

# Workforce Planning in the Nova Scotia Health Authority

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## **Executive Summary**

### **Project Objectives**

This report is the result of research conducted to identify the most effective approach to improve and guide workforce planning for Nova Scotia Health Authority (NSHA), the organization who is also the client for the research. Effective workforce planning is defined by the NSHA as developing a planning framework to achieve the following outcomes:

- Having a sustainable number and mix of health care providers;
- Having appropriate distribution of providers;
- Having providers working collaboratively to optimal scope of practice;
- Meeting the population health needs; and
- Delivering quality, safe, and cost-effective care.

The goal to achieve effective workforce planning, which is shared with the other health authority in Nova Scotia, the Izaak Walton Killam Health Centre (IWK), and the Department of Health and Wellness (DHW), aligns with the strategic directions of NSHA and the broader health system in Nova Scotia.

The rationale for studying workforce planning stems from the recent consolidation of health authorities in Nova Scotia and the problems that arose from this change in management and structure. The consolidation of nine individual district health authorities in Nova Scotia to NSHA on April 1, 2015 revealed inconsistencies in approaches to and practices for planning in general, and specific to this report, little to no evidence of proactive workforce planning in place. The lack of effective workforce planning was and remains problematic as failing to do so would likely have a significant negative impact on the organization's ability to provide care and services to the citizens of Nova Scotia.

The importance of effective workforce planning for health systems in general is highlighted by Tomblin Murphy et al. (2016, p. 2) when they note that employees who deliver care are the backbone of any health system and as such workforce planning has a direct impact on the functioning of health care systems. In commenting on the importance and challenges of workforce planning for all Canadian organizations, the Conference Board of Canada (2017, p. 2) further notes that with changes coming from all directions – politics, economy, society, and technology - planning for a workforce that can account for this is a top-rated challenge.

### **METHODOLOGY AND METHODS**

The methodology for this report was determined by identifying what approach was best suited to achieving the report purpose and objectives given the resources available to the researcher and the preferences of the client. Given the purpose of the report and the large body of recent, existing research in the literature regarding workforce planning for health services, a literature review was completed. The literature review focused on identifying smart practices related to workforce planning specific to the health care field given that many authors have written about this area. The logic and concepts of smart practices research as described by

Bardach (2012, pp. 109-123) were well suited to achieving the report purpose and objectives as they purposefully focused the research on identifying actions and behaviours that have potential for creating value, and the mechanisms, functions, features, and factors important for extracting and applying that potential in the NSHA context. Moreover, a smart practices approach is useful for this type of research because it supports the premise of constant learning, feedback and reflection of what works and does not work and the rationale why (Vesely, 2011, p. 101).

Multiple steps were taken to identify relevant workforce planning approaches and mechanisms, with emphasis on health care, recent developments and trends in the literature, and application of policies and procedures. Documents that were examined were identified through scanning the main search engine in the UVIC library (Summons), specific databases in the UVic library (i.e. EBSCO, PubMed, ProQuest), Google Scholar, and NSHA website for peer-reviewed articles and grey literature where the title included any of the following keywords either on their own or in combination: workforce, planning, health, human resources, forecasting, estimating, modeling, approach, methods, nursing, nurses, physicians, doctors, requirements, needs, demand, supply, utilization, and productivity. As articles were reviewed for their relevance, additional articles were identified through mining of references. In total, 27 articles were fully reviewed.

## KEY FINDINGS

The synthesis of smart approaches and practices resulting from the literature review provided a compass with which to determine the most effective approach to improve and guide workforce planning for NSHA.

Several high-level observations arose from the literature review:

- **The breadth and depth of literature on workforce planning in the health industry is immense** - The review of workforce planning literature revealed a large body of health workforce planning related materials in general and in the health industry.
- **Various research approaches and methods are taken** –Qualitative, quantitative, and mixed research approaches are used to conduct research in workforce planning and the methods used for the articles and books reviewed included case studies, literature reviews, interviews, and surveys.
- **Qualitative and quantitative research approaches are complementary** - While all workforce planning models reviewed focused on quantitative data and measures, the importance of including qualitative data and measures in the workforce planning process was stressed.
- **A focus on professions other than physicians and nurses is needed** – As noted in the literature, there is an opportunity for expansion of the research and literature specific to health provider professions other than physicians and nurses.

Several high-level observations arose from smart practices found in the literature review and the discussion and analysis of their application in the NSHA context:

- **An integrated approach is effective** - Advancing an integrated approach was found to be the best way to achieve overall objectives for workforce planning in general and for NSHA.

For example, this was highlighted by Birch, Tomblin-Murphy, MacKenzie, and Cumming (2014, p. 4) when they noted that by integrating financial planning, health service planning, and workforce planning into a single dynamic framework, threats to systems sustainability arising from the interdependence of demand for and supply of health care can be avoided and sustainable universal publicly funded health care systems can become a reality.

- **The current NSHA workforce planning projection tool should be extended** – The current NSHA tool demonstrates many of the smart mechanisms and practices identified through the literature review. It has flexibility to allow for further integration of these mechanisms and practices through accounting for expansion and contraction in health workforce provider types and long-term scenario based projections related to assumptions for future conditions associated with proactive integrated health services, financial and workforce planning.
- **A collaborative approach is preferred** - Given the magnitude of the consolidation from nine former health authorities to NSHA, the organization is in a period of ongoing change and transition. Progression through this transition requires focused support to promote coordination, collaboration, and partnership in leveraging resources to achieve shared interests, goals, and strategic objectives.
- **The evolution of the workforce planning team and service needs to be monitored** – Workforce planning services in NSHA are relatively new and in early stages of development. Given this, attention should be paid to the pace at which the service evolves to avoid creating expectations the service cannot meet. As the service progresses in its development, it will transition from being focused on operational and short-term approaches and solutions to strategic, proactive and longer-term approaches and solutions aligned with business strategy and broad human capital planning.
- **Investment in workforce planning resources is essential** – Significant and ongoing investment in the human resources, and data systems and environment in NSHA is required to achieve and maintain simplification, standardization, and alignment with current and future organizational structures and strategic objectives.

## RECOMMENDATIONS

The following recommendations are put forward for consideration by NHTSA (in no particular order):

1. **Integrate NHTSA workforce planning with health services and financial planning.**
  - Establish an integrated planning and analytics team comprised of representatives from workforce planning, quality and systems performance, and financial services.
  - With the integrated team, develop tools and processes designed to meet the objectives for effective workforce and integrated planning.
  - Pilot related tools and processes with management from key operational service program areas, with ongoing evaluation, revision, and expansion to other service program areas.
  - Engage other key stakeholders such as people services staffing and recruitment, and inter-professional practice colleagues in investigating specific matters identified through integrated planning and analytics, such as retired workers coming back to work, strategies for replacing LOA's and reducing absenteeism, and the relationship between health provider inputs and health outcomes achieved.

- 2. Continue to refine the workforce planning forecasting tool to meet integrated planning and analytics objectives, while maintaining flexibility and avoiding making it overly complex.**
  - Incorporate a new section to the tool to account for expansion or contraction in the demand for health workforce provider types.
  - Determine in detail how the tool will be used to provide workforce forecasts based on future health service and financial planning scenarios.
  - Develop and implement an electronic mechanism and processes by which workforce forecasts will be updated.
  - Continue to include and evolve qualitative data and information gathering from managers and those responsible for the delivery of services as part of the processes associated with the tool.
  
- 3. Build internal capacity for workforce planning in NSHA.**
  - Build trusting relationships with key stakeholders through focusing on shared interests, outcomes and objectives, and open, honest, and respectful communications. Given the focus on integrated planning and analytics, relationships with quality and systems performance and financial services are top priority.
  - As relationships and credibility are built, leverage champions who support the service for promoting it with others.
  - Engage the workforce planning team in defining objectives and processes, and provide role clarity and developmental opportunities to build their knowledge, skills, and abilities in fulfilling their roles.
  - Be realistic with and manage expectations for service delivery through monitoring and obtaining ongoing feedback related to the achievement of results, and making adjustments accordingly.
  - Develop and share communications that promote and describe workforce planning services, such as presentations, memos, and a visual logic model.
  
- 4. Align workforce planning with the overall organizational strategy.**
  - Ensure alignment between the operational plan for the workforce planning function and the broader people services program and NSHA strategic plans.
  - Target initiatives associated with the development and evolution of the workforce planning function with areas of organizational priority such as primacy care and mental health services.
  
- 5. Partner with the provincial government to address health workforce planning issues.**
  - Continue to collaborate with the provincial health workforce planning committee to find solutions to matters identified through internal NSHA workforce and integrated planning and analytics, such as increasing seats at educational institutions to address expansion in the need for Nurse Practitioners for primary care services.
  
- 6. Continue focused efforts to improve the data systems and environment.**
  - Lead and/or support projects and initiatives to simplify, standardize, and align information systems and processes associated with achieving the overall objective for workforce planning.

- Explore opportunities to form and implement a corporate non-clinical information systems governance committee, comprised of representatives from NSHA, IWK and the provincial government, to identify and coordinate priorities, and develop a shared strategy and road map to achieve them.

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## **1 Introduction**

On April 1, 2015, nine individual district health authorities in Nova Scotia were consolidated into one unified health authority, Nova Scotia Health Authority (NSHA). Serving individuals and communities across the entire province, NSHA’s mission is “To achieve excellence in health, healing and learning through working together” (Nova Scotia Health Authority [NSHA], 2017a, para. 3) and its vision is “Healthy people, healthy communities – for generations” (para. 4). NSHA has over 23,400 employees, 3,204 physicians, 5,500 learners, and 7,000 volunteers spread across locations throughout the province (NSHA, 2017b, para. 1). The NSHA, the Izaak Walton Killam Health Centre (IWK), and the Department of Health and Wellness (DHW) are working together to develop and implement a multi-year plan that will result in new provincial approaches to a range of services for Nova Scotians (NSHA, 2017c, para. 2). As health care and services are delivered by human resources, workforce planning to ensure an adequate supply of health providers to meet health service demands will be a significant aspect of this provincial approach.

With the consolidation that created NSHA, the transition to the new structure for the Human Resources Program began in September 2015. The new program, People Services, is comprised of five centres of expertise, one of which is Workforce Planning, Performance, and Operations. This centre of expertise is responsible for a broad scope of functions including: workforce planning; workforce policy, performance, and decision support; workforce benefits and compensation administration; and workforce information systems administration.

While maintaining core transactional services, the initial focus of the Human Resources Program was on reviewing existing structures and available resources to develop new job descriptions and structure for the delivery of services. The focus then shifted to transitioning current staff and hiring new staff to the new structure, which was completed for the most part in July 2016. With scope and staff in place, the workforce planning, performance, and operations centre of expertise has begun to examine its approach for each of its functional areas of responsibility<sup>1</sup>. The focus of this report is on the approach for the workforce planning function.

### **1.1 Report Client**

Carmelle d’Entremont, Vice President, People and Organizational Development in NSHA, is the report client and she requested that recommendations from this report be used to help shape and evolve the workforce planning function for NSHA. Given the magnitude of the change from nine individual health authorities to one unified health authority, the transition to thinking, planning, and acting as one is expected to take considerable time and effort. The establishment and evolution of the workforce planning function is hoped to contribute to the successful transition of NSHA.

### **1.2 General Problem and Importance of Workforce Planning**

Prior to the consolidation to NSHA, the nine former districts were deemed to have acted and operated as independent entities with limited collaboration and coordination taking place.

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<sup>1</sup> Source derived from observations of the author who is the Director of Workforce Planning, Performance and Operations for Nova Scotia Health Authority.

Such a structure often led to inconsistency in their approaches to and practices for planning in general, and there was little to no evidence of proactive workforce planning in particular. The effects of this siloed-structure likely contributed to the consolidation. For example, as noted by the DHA Consolidation Transition and Design Team (2014):

Consolidation is an important and necessary first step toward building sustainable health services and developing a more responsive system better suited to the size of our province. We need to break down the administrative walls of health care, to provide consistent, quality healthcare to Nova Scotians. With a population of less than a million people, we need to plan, organize, and integrate the delivery of health care using all of our available health care facilities, professionals, programs, and services. By breaking down the silos that currently exist in our healthcare system, we will reduce fragmentation, increase collaboration, establish consistency of services from one end of the province to the other, and most importantly, a more responsive and sustainable system focused on patient care. (p. 4)

The consolidation reflected the need for standardized, province-wide, and proactive workforce planning to meet NSHA's goal to "use the best evidence and engage Nova Scotians in order to create an accessible health system that offers the right care, in the right place, at the right time" (NSHA, 2017c, para. 3). To meet this outcome, the overall objective for effective workforce planning in NSHA, which was developed in collaboration with the IWK and DHW as part of the terms of reference for a combined committee, is for the organization to "have a sustainable number and mix of health care providers, appropriately distributed and working collaboratively to optimal scope of practice, to meet the population health needs and to deliver quality, safe, and cost-effective care" (Provincial Health Workforce Planning Committee, 2016, p. 1).

The lack of effective workforce planning in NSHA is a problem because failing to do so will likely have a significant negative impact on the organization's ability to provide care and services to the citizens of Nova Scotia. According to Tomblin-Murphy, Birch, MacKenzie, Bradish, and Elliott (2016), "[t]he backbone of any health care system is the human resources who deliver care. Thus, human resources for health planning has a direct impact on the functioning of health care systems" (p. 2). Ono, Lafortune, and Schoenstein (2013) indicate that "[h]ealth workforce planning aims to achieve a proper balance between the supply and demand of different categories of health professionals in both the short and longer-term. This is desirable to ensure adequate access to care, a key goal of health policy in all OECD countries" (p. 8).

Further in describing the importance of health workforce planning, Birch, Tomblin-Murphy, MacKenzie, and Cumming (2014) note that "[b]y integrating financial, service, and workforce planning into a single needs-based framework, the threats to system sustainability arising from the interdependence of demand for and supply of health care can be avoided and sustainable universal publicly-funded health care systems can become a reality" (p. 4). In commenting on the importance of workforce planning for all Canadian organizations, Cooper and Jackson (2017, p. 2) noted that with changes coming from all directions – politics, economy, society, and technology, planning for a workforce that can account for this is a top-rated challenge.

Given all of this, having an effective workforce planning approach is one of the essential factors to achieving the strategic objectives of NSHA and the success of Nova Scotia's health system.

