Deloitte.

Saskatchewan

FINAL REPORT

Saskatchewan Ministry of Health HHR Forecast Model Review

March 28, 2025

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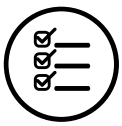
Project Purpose

The purpose of this analysis is to **evaluate the Saskatchewan (SK) Ministry of Health's (Ministry or MoH) Health Human Resource (HHR)** forecast model to identify opportunities for improving its methodology and approach.

This analysis is also intended to **provide actionable recommendations aimed at enhancing the quality and impact of the Ministry's HHR model** based on key findings from a detailed jurisdictional scan and interviews with stakeholders within Saskatchewan.

Scope and Approach



To arrive at the conclusions and recommendations, the following steps were undertaken:

1. A thorough **review of the Ministry's current HHR model (SK HHR model)**, including its design, data, assumptions, and limitations
2. **Interviews with key stakeholders in Saskatchewan** (within the MoH and from other organizations) to gain insights into how and to what extent the model's projections and outputs support HHR planning and budget decision-making, and how to improve the usefulness of the model and the presentation of its outputs in decision making in the areas of HHR training, recruitment, and retention.
3. A **comparative analysis of SK's HHR model against best practices** and industry standards in HHR forecasting across Canada (i.e., a jurisdictional scan).

Summary of Findings

Saskatchewan's HHR forecast model is well developed, features consistent and detailed supply and demand components, integrates the private sector, and covers a wide range of occupations. It has evolved from its first iteration, but like any model, there remains opportunity for feasible methodological refinements and improving its usefulness for stakeholders.

1 **Saskatchewan's HHR model is well structured, covering both demand and supply with all key components included.** The forecast assumptions used are reasonable given the data limitations, and the methodology remains consistent across occupations.

2 **Saskatchewan's HHR forecast model is well developed compared to similar models being used across Canada.** Different forecasting methodologies are used across jurisdictions, providing valuable insights that Saskatchewan could potentially leverage in its HHR model.

3 **Key stakeholders that provide inputs to the model, or use the model in any capacity, have growing confidence in the model's outputs.** However, many stakeholders displayed limited use of the model and seek greater collaboration to integrate data and analysis from their branch or organization.

4 To optimize the model, we recommend **incorporating demographics into demand** projections, **including private sector vacancies** where possible, **exploring regional breakdowns**, and **incorporating a physician outlook**. To enhance usage and trust, we suggest **establishing an advisory committee, improving communication**, and adding **qualitative content**. To evaluate the model going forward, we propose **assessing the accuracy of model outputs** and **evaluating stakeholder engagement.**

A Review of Saskatchewan's Health Human Resource Forecast Model

An Overview of Saskatchewan's Ministry of Health HHR Forecast Model (SK HHR Model)

The HHR forecast model developed by Saskatchewan's Ministry of Health is a bottom-up model in which the 42 non-physician health occupations are modelled independently. Saskatchewan's model is not currently a needs-based model.

Supply

Components

- Graduates from training
- \+ In-migration
- \+ Targeted recruitment

= Supply

Assumptions

Graduates: Calculated by applying historical graduation rates and labour force attachment rates to the number of enrolled students or seats.

In-migration: Projected based on a compound annual growth rate (CAGR) of historical in-migration. Data provided by regulatory bodies for regulated occupations.

Targeted recruitment: Accounts for the expected supply of workers from targeted recruitment initiatives (i.e., international missions). Data is obtained from Government Ministries and agencies leading recruitment missions.

Demand

Components

- Permanent vacancies
- \+ Attrition
- \+ Capital builds
- \+ Public commitments
- \+ Population growth

= Demand

Assumptions

Vacancies: For year 1, vacancies = permanent Saskatchewan Health Authority (SHA) and Saskatchewan Cancer Agency (SCA) vacancies. In following years, vacancies = shortage from the previous year.

Attrition: Retirements and resignations sourced from the 3sHealth payroll system. A five-year average resignation rate is applied to the workforce. Respective retirement rates are applied to the projected workforce by age cohort.

Capital builds/public commitments: Workforce needs for approved/ announced capital projects and new public commitments. Workforce needs are confirmed by MoH program branches/the SHA.

Population growth: Uses the five-year average paid FTEs/capita ratio. The population covered under Saskatchewan's health insurance plan is used.

= Gap

Additional Assumptions

- Model captures the change in supply and demand.
- Gap = Supply – Demand. Negative values indicate a shortage; positive ones a surplus.
- Surpluses do not carry over. Shortages carry over as vacancies.

Jurisdictional Scan

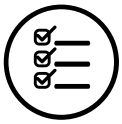
Jurisdictional Scan Purpose, Objectives and Outcomes

Purpose and Objectives

The purpose of the jurisdictional scan was to complete a **comparative analysis of SK's HHR model against best practices and industry standards in HHR forecasting across Canada.** The jurisdictional scan was also undertaken to help shape the recommendations on potential improvements regarding the model design, data and other elements of the model.

A total of six jurisdictions/models were studied: Alberta, Newfoundland and Labrador, Nova Scotia, Manitoba, Employment and Social Development Canada's (ESDC's) Canadian Occupational Projection System (COPS) projections, and the occupational projection model used by Saskatchewan's Ministry of Immigration of Career Training (ICT).

Outcomes



To help summarize the findings of the jurisdictional scan, **this section of the report is divided into four sections**:

1. **Analysis of Common Existing Models** – This section highlights the components, pros, and cons for two common types of HHR models: top-down and bottom-up.
2. **Jurisdictional Scan Evaluation Framework** – This section summarizes the evaluation framework for the jurisdictional scan. The detailed analysis for each jurisdiction highlights four key topics: the supply side methodology, the demand side methodology, addition assumptions, and a comparison to SK's HHR forecast model.
3. **Summary of Findings** – This section summarizes the following for each jurisdiction: the differences with SK's HHR model, the strength of SK's HHR model, and the opportunities for SK's HHR model.
4. **Detailed Analysis by Jurisdiction** – This section provides a detailed analysis of the components highlighted in the Jurisdictional Scan Evaluation Framework for each jurisdiction studied.

Analysis of Common Existing Models

HHR models can be categorized into two groups: top-down and bottom-up.

Top-Down Model	Bottom-Up Model
Summary	
Top-down models start by estimating employment by industry using a base model's demographic and macroeconomic forecast. Employment by industry is then distributed to the occupations based on the outlook by industry. Employment by occupation is thus constrained to a region's overall forecasted economic performance. • Typically covers multiple industries at the national and/or provincial levels. Uses the employment forecast for the health industry as a starting point. • Some models have a specific methodology for non-physician health occupations. • Supply typically considers school leavers, in-migration, and net occupational switchers; demand is the sum of expansion and replacement demand (includes retirements, in-service mortality, and emigration). • Occupation demand and supply projections are constrained to the broader macroeconomic outlook by industry. • Top-down models typically forecast supply and demand at the 5-digit NOC level given data availability from Statistics Canada.	Bottom-up models forecast supply and demand for occupations individually rather than using overall forecasted economic performance in a region to constrain the forecasted supply and demand for occupations of interest. • Uses current budgeted vacancies as a starting point for demand. • Base year vacancies and demand components increase due to specific demographic demand drivers and shortages carried forward. • Typically, these models cover occupations within the healthcare industry. • Supply and demand are projected using a methodology tailored to available data. In some instances, administrative data is used. • Supply and demand are not constrained to overall forecasted economic performance in the region of interest.

Analysis of Common Existing Models

HHR models can be categorized into two groups: top-down and bottom-up.

Top-Down Model	Bottom-Up Model
Pros	
• Can deploy sophisticated modelling techniques for each component of demand and supply due to abundance of data. • The macroeconomic analysis could be conducted at the census division or census subdivision level. Thus, regional nuances can be accounted for.	• Budgeted vacancies are included in the base year, reflecting the reality of government budget constraints. • Population growth is often included as one of the demand drivers. Population projections are key drivers of the forecast for economic growth. • Uses detailed occupations/job titles as opposed to the NOC groupings, which is more accurate, especially for occupations with small volumes of labour. • Can include occupation-specific micro data for components such as capital builds and public commitments for demand, and targeted recruitment initiatives for supply. • Bottom-up models generally have fewer variables, which means there is a smaller potential error associated with each assumption.
Cons	
• Factors GDP and employment growth at the industry and occupational level, reflecting need as opposed to the budgeted reality. Thus, top-down models typically do not account for the reality that governments make decisions based on the available budget. • These models do not explicitly account for capital builds, public commitments, or targeted recruitment initiatives. • Typically, occupations outside NOC groupings are not considered, which might be less useful in studying specific occupations that are one of many within a 5-digit occupational grouping (e.g., respiratory therapists, clinical perfusionists and cardiopulmonary technologists are all grouped under 5-digit NOC 32103, meaning these occupations cannot be separated out in most top-down models). • Expensive (costs of leveraging custom demographic and macroeconomic models).	• Variability in data quality depending on the occupation; modelling is dependent on available data.

Jurisdictional Scan Evaluation Framework

Below is the evaluation framework used for the jurisdictional scan. For each jurisdiction analyzed, the following topics and items will be reviewed.

