create the education-to-workforce MRT microsimulation model, we used data from Statistics Canada's Postsecondary Student Information System (PSIS) and the Education and Labour Market Longitudinal Platform (ELMLP). The PSIS provides population estimates of students undergoing education and training by field of study and program type across Canada.

It includes key education indicators such as enrolment counts and graduation rates, with estimates available by field of study, registration status, program type, credential type, and gender. The ELMLP provides data that allows policymakers understand the different trajectories that students can take through their postsecondary training and the student characteristics that may be related to these pathways. These educational attainment estimates are available Canada-wide, for the provinces and territories, combined.

What is the quality or completeness of the data?

The data used to create this microsimulation has some limitations. There were multiple cases in which data was either missing or incomplete and had to be inferred using available data. For additional details, please see the **Methodology Notes** at the bottom of the model's page.

Where can I learn more about the limitations of the data?

For more information on the methodology, coverage, and limitations of the Statistics Canada data used to develop this model, please see Technical Reference Guides for the Education and Labour Market Longitudinal Platform (ELMLP).

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) Verifying the model and website to ensure output data aligns with the model generated values and are presented correctly.

External validation steps included:

a) Advice on the data collection strategy, including confirmation of accredited MRT programs across Canda, was obtained from the Canadian Association of MRTs (CAMRT).
b) Data trends were presented to provincial government representatives and speciality groups (e.g., radiation technology) familiar with MRT enrolment and graduation trends for review and feedback.

As part of its ongoing data quality improvement efforts, Health Workforce Canada is seeking historical enrolment and graduation data from educational institutions and provincial partners.

What's next? How is the model evolving?

This is the first iteration of the Education-to-Workforce microsimulation model with a focus on MRTs. It is being released with the aim of gathering feedback to further refine and improve future versions. Our model development activities are based on expert input and ongoing engagement; we anticipate that future iterations will include enhanced features that support practical uses cases submitted by users. We are therefore seeking input from a broad range of potential users on what health workforce challenges our Education to Workforce model could inform and what user defined parameters and capabilities would provide value.

Ongoing revisions are currently informed through regular engagement and collaboration with our dedicated **Modelling Advisory Group** whose composition includes representatives from provincial and territorial government modelling teams, Statistics Canada, Canadian Institute of Health Information (CIHI), Health Canada, the Institute of Clinical Evaluative Sciences (ICES), and the Canadian Health Workforce Network (CHWN).

We are committed to continuous improvement and welcome feedback from users to help shape the model's evolution.

Scope & Applicability:

In my province, sonographers are a specialization of MRTs; why are they not included in the model?

This model includes four main MRT specializations: radiation therapy, radiological technology, nuclear medicine technology, and magnetic resonance imaging. While regulatory structures

vary by jurisdiction, sonographers are not consistently included within the MRT occupational category across Canada—for example, Ontario regulates diagnostic medical sonography as a fifth MRT specialty, and Nova Scotia began regulating sonographers later and incorporated them into MRT supply counts, whereas other jurisdictions do not include sonographers in the MRT category in the same way (CIHI, 2025). To preserve comparability across jurisdictions and over time, this model focuses on the four core MRT specializations and excludes sonographers at this stage.

What are the limitations of this model?

The MRT microsimulation model has several key limitations:

- **Geographic scope**: Estimates for certain provinces and territories may have lower precision and higher variability due to limited sample sizes or the higher impact of Statistics Canada's mandatory rounding requirements for data release in smaller groups. Additionally, in this first version of the model, place of employment is based on the place of residence reported in tax filings. Consequently, the data may include individuals who work in one province while residing in another.
- **Employment assumptions:** The model incorporates post-graduation employment status data from the ELMLP; however, this data only indicates whether graduates are employed, unemployed, or continuing full-time studies--not whether they work in their field of study. Employment status is determined by whether an individual had employment income based on T4s from the Canada Revenue Agency (CRA) AND was not registered in full-time studies. Graduates were assumed to be employed in their own field of study if they reported employment income as per CRA tax records two years after graduation. Province of employment was determined using these tax data, with province of residence in tax records serving as a proxy.

Can I compare MRT supply between provinces?

At this time, functionalities to compare MRT supply or scenarios across jurisdictions have not been integrated into the MRT microsimulation tool.

Using Scenarios:

How should I interpret the model's outputs?

The Education to Workforce microsimulation model provides projections of future MRT workforce needs based on entry cohort size, graduation, employment, and in-province retention rates.

The model outputs include four plots illustrating aspects of MRT supply up to 2036:

1. **Entry cohort or graduate counts over time** – Shows the number of students entering MRTs programs and those graduating by report year.
2. **Employment status 2 years after graduation** – Tracks whether MRT program graduates have demonstrated employment two years post-graduation. Graduates were assumed to be employed in their own field of study if they reported employment income as per CRA tax records two years after graduation.
3. **Employed graduates by training province/territory** – Displays the counts of newly employed MRT graduates, organized by where they were trained.
4. **Percentage of new employed graduates by training province/territory**—Shows the proportion of newly employed graduates by their jurisdiction of training. Province of employment was determined using CRA tax records, with province of residence in tax records serving as a proxy.

These visualizations help illustrate trends in the MRT education pipeline, workforce entry, and geographic distribution of new MRT professionals in Canada.

Use the projections as relative measures rather than precise estimates. Repeating a simulation using the same parameters may 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 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. Contact our team at HWCDataAndPlanning@healthworkforce.ca.
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. As part of our commitment to open-source modelling, we are exploring an open-source implementation of the MRT model to make it more accessible for users. If your team is interested in evolving the model using our source code, we invite you to connect with Health Workforce Canada.