### **1.3 Research Question and Report Objectives**

With the above factors and challenges in mind, NSHA requires a contextualized, evidence informed approach to achieve effective workforce planning. It is also important that any approach that is developed and implemented is aligned with the NSHA mission, vision, and strategic directions. This approach is in keeping with the conclusion of Tomblin Murphy et al. (2016) that “[t]he appropriateness of different human resources for health planning approaches for given jurisdictions depends on the objectives of the health care systems and the precise policy questions being asked for which they are planning as well as the context in which that planning takes place” (p. 10).

Therefore, the primary research question is: what is the most effective approach to improve and guide workforce planning for NSHA?

To answer this question, the key research objectives are as follows:

- To provide a literature review of workforce planning methods through applying a smart practices approach, with focus on health services and emphasis on recent developments, in order to identify a synthesis of smart workforce planning approaches, mechanisms, and practices.
- To discuss and analyze application of the synthesis of smart workforce planning approaches, mechanisms, and practices identified through the literature review within the context of the current and desired future state for workforce planning in NSHA.
- To provide conclusions and recommendations for the successful development and evolution of workforce planning in NSHA.

### **1.4 Report Structure**

This report is comprised of chapters that build upon and inform each other, and align with meeting the research objectives. This is intended to create flow and allow the reader to easily follow the underlying logic of the conceptual framework. Chapter 1, the introduction, provides details on the purpose of the report and context central to understanding its importance to the client organization. Chapter 2, the methodology and methods chapter, provides the reader with information regarding how the researcher approached answering the main research question, which is important in understanding the flow of the report and having confidence in its results.

Chapter 3 is the literature review that provides the reader with information about and a synthesis of workforce planning approaches, mechanisms, and practices. It serves as an opportunity for the reader to increase knowledge and understanding of workforce planning. Chapter 4 provides a discussion and analysis, giving the reader an in-depth view of NSHA's readiness, ability, and critical success factors that are required to apply the smart workforce planning approaches, mechanisms and practices identified in the literature review. Chapter 5 provides recommendations for actions to achieve the most effective approach to workforce

planning for NSHA. Chapter 6 concludes by highlighting key points the research revealed regarding workforce planning.

## **2 Methodology and Methods**

### **2.1 Methodologies**

The overall objective of the workforce planning function for NSHA and associated research question provided the context to identify the most suitable methodology. The primary approach used in this report was a smart practices review. Bardach (2012) notes that “a smart practice is made up of (1) the latent potential for creating value, plus (2) the mechanism for extracting and focusing that potential” (p. 115). Furthermore, according to Vesely (2011), “while a mechanism is the principal element of every smart practice, it is always surrounded by context that must be taken into consideration when smart practice is transferred from the source site to the target site” (p. 108).

The potential for effective workforce planning in NSHA, as described by the overall objective for the function, provided the context for identifying smart practices for application in NSHA. As noted by Bardach (2012), smart practice mechanisms have characteristic features that include: implementing features, which directly embody the basic mechanisms; supportive features, which are primarily those resources used to bring the implementing features into being; and optional features, which may be important in the site where the practice is observed but may not elsewhere (pp. 115-116). The following research in this report is organized and presented in a manner that accounts for these characteristic features.

Mechanisms and their implementing and supportive features were grouped under themes identified in the literature that describe broad categories of approaches and considerations central to workforce planning. While the language used to describe the categories of approaches across the literature was not entirely consistent, titles for three main approaches as described by Lopes, Almeida, and Almada-Lobo (2015), which are widely used in the field at large, are used to organize findings. These include approaches that are supply-based, demand-based, and integrated in their nature. A fourth theme related to data considerations underlying the three aforementioned approaches emerged and was used to group related findings. Key points as described across the 27 articles reviewed were noted under the themes and fused into a synthesis of smart health workforce planning approaches, mechanisms and implementing and supportive features. This synthesis was then subject to discussion and analysis as to its application in achieving the desired objectives for workforce planning in NSHA.

### **2.2 Methods – A Literature Review**

Crotty (1998) describes methods as “the specific techniques and procedures used to gather and analyze information related to answering a research question” (p. 3). Given the nature of the research question and large body of existing research in the literature regarding workforce planning for health services, a literature review was undertaken. Examples of workforce planning approaches and practices were selected based on their nature, the jurisdiction(s), when they were written, and substance illuminating the research question and overall objective for workforce planning in NSHA.

Multiple steps were taken to identify relevant health workforce planning approaches and mechanisms, with emphasis on recent developments and application. These included scanning relevant sources available through the main search engine in the University of Victoria (UVic)

library (Summons), specific databases in the UVic library (i.e. EBSCO, PubMed, ProQuest), Google Scholar, and NSHA website for peer-reviewed articles and grey literature where the title included any of the following key words either on their own or in combination: workforce, planning, health, human resources, forecasting, estimating, modeling, approach, methods, nursing, nurses, physicians, doctors, requirements, needs, demand, supply, utilization, and productivity. As articles were reviewed for their relevance, additional articles were identified through mining of references. In total, 27 articles were fully reviewed. Keywords associated with titles for health service providers outside of nurses and physicians were not used as initial preparation for the review revealed limited results in this area. There is opportunity for expansion of the research and literature to other health provider types.

According to Trochim and Donnelly (2008, p. G-2), content analysis is the analysis of text documents, which can be qualitative and/or quantitative, typically for the purpose of identifying patterns. Through the primary researchers' extensive knowledge, observations, and access to internal NSHA information, qualitative content analysis was conducted to identify existing mechanisms, functions, features, and factors that support implementation of the synthesized smart practices, and gaps that need to be addressed. In this regard and as consistent with the thoughts of Patton (2015, p.33), the primary researcher was an instrument within the research and my skills, experience, perspective, and background were important.

In forming recommendations, the logic of the basic mechanisms identified in the smart practices was maintained, while leaving maximum flexibility as to the specific design features that form the means to carry them out. Where "smart practices are internally complex, context-sensitive, and capable of being used by different parties to pursue slightly different bundles of goals" (Bardach, 2012, p. 117), report recommendations were tailored to the NSHA context, its complexities and vulnerabilities, and the supportive factors required for success. They also accounted for learning from practices that may not have gone as planned or that may have been successful in one setting but possibly not in the NSHA setting given its context.

### **2.3 Limitations and Delimitations**

In general and in accordance with the conclusion of Patton (2015), there is no perfect design to answering a research question: "[a]ny design inevitably reflects some imperfect interplay of resources, capabilities, purposes, possibilities, creativity, and personal judgments by the people involved" (p. 21). In the case of this report some limitations and delimitations of note include: possible issues of internal and external validity as associated with the report methodology; limitation within the literature review; and the research not including methods other than the literature review.

The report relies upon the overall objective for workforce planning created by the provincial health workforce planning committee and assumes there is a probable association between related outcomes and the strategic objectives of NSHA and the broader health system. Whether this probable association is accurate could be an issue of internal validity. Further, the report relies on the research of others to ensure a probable association between the identified smart practices that informed the recommended approach for NSHA and the achievement of the overall objective for workforce planning. These potential issues with internal validity were assumed to have been satisfactorily addressed through the process followed to create the

predetermined overall outcome for workforce planning, and through design of the methodology for the report, where articles chosen for full review were peer reviewed and aligned with achieving the elements of the predetermined outcomes for workforce planning. Potential problems with external validity in applying practices that were successful in other organizations and regions to NSHA were addressed through tailoring report recommendations to the NSHA context, its complexities and vulnerabilities, and the supportive factors required for success in its environment. Ongoing evaluation of outcomes resulting from application of report recommendations would confirm the validity of probable associations the report relies upon.

The extensive body of pre-existing research and literature on workforce planning for health services provided an excellent source of objective and reliable evidence upon which to determine the approach best suited to NSHA. The literature review revealed variation in the terminology used to describe approaches to workforce planning and their related mechanisms and implementing features. The 60 year review of workforce planning methodologies and approaches conducted by Lopes et al. (2015) provided an excellent overview of workforce planning and is therefore frequently referenced in this report. Reliance on Lopes et al. (2015) is offset by including the research of others within the findings and synthesis of smart workforce planning approaches, mechanisms, and implementing and supportive features resulting from the literature review. Another limitation from the literature review was that only documents written or translated in the English language could be reviewed. As well, variations in the use of key search terms and limitation in access to research sources may also have limited the review. Further, it was not possible in general for all potentially relevant websites to be included, and those that were may not have been searched exhaustively, which may have led to the exclusion of relevant publications.

The research did not include methods such as interviewing key informants from similar organizations to learn from their individual and organizational experiences although this data collection method may occur in the future. The rationale for not having a data collection method that included interviews was partly because of interview and survey fatigue within health organizations and related, because of the vast amount of research that is already available that is directly relevant to NHSA. Furthermore, the research question is specific to the NSHA context and because this is a smart practices study, it is believed by the client that key informants from other organizations would not have the in-depth knowledge required to answer the primary research question. This is not to necessarily state that conducting interviews would not be valuable or useful; however, because this is a new area for NSHA to address, the client wanted to identify what was available in the literature before undertaking other types of data collection. Also, the client and researcher recognize the importance and value of interviewing internal employees and stakeholders once the workforce planning strategy is better situated within NSHA.

### **3 Literature Review**

#### **3.1 Introduction**

The review of workforce planning literature, as described in the methodology section of this report, revealed a large body of health workforce planning related materials. Recognizing the inability to conduct a meta-analysis type of review due to resource capacity and time limitations, the focus of this literature review was on including those articles and books most relevant and timely to assist the NHSA in meeting its vision, mission, and strategic direction.

The 27 articles reviewed in this chapter span various approaches and practices in countries across the world, and also describe the evolution of the workforce planning discipline by prominent researchers in the field. Methods used for the articles reviewed included case studies, literature reviews, interviews, and surveys. While all workforce planning models examined focus on quantitative data and measures, the importance of including qualitative data and measures in the workforce planning process was stressed by many authors. For example, Kinsella and Kiersey (2016) note: “[w]orkforce planning has evolved as much as a qualitative process as a quantitative process” (p. 7). Of the 27 articles reviewed, six were specific to nurses, one to physicians, one to public health, and 19 were not specific to any health provider profession. Where the focus of this report was to identify an approach to workforce planning in general, articles that were not specific to any single profession were more likely to be identified by the researcher for inclusion.

In supporting the smart practices approach to the literature review, the four workforce planning themes by which the review was organized have been defined by the main themes and ways of organizing the function of workforce planning found in the literature. Each theme is described separately to provide the reader with a solid foundational understanding of the options upon which an overall approach to workforce planning may be built as described by the various authors. As also shown in the following sections, workforce planning can be applied at various levels ranging from macro strategic to micro tactical in an organization. The macro strategic level focuses on longer term decisions and impacts, while the micro tactical level focuses on shorter term operational impacts (Lavieri and Puterman, 2009, pp. 119 – 120). The following review of workforce planning approaches, mechanisms, and implementing and supportive features provides an overview from both the macro and micro perspectives.

The following themes that reflect the practices and functions of workforce planning and the literature in general are addressed in this review:

- Supply-based approach mechanisms
- Demand-based approach mechanisms
- Integrated approach mechanisms
- Data considerations

#### **3.2 Theme 1 - Supply-Based Approach Mechanisms**

The supply of health providers is referred to as the stock, which represents the total number of workers in the various health occupations available to provide services (Birch et al.,

2007, p. 6). Factors that determine the stock and its flow include the amount of time spent providing patient care and services (activity levels), and the proportion of workers who are actively practicing (participation levels) (Tomblin-Murphy et al., 2016, p. 11). When measuring the stock, conversion from headcount to full-time equivalents (FTEs) is important as many health providers only work part-time (Lopes et al., 2015, p. 15). According to Ono et al. (2013), “FTE is undoubtedly a better measure of the supply of the stock of health workers [than headcount], as it adjusts for working hours and part time work” (p. 19).

### *Supply – Stock Flow*

Ono et al. (2013) review 26 health workforce projection models from 18 countries and “[v]irtually all are based on stock-flow approaches on the supply side” (p. 24). They explain that “[t]he current and future supply of health workers are affected by the “inflows” in each occupation and the “outflows” (exits)” (p. 19).

Inflows result mainly from new graduates of health occupation educational programs, and to a lesser extent immigration of workers from other countries (Ono et al., 2013, p. 24). Another feature impacting inflows is workers returning to active practice from leaves of absence (Kinsella and Kiersey, 2016, p. 16). The availability of these inflows at the macro national or provincial level, and micro organizational level is impacted by many factors. New graduate inflows are impacted by factors including: the total number of seats available for students within the various health occupation educational programs at the various educational institutions; the structure and pathway of the curriculum for the various health occupation programs; and dropout and failure rates of students in these programs (Ono et al., 2013, pp. 24 – 25).

Immigration inflow rates are impacted by factors including licensure requirements for regulated health occupations, and conditions under which immigrants are allowed to enter into domestic labour markets (Ono et al., 2013, p. 25). According to Lopes et al. (2015), educational planning and policy changes that affect inflows take time and workforce planning should therefore “target a long enough time horizon” (p. 17).

Outflows result from exits due to retirement or at an earlier point either temporarily or permanently for reasons such as personal matters, career change, or emigration. All models reviewed take into account retirement, although the process by which retirement is accounted for varies from calculations based on standard ages to calculations based on actual retirement patterns (Ono et al., 2013, p. 26). As noted by Cooper and Jackson (2017, p. 66) in their review of workforce planning practices in Canada, and Pong (2011, p. 11) in his review of physician retirement, that rather than retiring in full at a single point in time, retirement is now more often a gradual progression toward not working. This suggests a gradual change in activity rate that may be accounted for by adjusting FTE status within workforce planning models (Pong, 2011, pp. 36 – 38). According to Ascentum Inc. (2011) from their consultations with older workers and employers in Canada, “promising retention practices identified by older workers and employers can be categorized as follows: accommodating workplaces, financial incentives and pension benefits, quality work experience, skills development, and health benefits and wellness supports” (p. 20).

Exits due to reasons other than retirement may be difficult to address as people experience illness and injury or make personal choices due to life events such as child birth, marriage, and career advancement. Tomblin-Murphy et al. (2012a, p. 198) found that registered nurse retention may be improved by enhancing orientation/on-boarding, having regular dialogue between staff and nurse leaders, social networking, employee recognition, supporting staff-led innovation, providing leadership development, and reducing absenteeism through strategies such as reducing job strain and role overload, improving support from supervisors and co-workers, clarifying roles, strengthening leadership, and reducing the physical demands of the job. Chung, Jung, Yoon, and Lee (2010, p. 235), note that the working environment of nurses needs to be continuously improved to decrease turnover rates. Accounting for these types of exits in workforce planning models may be done through trending historical patterns and projecting these patterns into the future (Beduz, Vincent, and Pauze, 2009, p. 35).