Evaluation Dimensions			
			
I. Supply Side Methodology	**II. Demand Side Methodology**	**III. Additional Assumptions**	**IV. Comparison to SK HHR Model**
• List supply components included within each model reviewed • Describe assumptions relating to the supply components • List data sources	• List demand components included within each model reviewed • Describe assumptions relating to the demand components • List data sources	• List and describe starting point assumptions • List and describe additional assumptions highlighted in each model (e.g., change in supply/demand vs. entire supply/demand)	• Highlight differences and similarities to Saskatchewan's HHR forecast model • Identify strengths and opportunities of Saskatchewan's HHR model compared against other jurisdictions

Summary of Key Findings (1/2)

	Comparison to Saskatchewan's HHR Model (SK HHR Model)		
	I. Supply	**II. Demand**	**III. Other Assumptions**
Newfoundland and Labrador	**Differences:** NL's model is broken down by five-year age cohort, gender and health zone, and attrition is on the supply side. **Strength of SK HHR model:** Supply components are consistent across all occupations in SK's HHR model. **Opportunity for SK HHR model:** Potential opportunity is segmenting the forecast by five-year age cohort, and geography.	**Differences:** In NL, a demand driver specific to each occupation is used. In SK's HHR model, occupation-specific demand is driven by capital projects and public commitments. **Strength of SK HHR model:** SK's HHR model is consistent. Components are the same across occupations. **Opportunity for SK HHR model:** SK's HHR model could be improved if it were split by geography.	**Differences:** SK's HHR model projects total supply and demand (i.e., total headcount) in the base year but projects incremental supply and demand for future years. NL's model projects total supply and demand for all forecast years. This is a difference in presentation of results. SK's HHR model uses a consistent methodology across occupations, while NL's approach varies by occupation.
Alberta	**Differences:** SK's HHR model is a bottom-up model and AB's is top-down. There are methodological differences between these two models. **Strength of SK HHR model:** SK's HHR model explicitly factors in targeted recruitment initiatives. AB's doesn't. **Opportunity for SK HHR model:** Incorporate macro/demographic factors impacting future labour supply in SK qualitatively (e.g., tariff impacts).	**Differences:** AB's top-down model projects industry employment based on GDP growth, then distributes it across occupations using industry-occupation shares. **Strength of SK HHR model:** SK's HHR model is set up to address urgent local needs and includes more health occupations (42 vs. 25). **Opportunity for SK HHR model:** SK's HHR model could explore how to account for technological and productivity impacts.	**Differences:** SK's HHR model captures occupational mobility for non-physician health occupations, including those who exit and then re-enter the labour force. AB's assumes inter-occupational mobility for non-physician health occupations to be 0 due to data limitations.
ESDC	**Differences:** SK's HHR model is a bottom-up model and ESDC's is top-down. There are methodological differences between these. **Strength of SK HHR model:** SK's HHR analysis spans more detailed health occupations than the 293 COPS groupings in ESDC's. **Opportunity for SK HHR model:** Qualitatively assess macro and demographic factors impacting future labour supply growth provincially (e.g., tariff impacts).	**Differences:** ESDC's top-down model projects industry employment based on GDP growth, then distributes it across occupations using industry-occupation shares. **Strength of SK HHR model:** SK's HHR model is set up to address urgent local needs, while ESDC's demand projections are broad-based. **Opportunity for SK HHR model:** Incorporate demographics in population growth component.	**Differences:** SK's HHR model forecasts supply and demand for 42 health-related occupations only, while ESDC forecasts supply demand for all 293 COPS groupings. Further, given SK's HHR model is updated annually, it is more responsive to policy changes.

Summary of Key Findings (2/2)

	Comparison to Saskatchewan's HHR Model (SK HHR Model)		
	I. Supply	**II. Demand**	**III. Other Assumptions**
Nova Scotia	**Differences:** NS's model captures total supply while SK's HHR model captures the incremental change in supply. **Strength of SK HHR model:** The outflows methodology is more comprehensive in SK's HHR model. **Opportunity for SK HHR model:** Including the physician forecast could inform the analysis for non-physicians.	**Differences:** The overall setup of NS's needs-based demand model differs from other bottom-up models. **Strength of SK HHR model:** SK's HHR demand model can provide insights on urgent or short-term need. **Opportunity for SK HHR model:** Incorporate demographic trends in population growth component.	**Differences:** The purpose of NS's needs-based approach is not to predict the future. Instead, the model is intended to simulate impacts of "what-if" scenarios to an integrated health model. Additionally, SK's HHR model forecasts demand and supply for 42 occupations, while NS's model currently informs 22.
SK ICT Model	**Differences:** The Ministry of ICT's model (i.e., SK ICT model) is a demand side only model. SK's HHR model accounts for both supply and demand.	**Differences:** SK ICT's top-down model projects industry employment based on GDP growth, then distributes it across occupations using industry-occupation shares. **Strength of SK HHR model:** SK ICT's model does not distinguish between full-time / part-time work; SK's HHR model does. **Opportunity for SK HHR model:** Could include result range.	**Differences:** SK ICT's demand model only goes down to the 5-digit NOC level, while SK's HHR model's forecast is conducted for more granular health occupations. Also, in SK's HHR model, supply and demand are forecasted for each in-scope occupation separately. The top-down nature of the SK ICT model means occupations are analyzed collectively.
Manitoba	**Differences:** SK's HHR supply forecasting methodology and data sources are more mature than MB's. **Strength of SK HHR model:** SK's HHR model forecasts each component of inflows and outflows. **Opportunity for SK HHR model:** A phased strategy could benefit SK's HHR model by iteratively improving the model and aligning it with stakeholder goals and needs.	**Differences:** SK's HHR demand forecasting methodology and data sources are more mature than MB's. **Strength of SK HHR model:** Includes demand variables beyond public sector vacancies. **Opportunity for SK HHR model:** Having a phased plan for future model iterations could benefit stakeholder buy-in.	N/A - MB's model is still in its preliminary stages.

Newfoundland and Labrador (NL) (1/2)

Newfoundland and Labrador's (NL's) HHR model is a bottom-up model in which the 57 health occupations are modelled independently. For the following occupations, where data was available, a needs-based approach was used for forecasting demand: physicians, respiratory therapists, clinical psychologists, cardiac perfusionists, radiation therapists, dosimetrists, and medical physicists.

I. Supply Methodology

Newfoundland and Labrador

- Supply is forecasted by five-year age cohort, gender, and health zone using the following: $Supply_{t,i} = Supply_{t-1,i} + Average\ inflows_{t,i} - Average\ outflows_{t,i}$
- $Supply_{t-1,i}$: Determine the supply of professionals from 2018 to 2022 by age, gender, and health zone, including those employed outside Newfoundland and Labrador Health Services (NLHS) (i.e., outside the public health system) where data is available.
- $Average\ inflows_{t,i}$: Forecast inflows based on the four-year average inflows by five-year age cohort, gender, and health zone over the 2019-2022 period. However, when outliers exist in the latest 4-year period, different years are used to estimate the average inflows. **Components include new hires (including school graduates and out of province hires), rehired retirees, rehires. Different components were included by health occupation based on data availability. For some occupations, only total average inflows are projected using different components.**
- $Average\ outflows_{t,i}$: Most components use the same approach as inflows. **Components include retirements, resignations, and other net migration**, by five-year age cohort, gender, and health zone. **Other net migrations are treated as a residual term. Different components were included by health occupation based on data availability. For some occupations, only total average outflows are projected using different components.**
  - However, retirements are projected based on the estimated retirement age per profession. The projected retirement age varies by health occupation and by zone.
- Supply, inflows and outflows are provided by the health authority or regulatory bodies, depending on the occupation.

IV. Comparison to SK HHR Model

Key Differences

- In SK's HHR model, in-migration, or inflows from out-of-province, are projected based on a CAGR of historical in-migration data provided by regulatory bodies for regulated occupations. SK's HHR model also captures re-entrants to regulated professions as in-migrations or "other (re-entering)". Data is not available for unregulated occupations, while in NL, a best estimate was used for unregulated occupations.
- One of the main differences between NL's and SK's HHR model is that attrition (retirements and resignations) is accounted for on the demand side in SK. In terms of retirements, in NL's model, everyone is assumed to retire and exit the workforce after a certain age. The retirement age was estimated based on historical data, which varied by occupation and health zone. In SK's HHR model, retirement rates are calculated for five-year age cohorts, specific to each occupation in scope, and the five-year evolution of these age components are studied. Then these retirement rates are applied to the workforce to project retirements.

Strengths of SK's HHR Model

- Supply components are consistent across all occupations in SK's HHR model, while data limitations in NL prevent them from being consistent.

Opportunities for SK's HHR model

- SK's HHR model does not break down the supply forecast by region, age, or gender. A potential opportunity for improvement in SK's HHR model is segmenting the forecast by five-year age cohort, and geography.

Source: Proprietary materials developed by Deloitte for NL's Department of Health and Community Services

Newfoundland and Labrador (NL) (2/2)

Newfoundland and Labrador's (NL's) HHR model is a bottom-up model in which the 57 health occupations are modelled independently. For the following occupations, where data was available, a needs-based approach was used for projecting demand: physicians, respiratory therapists, clinical psychologists, cardiac perfusionists, radiation therapists, dosimetrists, and medical physicists.

II. Demand Methodology

Newfoundland and Labrador

- Demand is forecasted based on the following: $Demand_{t,i} = [Supply_{t-1,i} + Vacancies_{t-1,i}] \times Growth\ in\ Demand\ Driver_{t,I}$ $Demand_{t,i} = Demand_{t-1,i} \times Growth\ in\ Demand\ Driver_{t,i}$
- $Growth\ in\ Demand\ Driver_{t,I}$: For each health occupation, a different demand driver is determined to estimate the growth in demand over the forecast period. One of the following four demand drivers is selected to estimate the demand for each health occupation: 1) growth in inflation-adjusted healthcare spending (i.e., growth in healthcare volumes); 2) growth in the demand for a closely related physician specialty; 3) growth in certain health conditions; 4) overall population growth.
- $Vacancies_{t-1,i}$: Vacancies are added to year 0 of the forecast. Point in time public sector vacancies were provided by the NL Department of Health and Community Services (HCS). Data on private sector vacancies was unavailable.
- $Demand_{t-1}$: For all professions included in the model, the starting point for demand is the starting supply plus any vacancies (i.e., **in year 0, demand = supply + vacancies**).

IV. Comparison to SK HHR Model

Key Differences

- The key components of demand in SK's HHR model are population growth, capital projects, public commitments, and attrition. In NL's model, a demand driver specific to each occupation is used. In SK's HHR model, occupation-specific demand is driven by capital projects and public commitments (including non-capital builds).
- In NL, demand drivers expand beyond government willingness to spend and population growth by including needs-based factors.

Strengths of SK's HHR Model

- Demand components in SK's HHR model are consistent across all occupations, allowing users to easily interpret each component of demand.

Opportunities for SK's HHR model

- Including needs-based demand drivers for some occupations could improve accuracy.
- The level of analysis in SK's HHR model could be improved if it were split by geography, accounting for region-specific characteristics.

III. Additional Assumptions and Limitations

Newfoundland and Labrador

- **Demand does not equal supply in year 0 of the forecast**. Demand = Supply + Vacancies in year 0 of the forecast.
- A base case scenario accounts for capital projects and public commitments.
- Supply: For four occupations, due to data limitations, NL forecasted supply as below, using data from the 2021 Census: $Labour\ supply_{t,i} = Labour\ supply_{t-1,i} - Retirements_{t,i} + School\ leavers_{t,i} + Immigrants_{t,i} + Other\ job\ seekers_{t,i}$

IV. Comparison to Saskatchewan

Key Differences

- NL forecasts total supply and demand while SK's HHR model forecasts incremental supply and demand. This is a difference in how results are presented.
- The methodology for forecasting supply and demand is consistent across all occupations in SK's HHR model. Due to data limitations, the methodology is different by health occupation in NL.

Source: Proprietary materials developed by Deloitte for NL's Department of Health and Community Services

Alberta (1/3)

Alberta's (AB) occupational outlook is a top-down provincial labour market model anchored to macroeconomic and demographic forecasts produced by the Conference Board of Canada (CBoC) and Alberta Treasury Board of Finance (TBF). Occupations are modelled collectively, and the forecast for supply and demand is conducted at the provincial level. Alberta uses a specific supply methodology for health occupations.