### ***Supply - Productivity***

In defining the concept of productivity, Evans, Schneider, and Barer (2010) in their research on health human resources productivity define it as “a relationship between one or more inputs to a production process (in economes, “factors of production”) and one or more outputs from that process” (p. 4). According to Evans et al. (2010), “[p]roductivity increase could be indicated either by increased outputs and corresponding identifiable improvements in health outcomes without increased inputs, or by reduced inputs with increases, or at least maintenance of equivalent health outcomes” (p. 32). Ono et al. (2013), group workforce productivity into two broad sources: working smarter and working longer. Working smarter occurs when the same quantity of workforce produces increased outputs and/or improved outcomes per unit of time. Working longer occurs when the same quantity of workforce produces increased outputs and/or improved outcomes over a specified period of time by working an increased number of hours (p. 29).

Working smarter is reflected as a reduction in the demand for health service providers and may occur from such things as increased training and experience, better work organization, and technological advancement (Ono et al. 2013, p. 29). Tomblin-Murphy et al. (2012a, p. 199), identify productivity as being influenced by things such as the safety of the work environment, availability of support workers and services, the efficiency with which workers are deployed, and competencies of the workers. Tomblin-Murphy et al. (2012b, p. 10) identify absenteeism as a factor that reduces worker activity and productivity. Working longer is reflected as an increase in the supply of health service providers as represented by a greater number of working hours and FTEs (Ono et al., 2013, p. 29). As associated, Tomblin-Murphy et al. (2016, p. 7), note the importance of financial incentives as determinants of provider behaviour, and Beduz et al. (2009, p. 48) in discussing triggers that lead to staff scheduling pattern reviews noted overtime as one of the factors.

Lopes et al. (2015) identify that “it is possible to reorganize services and incentives so as to promote increased productivity or implement lean and operations research recommendations to significantly improve the output and outcome of the workforce” (p. 5). Birch et al. (2007, p. 14), Evans et al. (2010, p. 1), and Tomblin-Murphy et al. (2012a, p. 199), agree that while the concept of increased productivity is generally an attractive solution to workforce challenges,

planning for and measuring specific improvements in productivity is challenging given that there is disagreement across subject matter experts, policy decision makers, and those receiving services as to what specific outputs and outcomes are desirable, and that it is often difficult to measure the quality of outcomes in terms of health benefits to the population.

### ***Supply – Skill Mix***

Lopes et al. (2015, p. 5) define skill mix as the composition of the core competencies and activities performed by health professionals, which due to a degree of interdisciplinarity between medical professionals, may be reorganized to enhance roles performed. The potential for redistributing tasks within and across health occupations was noted by Turner, Osstbye, and Pederson (1993a, p. 38) as a way to address workforce planning challenges. According to Lopes et al. (2015), “[h]orizontal substitution (between different medical specialties) and vertical substitution (between different working classes) can be used to improve the amount of health-care services provided” (p. 5). Ono et al. (2013) in commenting on changes in health service delivery models note that “[a]ny re-organization in health service delivery can be expected to have an impact on health workforce requirements, requiring a different number and mix of health care providers” (p. 35).

To achieve changes to the skill mix for regulated health occupations, adjustments to scopes of practice and associated regulatory structures may be required. Tomblin-Murphy et al. (2016) in their extensive review of recent workforce planning requirements note that “[c]hanges to legislation and the other structures that govern the regulation, management, and delivery of health care are identified as an issue in several documents” (p. 6). According to Ono et al. (2013, p. 10), “multi-professional models are necessarily more complex and may raise sensitive issues around the scope of practice of different providers, but they point out that a certain degree of horizontal or vertical substitution may help to reduce any projected gaps for different categories of providers.” Panzera et al. (2016, p. 66) in their work on regional health workforce planning in rural Australia, note that not every community can include a member of each health profession and therefore they emphasised roles for multi-skilled health workers. They further conclude that “[b]reaking down rigid silos and enabling efficiencies through combining roles and functions within the health service are most likely to deliver these outcomes sustainably in regional and rural areas” (p. 67). Regan, MacDonald, Allan, Martin, and Peroff-Johnston (2014) in their comparative analysis of Public Health policies in two Canadian provinces note that “[p]olicy documents in both provinces discussed the importance of having an educated, competent public health workforce with the appropriate competencies for the effective and efficient delivery of public health services” (p. 4).

### ***Supply – Worker to Population Ratios***

According to Lopes et al. (2015, p. 5), the worker to population ratio “method establishes a desired ratio for the number of physicians and nurses per unit of population and compares it to the actual ratios. Policies to increase or decrease these ratios may then be pushed forward.” Dreesch et al. (2005, p. 269), define health workforce to population ratios as specifying desired worker-to-population ratios without reference to specific types of providers. An example at the micro organizational departmental level is the work of Hurst (2003), where five workforce planning systems for estimating the size and mix of nursing teams were highlighted. Each of the

systems establishes ratios for nurses to patients for application in determining efficient staffing for nursing units. A further micro example is included in the work of Beduz et al. (2009, p. 29) where they note the use of standardized nurse-to-patient ratios in describing common methods for nursing human resources planning for individual departments.

An example of comparisons done at the macro level is the Canadian Institute of Health Information (CIHI) provincial profiles of health care providers across Canada. The latest report (CIHI, 2015) provides the ratio of selected health professions per 100,000 of population in Canada and within the provinces. Comparisons can be made across all provinces of the total number of a certain type of health provider per 100,000 of population, such as psychologist, and policies adjusted to impact the ratio in whatever direction desired. Dreesch et al. (p. 269) and Lopes et al. (p. 5) agree that while worker-to-population ratios are relatively easy to apply, they ignore and do not allow for exploration of other supply and demand factors, such as provider numbers, mix, productivity, and population needs, which may influence the requirements for health providers across varied jurisdictions.

### ***Summary – Supply-Based Approach Mechanisms***

A relatively comprehensive summary of supply-based approach mechanisms was provided by Lopes et al. (2015, p. 13) in their review of 60 years of research related to workforce planning. A summary based on their table with some modifications based on the review completed for this report is provided in Appendix A. For each supply-based approach mechanism a description and related underlying assumptions, advantages, limitations, ideas to overcome limitations, requirements, and countries where documented usage was found is provided.

### **3.3 Theme 2 - Demand-Based Approach Mechanisms**

People seek health services in order to maintain and improve their health and well-being (Lopes, 2015, p. 5). Many factors influence the behaviour of people when it comes to seeking health services. In identifying determinants of health that contribute to making Canadians healthy, the Public Health Agency of Canada (PHAC, 2017), identifies 12 key determinants of health including: income and social status, social support networks, education and literacy, employment/working conditions, social environments, physical environments, personal health practices and coping skills, healthy child development, biology and genetic endowment, health services, gender, and culture. These key determinants serve as factors that may influence the incidence, distribution, and control of health and illness within a population.

Approaches to modelling the future demand for health care providers vary widely, ranging from simple approaches which only take into account the projected growth in population size to more sophisticated health services utilisation or health care needs approaches which may take into account morbidity or epidemiological factors, potential impacts of changes to health services delivery models, and the potential effect of future GDP growth and health expenditure growth (Ono et al., 2013, p. 30). According to Birch, Tomblin-Murphy, MacKenzie, and Cumming (2014, p. 3), models of health care expenditure need to recognize the complex nature of health care demand and supply, where expenditure is a function of service usage and use reflects the intersection of supply and demand. According to Lopes et al. (2015, pp. 5-6), demand

for health care services may be restricted at the individual level by the patients' ability to pay and at the macro governmental level by the public budget. Therefore, potential demand, projected strictly in terms of biological needs without a budget constraint, may not correspond to the demand effectively observed due to economic restraints. The gap in demand resulting from scarcity in financial resources is represented by the difference between potential demand and the effective demand actually observed.

Demand-based approach mechanisms described in this report are consistent with those identified by Lopes et al. (2015, p. 6) and include the following: needs (potential demand), economic (effective demand), and service targets. Each of these mechanisms will be described in detail based on key points made by authors across the 27 articles included in the literature review.

### ***Demand – Needs (Potential Demand)***

In this approach effects of health diseases, epidemiological patterns and overall mortality and morbidity rates on the demand for health services are used to determine requirements for health care provider supply. When and how disease trends evolve is critical to properly anticipate the needs of the population, a proxy to the expected future demand (Lopes et al., 2015, p. 6). According to Birch et al. (2009), “explicit recognition of needs for care within the population provides a more appropriate approach to expressing provider requirements (p. 59). In describing needs-based approaches, Tomblin-Murphy et al. (2016) note that they determine health human resources requirements by applying estimated future levels of health in the population to best practices (or current policy) for service provision in response to different levels of health. Provider requirements are then estimated from the best practice (or current productivity norms) of delivering care to meet those health care needs” (pp. 4-5).

According to Birch et al. (2007, p. 14), there are no universal standards for translating needs into service requirements, which are largely determined by provider discretion based on professional guidelines and ethics, and subject to the constraints of budgets and provider availability. When needs are assessed by a panel of experts in epidemiology they may not match the services that the public wants (Lopes et al., 2015, p. 6). Needs-based models face the challenge of coming up with reliable estimates of current and future health care needs, which are subject to normative judgments and high uncertainties (Ono et al., 2013, p. 10). Further limitations to needs-based approaches were identified by Dreesch et al. (2005, p. 269) and include that they ignore efficiency in the allocation of resources, require extensive data, require update to norms if technology changes, and they may project unattainable service and staff targets.

### ***Demand – Economic (Effective Demand)***

In this approach demand for health services is derived by translating the actual observed demand, usually measured in terms of service utilization ratios such as bed occupancy rates or number of inpatients (Lopes et al., 2015, p. 5). According to Dreesch et al. (2005, p. 269), utilization based approaches estimate future requirements for health services based on current levels of service utilization in relation to future projections of demographic profiles. Ono et al.

(2013) in describing this approach note that “future demand may be based on information about current health service utilisation patterns by sex and age groups, and how these translate into health workforce requirements, with the assumption that these patterns would remain constant in the future” (p. 30).

According to Tomblin-Murphy et al. (2012a), “while utilization-based models incorporate measures of health care utilization, these tend not to be linked to measures of the health conditions that ultimately determine the need (as opposed to demand) for health care services. Hence the models do not respond directly to differences in need across communities or over time” (p. 196). Where this method ignores needs or wants and looks at services actually contracted, it is subject to economic constraints that may put an upper bound on the quantity of services solicited and as a result may not imply a healthy population (Lopes et al., 2015, p. 6). According to Basu and Pak (2016), “the main criticism of utilization based methods has been that many other factors, such as technological innovations (new treatments or diagnostic services), epidemiological changes, personal preferences, and socio-economic factors, also affect the demand for healthcare providers” (p. 101).

### ***Demand – Service Targets***

In the target setting approach, the number and types of services are set as specific targets at various levels of care, considering the current level of technology, the demand of the population for certain services, and the various services already performed by health workers (Dreesch, 2005, p. 268). Normative targets for levels of service and associated provider requirements are established for a specific health service based on the current levels of service. While this approach is relatively easy to understand, it may result in potentially unrealistic results as it assumes that established service targets are achievable in terms of financial and physical capital resources (Lopes et al., 2015, p. 14).

### ***Summary - Demand-Based Approach Mechanisms***

A relatively comprehensive summary of demand-based approach mechanisms was provided by Lopes et al. (2015, p. 14) in their review of 60 years of research related to workforce planning. A summary based on their table with modifications based on the review completed for this report is provided in Appendix B. For each demand-based approach mechanism a description and related underlying assumptions, advantages, limitations, ideas to overcome limitations, requirements, and countries where documented usage was found is provided.

## **3.4 Theme 3 - Integrated Approach Mechanisms**

According to Lopes et al. (2015), an integrated approach to workforce planning is “a method that incorporates in its process projections of the workforce supply and the impact of microeconomic and organizational change in productivity and in the skill mix, of the evolution of demand for health-care services and also of the evolution of health diseases and its potential impact on the health system” (pp. 11-12). They further note (p. 17) that the results of their review of over 60 years of publications in workforce planning point in one clear direction; that health human resource planning requires an approach that is both integrated and flexible, featuring

supply and demand and other factors. An overview of the supporting literature within the review completed for this report that demonstrates the application of integrated approaches follows.

Turner et al. (1993, p. 29) in part two of their review of health work force planning in the 90's recommended a review of strategies to ensure that an adequate number of health workers locate and stay in rural and remote communities. Their assessment of distributional issues related to the stock and flow of health providers in meeting health service needs demonstrates consideration for systems level challenges and the many factors that influence them. Denton, Gafni, and Spencer (1995, p. 126) provided an analytical framework for the health system that was based on the view that the planning process should be well informed, integrated, and whole systems based in its approach. The framework, titled System for Health Area Resource Planning (SHARP), included consideration for demand based on identifying needs of the population and current utilization rates, and for supply based on review of stock and flow of health providers that encompassed opportunities for skill mix substitution. Dreesch et al. (2005, p. 274) in commenting on workforce planning approaches identified that there was a failure to recognize the effects of shared competencies and that a more integrated approach that considered opportunities for achieving utilization efficiencies from skill mix substitution within and across health providers must be adopted.

Birch et al. (2007, pp. 4-8) exemplify an integrative approach by presenting a needs based analytical framework that incorporates essential elements in a way that captures the interplay among factors impacting provider supply and provider requirements in the context of social, political, geographic, and economic contexts. Lavieri and Puterman (2009, p. 127) in their description of a model to optimize nursing human resource planning in British Columbia note their assumption that service needs are known and present the possibility to expand their model to be more integrative and include consideration for population needs, demographic considerations, expansion to other health professionals, and changes to skill mix, scopes of practice, and models of care.

Chung et al. (2010, p. 235) in their work on forecasting nursing manpower requirements highlight the importance of taking an integrative approach when they conclude that for accurate forecasting a comprehensive approach considering supply and demand from multiple perspectives should be followed. Evans et al. (2010, p. 1) in providing key messages resulting from their work on health human resource productivity noted that it should be measured in terms of the relationship between health outcomes achieved and health human resource inputs required. They went on to recommend that success stories and future research be focused on productivity within the context of the integrative relationship between inputs and outcomes.