I. Supply Methodology

Alberta

While AB's model is conducted for all occupations across the province, tweaks are made to the broad methodology for health occupations.

- Total supply each year is forecasted as the sum of the following components: ***Supply of workers for health-related occupations = Graduates + In-migrations + Net other entrants***
- ***Graduates (non-physician):*** The model begins by forecasting new enrollments in health-related programs, identified by their 4-digit CIP codes, by applying average historical enrollment rates to the projected population by credential type, age, gender, and status (domestic/international). These forecasts feed into a "graduation rate matrix" that captures how many students graduate each year using historical completion patterns for comparable cohorts. This helps determine the number graduates per year.
- ***In-migration:*** Both international and interprovincial migration are forecasted by age and gender for the province as a whole. International migrants include landed immigrants, returning emigrants, and net non-permanent residents. These top-down forecasts already account for federal immigration targets. To map incoming migrants to the labour force, the model applies age and gender-specific participation rates for both international and interprovincial migrants. Lastly, using migration–occupation matrices from the 2021 Census, migrants are distributed across the occupations.
- ***Net other entrants:*** Modelled as a residual term by reconciling the labour implicitly projected using the stock-flow approach with the provincial labour force projections. Like with the other two supply components, net other entrants are projected by age and gender.

IV. Comparison to SK HHR Model

Key Differences

- SK's HHR model uses a bottom-up approach, while AB's top-down model forecasts provincial labour supply for each supply component separately and distributes it to occupations using occupational shares. AB also has a distinct supply methodology for non-physician health occupations - key differences are outlined below.
- To forecast the number of graduates that will enter the labour force, the number of graduates is multiplied by an estimate and applicable participation rate by age and immigration status. This methodology differs from SK's HHR model methodology, which applies a graduation rate by program and institution, and an average labour force attachment rate by occupation.
- As a next step, to map new graduates to specific occupations, a transition matrix is used, which is derived from Statistics Canada's Census of Population. Given SK's HHR model is a bottom-up model, it forecasts the number of graduates for each occupation independently.

Strengths of SK's HHR Model

- SK's HHR model explicitly factors in targeted recruitment initiatives and estimates graduation rates by institution and program, which may lead to a more accurate forecast for the in-scope health occupations.

Opportunities for SK's HHR model

- SK's HHR model is not linked to a broader demographic model, so policy changes like Canada's restrictions on non-permanent residents are not factored in. SK's HHR model could incorporate such macro factors qualitatively to inform provincial trends.

Source: Link to publicly available documentation here.

Alberta (2/3)

Alberta's (AB) occupational outlook is a top-down provincial labour market model anchored to macroeconomic and demographic forecasts produced by the Conference Board of Canada (CBoC) and Alberta Treasury Board of Finance (TBF). Occupations are modelled collectively, and the forecast for supply and demand is conducted at the provincial level. Alberta uses a specific supply methodology for health occupations.

II. Demand Methodology

Alberta

- Total demand each year is projected as the sum of expansion and replacement demand: ***Occupational demand = Expansion demand + Replacement demand***
- ***Expansion demand:*** Expansion demand reflects jobs created/lost to meet the changes in demand for goods and services as the economy evolves. To project expansion demand, first, historical labour force and employment data by occupation is collected from Statistics Canada's Labour Force Survey (LFS). An in-house algorithm then fills missing data points and constrains the labour force to administrative data for 25 health occupations. The model is then anchored to employment growth by industry as forecasted by the CBoC and TBF. The share of each occupation by industry from the 2021 Census of Population is used to determine employment by occupation. To account for technological impacts, AB's model applies an automation index (from Brookfield Institute's methodology) that reallocates jobs lost to automation into other occupations.
- ***Replacement demand:*** Replacement demand reflects additional workers required to replace those people leaving an occupation. Replacement demand covers demand resulting from retirements, deaths, and emigration out of the province. Forecasts draw on CoBC and TBF demographic projections by single age and gender, incorporating births, deaths, and components of interprovincial and international migration. Deaths are forecasted using age-specific mortality rates; out-migration is distributed by industry and assigned to occupations through Census industry–occupation matrices. Retirements are projected for people over 55 by five-year age cohort using age-specific participation rates, which are computed using an in-house regression model.

IV. Comparison to SK HHR Model

Key Differences

- The key difference between AB's and SK's HHR model is the type of model. AB's top-down demand model projects industry employment based on GDP growth, then distributes it across occupations using historical shares of occupations in industry employment based on the 2021 Census.

Strengths of SK's HHR Model

- Demand in SK's HHR model informs urgent need by factoring in near-term vacancies, while AB's model may underrepresent urgent needs at a provincial or sub-provincial level.
- SK's HHR model includes known capital builds and public commitments, which also helps improve accuracy of SK's HHR model. While announced projects and policy changes may be included in AB's projection of expansion demand, they are not explicitly called out.
- SK's HHR model analyzes a greater number of health occupations (42 vs. 25 in AB).

Opportunities for SK's HHR model

- Exploring how to account for the impacts of technological change could potentially benefit SK's HHR model.

Source: Link to publicly available documentation here.

Alberta (3/3)

Alberta's (AB) occupational outlook is a top-down provincial labour market model anchored to macroeconomic and demographic forecasts produced by the Conference Board of Canada (CBoC) and Alberta Treasury Board of Finance (TBF). Occupations are modelled collectively, and the forecast for supply and demand is conducted at the provincial level. Alberta uses a specific supply methodology for health occupations.

III. Additional Assumptions and Limitations

Alberta	IV. Comparison to SK HHR Model
• Inter-occupational mobility for other non-physician health occupations are assumed to be 0 due to lack of data and the relatively immobile nature of health occupations.	**Key Differences** • SK's HHR model captures occupational mobility for non-physician health occupations, including those who exit and then re-enter the labour force.

Source: Link to publicly available documentation here.

ESDC (1/3)

ESDC's COPS is a top-down, national labour market model anchored to macroeconomic and demographic forecasts produced by Deloitte Canada's Economic Advisory practice. COPS is not a forecasting system. It's a method which signals whether current imbalances will continue or emerge if current trends persist. It projects conditions for 293 occupations across 13 provinces/territories.

I. Supply Methodology

ESDC

- Supply is defined as "job seekers". Total supply each year is estimated as the sum of the following components:
  ***Supply** = **Immigration** + **School Leavers** + **Other Job Seekers** +*
  Net Occupational Mobility (residual)
  - Net occupational mobility includes occupational movers, net re-entrants, and working students.
- ***Immigration:*** ESDC's COPS projections forecast new arrivals (permanent residents) each year based on Immigration, Refugees and Citizenship Canada's (IRCC) national immigration targets, adjusting for labour force participation rates (derived from the Labour Force Survey (LFS)). These new entrants are then distributed across 293 occupational groups (a combination of the 500 4-digit NOC categories as per the 2016 classification) according to historical immigrant-by-occupation patterns (using Census of Population data).
- ***School Leavers**:* ESDC's COPS Projections identify individuals (aged roughly 15–34) who either graduate or drop out of educational programs each year. Their movement into occupations is modelled using historically observed transitions from education to occupational groups based on age, gender, and level of education.
- ***Other Job Seekers**:* This captures net re-entrants (those returning to the labour force after an absence), as well as working students. These inflow estimates are constrained so that projected unemployment rates align with macroeconomic scenarios provided by Deloitte Economics.
- ***Net Occupational Mobility**:* This tracks individuals in the labour force transitioning between occupations. Longitudinal datasets help measure how workers shift among "occupational families" over time.

IV. Comparison to SK HHR Model

Key Differences:

- SK's HHR model uses a bottom-up approach, while ESDC's top-down model forecasts provincial labour supply for each labour supply component separately. ESDC uses occupational shares to forecast each supply component by occupation.
- ESDC's COPS projections cover the entire Canadian labour market with 293 occupations at the NOC level in scope, while SK's HHR model focuses on 42 health occupations within the province.

Strengths of SK's HHR Model

- SK's HHR model enables analysis of more specific health occupations beyond the 293 standard occupation groupings.

Opportunities for SK's HHR model

- ESDC provides a macro, broad-based perspective on inflows (immigration, education) and captures occupational outlooks beyond a single sector. Given SK's HHR model is not anchored to a broader demographic model, policy changes such as Canada's cap on international study permits and non-permanent resident population is not factored in explicitly. SK's HHR model could potentially consider such macro factors in a qualitative analysis to inform broad provincial trends.

Source: Link to publicly available documentation here.

ESDC (2/3)

ESDC's COPS is a top-down, national labour market model anchored to macroeconomic and demographic forecasts produced by Deloitte Canada's Economic Advisory practice. COPS is not a forecasting system. It's a method which signals whether current imbalances will continue or emerge if current trends persist. It projects conditions for 293 occupations across 13 provinces/territories.

II. Demand Methodology

ESDC

- Demand is defined as "job openings" and total demand each year is projected as the sum of expansion and replacement demand. ***Demand = Expansion demand + Replacement demand***
- ***Expansion Demand****:* Expansion demand projects the annual creations/elimination of employment resulting from changes in industry output growth. ESDC's COPS projections start with GDP projections by industry (Deloitte scenarios) and industry-level employment growth, then allocates that growth to occupations based on historical staffing patterns (as highlighted in Statistics Canada's LFS). This results in an estimate of how many new positions might be created—or lost—if current trends persist.
    - Deloitte Canada's Economic Advisory practice develops custom projections for GDP, employment, and labour productivity by industry prior to distributing growth at the occupational level. Note that these projections also account for industry productivity.
- ***Replacement Demand****:* Replacement demand accounts for workforce exits, notably: 1) Retirements, including both voluntary (sourced from LFS data on self-reported reasons for leaving) and involuntary (longer unemployment spells for those aged 50+ sourced from the Longitudinal Administrative Database (LAD) and the LFS), 2) In-service mortality, estimated using Statistics Canada's mortality tables by age, and 3) Emigration, estimated by distributing outflows to occupations based on historical shares of out-migrants.

IV. Comparison to SK HHR Model

Key Differences

- The key difference between ESDC and SK's HHR model is the type of model. ESDC's top-down demand model projects industry employment based on GDP growth and then distributes it across occupations using occupational shares determined using time series LFS data.

Strengths of SK's HHR Model

- Demand in SK's HHR model informs local and urgent need by factoring in near-term vacancies, while ESDC's model may underrepresent urgent local needs at a provincial or sub-provincial level.
- SK's HHR model enables analysis of more specific health occupations beyond the 293 standard occupation groupings.