Tomblin-Murphy et al. (2012b, p. 1) in their pilot-testing of an applied competency based approach to health human resources planning observe that competencies required to deliver specific health services in meeting population needs may be used as the basis for planning for use of health providers. This direct linkage between planning for use of the health workforce supply in meeting population needs demonstrates an integrative approach to workforce planning. Birch, Mason, Sutton, and Whittaker (2013, pp. 108-109) in their presentation of a framework that integrates health service and workforce planning focused on responding to population needs make a key point regarding the application of worker to population ratios. By assuming that what

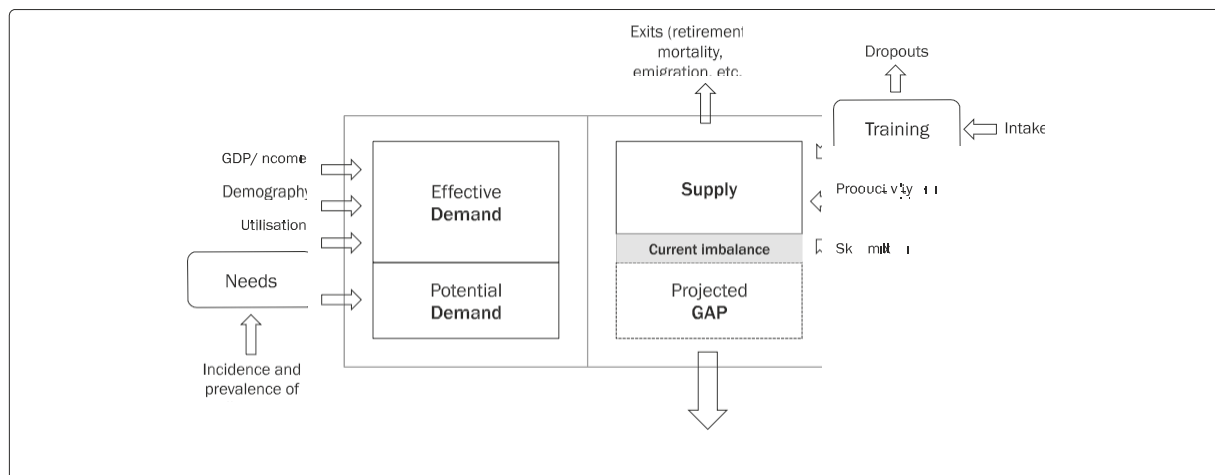
providers do, how they do it, and what they achieve by doing it is fixed, these ratios fail to account for improvements in efficiency from such mechanisms as technology and productivity, and result in inflated forecasts for provider requirements. This point highlights the need for taking a more comprehensive and integrated approach to workforce planning.

Ono et al. (2013, p. 15) comment that the uncertainties on both the demand and supply side represent formidable challenges and complexities for health workforce planning. To address these they state that they observed renewed efforts in many OECD countries to improve methodologies in order to provide better guidance and advice for decision making. These methodological improvements relate to being more integrative in their approaches by considering multiple factors impacting both the supply of and demand for health workforce providers.

The importance of taking an integrated approach is further highlighted by Birch et al. (2014, p. 4) where they note that by integrating financial planning, health service planning, and workforce planning into a single dynamic framework, threats to systems sustainability arising from the interdependence of demand for and supply of health care can be avoided and sustainable universal publicly funded health care systems can become a reality.

Regan et al. (2014, p. 9) in their comparative analysis of public health human resources in two Canadian provinces demonstrated support for an integrative approach when they noted that both provinces had identified the importance of planning public health services based on regional and local population health needs and that focus was evident on core public health competencies and supporting structures and resources to meet these needs. Lopes et al. (2015, p. 15) provide a model of an integrative system that incorporates several methodologies to address the many factors included in workforce planning. Their model is reproduced below in Figure 1 as a visual demonstration of its comprehensive nature. It includes a supply side with associated factors and a demand side with associated factors. In their description of the model they stress the importance of the use of FTEs to quantify the stock of providers and of factoring in financial and service planning considerations.

**Figure 1: Reproduction of Lopes (2015, p. 15)**

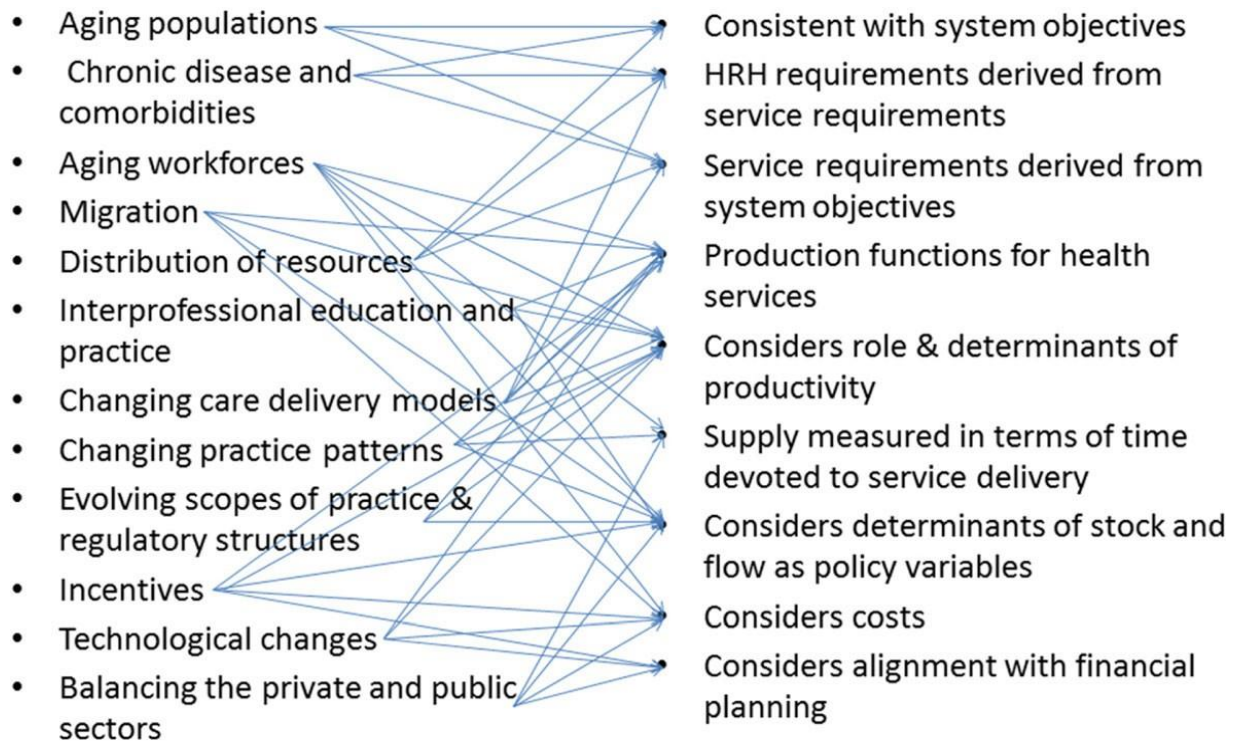


Hu et al. (2016, p. 1136) in their work on strategic health workforce planning conclude that more realistic models may be created by incorporating other elements such as the mix of providers and changes in scopes of practice and how they serve the patient demand. Their comment supports taking a more comprehensive integrative approach to result in better forecasts for health workforce planning. Panzera et al. (2016, p. 67) stress the importance of systems thinking and creativity in enabling efficiencies through combining roles and functions based on shared competencies to meet community needs in regional and rural areas of Australia. Again, the importance of whole systems thinking and accounting for the interdependence between supply and demand factors is demonstrated.

Kinsella and Kiersey (2016, p. 30) provide further evidence in their review of health workforce planning models, tools, and processes in five countries as they observed that most models attempt to strive for some semblance of an integrated approach. Basu and Pak (2016, p. 109) in questioning whether the needs based approach will lead to excess supply and inefficiency conclude that needs based models need to include a definition of needs that considers personal preferences and other socio-economic factors. They reached this conclusion as they observed that even if services were available to meet all needs, people would not necessarily utilize these services and as such there would be an oversupply. Their reference to considering personal preference and other socio-economic factors in determining an efficient level of health provider supply extends the integrative approach, which may result in more accurate forecasting.

Tomblin-Murphy et al. (2016, p. 12) in their synthesis of recent analyses of human resources for health requirements and labour market dynamics in high-income OECD countries provide a summary of inputs into workforce planning and how they map to planning criteria. Their summary, replicated in Figure 2 below, is an excellent overview of the integrative nature of factors impacting on the demand for health services, supply of health providers, and systems considerations such as overall objectives, provider distribution and financial planning.

**Figure 2: Reproduction of Tomblin-Murphy et al. (2016, p. 12)**



Cooper and Jackson (2017, p. 7) in their review of workforce planning practices in Canada observe that processes and tools used vary depending on the approach however they introduce a common framework for workforce planning that has six stages. These stages exemplify an integrative approach in that they tie to organizational strategy and objectives, account for supply, demand, and gap analysis for the target workforce, and align human resource strategy and actions to address gaps in an iterative and cyclical manner based on monitoring and evaluation and circling back to possible revision of strategy.

***Summary – Integrated Approach Mechanisms***

The overview of integrative approaches and mechanisms provided above demonstrates considerable evidence that it is the preferred and most appropriate approach to take for providing accurate projections for workforce planning. It also demonstrates that integrative approaches vary in their comprehensiveness and complexity, as associated with the number of factors considered and the objectives of the planning exercise. Different approaches to human resources for health planning will be appropriate for different jurisdictions depending on their respective contexts and the objectives of their health care systems and hence the policy questions being faced (Tomblin-Murphy et al., 2016, p. 13). A description of workforce planning approaches ranging from operational to strategic, as provided by Cooper and Jackson (2017, p. 6), is reproduced in Table 1 below. While not intending to be prescriptive, it demonstrates the continuum from basic to advanced approaches and may serve as a diagnostic tool for organizations to determine their current state and future direction to workforce planning.

Table 1: Reproduction of Cooper and Jackson (2017, p. 6)

<b>Foci</b>	<b>Approach</b>	<b>Processes</b>	<b>Outputs</b>	<b>Planning Horizon</b>
<b>Individual Positions (Operational)</b>	Ad hoc	<ul style="list-style-type: none"> <li>• Hire as needed</li> <li>• Talent not linked to business strategies</li> </ul>	<ul style="list-style-type: none"> <li>• No workforce plan</li> </ul>	Now
	Head count planning	<ul style="list-style-type: none"> <li>• Uses head count analysis and basic labour costing</li> <li>• Analyzes the immediate gaps between supply and demand in the workforce</li> </ul>	<ul style="list-style-type: none"> <li>• Specific head counts for all individual positions</li> <li>• Plans for external hiring and internal transfers for individual positions to meet the needs of current operating plans</li> </ul>	Current year
	Workforce forecasting analytics	<ul style="list-style-type: none"> <li>• Mines current and historical/lagging business-specific employee data</li> <li>• Uses descriptive workforce analytics to inform and plan recruitment</li> <li>• Analyzes relationships between workforce and business data (human capital metrics)</li> </ul>	<ul style="list-style-type: none"> <li>• Forecasts for all individual positions</li> <li>• Talent plans for recruitment, development, and movement for individual positions</li> </ul>	Next year or two
<b>Workforce Groups /Segments (Strategic)</b>	Strategic workforce planning	<ul style="list-style-type: none"> <li>• Uses an iterative method to explore assumptions about how future business conditions will change</li> <li>• Focuses on planning workforce needs for pivotal roles, or segments, in the organization</li> <li>• Uses tools like workforce segmentation, analytics, and scenario planning</li> </ul>	<ul style="list-style-type: none"> <li>• Plans for the employee groups and segments within the workforce that support projected business strategy</li> <li>• Alternative plans to meet the workforce needs for several possible business scenarios</li> <li>• Uses higher-level implications to inform operational workforce planning</li> </ul>	In parallel with business strategic planning (2–4 years)
	Human capital planning	<ul style="list-style-type: none"> <li>• Works at the enterprise-level and builds off SWP results</li> <li>• Focuses differentiated workforce investments in mission-critical segments</li> <li>• Broader strategy to build/ buy/ borrow/partner for talent requirements</li> </ul>	<ul style="list-style-type: none"> <li>• Plans that include workforce risk management and mitigation that respond to broad human capital needs</li> <li>• Informs talent management strategy and planning</li> </ul>	Focuses on broader trends (3–5 years out)

### 3.5 Theme 4 - Data Considerations

Decisions regarding the sophistication of the workforce planning approach align with the context and objectives of the organization making those decisions (Tomblin-Murphy et al., 2016, p. 11). According to Cooper and Jackson (2017), organizations may choose from a range of approaches, from basic to intermediate to advanced, depending on their needs, resources available, and experience” (pp. 4-6). The degree of sophistication in the approach will have implications for data requirements, where more comprehensive approaches will have greater requirements than simpler approaches (Birch et al., 2007, p. 15). This is demonstrated by Lavieri and Puterman (2009, p 126), when they noted that a key challenge to applying their model for nursing human resources planning in British Columbia was obtaining the necessary information to populate the model.

According to Tomblin-Murphy et al. (2016), “the validity and credibility of all workforce planning approaches is dependent on the availability, relevance, and accuracy of the data and information underlying its findings” (p. 8). Without a relatively accurate picture of the current situation, it is simply impossible to project the future accurately (Ono et al., 2013, p. 23). To support this, Kinsella and Kiersey (2016, p. 67) note that expenditure is necessary on core manpower and workforce planning information systems to develop and oversee any successful workforce planning system.

According to Lopes et al. (2015, p. 15), adequate data is always required to feed workforce planning models and increase the probability of a more comprehensive projection. In all cases a minimum data set is required to set a baseline for measurement and forecasting (Kinsella and Kiersey, 2016, p. 18). In identifying specific types of data to include, Beduz et al. (2009), found that “integrated reports should include data on: budgeted FTEs and utilization in FTEs for full-time, part-time, casual, agency staff; utilization in FTEs for sick time, over-time, education, orientation, benefit hours such as vacation; and retirement trends in past years and future projections based on age of staff “ (p. 3). According to Ono et al. (2013), “FTE is undoubtedly a better measure of the supply of the stock of health workers, as it adjusts for working hours and part-time work, but it requires detailed data on working hours” (p. 19). A relatively comprehensive list of the types of data and information necessary for workforce planning, as aligned with the various supply, demand, and integrated mechanisms identified in this report, was provided by Lopes et al. (2015, p. 16). A summary based on their table with modifications based on the review completed for this report is provided in Appendix C.

Health workforce planning, as any other attempt to project the future, is not an exact science, and there is a need for continuous improvement in methodology and data sources to improve the accuracy of the projections and their usability in testing different policy-relevant scenarios about the future (Ono et al., 2013, p. 13). According to Kinsella and Kiersey (2016), “[a]dvancements in data collection, database construction and maintenance as well as statistical modelling must evolve within systems of dialogue and feedback to understand the evolution of the healthcare planning system. Using the data collection and modelling process as part of a structured dialogue with health professionals is the key to any workforce planning model’s success” (p. 11). Otherwise projections may be inaccurate and initiatives taken as a result of the projections inappropriate.

### **3.6 Summary - Literature Review**

The literature review revealed four themes within which various mechanisms and practices for workforce planning were captured and explained: supply based approach, demand based approach, integrated approach, and data considerations. What makes these approaches and mechanisms smart is their potential to be used to achieve the overall objectives for workforce planning in NSHA, which is directly aligned with achieving the mission, vision and strategic directions of the organization and of the health system in Nova Scotia. A synthesis of the smart approaches and mechanisms identified in the findings of the literature review, that includes reference to implementing and supporting features is provided in Appendix D. Whether, to what extent, and how each of the approaches and mechanisms should be used will be determined through the discussion and analysis in Chapter 4 of each of them as set in the context of answering the research question of what is the most effective approach to improve and guide workforce planning for NSHA.

## **4 Discussion and Analysis**

### **4.1 Introduction**

The relatively newly formed NSHA Workforce Planning, Performance and Operations centre of expertise is expected to address the need for standardized, province-wide, and proactive workforce planning in order for the organization to have a sustainable number and mix of health care providers, appropriately distributed and working collaboratively to optimal scope of practice, to meet the population health needs and to deliver quality, safe, and cost-effective care. In determining the most effective approach to improve and guide workforce planning for NSHA, the synthesis of smart approaches, mechanisms and practices identified through the literature review will be discussed and analysed as to their application in the NSHA context. In keeping with the structure of the literature review, the discussion and analysis is organized around the four themes under which the smart approaches and their related mechanisms and practices align with: supply based approach mechanisms, demand based approach mechanisms, integrated approach mechanisms, and data considerations. This integration of the research is representative of the methodology underlying the report.

### **4.2 Findings**

#### **4.2.1 Theme 1 – Supply-Based Approach Mechanisms**

##### ***Supply – Stock Flow***

The flow of the stock of health workforce providers has been described by mechanisms and practices related to inflows and outflows at both the macro strategic and micro operational levels. Implementing features related to mechanisms and practices for inflow include new graduates, migration, and hiring incentives. Implementing features related to mechanisms and practices for outflow include retirements, employment/career changes, terminations, leaves of absence, and retention strategies. Following is a discussion and analysis of each of these implementing features and how NSHA may wish to approach them.

New graduates are a means to replenish and maintain stability in the overall stock of the various types of health workforce providers. In Nova Scotia, as in all health sector jurisdictions, the health workforce is comprised of regulated and unregulated workers, some of which focus on clinical activities and some of which focus on non-clinical activities. This discussion on new graduates will focus on regulated health workforce provider classifications that are focused on clinical activities as these are critical to providing front-line care. These classifications, such as physicians, nurses, pharmacists, physiotherapists, psychologists, social workers, dietitians, medical laboratory technologists, medical radiation technologists etc., are governed by legislation, regulations, and licensing bodies such as associations and colleges, and are produced by accredited educational institutions such as universities and colleges. The provincial government works with these licensing bodies and accredited educational institutions to set numbers for how many seats will be made available for students to enroll. It also works with employers who employ these regulated health providers to determine what their current and future needs will be for these types of workers for health services delivery.

NSHA is part of a provincial health workforce planning committee where information regarding its current and future needs for regulated health providers is shared and discussion occurs regarding new graduates, including the adequacy of their preparation to begin employment and the rate at which they are being produced. To be prepared to share information regarding its requirements for new graduates with this provincial committee, NSHA needs internal structure for determining what its needs are and will be in the future. Currently, there is no direct mechanism in NSHA linking health services planning activities and projections for health provider requirements being completed by the workforce planning centre of expertise service. This is an area where there is opportunity for development for the workforce planning function for NSHA.

Migration is another form of inflow that helps support maintenance of the stock of health providers. When workers in regulated health professions migrate from another province, territory, or country they must meet licensure requirements for practice when registering with the licensing body in the jurisdiction they are moving to. These requirements are based on ensuring associated standards of practice are met and are important to the provision of safe and high quality services. In addition, employers looking to hire workers from other countries are often required to prove that similar workers are not available within their jurisdiction. Efforts to streamline and improve processes associated with migratory requirements flow through the provincial health workforce planning committee to government and associated licensing bodies and educational institutions. The workforce planning function for NSHA works internally with managers, the recruitment and staffing service, and the inter-professional practice service to identify issues and opportunities for improvement for bringing to the provincial committee. Currently, there is no formal recurring internal meeting of key stakeholders to coordinate and organize this work. Setting a recurring internal meeting with a group of key stakeholders, with terms of reference to guide the work, would allow for better coordination and preparation for identifying matters to bring to the provincial committee. Migration across or within employers in the same jurisdiction results in shuffling and redistribution of the stock available in that jurisdiction. It does not address shortages or overages that may exist in the overall stock and may result in distributional issues for that stock within the jurisdiction, where some geographic areas may be oversupplied and others undersupplied. Further discussion regarding distributional issues is included under theme 3 - integrated approach mechanisms below.

Hiring incentives are typically offered by employers to recruit workers into hard to fill positions where they are experiencing shortages in the stock of provider supply or where competition for specific provider types is high. They include practices such as accelerated rates of pay, monetary hiring bonuses, relocation expenses reimbursement, recognition of prior service for setting vacation accumulation rates and future long service allowance awards, special pension and benefits arrangements such as participation in supplementary employee retirement pension programs and waivers of waiting periods for benefits enrollment, flexible work schedules and arrangements, and monetary and non-monetary support to pursue educational achievement such as bursaries for students and time off for workers. These incentives are sometimes combined with those receiving them signing return of service agreements to stay for specified lengths of time, which is typically commensurate with the size and overall value of the incentives.

All of these practices are currently used by NSHA; however with the consolidation of the nine former health authorities, internal policies and guidelines are inconsistent. Focus on developing a policy or set of guidelines for when and how to use hiring incentives would lead to standardization and consistency in their application and in financial planning to account for their costs. This work could be overseen by an internal working group of key stakeholders, such as the one noted in the previous section on migration. While hiring incentives may alleviate worker shortages in the short-term, there is no guarantee that workers who receive them will stay in the positions they were recruited to beyond the length of any return of service agreement that may have been established with the incentive. As such and as consistent with the findings of Tomblin-Murphy et al. (2016, p. 7), the effectiveness of hiring incentives may vary in different contexts and they should be viewed as only one part of a broader strategy to address workforce planning requirements.

Retirements are one of the main contributors to outflow of health workforce providers and must be accounted for when workforce planning. The current practice of the NSHA workforce planning service for accounting for retirements, which is consistent with the smart practice identified through the literature review, is to establish a historical trend for the workforce being examined based on the pattern for retirement of that specific workforce. This trend is converted to FTE projected retirements and then validated with the manager of the workforce being examined. According to Carriere and Galarneau (2012, p. 4), Canadians are postponing their retirements and retiring at an older age than they used to. While this serves as evidence that workers are generally working longer than they used to, whether they continue to work full-time hours or at a reduced activity rate may impact the extent to which older workers contribute.

Review of a recent NSHA workforce profile (2017) for fiscal year ending March 31, 2017 reveals that the average age of retirement in the organization is 60 and that retirement across the organization remained relatively stable as compared to previous fiscal years at an average quarterly rate of 0.8% of the workforce. While retired NSHA health providers receive defined benefit pensions, qualitative observation of the researcher indicates that some workers return to work part-time or casual after retiring in order to supplement their retirement income. This is something for further investigation as over reliance on retired workers is not a good long term strategy for workforce planning, especially if positions that could be provided to younger workers entering the workforce are being held or altered to provide part-time and casual relief work to retired workers. Having an appropriate mix of workers from across age groups provides stability in workforce planning and service provision.

Outflows related to worker movement due to such things as employment and career changes, and terminations, initiated voluntarily at the choice of the worker or involuntarily by the employer, may be referred to from an individual employer perspective as separations for reasons other than retirement. When these separations result in internal movement across departments and programs within NSHA, they may be referred to as internal transfers. When these separations result in health service providers leaving the NSHA all together, they may be referred to as terminations. NSHA workforce information from the recent workforce profile (2017) reveals that the average quarterly rate of separations resulting in termination of

employment from the organization for fiscal year ending March 31, 2017 was 1.2% of the workforce, which was consistent with the rate from the previous fiscal year.

While this rate when viewed at the organizational level is not overwhelming, review at the departmental level may reveal higher rates that could be problematic to the stability of the workforce at that level. The NSHA workforce planning function currently completes workforce projections, including review of all separations, for a limited number of departments. Expansion of this work to include other departments may help reveal issues at that level. Separations at the individual employer level may not result in changes to the overall stock of health providers within a broader jurisdiction if workers are changing employers but not leaving that jurisdiction. As such, workforce planning at a broad provincial or national level may account for outflows resulting from separations differently than individual employers and only include them if workers have left a specific health provider category or jurisdiction all together.

Leaves of absence, both paid and unpaid, occur for a variety of reasons. The NSHA workforce profile (2017) shows that at fiscal year end March 31, 2017, 9.1% of NSHA's employees were on leave, including long term disability. Over 50% of leaves of absence in NSHA result from health provider illness and injury. Other types of leaves occur for such issues as pregnancy, parental, adoption, education, and other personal reasons. Most leaves are for a limited timeframe and result in return to work. As such, when accounting for leaves in workforce planning at the organizational level the timeframe over which projections are being made must be considered as the leaves may begin and end within the timeframe over which the projections are being made.

This may be addressed by accounting for both leaves that began and leaves that ended during the period that workforce planning is being done for. Replacement of workers on temporary leaves of absence can be challenging. Recruiting and retaining workers in casual relief and temporary positions created to replace temporary leaves is difficult. This may result in increased overtime and other costs to maintain services and in some extreme cases inability to provide services.

One strategy employed in NSHA to address this is to establish a trend for total average FTE positions on leave within the workforce being studied and hire an equivalent FTE amount of permanent positions. This provides for greater stability when scheduling workers to meet service demands but may result in having too many workers if the actual amount of leave is lower than the average upon which the hiring of additional FTEs was done. Given the inevitability of leaves of absence occurring, further investigation in this area and development of strategies is warranted.

Retention strategies assist in maintaining the stock of health providers and preventing issues that may result when levels of health provider outflow exceed levels of health provider inflow available to meet health service needs. These strategies are particularly important at the individual organization level as at a more macro level outflows of providers from one organization to another within the same jurisdiction will not be considered outflow at the jurisdictional level. In providing examples of retention strategies, the recommendations of

Cooper and Jackson (2017, pp. 66-67), although focused on retaining older workers are applicable to all workers as follows:

- Allow flexible work arrangements, including working from home, part-time, etc.;
- Offer financial incentives and pension benefits;
- Improve the quality of the work experience (e.g., foster a sense of purpose);
- Offer training and development;
- Provide health benefits and wellness supports;
- Promote health through job design; and
- Foster a culture of inclusion/valuing all workers.

While there is evidence within policies, programs, and practices across NSHA of all of these strategies being employed, further development and focus on standardization and consistency in their application may result in improved results.

In concluding the discussion and analysis of smart supply based stock flow mechanisms and practices, the current NSHA workforce planning projection tool, which has its origins in the Beduz et al. capacity analysis tool (2009, p. 43) and incorporates many of these mechanisms and practices, will be reviewed and is provided in Figure 3 below.

**Figure 3: NSHA Workforce Planning Projection Tool**

**(Insert Provider Type/Program Name) Workforce Planning**

	Staffing Profile	Full Time Equivalency (FTE)	Validated FTE (Yellow Cells Only)	Code	Definition
Staffing Profile at Beginning of Review Period	Budgeted FTE (per Finance) Adjusted to Planned FTE by Mgr			A	Planned FTE for Health Services Delivery - Unit Producing Personnel (UPP)
	Active Full-Time Positions			B	Active FT and PT permanent and temporary / excludes leaves of absence
	Active Part-Time Positions			C	Active FTEs - excludes temporary leaves e.g. illness, pregnancy, parental, education, LTD, personal etc.
	Spare FTE			D=A-B-C	FTE unfilled with permanent or temporary positions and available to use for relief and/or hiring
Relief FTE Usage	Casual			E	Average actual relief usage over previous 3 years
	Over-time			F	
	External Agency Staff			G	
Staffing Projections Over Entire Review Period	<b>Workforce Staffing Projection to (insert date)</b>				
	Planned FTE			A	Based on profile above
	Active Staffing			H=B+C	Based on profile above
	Spare FTE			I=A-H	Based on profile above
	<b>Plus Projected FTE Reductions</b>				
	Terminations from NSHA			J=H*Termination Trend %	Projected terminations based on historical trend %
	Internal Transfers Out			K=H*Transfer Out Trend %	Projected internal transfers out based on historical trend %
	Retirements			L=H*Retirement Trend %	Projected retirements based on historical trend %
	Leaves of Absence			M=H*LOA Trend %	Projected LOA's (e.g. illness, pregnancy, parental, education, LTD, personal etc.) based on historical trend %
	Total Projected FTW Reductions			N=J+K+L+M	
	<b>Less Projected FTE Additions</b>				
	Confirmed Internal Recruitment			O=H*Internal Recruitment Trend %	Projected internal transfers and supernumerary/over core becoming unit producing based on historical trend %
	Confirmed External Recruitment			P	Known new external hires over projection period
	Leaves of Absence Returning			Q=M*LOA Return Trend %	Projected LOA's returning based on historical trend %
	Total Projected FTE Additions			R=O+P+Q	
	Staffing Requirement Sub-Total			S=I+N-R	
Less Relief FTE			T	Proportion of FTEs protected to manage census peaks and troughs e.g. Casual, OT, and Agency	
Staffing Requirement Target			U=S-T	Projected staffing target for review period	

The tool is designed to study individual provider types or professions such as registered nurse or medical laboratory technologist at the full range of levels, from an individual department at an individual site to across the entire organization. In this regard projections may be rolled up or broken down at whatever level the planning is focused on. This is useful as issues at an individual department or site level may vary from those in other departments, sites and geographic areas, and when viewing the organization as a whole.