Opportunities for SK's HHR model

- ESDC's model captures longer-run macroeconomic forces and economic cycles that can affect demand across the entire Canadian labour market. SK could potentially consult broad provincial forecasts as part of a qualitative review of HHR model outputs.
- SK's HHR model could be enhanced by including demographic trends in the population growth component.

Source: Link to publicly available documentation here.

ESDC (3/3)

ESDC's COPS is a top-down, national labour market model anchored to macroeconomic and demographic forecasts produced by Deloitte Canada's Economic Advisory practice. COPS is not a forecasting system. It's a method which signals whether current imbalances will continue or emerge if current trends persist. It projects conditions for 293 occupations across 13 provinces/territories.

III. Additional Assumptions and Limitations

ESDC	IV. Comparison to SK HHR Model
• As a first step to their analysis, ESDC undergoes a thorough analysis of key economic indicators (data gathering and qualitative research) to form a story for each industry prior to producing the forecast. This is followed by a consultation with region-specific analysts to validate the story and underlying assumption. • ESDC's COPS projections are updated every two to three years. • ESDC's COPS projections do not have a healthcare industry-specific methodology.	**Key Differences** • Given the annual update to SK's HHR model, it is more responsive to policy changes (e.g., new bridging programs for internationally trained nurses, or new public commitments and capital projects) than ESDC's model. • SK's HHR model focuses only on supply and demand for health occupations.

Source: Link to publicly available documentation here.

Nova Scotia (1/3)

Nova Scotia's (NS) current HHR model is a bottom-up model. However, a needs-based demand approach is being developed in parallel. This dynamic, integrated multi-professional, and needs-based HHR model would be a first of its kind. It explicitly accounts for how professionals split their time and how tasks are divided, allowing decision-makers to test various scenarios.

I. Supply Methodology

Nova Scotia

- NS currently uses a basic stock and flow model, starting with the headcount of licensed/registered to practice professionals (obtained from regulatory bodies' registries), and makes three adjustments to the stock as noted below: ***Labour supply*** $_{n,t} = S_{n,t} \times D_{n,t} \times A_{n,t} \times F_{n,t}$
- $S_{n,t}$: Licensed stock - profession n in year t.
- $D_{n,t}$: Proportion of that stock providing direct patient care.
- $A_{n,t}$: Average fraction of an FTE devoted to clinical care (i.e., activity level).
- $F_{n,t}$: Clinical focus fraction (e.g., the % of a provider's clinical time spent on a specific population or condition).
- **Inflows:**
  - Graduates are derived from each local training program (seats, program duration, program retention and seats filled). The model tracks the age distribution of new graduates and adjusts the number of graduates by applying a new grad retention rate. Depending on the profession, it may adjust for the proportion of seats being filled.
  - In-migration captures the number of healthcare professionals moving to NS from other provinces or countries and is estimated based on historical patterns or through licensing data.
- **Outflows:** All types of outflows are grouped and modelled as one outflow using an outflow/turnover rate sourced from regulatory bodies. Outflows are projected as people not renewing their license to practice. In addition, the model assumes everyone retires at 65.

IV. Comparison to SK HHR Model

Key Differences

- NS's model captures total supply for each forecast year, while SK's HHR model captures the incremental supply for each forecast year.

Strengths of SK's HHR Model

- The methodology for forecasting outflows is more comprehensive in SK's HHR model as retirements and resignations are projected as separate components, whereas in NS a single rate is assumed to capture all attrition.
- SK's HHR model accounts for targeted recruitment initiatives, while NS does not.

Opportunities for SK's HHR model

- NS's model includes some physician specialties such as family physicians, pediatricians, and psychiatrists. Bringing in the physician forecast prepared by Medical Services could help inform the analysis for related health occupations such as registered nurses (RNs), psychologists, social workers, etc.

Source: Link to publicly available documentation here.

Nova Scotia (2/3)

Nova Scotia's (NS) current HHR model is a bottom-up model. However, a needs-based demand approach is being developed in parallel. This dynamic, integrated multi-professional, and needs-based HHR model would be a first of its kind. It explicitly accounts for how professionals split their time and how tasks are divided, allowing decision-makers to test various scenarios.

II. Demand Methodology

Nova Scotia

- NS's current demand methodology is similar to SK's, as it uses the number of funded vacancies as a starting point to estimate the gap between supply and demand.
- NS's proposed needs-based approach identifies the forecasted service volume required for each subpopulation (i.e., by age, gender and health status), and links the required service volumes to provider time for different health occupations.
- It accounts for disease prevalence rates, the number of services required by subpopulation based on their health status, the division of work among health professionals, and productivity shifts. Productivity shifts are estimated using expert inputs or billing data for physicians (primary care roster size, number of procedures performed). For more details, please reference the link below.
- Parameters account for changes in demographics, changes to the prevalence of health conditions within the population, and changes to the level of service.

IV. Comparison to SK HHR Model

Key Differences

- NS's needs-based demand model differs fundamentally from SK's HHR model. Instead of using vacancies and expansion project plans to forecast demand, it projects demand based on population health needs, level of service required, and care delivery resourcing patterns, leading to distinct needs-based inputs and assumptions.

Strengths of SK's HHR Model

- Demand in SK's model can provide insights on urgent or short-term need. This is not the case for NS's proposed needs-based model as it is a simulation model that is not intended to predict the future with high accuracy. NS mainly uses this approach to test multiple "what-if" scenarios.

Opportunities for SK's HHR model

- If SK ever wants to transition to or build a needs-based simulation model, NS is the benchmark within the country for this approach.
- A first step for SK's HHR model could be to factor in demographic trends by segmenting demand driven by population growth by age cohort.
- Collecting relevant data for some of these components in advance, i.e., required services per person by health status, the proportion of specific services delivered by a profession, and productivity measures, could be useful if ever SK wishes to deploy a needs-based model in the future.

Source: Link to publicly available documentation here.

Nova Scotia (3/3)

Nova Scotia's (NS) current HHR model is a bottom-up model. However, a needs-based demand approach is being developed in parallel. This dynamic, integrated multi-professional, and needs-based HHR model would be a first of its kind. It explicitly accounts for how professionals split their time and how tasks are divided, allowing decision-makers to test various scenarios.

III. Additional Assumptions and Limitations

Nova Scotia

- The purpose of NS's proposed needs-based approach is not to predict the future. Instead, the model is intended to integrate knowledge of other aspects of the healthcare system (such as planned service levels) into a single planning and communication tool to simulate how various factors could affect supply.
- In NS's current HHR model, private sector vacancies are included for pharmacy professions due to data availability. NS is currently in the process of gathering the information required to include private sector vacancies for mental health occupations.
- NS's current model includes roughly 19 non-physician occupations and three physician specialties – family physicians, anaesthesiologists, and emergency physicians. The team is working towards adding 12 other specialties this year.
- While NS's current HHR model is only done for the province as a whole, the model can be narrowed down by geography for the particular purpose of increasing capacity at a local university.

IV. Comparison to SK HHR Model

Key Differences

- SK's HHR model currently only includes vacancies within the SHA and SCA and could consider including private sector vacancies for some occupations similar to NS by working with regulatory bodies or boards to gather data on private sector vacancies.
- One reported challenge is that NS does not always have complete current state data, especially when it comes to incorporating nuances from the private sector. Consequently, when data is lacking, rather than not including it, NS consults with a panel of experts to determine the appropriate assumptions for the missing inputs. SK experiences similar issues with data availability, especially as it relates to private sector vacancies but currently does not include data if it is difficult to come by. While assumptions would still need to be made, SK could potentially consult with a panel of experts to come up with assumptions for occupations where there is significant missing data/employment in the private sector.
- SK's HHR model forecasts demand and supply for 42 occupations, while NS's model currently informs 22 (including three physician specialties).
- SK's HHR model cannot be broken down by geography (yet).

Source: Link to publicly available documentation here.

Ministry of ICT (1/2)

The Ministry of ICT's labour demand outlook is anchored to QED Inc.'s model for Saskatchewan, which is a demand side only top-down model based on Saskatchewan's Ministry of Finance's budget planning assumptions. QED Inc.'s model distributes future employment growth across 19 2-digit NAICS industries and 413 NOC occupations. The Ministry of ICT breaks the forecast down further into 4-digit NAICS and 5-digit NOCs.

I. Supply Methodology

SK ICT model

- QED's model used by the Ministry of ICT (the SK ICT model) is a demand-based model and does not produce a supply forecast. However, the team is currently working on adding a labour supply model, which will highlight imbalances/opportunities when available.

IV. Comparison to SK HHR model

- SK's HHR model includes a supply forecast, while the SK ICT model does not.

II. Demand Methodology

SK ICT model

- ***Job Openings = Expansion demand + Replacement demand***
- ***Expansion demand:*** Projects the annual creations/elimination of employment resulting from changes in economic growth. QED produces employment projections for the 19 2-digit NAICS industries for SK and are distributed to the 413 NOCs in scope based on the historical distribution of occupations by industry. Data on the share of occupations by industry is obtained from the LFS, the Census of Population, and National Accounts.
- ***Replacement demand:*** Measures existing jobs that need to be replaced, mostly due to retirements. Retirements are forecasted by age cohort, geography, industry and occupation by multiplying the retirement rate by the corresponding labour force estimate. While the intention of this rate is to capture all attrition, it currently only captures retirements.
- Confirmed public commitments and capital projects that will impact hiring are included implicitly in the Ministry of Finance's economic outlook. If there are capital projects or changes in their development not being captured, ICT includes/excludes them in their alternative scenarios.
- Private sector demand is accounted for.

IV. Comparison to SK HHR model

Key Differences

- The key difference between SK's ICT model and SK's HHR model is the type of model. SK's ICT model is a top-down demand model, which projects industry employment based on GDP growth and then distributes it across occupations using occupational shares.
- SK's ICT model captures total demand for each forecast year, while SK's HHR model captures the incremental demand for each forecast year.

Strengths of SK's HHR Model

- SK's HHR model converts FTEs to headcount and vice versa, while only headcount is used to forecast job openings in the SK ICT model. The SK ICT model does not provide an FTE estimate.
- SK's HHR model captures retirements and resignations, while SK's ICT model only captures retirements. However, ICT estimates a retirement rate by age, geography, industry, and occupation which may be more accurate.

Opportunities for SK's HHR model

- ICT adds two scenarios to the baseline forecast, providing a high and low range for outputs, which SK HHR could consider.
- ICT's forecast can be broken down to the CMA level. SK's HHR model could potentially be split by geography.

Source: Publicly available documentation available by clicking the "Methodology" link here

Ministry of ICT (2/2)

The Ministry of ICT's model is based on QED Inc.'s outlook for Saskatchewan, which is a demand side only top-down model anchored to assumptions in the latest budget from Saskatchewan's Ministry of Finance. QED Inc.'s model distributes future employment growth across 19 2-digit NAICS industries and 413 NOC occupations. The Ministry of ICT breaks the forecast down further into 4-digit NAICS and 5-digit NOCs.