The top section of the tool is focused on identifying the staffing profile of the workforce being studied at the beginning of the review period. This establishes the baseline upon which the remaining factors are dependent in determining the projection for the period being reviewed. It starts with stating the budgeted FTE as provided by NSHA financial services. The manager(s) of the workforce being studied then validate whether the budgeted FTE matches their planned FTE based on the amount of health service providers they schedule to provide health services on a day-to-day basis.

Application of the tool to date has identified examples where the planned FTE does not match the budgeted FTE, which results in a budget variance. Work with NSHA financial services to account for this has begun and should be pursued until a solution is identified. Next FTE for active full-time and part-time positions are identified and validated by the manager(s) so they may be subtracted from the planned FTE to determine whether there is spare FTE that is currently not being accounted for with full-time and part-time positions.

The next section provides information as to historical usage of relief FTE, which is not accounted for within active full-time and part-time positions. Relief FTE includes use of casual staff who aren't provided guaranteed work, overtime, and external agency staff. This information does not automatically carry down to the projection section. It is meant to provide context when determining in the projection section of the tool what FTE the manager(s) wish to assign to this factor for the projection period being reviewed. By accounting for relief FTE in the projection section, the manager(s) for the workforce being studied stays within their total planned FTE as determined in the top section of the tool. This provides for sound financial management of the human resources assigned to the workforce being studied.

The projection section is next and is made up of multiple sub sections that lead to the projected staffing requirement target for the workforce being studied for the period being reviewed. First the staffing profile from the top section is automatically pulled down to the top of the projection section. Next projected FTE reductions for the review period are calculated. These include reductions resulting from terminations, internal transfers, retirements, and leaves of absence. To calculate these projections, trends based on historical percentage rates for each of these elements for the workforce being studied are established. By using trends based on the actual historical experience of the workforce being studied and not broader macro trends, the likelihood of those trends accurately reflecting what will occur in the future for the workforce being studied is increased.

The trend percentages are then applied to the active FTE identified in the profile section to determine FTE reductions for each element for the period being reviewed. These projected reductions for each element are then validated by the manager(s) to increase their probability of

being accurate. The engagement and inclusion of the manager(s) responsible for the workforce being studied throughout the process not only increases the accuracy of results, it leads to increased understanding of the process, the establishment of a sense of ownership and trust, and to networking that supports discussion and identification of initiatives to address results.

The next sub-section is focused on calculating projected FTE additions for the review period. These include additions resulting from confirmed internal recruitment, confirmed external recruitment, and leaves of absence returning during the period being reviewed. The process for calculating confirmed internal recruitment and leaves of absence returning is based on applying historical trend percentages in the same manner as that for calculating the projected reductions as noted in the previous section. When calculating confirmed external recruitment, the manager(s) of the workforce being studied provide this FTE information based on any known hires that will start employment during the review period.

Next a staffing requirement sub-total is calculated by adding the spare FTE identified in the profile section to the total FTE reduction identified in that sub section, and then subtracting the total FTE addition identified in that sub section. The manager(s) of the workforce being studied then determine how much FTE they will allot for use as relief FTE for the period being reviewed, and this is subtracted from the previous sub-total to result in the projected staffing requirement for the workforce being studied for the period being reviewed.

The projected staffing requirements are then used by the manager(s) and other key stakeholders such as the people services workforce planning and staffing and recruitment teams, and inter-professional practice teams to proactively plan for having a stable workforce. In this regard the projections support the identification of strategies and initiatives that support achievement of the overall objective for workforce planning for NSHA, which is to have a sustainable number and mix of health care providers, appropriately distributed and working collaboratively to optimal scope of practice, to meet the population health needs and to deliver quality, safe, and cost-effective care.

### ***Supply – Productivity***

The findings of the literature review grouped smart mechanisms and practices associated with productivity based on working smarter and working longer. The implementing features associated with working smarter include training and development, work flow and process improvement, scheduling efficiency, technological advancement, reduced absenteeism, and worker satisfaction and engagement. The implementing features associated with worker longer include overtime, standby and callback, and night and weekend work. Following is a discussion and analysis of these two groupings of implementing features as set in the NSHA context.

As noted in the literature review, working smarter occurs when the same quantity of workforce produces increased outputs and/or improved outcomes per unit of time. Training and development achieves this through improving the knowledge, skills, and abilities of health services providers to improve performance related to technical/clinical, legislative, and culturally based standards and expectations. Technical/clinical standards and expectations relate to job specific knowledge, skills, and abilities. Legislative standards and expectations stem from

legislation and regulations such as the persons in care act, privacy, and occupational health and safety. Culturally based standards and expectations relate to behaviours associated with demonstrating the organizational culture, as described by the values of the organization, leadership capabilities, and codes of conduct and ethics. In NSHA responsibility for training and development is distributed across multiple portfolios and programs, and is delivered through use of a combination of internal and external resources. Exploration of possibilities for coordination, particularly where shared competencies and interests exist, may be beneficial.

Work flow and process improvement achieves improved outcomes per unit of time by removing inefficiency and streamlining. This may occur within and across programs and service areas. As things such as organizational structures and environments, and the needs of those served evolve and change, existing work flows and processes may become outdated, inefficient, and sub-optimal in meeting desired outcomes and objectives. Through taking a systematic approach to reviewing and adjusting existing work flows and processes, continuous improvement aligned with meeting the overall objective for quality, safe and cost-effective care may be achieved. In NSHA, the quality and systems performance portfolio has a team focused on supporting work flow and process improvement. The workforce planning service has connected with this team to explore opportunities for collaboration and coordination. This may lead to development and execution of a pilot project to align and integrate tools and processes to better meet shared interests and the strategic objectives of NSHA.

Efficiencies related to the scheduling of the health provider workforce may be achieved through ensuring the workforce is scheduled in a manner that optimizes utilization in meeting the needs for health services. Optimal utilization is impacted by factors such as labour standards, collective agreement provisions, shift lengths, fatigue management, timekeeping practices, and decisions regarding allocation of the various types of providers. With the consolidation of the nine former health authorities, NSHA currently has multiple scheduling and timekeeping systems, and varied practices. The workforce planning, performance and operations centre of expertise is involved in and connected to work to move towards having a single system and standardized practices where applicable and appropriate.

As this work progresses, ensuring alignment and integration with the overall objective for workforce planning and broader strategic objectives will be important. The environment within which scheduling occurs is complicated by the breadth and nature of services provided on a continuous 24 hour a day basis, and variation in requirements related to the existence of multiple collective agreements, where approximately 90% of the workforce is unionized. The work to standardize includes consideration for these factors.

Technological advancement achieves improved outcomes per unit of time by requiring fewer inputs to achieve the same or increased amount of output through use of technology. Technological advancement in the health sector is ongoing and broad ranging, as demonstrated by such things as improved diagnostics through various scanners and laboratory processes, improved surgical and therapeutic instruments and systems, and improved information technology for use in managing health information for both health service providers and consumers. As consistent with the observations of Tomblin-Murphy et al. (2016, p. 7), the

impacts of technological advancement in terms of the health provider workforce are not clear in the literature.

The implementation of technology may result in reduced need for human resources however these human resources may in turn be reallocated in meeting service needs. Where technological advancement may have significant financial, health workforce, and service implications, thorough assessment and planning should occur prior to implementation. In NSHA, opportunities for technological advancement in the various health service areas may be linked with broad initiatives being done in collaboration with the provincial department of health and wellness or may be identified by managers and health service providers working in the various program service areas. The workforce planning function, while not responsible to lead in this area, may link with associated key stakeholders to determine how to incorporate technological advancement when workforce planning.

Reduced absenteeism and greater satisfaction and engagement of workers may be achieved through programs and initiatives focused in these areas. The retention strategies of Cooper and Jackson (2017, pp. 66-67) as noted above serve as topics where attention may be placed in the development of related programs and initiatives. While NSHA has many related programs and services in place, greater attention to coordination and standardization, and expansion and development may result in improved results. When workers look forward to coming to work and find meaning in the work they do, they are more likely to show up for work and be productive in delivering care and services.

The impacts of the application of implementing features related to working smarter may result in the need for adjusting the stock of various health workforce provider types. The workforce planning function for NSHA may incorporate these impacts into their processes by expanding their existing forecasting tool (see Figure 3) to include a section related to expansion and contraction. This section could include detail for the resulting FTE expansion or contraction of health provider types associated with each of the implementing features individually or as a rolled up number. Expansion of the tool in this manner would make it more robust and integrated with factors influencing the outcomes associated with the overall objective for workforce planning, which is for NSHA to have a sustainable number and mix of health care providers, appropriately distributed and working collaboratively to optimal scope of practice, to meet the population health needs and to deliver quality, safe, and cost-effective care.

As noted in the literature review, working longer occurs when the same quantity of workforce produces increased outputs and/or improved outcomes over a specified period of time by working an increased number of hours. Associated implementing features include overtime, standby and callback, and night and weekend work. Decisions related to approving the use of these implementing features have implications for requirements and outcomes associated with financial costs, the stock of health providers, and health services. In determining whether these implementing features are being used in an effective manner, the overall objective for workforce planning, which directly aligns with the strategic objectives of NSHA, should be considered.

Results related to these implementing features should not be considered in isolation of other factors and variables that influence them and whether overall objectives are met. The

existing NSHA workforce planning forecasting tool (see Figure 3) accounts for FTE associated with these features by including past and future relief FTE in the calculations. Through increased collaboration and coordination with other key internal stakeholders such as health services managers, finance, and quality and systems performance, improved assessment and initiatives related to ensuring effective use of these features may be achieved.

### ***Supply – Skill Mix***

Skill mix has been described for the purposes of this report by the designation of which tasks can be performed by whom and the design of health services as associated with the combinations of health providers designated to carry out those services. The smart skill mix mechanisms identified through the literature review have been described by implementing features related to scopes of practice, scopes of employment, shared competencies, vertical and horizontal substitution, models of care and service design, and standards of care and service. Following is a discussion and analysis of these implementing features as set in the NSHA context.

While the overall objective for workforce planning for NSHA includes health providers working to optimal scope of practice, the workforce planning service is not responsible to lead initiatives in this area. Work has been and continues to be done with the provincial department of health and wellness, regulatory bodies, and NSHA clinical and non-clinical managers and administrative staff to review models of care and service and scopes of practice and employment. This work includes discussion regarding opportunities for substitution in performing tasks between various types of health service providers, and for accounting for challenges related to reaching agreement on standards of care and service and resistance to change. A few examples of changes that have resulted include vertical substitution in performing tasks between registered nurses, licensed practical nurses, and care team assistants in some nursing units, and vertical substitution between pharmacists and pharmacy practice assistants.

While these changes align with the overall objective for optimizing the use of health service providers, they have not been applied consistently across NSHA. The workforce planning service should encourage further exploration in this area when doing workforce planning with managers from the various programs across NSHA, and through discussion and collaboration with key stakeholders both internal and external to the organization. In addition, the workforce planning service may incorporate any alterations in the stock of the various types of health service providers resulting from alterations to skill mix implementing features by expanding their existing forecasting tool (see Figure 3) to include a section related to expansion and contraction.

### ***Supply – Worker to Population Ratios***

The smart practices literature review described worker to population ratios as ratios that identify the number of specific health occupation providers currently being used to serve a specific unit of population in a particular jurisdiction. Examples were provided of their application at the micro departmental level for nursing units and at the macro provincial and national levels for the ratio of selected health professions per 100,000 of population in those jurisdictions. To determine these ratios, implementing features related to current service

standards and targets, and demographic information for the population being served is required. Following is a discussion and analysis of worker to population ratios as set in the NSHA context.

In NSHA, scheduling done at the departmental level is mostly based on established past and current patterns for health service provider utilization in providing services. These patterns have not resulted in worker to population ratios that are systematically and consistently established, and regularly reviewed and adjusted. This is an area for further investigation and may be integrated with work to consider alterations to skill mix implementing features such as scopes of practice and standards of service, productivity implementing features related to standardizing scheduling and timekeeping systems and practices, and alignment with systems objectives and financial processes as previously noted. Another feature considered when scheduling at the departmental level is the mix of levels of experience and competency that exists amongst the health service providers delivering services. Consideration is given to scheduling and ensuring there is an appropriate mix of providers with varying levels of experience and competence in ensuring overall objectives for safety and quality.

This aligns with work done to provide training and development in ensuring all health providers are performing at an acceptable level in meeting standards and expectations, and serves as another example of the integrated nature of workforce planning. A further example of the integrated nature is when worker to population ratios are combined with future service targets based on anticipated changes in the demand for services. This allows for scenario based planning which could be accomplished through adjusting factors considered in the existing NSHA workforce planning forecast tool as described and included in Figure 3 above. Additional discussion and analysis of integrated approach mechanisms and implementing features will occur in the section devoted to that theme below.

#### **4.2.2 Theme 2 – Demand-Based Approach Mechanisms**

Where the workforce planning service for NSHA is not responsible to lead work related to the mechanisms and implementing features of determining demand, and where as previously noted currently has no direct mechanism by which its tools and processes are linked to health services planning, the discussion and analysis of demand based approach mechanisms will be combined under one heading. Demand based mechanisms have been described by the smart practices literature review as deriving demand by assessing requirements for levels of service and the corresponding mix of health service providers based on patterns that are either bounded by current utilization or that have no bounds for defining needs. Assessments based on current utilization may result in the establishment of normative service targets that may be used in workforce planning. Implementing features related to demographic and epidemiological considerations inform projections associated with demand based mechanisms. In the discussion and analysis of demand based approaches within the NSHA context that follows, related limitations and ways to overcome them as noted in the literature review are important and will be considered.

Health services planning in NSHA is led by management and program leaders responsible for the various service program areas. As the workforce planning service has met with managers and program leaders from the various programs, discussion of service needs and

targets, and how they have been determined has occurred. Based on these discussions as set in the aforementioned consideration for limitations, planning for health services delivery has included estimation of future demand corresponding with the effect of factors related to epidemiological and demographic factors. It has also taken financial constraints into consideration, which appears to have resulted in an upper bound within planned levels of service and as such has made them more realistic.

Further, it has aligned with strategic directions and related operational outcomes for health services delivery at the organizational and systems levels. Consideration for health human resource workforce planning however appears to occur late in the process and not in a consistent and systematic manner. Determining and implementing a consistent and systematic approach to this presents an opportunity for the NSHA workforce planning service to add value to the process and evolve related tools, processes, and services.

As part of exploring this opportunity, the current NSHA workforce planning projection tool as described in Figure 3 may be used to investigate health provider implications for various health service planning scenarios. This could be done as a pilot with a group of key stakeholders for a specific service area program. The implications of assumptions regarding the application of various workforce planning approach mechanisms and implementing features could be represented in the profile section of the current projection tool, with resulting health provider requirements being reviewed and used to inform related decisions and actions. This integration of workforce planning with health services planning, as set in the context of the description of workforce planning approaches provided by Cooper and Jackson (2017, p. 6) reproduced in Table 1, would demonstrate evolution in NSHAs approach to workforce planning from being focused on workforce analytics to taking a more strategic approach that aligns with business strategy and encourages initiatives aligned with broad human capital planning.

#### **4.2.3 Theme 3 – Integrated Approach Mechanisms**

The findings from the literature review provide overwhelming evidence that taking an integrated approach is the preferred method for providing accurate and comprehensive workforce planning. While integrated approaches may vary in their comprehensiveness and complexity based on the number of implementing features applied, they are illustrated by combinations of supply and demand mechanisms and by taking a broad holistic systems based view that may incorporate consideration for systems objectives, financial planning, and distributional issues with stock and flow. Following is a discussion and analysis of the extent to which NSHA is currently employing an integrated approach and what may be done to evolve towards greater application of this approach in achieving the overall objective for workforce planning.

The discussion and analysis of smart supply and demand based approach mechanisms, implementing features, and practices above demonstrates how they may be applied to achieve outcomes associated with the overall objective for workforce planning in NSHA. While they do not work in isolation of each other in achieving outcomes, following is a summary of the associations between the smart practices and those outcomes that they closely align with.

Stock and flow implementing features, practices, and tools, which relate to inflows and outflows of health providers, align closely with having a sustainable number and mix of health providers, and with having appropriate distribution of providers. An example of this is when hiring incentives are used to recruit providers to locations within which there are difficulties filling positions. Productivity implementing features, practices, and tools align closely with delivering quality, safe, and cost-effective care and services. Skill mix implementing features, practices, and tools align closely with having providers working collaboratively to optimal scope of practice. Worker to population ratios are a tool that integrates many of the other mechanisms and implementing features within them and as such may align with all of the outcomes that describe the overall objective. Demand based mechanisms, implementing features, practices, and tools align closely with meeting population health needs.

As part of the evolution of the workforce planning service for NSHA, associations between workforce planning inputs, components, implementation activities, outputs, and outcomes may be more explicitly identified through creation of a logic model, such as that described by McDavid, Huse, and Hawthorn (2013, p. 47). The resulting visual representation of the structure and processes of the NSHA workforce planning service would describe and explain the intended cause-and-effect linkages connecting resources, activities, and results, which would support increased understanding from key stakeholders whose collaboration and partnership is required to achieve results.

Taking a holistic systems-based approach infers viewing the health system as a whole and the inclusion of multiple factors that influence it. As described in the smart practice literature review, this not only includes incorporating supply and demand based mechanisms but also ensuring alignment with systems objectives and financial planning. Systems objectives in the health sector are defined by the strategic directions of the provincial department of health and wellness (DHW) and individual health organizations. In the case of objectives related to workforce planning, the provincial DHW, NSHA, and the IWK, through the collaborative work of the provincial health workforce planning committee, developed and share the same overall objective. Part of the ongoing work of the provincial committee is to clarify and determine roles and responsibilities, and tools and processes by which the shared objective may be met. The determination of roles and responsibilities is guided by mandates for the three organizations as described in the 2016/17 DHW business plan (2016, p. 2) as follows:

The department is responsible for:

- Providing leadership for the health system by setting the strategic policy direction, priorities, and standards for the health system;
- Ensuring appropriate access to quality care through the establishment of public funding for health services that are of high value to the population; and
- Ensuring accountability for funding and for the measuring and monitoring of health system performance.

The NSHA and IWK are responsible for:

- Governing, managing, and providing health services in the province and implementing the strategic direction set by the department; and
- Engaging with the communities they serve, through the community health boards.

The NSHA workforce planning service should ensure alignment of its approach to workforce planning with that of the DHW and IWK through the ongoing work of provincial health workforce planning committee.

Alignment with financial planning is important to ensuring the approach to workforce planning for NSHA is realistic, as without funding commensurate with required capital and human resources to carry out the planning these resources will not be available and objectives may not be met. The current NSHA workforce planning forecast tool, as provided in Figure 3 and described above, incorporates alignment with financial planning by including budgeted FTE obtained from NSHA financial services for the workforce being studied in the profile section. In addition, it accounts for multiple elements of human resource planning that result in costs, such as the use of relief FTE. As previously noted, the process of managers validating budgeted FTE has revealed situations where the FTE the manager has planned to use does not match the budgeted FTE provided by NSHA financial services and work is ongoing to account for this. Where NSHA financial services creates the budgets for NSHA programs and services in accordance with funding provided by the DHW, the alignment of the workforce planning forecast tool with NSHA budgets results in alignment with financial planning at a whole systems level. This demonstrates the application of smart practice in this area.

The discussion and analysis of migration as an implementing feature of the supply stock and flow mechanism revealed that distributional issues associated with over and under supply of the stock of health providers within certain jurisdictions is an issue. As observed by Tomblin-Murphy et al. (2016, p. 6) in their synthesis of recent analyses of human resources for health requirements, imbalances in the stock of health providers is most often observed between urban and rural jurisdictions. This observation is consistent with the experience of NSHA, where challenges in recruiting and retaining various health providers, such as physicians and nurses, to rural areas across Nova Scotia are persistent and have on occasion contributed to the inability to provide services.

Strategies to address challenges with recruiting and retaining providers in rural and other areas may include such things as reducing the need for related providers through altering service delivery models, providing monetary and non-monetary incentives and supports, determining the characteristics of those who thrive and stay in rural areas and targeting recruitment and selection at people who demonstrate these characteristics, and providing training and placements as part of the curriculum for health service professions in rural areas. Given the persistence of distributional issues, further investigation and research to identify initiatives to address them is warranted. The workforce planning service for NSHA may encourage this by working with their colleagues in the people services program that have lead responsibility for recruitment and selection and through discussion and supports that may be available through the provincial health workforce planning committee.

In concluding the discussion and analysis of integrated approach mechanisms, supportive features which relate to those resources used to bring the integrated implementing features into being will be reviewed. The smart practices literature review identified supportive features related to manager and leader perspectives and attitudes, organizational strategy and culture,

resource allocation to workforce planning, data systems and environment, and the knowledge, skills and abilities of workforce planners.

The perspectives and attitudes of managers and leaders have been shaped by their past experiences. Where NSHA is a relatively new organization, these experiences have for the most part occurred under the structure, culture and organizational strategies of the nine former health authorities. Interaction with managers and leaders from across NSHA has led to the conclusion that when viewed as a group they have limited knowledge and understanding of the breadth of workforce planning mechanisms and practices and how they may add value to achieving shared strategic directions and objectives. This serves as both a challenge and opportunity for the NSHA workforce planning service. Through developing processes, tools, and communications mechanisms, such as the aforementioned NSHA workforce profile, projection tool, and visual logic model, and developing relationships and coalitions with key stakeholders where these can be piloted and shared, the service may increase understanding, build credibility, and evolve to being a trusted partner for supporting managers and leaders to achieve strategic and operational objectives.

NSHA has allocated resources to workforce planning through the creation of the workforce planning service. The service is comprised of a director, manager, and nine analysts focused on various functions related to workforce planning and performance. All nine of the analysts are employees that were in roles with the former health authorities that varied from the roles they were placed in under the newly formed service for NSHA. This has resulted in a prolonged period of transition where ongoing clarification of roles and responsibilities, and development of processes and procedures aligned with delivering services in a new manner has been required. The management of the NSHA workforce planning service should apply continued focus in this area, including engagement of and support for employees to be successful under the new structure. Support should include ongoing reference to expectations outlined in their job descriptions and the provision of training and development to build their knowledge, skills, and abilities in fulfilling their roles. Supportive features related to the data systems and environment will be discussed and analysed under the theme related to this topic, which follows next.

#### **4.2.4 Theme 4 – Data Considerations**

The smart practices literature review stressed the importance of the availability, relevance, and accuracy of the data and information underlying workforce planning findings. Related implementing features identified included having clear definitions for data types that form the basis of a minimum data set, having well designed information systems to serve as data sources and processes for extracting data and providing reports and analysis, using qualitative data collection methods to compliment and add to the validity of quantitative data, using FTE as the unit of measure for provider stock, and allocating appropriate resources to achieve the objectives of workforce planning. Following is a discussion and analysis of the extent to which NSHA is currently applying these features and suggestions for what may be done evolve their application.

The NSHA workforce planning service has clearly defined the data types that are included in its organizational profile and forecasting tool. It is also in the process of working with the DHW and IWK to define data types for a shared minimum data set that will be used for collaborative workforce planning efforts between the organizations. Ensuring availability, relevance, and accuracy is part of the process of these activities. In addition, having consistency in definitions supports the validity of comparisons across the organizations. Focus on these activities should continue as the workforce planning service evolves.

The primary information system for mining workforce planning data in NSHA is its business enterprise software system, SAP. The underlying structure of this system remains in many ways based on the former nine district health authority structure and environment. Where much of the system is based on terms and conditions of employment as set out in collective agreements that are still based on the former structure, there is significant variation in codes for data types and nomenclature for data relevant to workforce planning. This and underlying systems configuration that is also still based on the former structure restricts the ability of the workforce planning service to standardize and organize the data in the system.

To overcome this reality, the workforce planning service has spent considerable time and effort to create mappings, algorithms, and processes for extracting data from the system in a manner that ensures alignment with the clear definitions it has created for the data types used in its tools. The data is extracted to a database that is structured in a manner that is aligned with the current structure of NSHA. This enables the ability to provide reports and analyses that aligns with the current structure for NSHA program service areas. While the efforts of the workforce planning service have helped overcome challenges with its primary business enterprise system, the service should pursue opportunities for creating standardization and alignment within this system as they arise.

Other information systems that serve as data sources for workforce planning include scheduling and timekeeping systems, the NSHA recruitment and staffing system, and clinically based information systems. As previously noted, NSHA currently operates multiple scheduling and timekeeping systems and is moving towards having a single system and standardized processes and practices. The recruitment and staffing system is relatively new and is capable of providing data on posted positions, including those that either take a long time to fill or remain unfilled. Further work is required to align data available from this system with the clearly defined data types used in workforce planning. The workforce planning service does not have direct access to clinically based information systems. The service has begun work with the NSHA quality and systems performance service to link data associated with clinical service delivery outcomes and targets to other workforce planning mechanisms and implementing features such as stock flow factors and worker to population ratios based on service targets. This collaboration with the quality and systems performance service is a means to expand the integrative approach and evolve towards more strategic workforce planning for NSHA.

Practices associated with the application of the current workforce planning forecasting tool, as provided in Figure 3 and described earlier in this report, align with the smart practices identified for implementing features associated with data considerations. Specifically, the current tool uses FTE as its unit of measure and engages managers of the workforce being studied in

qualitative data collection through having them validate data types and results from the tool. This engagement of the managers adds context that leads to increased validity and acceptance of workforce planning projections, and to partnership in developing strategy, policy, and initiatives to address results. An area for further engagement of managers that the workforce planning service is working on is making the tool available for managers to update electronically on an ongoing basis. This should continue to be pursued as it would result in making the process iterative based on updated information and could be aligned with existing planning cycles.

In concluding the discussion and analysis of data considerations, the NSHA workforce planning service should pay attention to the pace at which it evolves in its approach to workforce planning. The recommendation from the smart practices literature suggests that organizations just beginning workforce planning may want to start with a simpler approach and evolve to a more sophisticated approach as resources and expertise are developed. While human resources have been allocated to the service, they require support and development and are in an ongoing state of transition to new responsibilities and functions in their roles. The data environment as noted above has considerable challenges and is also in a state of ongoing transition. To avoid creating expectations that the service cannot meet, it should align the pace at which it evolves with the pace at which resources required to achieve related results transition and evolve.

#### **4.3 Summary - Discussion and Analysis**

The primary research question for this report asks; what is the most effective approach to improve and guide workforce planning for NSHA. In answering this question, effectiveness is associated with achieving the overall objective for workforce planning. The overall objective, which aligns with achieving the strategic directions of the organization and health system in Nova Scotia, includes attaining multiple related outcomes as follows:

- Having a sustainable number and mix of health care providers;
- Having appropriate distribution of providers;
- Having providers working collaboratively to optimal scope of practice;
- Meeting the population health needs; and
- Delivering quality, safe, and cost-effective care.

These outcomes are comprehensive and complex in nature and as such require an approach to workforce planning that accounts for this in its design and execution. The discussion and analysis of the themes associated with smart workforce planning approaches and their mechanisms and practices as set in the NSHA context demonstrates how application of them would lead to achieving the outcomes associated with the overall objective. It also describes gaps, activities, resources, and factors associated with evolving the workforce planning approach for NSHA towards greater integration in achieving outcomes associated with overall objectives. All of this informs and leads to conclusions and recommendations related to answering the primary research question.

## 5 Recommendations

The following recommendations are put forward for consideration by NHSA (in no particular order):

### 1. **Integrate NHSA workforce planning with health services and financial planning.**

- Establish an integrated planning and analytics team comprised of representatives from workforce planning, quality and systems performance, and financial services.
- With the integrated team, develop tools and processes designed to meet the objectives for effective workforce and integrated planning.
- Pilot related tools and processes with management from key operational service program areas, with ongoing evaluation, revision, and expansion to other service program areas.
- Engage other key stakeholders such as people services staffing and recruitment, and inter-professional practice colleagues in investigating specific matters identified through integrated planning and analytics, such as retired workers coming back to work, strategies for replacing LOA's and reducing absenteeism, and the relationship between health provider inputs and health outcomes achieved.

### 2. **Continue to refine the workforce planning forecasting tool to meet integrated planning and analytics objectives, while maintaining flexibility and avoiding making it overly complex.**

- Incorporate a new section to the tool to account for expansion or contraction in the demand for health workforce provider types.
- Determine in detail how the tool will be used to provide workforce forecasts based on future health service and financial planning scenarios.
- Develop and implement an electronic mechanism and processes by which workforce forecasts will be updated.
- Continue to include and evolve qualitative data and information gathering from managers and those responsible for the delivery of services as part of the processes associated with the tool.