III. Additional Assumptions and Limitations

SK ICT model

- SK's ICT model does not have a health-specific methodology, which is usually a layer added to the supply side in top-down models. The key starting point in SK's ICT model is the employment forecast for the healthcare industry in Saskatchewan from the Ministry of Finance's analysis.
- Demographic assumptions are built in and inform the macroeconomic forecast for both expansion and replacement demand.
- QED Inc. (i.e., SK ICT's base model) does not account for 99 out of the 512 NOC occupations as these occupations had fewer than 100 employed in the province in 2024 and therefore data is suppressed or unavailable for most indicators.

IV. Comparison to SK HHR model

Key Differences

- The SK ICT model is a demand side only model. SK's HHR model accounts for both supply and demand.
- SK's ICT demand model only goes down to the 5-digit NOC level. The NOC classifications currently group together multiple occupations. SK's HHR model forecast is conducted for more granular occupations.
- SK's HHR supply and demand forecast are conducted for each in-scope occupation separately, likely leading to a more accurate forecast for more granular occupations.
- SK's HHR model does not currently factor in demographic projections, presenting an opportunity for improvement.
- Vacancies are accounted for directly in SK's HHR model, while they are more implicitly accounted for in SK's ICT model through replacement demand.

Source: Publicly available documentation available by clicking the "Methodology" link here

Manitoba (1/2)

Manitoba's (MB) HHR model follows a bottom-up approach where occupations are independently modelled. Still in early development, it uses a basic stock-flow method to capture supply, inflows, and outflows at the provincial level. Demand is driven by known vacancies and planned service expansions. Future phases aim to include detailed service utilization, needs-based demand drivers, population growth, and demographic trends.

I. Supply Methodology

Manitoba

- ***Labour supply*** $_t$ ***= Labour supply*** $_{t-1}$ ***+ Average inflows*** $_t$ ***- Average outflows*** $_t$
- ***Labour supply*** $_{t-1}$ **:** MB's model starts with the current stock of healthcare workers. Current supply is forecasted using average historical inflow and outflow rates.
- ***Average inflows*** $_t$ **:** Historical inflow rates are used and assumed to capture all inflows. The plan for future phases is to include a detailed breakdown of inflows by component.
- ***Average outflows*** $_t$ **:** Historical outflow rates are used and assumed to capture all outflows. The plan for future phases is to include a detailed breakdown of outflows/attrition by component.
- The model's first objective is to reconcile how projected inflows will address immediate vacancies in the system.

Note on Data Sources:

- Data remains fragmented across multiple systems and work is underway to centralize data across multiple systems.
- MB's plan is to gather administrative data from Service Delivery Organizations (SDOs) and all clinical service areas, and enhance collaboration with them to validate the data, approach, and share model results.
- MB also plans to engage and collaborate further with educational institutions in the future to obtain historical graduate and enrollment data.

IV. Comparison to SK HHR Model

Key Differences

- The methodology and data sources used in SK's HHR model are more mature than MB's. MB is in the early stages of building a centralized data repository and a modelling methodology.
- SK's HHR model accounts for outflows/attrition on the demand side, while MB captures it in supply.

Strengths of SK's HHR Model

- SK's HHR model is more detailed as it forecasts each inflow and outflow component, while MB's current preliminary model forecasts aggregated total inflows and total outflows.

Opportunities for SK's HHR model

- MB has a three-phase plan to evolve their model. While MB's model is still in its early stages (phase 1), having a phased strategy could be beneficial in the context of SK's HHR model to iteratively improve the model and gain stakeholder alignment early on regarding the model's ultimate purpose.

Source: Discussion with the executive director of HHR planning and the team at Manitoba Health

Manitoba (2/2)

Manitoba's (MB) HHR model follows a bottom-up approach where occupations are independently modelled. Still in early development, it uses a basic stock-flow method to capture supply, inflows, and outflows at the provincial level. Demand is driven by known vacancies and planned service expansions. Future phases aim to include detailed service utilization, needs-based demand drivers, population growth, and demographic trends.

II. Demand Methodology

Manitoba

- Demand is forecasted based on the following equations:
  $Vacancies_t = Vacancies_{t-1} \times (1+Growth\ rate)$
  $Demand_t = [Supply_{t-1,i} + Vacancies_{t-1,i}]$
- $Vacancies_{t-1}$: Identified vacancies in the public health system serve as a proxy for immediate demand. Private sector vacancies are not included yet. The model treats current vacancies as unmet demand that must be filled as a priority.
- **Growth rate:** For the near-term (next five years), vacancy rates are projected linearly based on historical vacancies and adjusted for expansion plans.
- Accounts for known or approved expansion plans and commitments to identify the impacted occupations and the extent of the impact in FTEs.
- In the medium term, the plan is to move towards a service utilization model which accounts for workload on the demand side, broken down by region. Over the long-term, MB plans to move to a needs-based model which includes population growth, demographic changes, etc.

IV. Comparison to SK HHR Model

Key Differences

- MB projects vacancies using a growth rate, while SK's HHR model does not.

Strengths of SK's HHR Model

- SK's HHR model captures population growth on the demand side, while MB's does not yet.

Opportunities for SK's HHR model

- MB has a three-phase plan to evolve their model. While still in the initial phase, this phased strategy could benefit SK's HHR model by enabling iterative improvements and securing early stakeholder alignment on the model's ultimate purpose.

III. Additional Assumptions and Limitations

Manitoba

- Model results are currently provided to provincial leadership. For some occupations (e.g., paramedics), the model has been used already to request funding and close the gap. The future goal is to get more of a cohesive provincial plan by working closely with advanced education and training organizations.

IV. Comparison to SK HHR Model

Key Differences

- N/A: MB's model is still in its preliminary stages.

Source: Discussion with the executive director of HHR planning and the team at Manitoba Health

Stakeholder Consultations

Purpose and Approach

Purpose

The purpose of the stakeholder consultations was to connect with different ministries and organizations in Saskatchewan **to gather insights on the end uses of the model and incorporate feedback on potential areas of improvement**.

Specifically, the consultations were undertaken to gain insights into:

1. How and to what extent do the model's projections and outputs support HHR planning and budget decision-making, and
2. How to improve the usefulness of the model and the presentation of its outputs in decision making.

Approach

To gather insights from stakeholders, **the following questions were asked**:

1. What is your familiarity with the Ministry of Health's HHR Forecast Model? If you are not familiar, do you use labour market information for decision making? If so, what kind?
2. How and to what extent do the model's projections and outputs support HHR and budget decision-making by your work unit/organization?
    a. What other information does your work unit/organization use to assess the labour market conditions when making HHR and budget decisions (such as expanding current programs, introducing new programs, proposing new capital projects that have incremental labour requirements, etc.)?
    b. At what stage in the decision-making process do you find it most effective to incorporate the HHR Forecast Model's output to ensure alignment with partners in the HHR space?
3. Are there any ways that you think could improve the usefulness or value of the model in your work unit/organization's decision making?
    a. Are there any improvements that you would recommend regarding the approach (design), data, assumptions of the model (technical components of the model)?
    b. Are there any improvements that you would recommend regarding the presentation, communication, and interpretation of the model?
4. How would you rate or describe your work unit/organization's confidence in the model and the projections produced by the HHR Forecast Model? Please explain how your confidence level has been formed or changed over time.
    a. What could potentially improve your confidence in the model's projections?
5. Would it be beneficial to implement a needs-based demand model for HHR planning, as opposed to relying solely on the model as it is currently designed, and how might this shift improve the accuracy and effectiveness of workforce planning?

The stakeholders consulted can be divided into two groups:

1. Stakeholders from different branches **within the Ministry of Health** (internal)
2. Stakeholders in organizations **external to the Ministry of Health** (external).

Disclaimer: The themes and insights highlighted in the following pages are based on interviewees' subjective opinions and experiences. They may not reflect the realities of the model and should be considered personal viewpoints rather than fact.

Summary of Internal Stakeholder Consultations (1/2)

The below summarizes inputs from stakeholders from different branches within the Ministry of Health (i.e., stakeholders internal to the Ministry of Health).

3	9	8	3	3	0
Interview Sessions	Unique Attendees; Director+	Have a basic understanding of the model	Use the model directionally for long-term planning	Use the model directionally for budget decisions	Use the model as a primary source for budget decisions

1. Familiarity with the HHR forecast model

8/9 stakeholders are aware of the model, yet 6/9 are still unaware of its approach and methodological details. Only 3/9 use the model.

- Six stakeholders have never used the model outputs. They are not often exposed to the model and/or rely on branch-level expertise and independent data analyses.
- All stakeholders are willing to use model outputs. However, common reasons for limited use of the model are that data isn't detailed enough, or results are not released in time for the branch's needs. One stakeholder has a goal to provide relevant data to make the model more usable.
- One branch relies on HHR forecasts to plan for capital projects. Some branches use parts of the model outputs to make a case for new programs, additional training seats, or staffing.

2. Budget decision-making

The model is being used to validate budget decisions, but not as the primary source for decision-making.

- Most branches conduct their own analyses, because they can collect the data required for their needs and have the expertise to analyze that data (e.g., primary care relies on their own extensive analysis).
- Most branches favour real-time data and on the ground experiences, which reflect immediate need, to inform their recruitment and retention needs. Some produce a "best guess" of staffing needs to deliver certain programs and don't rely on the model.
- Branches usually prepare their business case and then refer to the model for directional guidance to validate their business case. According to some internal stakeholders, they find it a challenge to use the model in decision-making because they feel it does not accurately reflect community and private sector needs, or the constraints of the province's health system.[1] The model may highlight a big gap for a certain occupation, but the estimated gap may be too large to close by the system within a realistic time.

3. Suggestions to improve usefulness

Stakeholders would like to better understand the model and its assumptions and be able to provide feedback on its inputs to gain more trust in its outputs and use it more frequently.

- Improvements proposed by most internal stakeholders include breaking the model down by geography (urban vs. rural), incorporating demographic trends and chronic disease prevalence when forecasting demand, incorporating waitlists, incorporating factors driving talent away from SK, and including additional occupations in the model (e.g., other non-clinical roles like IT, finance, cooks).
- Most stakeholders indicated they wanted to improve collaboration with the HHR team. Some feel that meeting with the HHR team again to fully understand the model and its assumptions in detail, and being able to provide additional data inputs, would help improve trust and use.
- Three stakeholders disagreed with the prioritization framework. Shortages for some occupations (e.g., paramedics) are more critical/urgent, and those nuances do not seem to be captured. The prioritization framework should not group all occupations together. One cannot compare a small occupation to a larger occupation, as they face different urgencies.

Note 1: Please note that, while stakeholders may feel that the private sector is not included in the model, a thorough review of the current HHR model in SK confirms the private sector is indeed incorporated.

Summary of Internal Stakeholder Consultations (2/2)

The below summarizes inputs from stakeholders from different branches within the Ministry of Health (i.e., stakeholders internal to the Ministry of Health).

3	9	8	3	3	0
Interview Sessions	Unique Attendees; Director+	Have a basic understanding of the model	Use the model directionally for long-term planning	Use the model directionally for budget decisions	Use the model as a primary source for budget decisions

4. Confidence in the model's projections

Confidence is high for two stakeholders that use the model and have attended information sessions about the model, but lower for the rest since they are unfamiliar with the model.

- Two stakeholders, who attended information sessions held by the HHR branch in 2024, were more confident with the model's results and appreciated the HHR branch's efforts to gather feedback.
- Most could not comment on their confidence in the model given they are not very familiar with it. However, missing components flagged in #3, the belief that private sector demand is not included – although a review of the model confirms private sector demand is indeed included in the model – and the labour challenges community-based organizations' (CBOs) face is impacting stakeholders' confidence in the model.
- One stakeholder claims their confidence varies by occupation. Where data is highly specific (e.g., small groups like perfusionists), confidence is higher; for large, diverse occupations (e.g., nurses, paramedics, pharmacists), data limitations erode confidence in the results.

5. Needs-based demand model

Strong endorsement for including demographic trends into demand and incorporating components of a needs-based model that captures policy and occupational drivers.

- All stakeholders interviewed see the value in incorporating elements of a needs-based model. Some claim it would be useful for long-term planning.
- Suggestions include factoring in chronic disease prevalence rates, demographic trends (i.e., the aging population), wait times, and broader, longer term, policy changes. These trends may inform the need for new non-clinical roles such as "super" personal support workers (PSWs) who specialize in providing bedside assistance, or specialized health navigators.
- Some conduct a "needs-based" analysis independently. For example, one branch looks at target wait times for certain procedures and estimates the staff required to achieve that target.

6. Additional common themes

Improving collaboration across all levels and improved presentation of the model's outputs and assumptions would help build confidence and increase use of the model.

- A few stakeholders appreciated the progress the model has seen to date and are proactively collaborating with the HHR branch to make the model more usable by providing data inputs.
- One stakeholder claimed engagement across all levels—directors, frontline managers, associations—would be helpful so that everyone is aware of and trusts the model's capabilities.
- One stakeholder suggested the need for altering the presentation of model results in the future (e.g., using infographics).
- Improving the clarity or presentation of the prioritization logic (i.e., not labelling certain professions as "low priority") would help with stakeholder buy-in.

Summary of External Stakeholder Consultations (1/2)

The below summarizes inputs from stakeholders in organizations external to the Ministry of Health.

4	16	13	6	3	1
Interview Sessions	Unique Attendees	Have a basic understanding of the model	Use the model directionally for long-term planning	Use the model directionally for budget decisions	Use the model as a primary source for budget decisions

1. Familiarity with the HHR forecast model

13/16 stakeholders are familiar with the model and 6/16 have a relatively good understanding of its design and outputs and use it for decision making.

- Most organizations are active clients of the model and provide data inputs as well. One uses it to guide decision-making and identify post-secondary program expansions needs. The inputs they provide help forecast the flow of graduates into different occupations. Others use it to either support training programs or to identify gaps to plan for new recruitment strategies, including those related to future infrastructure needs or service expansions.
- Two organizations are familiar with the model but do not use it directly for decision-making. One conducts their own needs-based analysis as they are only interested in a few occupations. The other uses it as a check against their own assumptions but feel outputs don't always reflect reality.

2. Budget decision-making

Most rely on the model to validate their own research, but not as a primary source for decision-making. However, some organizations have used it to justify large program expansions.

- One organization uses the model to expand training seats and has made significant investments ($100M+) over the last three years based on model results. However, they face challenges translating forecasted employment needs to a number of training seats required. Another organization relies on the model for budgeting when big changes to the system are anticipated. Some rely on their own analyses.
- According to some, model results are often not released in time for budget planning. One organization would prefer if results could be released by the end of June which would allow them to make more use of it. The timing of when model results are released is key, especially for longer-term decisions like expanding the number of seats for a four-year training program. Matching the number of vacancies to graduate inflows from a longer program is more challenging.

3. Suggestions to improve usefulness

Stakeholders would like the model to include physician occupations and other non-clinical occupations, be frequently updated, and better capture current shortages.

- Some feel it would be helpful to increase the number of occupations covered in the model. Including physicians would help stakeholders assess staffing models for complementary roles. Capturing non-clinical roles (IT, finance, janitors, etc.) would also help as they struggle to recruit for those roles.
- Some stakeholders would prefer more frequent updates to the model, despite the model already being updated annually.
- According to some, the model underestimates demand as it does not capture demand from the private sector (while a thorough review of the current HHR model confirms that it does in fact account for private sector demand). In addition, some stakeholders stated that the model only captures budgeted vacancies but feel that these budgeted vacancies do not truly reflect the unmet demand for certain occupations. It was highlighted that large shortages for some occupations, such as occupational therapists and speech language pathologists, are preventing them from practising to their full scope. As a result, these professionals are currently limited to performing basic needs assessments rather than providing the full range of services they are capable of.

Summary of External Stakeholder Consultations (2/2)

The below summarizes inputs from stakeholders in organizations external to the Ministry of Health.

4	16	13	6	3	1
Interview Sessions	Unique Attendees	Have a basic understanding of the model	Use the model directionally for long-term planning	Use the model directionally for budget decisions	Use the model as a primary source for budget decisions

4. Confidence in the model's projections

Confidence is growing and is higher among stakeholders that use and provide inputs into the model. Inherent limitations of forecasting models to incorporate real-world complexities challenge confidence levels for some.

- Some stakeholders have stated that their confidence in the model has grown over time, and appreciate the presentations given by the HHR branch and their willingness to collaborate.
- One stakeholder noted significant year-to-year variations in the model's output and expressed concern over the communication of these changes, especially as large investments are made based on earlier forecast results. However, a review of the HHR model and accompanying documentation confirms that methodological updates and variances are already clearly documented and explained.
- One organization has a good understanding of their business and needs and thus does not use the model. Another organization is unsure whether the model is double counting people moving through the system (e.g., licensed practical nurses that become registered nurses). However, a thorough review of the model confirms they are not being double counted.

5. Needs-based demand model

There is broad support for a needs-based approach, but stakeholders caution that it must still account for budget realities and avoid unrealistic projections.

- Many already conduct a "needs-based" analysis independently (e.g., for oncology programs).
- One stakeholder claimed that they would like model outputs to be more frequently validated with health system leaders to confirm the prioritization rankings and whether projected imbalances are aligned with on-the-ground observations at employers across the province.
- Most stakeholders favour a transition to a needs-based approach in the future that accounts for shifting demographics and levels of acuity. However, one more experienced user warns that a purely needs-based model could consistently project demand beyond available budgets. Newer users may benefit from extra guidance to fully grasp the complexities of transitioning to a needs-based model.

6. Additional common themes

There is a desire for model outputs to be released prior to budget planning cycles, for there to be improved collaboration with the HHR team, and for revisiting the prioritization framework.

- Many want model outputs to be released ahead of when budget planning needs to begin.
- A few stakeholders who do not use the model would like there to be more frequent collaboration with the HHR team to better understand the inputs and outputs of the model.
- Some stakeholders disagreed with the prioritization framework. Some small occupations may only have few vacancies, but because they make up a significant portion of their small supply, they move up in the priority ranking. However, larger occupations may have a large number of vacancies, but because they make up a smaller share of their supply, they are lower in the rankings. Suggestions include breaking down occupations into two provider groups (small and large) for prioritization.
- Some stakeholders suggested to add layers to the model (small vs. large occupation groups, short vs. long training, urban vs. rural geography split, factoring in wait times, etc.).

Conclusions and Recommendations

Conclusion and Recommendations

Saskatchewan's HHR forecast model is well developed, incorporates consistent and detailed supply and demand components, integrates the private sector, and encompasses broad occupational coverage. It has evolved significantly from its first iteration, but there remains opportunity for continued refinement and improved communication.

Based on a thorough review of the Ministry's current HHR model, input from stakeholders, and the outputs of the jurisdictional scan, we propose the following recommendations. Looking to increase the effectiveness, impact and uptake of the model, recommendations have been categorized into three groups:

1. **Model optimization:** Recommendations intended to help improve the model outputs.
2. **Increasing use and building trust:** Recommendations intended to help build trust in model outputs among potential users, ultimately increasing usage of the model.
3. **Continuous improvement:** Recommendations intended to provide suggestions on how the Ministry can evaluate the model going forward.

Model optimization	**1. Include Demographics in Demand**
	2. Incorporate Private Sector Vacancies where Possible
	3. Consider Breaking the Model Down by Region
	4. Include Physician Outlook within the Forecast for Non-Physician Health Occupations
Increasing use and building trust	**5. Form a Formal Advisory Committee to Inform Model Inputs and Outputs**
	6. Enhance Model Communications
	7. Include a Qualitative Analysis to Support the Forecast
Continuous improvement	**8. Evaluate Model Outputs and Stakeholder Engagement**

Model Optimization

Recommendation 1: Include Demographics in Demand – Implementation Option 1

Currently, the province's HHR forecast model accounts for population growth on the demand side. The population growth component uses the total projected population covered under Saskatchewan's health insurance plan. However, we know that older individuals use the healthcare system more often than younger people. Thus, we recommend splitting the population growth component by age. There are two proposed ways to implement this recommendation:

Implementation option 1: Estimate the average FTE per capita (utilization) by age cohort in the population growth component

If data is available, we recommend estimating the five-year average number of FTEs per capita by five-year age cohort when projecting demand due to population growth. Ideally, the population growth component would be segmented by five-year age cohort, but if needed, larger age groupings could also work. The steps highlighted below would be undertaken for each occupation.

Step 1: Estimate a five-year average paid FTE per capita by age cohort and occupation to obtain the number of FTEs needed due to population growth by age cohort per year

Year	Projected population	Age cohorts	5-year average paid FTE per capita (SHA, SCA, affiliates)	Projected FTEs
t	50,000	0-4	0.0001	50k x 0.0001 = 5
	60,000	4-9	0.0002	60k x 0.0002 = 12
	…	…	…	…
	5,000	90+	0.008	5k x 0.008 = 40
	Total			**5+12+…+40 = 395**
t+1	55,000	0-4	0.0001	55k x 0.0001 = 5.5
	65,000	4-9	0.0002	65k x 0.0002 = 13
	…	…	…	…
	6,000	90+	0.008	6k x 0.008 = 48
	Total			**5.5+13+…+48 = 400**
…	…	…	…	…

Step 2: Apply the estimated % on payroll and the SHA headcount to FTE ratio to get the demand in headcount due to population growth

Year	Demand in FTEs	Incremental FTEs	Estimated % on payroll	SHA headcount to FTE ratio	Demand in headcount
0	388	NA	60%	1.2	NA
t	395	7			(7/60%) x 1.2 = 14
t+1	400	5			(5/60%) x 1.2 = 10
…	…	…			…

Reference model(s): Newfoundland and Labrador

Note: All numbers highlighted above are hypothetical.

Recommendation 1: Include Demographics in Demand – Implementation Option 2

Currently, the province's HHR forecast model accounts for population growth on the demand side. The population growth component uses the total projected population covered under Saskatchewan's health insurance plan. However, we know that older individuals use the healthcare system more often than younger people. Thus, we recommend splitting the population growth component by age. There are two proposed ways to implement this recommendation:

Implementation option 2: Estimate a weighted average population growth to capture demographic changes

If the data to undertake Option 1 is not available, we propose estimating the weighted average population growth using expenditure on other professionals by age cohort in SK from CIHI to capture demographic changes. The following steps would be undertaken for each occupation.

Step 1: Calculate the weighted average (WA) population growth for each year of the forecast

Numerator (i.e., the total sum of products)=

Age cohorts	Pop growth (year t-1 to t)	Total per capita health expenditure from CIHI	Product
0-4	2%	2K	2% x 2 = 0.04
4-9	2%	1K	2% x 1 = 0.02
10-14	1%	1K	1% x 1 = 0.01
…	…	…	…
90+	2%	8K	2% x 8 = 0.16
Total sum of products			**0.04+0.02+0.01+…+0.16**

Denominator (per capita) = $\text{Expenditure}_{t,0\text{-}4}$ +$\text{Expenditure}_{t,5\text{-}9}$ + …+ $\text{Expenditure}_{t,90+}$

$WA_t = \frac{Numerator}{Denominator}$

Step 2: Apply the WA growth to the paid FTEs on payroll

Assuming the WA growth rate estimated in year t = 3% and year t+1 = 2%.

Year	WA Pop Growth	FTEs	Incremental FTEs
0	NA	200 (starting point)	NA
t	3%	206 = 200 x (1+3%)	6.00
t+1	2%	210.12 = 206 x (1+2%)	4.12
…	…	…	…

Step 3: Apply the estimated % on payroll and the SHA headcount to FTE ratio to get the demand in headcount due to population growth

Year	Incremental FTEs	Estimated % on payroll	SHA headcount to FTE ratio	Demand in headcount
t	6	60%	1.2	(6/60%) x 1.2 = 12
t+1	4.12			(4.12/60%) x 1.2 = 8
…	…			…

Reference model(s): Newfoundland and Labrador

Note: All numbers highlighted above are hypothetical.

CIHI expenditure data by age: National health expenditure, series E1, table E.1.25.2

- Public spending on other professionals would have been preferred, but it is skewed towards publicly funded dental services and vision care services for children under 18.

Recommendation 2: Incorporate Private Sector Vacancies where Possible

During interviews with stakeholders, a key suggestion for improvement was to further incorporate private sector demand when possible. Based on what we've heard and what other jurisdictions are currently doing (e.g., Nova Scotia), the second recommendation is to include private sector vacancies, at least for occupations with substantial private sector employment, to avoid underestimating current unmet demand.

Step 1: Create a list of health occupations with large shares of private sector employment. A few examples of such occupations include pharmacists, audiologists, advanced care paramedics, addictions counsellors, physical therapists, and mental health therapists as outlined in the 2024-25 HHR forecast package.

Step 2: Further filter for occupations where private sector employment and vacancy data could be gathered from private sector employers, experts, surveys, and/or any other regulatory body/organization. For example, NS's HHR model captures private sector data for pharmacy occupations, as they were able to gather data from regulatory bodies. SK could also leverage data from agreements with employers that are fully funded by the public system (diagnostic clinics, radiologist billing data, etc.).

- Alternatively, private sector vacancies can be obtained from the job bank. Vacancies are updated in real time on the job bank website (link here) and can be filtered by job title, province, city, and the employer's name.
- For easier manipulation of data, Open Government publishes job postings advertised on Canada's job bank website monthly (link here).

Below is an example of the implications of excluding private sector vacancies in the model. Consider speech language pathologists (SLPs). As of March 31, 2024, there were 412 SLPs in the province (31% public, 69% private). 19 public sector vacancies exist in 2024-25 for SLPs. Assume 40 private sector vacancies in 2024-25.

Accounting for private sector vacancies

Model Component	2024-25	2025-26
Graduates (Domestic)	0	0
Graduates (IPA)	0	8
In-Migrations	26	29
Targeted Recruitment	0	0
Total Supply	**26**	**37**
Private + Public Vacancies	19 + 40 = 59	80
Capital Projects	0	0
Attrition	9	9
Population Growth	36	6
New Public Commitments	2	0
Total Demand	**106**	**95**
Balance	**-80**	**-58**

Not accounting for private sector vacancies (current model setup)

Model Component	2024-25	2025-26
Graduates (Domestic)	0	0
Graduates (IPA)	0	8
In-Migrations	26	29
Targeted Recruitment	0	0
Total Supply	**26**	**37**
Private Vacancies	-	-
Public Vacancies	19	40
Capital Projects	0	0
Attrition	9	9
Population Growth	36	6
New Public Commitments	2	0
Total Demand	**66**	**55**
Balance	**-40**	**-19**

Not accounting for private sector vacancies, leads to a significant underestimation of the current gap and the shortage in upcoming years in the forecast.

Reference model(s): Nova Scotia

Note: All numbers highlighted above are hypothetical.

Recommendation 3: Consider Breaking the Model Down by Region – Implementation Option 1

The model currently breaks down vacancies into four regions: North, South, Regina, and Saskatoon. We recommend extending this regional breakdown—or use SK's seven health zones—across all demand and supply components. During interviews, stakeholders emphasized that analyzing urban and rural areas separately would better capture regional dynamics. Ideally, we recommend extending this regional breakdown throughout the forecast period.

Implementation option 1: Segment model by health zone or region on the supply and demand side for the entirety of the model's forecast

Step 1: Determine sub-provincial regions for the regional breakdown. Align on either segmenting the model by health zone or into the four regions currently used to split vacancies: North, South, Regina, and Saskatoon.

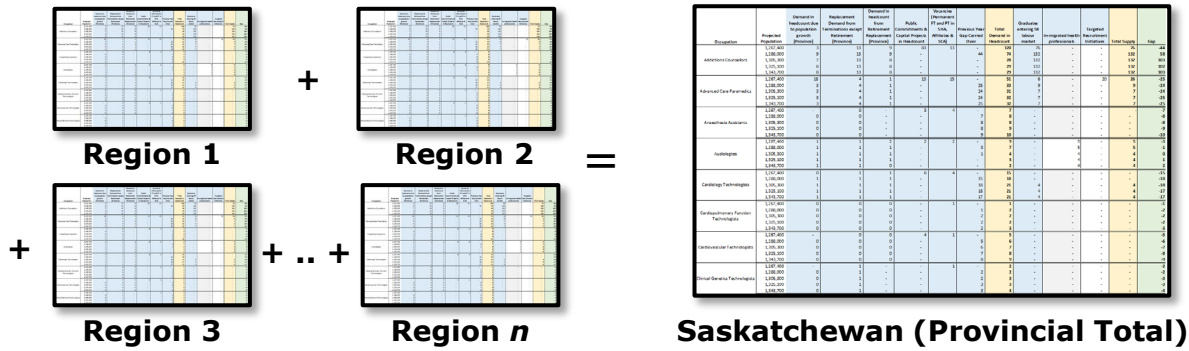
Note: The favourable regional split can be determined based on data availability.

Step 2: Segment the demand and supply components by region in a manner similar to the current setup for the entire province (refer to images below). If there are data challenges with specific occupations, consider initially providing a regional breakdown only for occupations that have data available for all supply and demand components.

Note: Assumptions will likely need to be made to segment the supply components and resignations by region. For example, if region-specific data is unavailable for a component, one suggestion is to use the share of the population within each region to initially segment that component by geography. Below is an example of how that can be done for in-migrations:

	Region 1	Region 2		Region n	Provincial Total
Population (year 0)	1,000	500	..	200	2,000
Share (%)	50%	25%	..	10%	100%
In-migrations (year t) *Distributing provincial in-migration by region*	300 x 50% = **150**	300 x 25% = **75**	..	300 x 10% = **30**	**300 (Starting Point)**

Step 3: Sum up each demand and supply component across all regions. The sum across regions for any model component, occupation, and year should be equal to the provincial total.



Reference model(s): Newfoundland and Labrador

Note: All numbers highlighted above are hypothetical.

Recommendation 3: Consider Breaking the Model Down by Region – Implementation Option 2

The model currently breaks down vacancies into four regions: North, South, Regina, and Saskatoon. We recommend extending this regional breakdown—or use SK's seven health zones—across all demand and supply components. During interviews, stakeholders emphasized that analyzing urban and rural areas separately would better capture regional dynamics. Ideally, we recommend extending this regional breakdown throughout the forecast period.

Implementation option 2: Keep the forecast as is (for the province as a whole) but provide a regional breakdown for the current state analysis.

If data limitations do not permit for the model to be broken down by region over the course of the forecast, we suggest keeping the forecast at the provincial level, but provide a more in-depth current state analysis by region. Although this is only the current state, it may help users of model outputs better contextualize forecast outputs. Like with Option 1, if there are data challenges with specific occupations, consider initially providing a regional breakdown only for occupations that have data available for all supply and demand components.

Step 1: Determine sub-provincial regions for the regional breakdown. Align on either segmenting the model by health zone or into the four regions currently used to split vacancies: North, South, Regina, and Saskatoon.

Note: The favourable regional split can be determined based on data availability.

Step 2: Segment the current headcount of employees (public and private combined) and vacancies (public and private sector vacancies if possible) by the selected regions to paint a better picture of the current supply and part of the unmet demand by region.

Given the age distribution of the workforce plays an important role in estimating attrition, segmenting the current supply by age cohort as well as by region will help provide a more comprehensive understanding of the current state by occupation.

Current Supply:

Occupation	Age cohorts	Current # of employees Region 1	Current # of employees Region 2		Current # of employees Region *n*	Total SK (Region 1+..+*n*)
Occupation 1	15-24	2	4	…	2	10
	25-64	5	10	…	6	40
	65-74	3	5	…	2	15
	75+	6	3	…	3	5
Total by region		16	22	…	13	**70**

Vacancies:

Occupation	Vacancies Region 1	Vacancies Region 2		Vacancies Region n	Total vacancies
Occupation 1	3	5	…	2	10
…	…	…	…	…	…

Reference model(s): Newfoundland and Labrador

Note: All numbers highlighted above are hypothetical.

Model Optimization

Recommendation 4: Include Physician Outlook within the Forecast for Non-Physician Health Occupations

A separate group, the Medical Services branch, is responsible for the physician forecast, but many non-physician health occupations work closely with physicians. Thus, the outlook for some physician specialties could greatly influence the demand for other non-physician health occupations. We propose the physician forecast be presented alongside the forecast for other health occupations and be considered when projecting demand for the 42 in-scope health occupations.

Some of the 42 in-scope occupations work more closely with physicians than others. Consequently, initially a subset of specialties could be included. Examples of physician specialties that are likely to drive demand for other health occupations are highlighted below. These are examples and not the full list of physician specialties closely tied to the demand for other health occupations.

Physician Specialty		Closely Tied Occupation
Family physicians (especially in primary care settings)	⟷	Nurses (licensed practical nurses, registered nurses, nurse practitioners)
• Cardiac surgeons • Cardiologists	⟷	• Perfusionists • Cardiovascular technologists • Cardiology technologists • Diagnostic cardiac/medical sonographers
Respirologists	⟷	Cardiopulmonary function technologists
Anaesthesiologists	⟷	Anaesthesia assistants
Radiologists	⟷	• Dosimetrists • Medical physicists • Radiation therapists

Using the growth in demand for a closely related physician specialty

Example

- After estimating the demand for anaesthesia assistants using the current demand components in the model, it would be ideal to compare it to the growth in demand for anaesthesiologists. Assuming the growth in demand for anaesthesiologists is 3% per year, demand for anaesthesia assistants should grow at a similar pace.
- If the growth in demand for anaesthesia assistants is vastly different from 3%, the components within demand may need to be tweaked.

Reference model(s): Newfoundland and Labrador, Nova Scotia, Alberta

Increasing use & building trust

Recommendation 5: Form a Formal Advisory Committee to Inform Model Inputs and Outputs

One of the main points of feedback received during interviews is that stakeholders wish to be more involved in providing inputs and discussing model assumptions and outputs. The Ministry already informally engages with the Ministry of Advanced Education, the Ministry of Immigration and Career Training, and the SHA to gather inputs in advance of any changes to the model methodology, throughout the execution of the model, and once the modelling exercise is complete to collect feedback. However, some stakeholders interviewed still feel inputs and output results do not always reflect realities on the ground. There is consequently lack of trust in the model. We propose creating a more formal advisory committee to allow for more stakeholders to provide inputs, review modelling assumptions, and validate outputs. Creating an advisory committee has proven successful in the past when developing models requiring various, and continuously evolving, inputs.

Representatives to include in the advisory committee

Representatives from the following organizations could be included in the committee:

- Regulatory bodies (Colleges of Registered Nurses and Licensed Practical Nurses, Saskatchewan College of Pharmacy Professionals, etc.)
- Saskatchewan Health Authority
- Saskatchewan Cancer Agency
- Saskatchewan Ministry of Advanced Education
- Saskatchewan Ministry of Immigration and Career Training
- Saskatchewan Health Recruitment Agency
- Representatives from the various branches within the Ministry of Health, including Medical Services

When to consult with the advisory committee

The advisory committee could be consulted in the following instances to allow for continuous feedback:

1. Before modelling begins to discuss and validate assumptions with the group.
2. During the modelling exercise to modify assumptions as needed.
3. Once the modelling exercise is complete to validate outputs and notify of and explain changes to modelling outputs from the previous iteration.

Reference model(s): Newfoundland and Labrador, Manitoba

Increasing use & building trust

Recommendation 6: Enhance Model Communications

A significant portion of the feedback received during interviews with stakeholders related to the communications surrounding the model outputs. Below are some proposed ways the Ministry can enhance model communications. These enhanced communications should further help build trust in model results and hopefully lead to increased use of model outputs.

Share a condensed forecast package with senior people

While a lot of important and detailed information should be highlighted in the HHR forecast package for more technical individuals, not everyone, absorbs or reads all the content in the forecast package, especially people in positions of leadership.

Providing a summary document highlighting the overall forecast, key assumptions, and the changes from the previous iteration of the forecast would be beneficial for those less technical people.

This more condensed forecast package could also be published on the Government of Saskatchewan's website to further broaden reach and hopefully help increase use of model outputs.

Present model results more frequently and to a broader group

Model results are currently being presented once per year to senior leadership.

However, during interviews with stakeholders, some mentioned they were unable to make it to that presentation. Presenting model results on multiple occasions would allow for people who are unable to attend the first meeting to be a part of the conversation, which would ultimately improve stakeholder buy-in.

In addition, ensuring results are presented to a broad range of stakeholders across all levels (i.e., not just to leadership) would enhance knowledge of the model and its potential uses.

Reference model(s): Newfoundland and Labrador, Manitoba

Increasing use & building trust

Recommendation 7: Include a Qualitative Analysis to Support the Forecast (1/2)

Putting the outlook into perspective is key to stakeholders' understanding of model results. Thus, we propose conducting qualitative research prior to producing the forecast and highlight key findings and assumptions as part of the forecast package. Based on findings from the jurisdictional scan and stakeholder interviews, considering the factors below would improve the usefulness of the model's outputs.

1. Incorporate macroeconomic and demographic context

- The macroeconomic context in SK as well as any large policy changes at the federal and provincial level are likely to drive supply of and demand for various health occupations. Thus, this recommendation proposes including some qualitative macroeconomic insights in the forecast package (e.g., demographic trends in SK, factors influencing GDP in the province by industry, employment trends in healthcare, major policy changes such as the recent changes to policy changes to immigration, tariffs, etc.).
- More specifically, we suggest incorporating assumptions highlighted in the Ministry of Finance's Provincial Budget (The Saskatchewan Economy section) in order to better contextualize the HHR forecast with the overall forecast for SK's economy.

2. Accompany each occupational forecast with a story

- Develop a high-level story for each occupation to contextualize quantitative findings. This is an opportunity to complement historical findings with forward-looking assumptions to help inform the occupational forecast.

3. Further analyze current unmet demand

- Some occupations have significant waitlists (e.g., addictions counsellors, dietitians). While vacancies partly paint the picture, waitlists would help further highlight the unmet demand for these occupations.
- For occupations like medical laboratory technologists and medical laboratory assistants (MLTs and MLAs), highlighting test backlogs can emphasize unmet demand and help ensure stakeholders feel acknowledged in the modelling process.

Reference model(s): ESDC, and Newfoundland and Labrador (detailed report for each occupation with qualitative context as appropriate and productivity improvements captured on the demand side for a subset of the occupations)

Recommendation 7: Include a Qualitative Analysis to Support the Forecast (2/2)

Putting the outlook into perspective is key to stakeholders' understanding of model results. Thus, we propose conducting qualitative research prior to producing the forecast and highlight key findings and assumptions as part of the forecast package. Based on findings from the jurisdictional scan and stakeholder interviews, considering the factors below would improve the usefulness of the model's outputs.

4. Highlight occupations with shortages, limiting scope of practice

- During consultations, stakeholders noted that budgeted vacancies in the model do not accurately reflect unmet demand. Significant shortages in some occupations are limiting professionals to basic needs assessments instead of their full range of services. Given this is hard to quantify, we propose to qualitatively highlight this issue.
- For example, this additional context can be provided for SLPs.

5. Assess the impacts of technology and productivity

- Technology and automation can potentially play an important role in improving productivity in healthcare. If data were to become available, SK could eventually create an assumption around productivity improvements. Productivity improvements could dynamically adjust the utilization ratio over time, rather than keeping it constant.
- We suggest consulting with experts to determine productivity by occupation and the vulnerability of certain tasks to technology and automation.

Reference model(s): ESDC, and Newfoundland and Labrador (detailed report for each occupation with qualitative context as appropriate and productivity improvements captured on the demand side for a subset of the occupations)

Continuous improvement

Recommendation 8: Evaluate Model Outputs and Stakeholder Engagement

Below are some suggestions on how the Ministry can evaluate the model going forward. Some indicators relate specifically to the modelling outputs, while others relate to stakeholder engagement with model inputs and outputs.

I. Model Outputs

Every year, evaluate the error between the predicted and actual supply for each occupation.

- Evaluate the size of the error (i.e., the difference between the forecasted supply and the actual supply) from year to year
- When a change to model methodology is made, compare the error when using the old methodology to the error when using the new methodology. Has the error gotten larger or smaller with the new methodology?

II. Stakeholder Engagement

Every time model results are presented to stakeholders, the following indicators could be captured:

- Share of attendees (#attendees/#invites)
- Share of attendees that use model outputs directionally for long-term planning
- Share of attendees that use model outputs directionally for budget decisions
- Share of attendees that use model outputs as a primary source for budget decisions
- Share of attendees that:
  - ❑ Do not trust model outputs
  - ❑ Partly trust model outputs
  - ❑ Trust model outputs

The goal is for these indicators to improve from year to year. Any level of improvement is a move in the right direction.

Appendix

Glossary

AB: Alberta

CAGR: Compounded Annual Growth Rate

CBO: Community-Based Organizations

CBoC: Conference Board of Canada

CIP: Classification of Instructional Programs

COPS: Canadian Occupational Projection System

ESDC: Employment and Social Development Canada

FTE: Full-Time Equivalent

GDP: Gross Domestic Product

HHR: Health Human Resource

HHRB: Healthcare Human Resources Branch

ICT: Saskatchewan's Ministry of Immigration of Career Training

IRCC: Immigration, Refugees and Citizenship Canada

LAD: Longitudinal Administrative Database

LFS: Statistics Canada's Labour Force Survey

MB: Manitoba

MLA: Medical Laboratory Assistant

MLT: Medical Laboratory Technologist

NL: Newfoundland and Labrador

NOC: National Occupational Classification

NS: Nova Scotia

SCA: Saskatchewan Cancer Agency

SDO: Service Delivery Organizations (in Manitoba)

SHA: Saskatchewan Health Authority

SHRA: Saskatchewan Healthcare Recruitment Agency

SK: Saskatchewan

SK ICT model: Saskatchewan Ministry of Immigration and Career Training's labour outlook model

SK HHR model: Saskatchewan Ministry of Health's Health Human Resource forecast model

SLP: Speech language pathologist

TFB: Alberta Treasury Board of Finance

WA: Weighted Average

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