### 3. **Build internal capacity for workforce planning in NSHA.**

- Build trusting relationships with key stakeholders through focusing on shared interests, outcomes and objectives, and open, honest, and respectful communications. Given the focus on integrated planning and analytics, relationships with quality and systems performance and financial services are top priority.
- As relationships and credibility are built, leverage champions who support the service for promoting it with others.
- Engage the workforce planning team in defining objectives and processes, and provide role clarity and developmental opportunities to build their knowledge, skills, and abilities in fulfilling their roles.
- Be realistic with and manage expectations for service delivery through monitoring and obtaining ongoing feedback related to the achievement of results, and making adjustments accordingly.
- Develop and share communications that promote and describe workforce planning services, such as presentations, memos, and a visual logic model.

- 4. Align workforce planning with the overall organizational strategy.**
  - Ensure alignment between the operational plan for the workforce planning function and the broader people services program and NSHA strategic plans.
  - Target initiatives associated with the development and evolution of the workforce planning function with areas of organizational priority such as primacy care and mental health services.
  
- 5. Partner with the provincial government to address health workforce planning issues.**
  - Continue to collaborate with the provincial health workforce planning committee to find solutions to matters identified through internal NSHA workforce and integrated planning and analytics, such as increasing seats at educational institutions to address expansion in the need for Nurse Practitioners for primary care services.
  
- 6. Continue focused efforts to improve the data systems and environment.**
  - Lead and/or support projects and initiatives to simplify, standardize, and align information systems and processes associated with achieving the overall objective for workforce planning.
  - Explore opportunities to form and implement a corporate non-clinical information systems governance committee, comprised of representatives from NSHA, IWK and the provincial government, to identify and coordinate priorities, and develop a shared strategy and road map to achieve them.

## 6 Conclusions

The objectives of this report were to identify a synthesis of smart workforce planning approaches and practices from the literature for discussion and analysis as to their application in the NSHA context in order to determine the most effective approach to workforce planning for the organization. A comprehensive literature review was conducted, spanning approaches and practices in countries across the world, and accounting for the evolution of the workforce planning discipline as described by prominent researchers in the field. The resulting synthesis of smart approaches and practices provided a compass by which to determine the most effective approach to improve and guide workforce planning for NSHA. As the service evolves, this compass may continue to be relied upon to provide sound advice and continued guidance.

Advancing an integrated approach is the best way to achieve overall objectives for workforce planning in NSHA, which are aligned with the strategic directions of the organization and the broader health system in Nova Scotia. This is highlighted by Birch et al. (2014, p. 4) where they note that by integrating financial planning, health service planning, and workforce planning into a single dynamic framework, threats to systems sustainability arising from the interdependence of demand for and supply of health care can be avoided and sustainable universal publicly funded health care systems can become a reality. Given the magnitude of the consolidation from nine former health authorities to NSHA, the organization is in a period of ongoing change and transition. Progression through this transition requires focused support to promote coordination, collaboration, and partnership in leveraging resources to achieve shared interests, goals, and strategic objectives.

The current NSHA workforce planning projection tool demonstrates smart mechanisms and practices related to the flow of the health workforce provider stock, financial alignment, and data management. It has flexibility to allow for integration of additional smart mechanisms and practices, such as those related to skill mix and productivity, through incorporating a section related to resulting expansion and contraction in health workforce provider types. It also allows for longer-term scenario based projections related to assumptions for future conditions in proactive integrated health service, financial and workforce planning. Expansion of the tool in this manner will make it more robust and effective in supporting the achievement of outcomes associated with the overall objective for workforce planning.

Together with the IWK and DHW, NSHA is collaborating to carry out province wide proactive planning for health services that Nova Scotians rely on to care for and help them be healthy. This collaborative province wide proactive planning extends to workforce planning through the provincial health workforce planning committee. As health services are delivered by human resources, effective workforce planning is essential to the functioning and achievement of strategic objectives of the individual organizations and the provincial system as a whole. This province wide integration in workforce planning magnifies the importance of having effective workforce planning in NSHA and provides an opportunity for the province of Nova Scotia to demonstrate leadership in this field to the broader national and international audiences.

The workforce planning service and function for NSHA are relatively new and in early stages of development. Given the general lack of understanding of workforce planning and its potential within the organization, the service will need to establish itself in a manner that promotes understanding and the building of credibility. The workforce planning team itself is in a state of change and transition and requires focused attention to develop and evolve to meet objectives for the service. Attention should also be paid to the pace at which the service evolves so as to avoid creating expectations that the service cannot meet. The pace of evolution should align with the pace at which resources, human, technological, and financial, required to achieve results transition and evolve. As the service progresses in its development it will move from being operationally focused on workforce analytics and short-term solutions to being more strategically focused on proactive and longer-term approaches and solutions that align with business strategy and encourage initiatives aligned with broad human capital planning.

The data systems and environment in NSHA require significant and ongoing attention to achieve and maintain standardization and alignment with current and future organizational structures and strategic objectives, including those related to workforce planning objectives, processes, tools, and data definitions. Simplification and improvement in the environment through reconfiguration of the business enterprise system, movement to a single scheduling and timekeeping system, and optimization of the new recruitment and staffing system will support this. The workforce planning service should continue to demonstrate leadership and promote initiatives associated with this work as it will lead to improved data validity and methods for data extraction and mapping to reports and tools that support the achievement of the overall objective for workforce planning.

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## Appendix A - Supply-Based Methodological Approaches Overview

Methodology/ Mechanism	Description	Assumptions	Advantages	Limitations	Overcoming Limitations	Requirements	Documented Usage
<b>Supply – Stock Flow</b>	Projects the availability of health-care professionals based on the current stock of clinicians, the training process (entries and dropouts), migration flows, attritions and retirement rates	Demand for medical services is assumed to remain constant and the projections are used to reduce the supply gap	Predictions for the future supply can be obtained in a fairly simple and immediate way	Demand for medical services is assumed to remain constant, which may not be true No critical assessment of the adequacy of current service levels	Incorporate a model of demand: economic or needs-based (or both) Evaluate current level of service through waiting lists, overtime hours, foreign workers, etc.	Accurate and up-to date accounting of the current stock and flow of health service providers, migration rates, entry and drop out rates and expected retirements etc. Service usage levels from the health-care sector	Australia, Belgium, Canada, Chile, Denmark, Finland, France, Germany, Ireland, Israel, Japan, South Korea, Norway, Switzerland, The Netherlands, United Kingdom, USA
<b>Supply – Productivity</b>	Reorganize services and/or economic incentives to promote higher productivity Work smarter or work longer	Health providers act as rational agents and react to economic incentives like wage increases	Does not require a change in the quantity of human resources Can be implemented immediately	Productivity improvements may not be enough to accommodate large gaps in the supply of professionals	Do not preclude from evaluating the number of professionals necessary given different productivity levels	Operational indicators like the number of patients served with a given number of FTEs (or head counts)	Australia, Canada, Japan, Korea, Netherlands, Norway, Switzerland, United Kingdom, USA
<b>Supply – Skill Mix</b>	Delegate certain tasks to other health professionals Substitution can be horizontal (between medical professions) or vertical (between physicians and nurses)	Professionals can assume new roles and perform new tasks	May not require a change in the quantity of human resources	Enforcing such changes can be a political challenge and may take considerable time to implement May not solve large gaps in the supply	Providing success stories to involved stakeholders, health authorities and medical associations	Education schools and mechanisms that can provide advanced education to the existing workforce	Netherlands, United Kingdom, Canada, USA
<b>Supply – Worker to Population Ratios</b>	Specifies desirable worker to population ratios based on direct comparison with another region of country	Regions and/or countries can be directly compared	Extremely easy to understand and apply Useful for providing baseline comparisons	Does not take into account the intrinsic differences between regions and countries, the productivity and skill mix of the available workforce	Combine with other supply and demand based approaches in an integrated approach	Records of the current workforce to population ratios	Chile, France, Ireland, Israel, Switzerland, United Kingdom, Canada

Based on Lopes et al. (2015, p. 13)

## Appendix B - Demand-Based Methodological Approaches Overview

Methodology/ Mechanism	Description	Assumptions	Advantages	Limitations	Overcoming Limitations	Requirements	Documented Usage
<b>Demand – Needs (Potential Demand)</b>	Estimates future requirements by projecting the effect of demographic and socio-economic factors on the current level of service	Current level of service is adequate. Skill mix and distribution of health service is appropriate Demographic profile of the population and its effect on healthcare demand can be accurately forecasted	Conceptually easy to understand and to apply Allows decoupling of the various components of demand and their influence on the overall aggregate demand	Tends to produce estimates of HHR demand that exceed practical limits No critical assessment of the adequacy of current service levels Ignores the real demand, focusing instead on the effective demand	Take financial constraints into consideration Evaluate current level of service through waiting lists, overtime hours, foreign workers, etc. Include a needs-based evaluation	Accurate and long term demographic estimates Service-usage levels from the health-care sector Macroeconomic indicators and statistical data crossing income and usage	Australia, Belgium, Canada, Denmark, Finland, Germany, Japan, Norway, South Korea, Switzerland, The Netherlands, USA
<b>Demand – Economic (Effective Demand)</b>	Considers the effect of epidemiology on the demand for health-care services Projects age- and gender specific needs based on morbidity epidemiological trends	All health-care needs can and should be met Resources are used in accordance to needs	Allows for a fine-grained analysis of the requirements of each medical specialty Is independent of the current service utilization ratios	Absence of economic/efficiency considerations may render projections unattainable Dependent on epidemiological projections which may not be obvious Does not consider current level of provision nor the capacity to deliver services	Consider an upper bound for a practical result Consider projections of the most common health patterns Incorporate economic considerations in the model	Demographic estimates that are accurate Service-usage levels from the health-care sector	Belgium, Canada, Germany, United Kingdom
<b>Demand – Service Targets</b>	Defines normative targets for the production of health-care services, which are then converted to HHR requirements	Assumes that established service targets are achievable in terms of financial and capital resources and provider supply	Easy to define, interpret and understand Facilitates cost estimation Requires modest data and planning capabilities	May originate unrealistic assumptions Ignores financial and other active constraints	Incorporate economic and HR considerations in the model	Current level of service Information regarding the population being targeted	

Based on Lopes et al. (2015, p. 14)

## Appendix C - Workforce Planning Mechanisms and Associated Data Types

Mechanism	Data Types
Supply – Stock	<ul style="list-style-type: none"> <li>• Overall Stock in Full Time Equivalency (FTE) or Headcount</li> <li>• Geographic Distribution of Stock</li> <li>• Budgeted FTE</li> <li>• Unfilled FTE</li> <li>• Employment Status e.g. Full-time, Part-time, Casual/Relief, Inactive</li> <li>• Wage Rates</li> <li>• Date of Birth/Age</li> <li>• Educational Attainment</li> <li>• Diversity Indicators e.g. Gender, Language, Minority Status</li> </ul>
Supply – Stock Flow (Inflows & Outflows)	<p>Employment:</p> <ul style="list-style-type: none"> <li>• Retirements</li> <li>• Terminations (voluntary and involuntary)</li> <li>• Leaves of Absence (illness, accident, pregnancy, parental, educational etc.)</li> <li>• Confirmed Recruitment (external hires, internal transfers)</li> <li>• Projected Provider Expansion</li> <li>• Projected Provider Contraction</li> </ul> <p>Education/Training Programs:</p> <ul style="list-style-type: none"> <li>• Number of Registrants</li> <li>• Attrition/Drop-out Rates</li> <li>• Length of Program</li> <li>• Number of Graduates</li> <li>• Costs</li> </ul> <p>Migration:</p> <ul style="list-style-type: none"> <li>• In-migration (foreign trained, return to profession)</li> <li>• Emigration (provincial, national, across employers)</li> </ul>
Supply - Productivity	<p>Labour Market:</p> <ul style="list-style-type: none"> <li>• Occupational Participation Rates</li> <li>• Employment Participation Rates</li> <li>• Employment Expansion/Contraction Projections</li> <li>• Provider Inflow &amp; Outflow Projections</li> <li>• Productivity Growth/Retraction</li> <li>• Cyclical Factors</li> </ul> <p>Health Service:</p> <ul style="list-style-type: none"> <li>• Provider Input Factors e.g. Average FTE , Direct Patient Care Hours (overall or task specific)</li> <li>• Technological Input Factors e.g. work flow impact, costs</li> <li>• Health Service Outputs/Outcomes e.g. Number/Type of Patients Served, Number/Type of Tasks Completed, Patient Well-being &amp; Satisfaction</li> <li>• Staff Scheduling Algorithms &amp; Patterns</li> <li>• Overtime &amp; Other Wage Premiums</li> </ul>
Supply – Skill Mix	<p>Governmental:</p> <ul style="list-style-type: none"> <li>• Education Strategy, Policy &amp; Funding</li> <li>• Scopes of Practice Regulation</li> <li>• Licensing Regulations</li> <li>• Immigration Policy</li> <li>• Remuneration Rates/Types e.g. Physician Fee for Service or Alternate Payment Methods</li> </ul> <p>Employer:</p> <ul style="list-style-type: none"> <li>• Models of Care &amp; Service Delivery Design</li> <li>• Provider Job Classification/Role Design</li> <li>• Provider Competency &amp; Capacity Building</li> </ul>
Supply – Worker-to-Population Ratios	<ul style="list-style-type: none"> <li>• Health Provider Stock Data (see above)</li> <li>• Population Demographics e.g. Total Population, Age/Sex/Geographic Distribution, Births/Deaths, Population Projections</li> </ul>
Demand – Economic (Effective Demand)	<ul style="list-style-type: none"> <li>• Service Utilization Rates &amp; Patterns</li> <li>• Population Demographics e.g. Total Population, Age/Sex/Geographic Distribution, Births/Deaths, Population Projections</li> <li>• Socio-Economic Indicators e.g. Income Levels, Gross Domestic Product, Education Levels</li> <li>• Population Health Status e.g. Morbidity, Mortality, Acuity</li> </ul>
Demand – Needs (Potential Demand)	<ul style="list-style-type: none"> <li>• Population Health Status e.g. Morbidity, Mortality, Acuity</li> <li>• Epidemiology e.g. Chronic Disease &amp; Other Incidence &amp; Prevalence Rates, Hospital Discharge Rates, Health Patterns</li> </ul>
Demand – Service Targets	<ul style="list-style-type: none"> <li>• Service Utilization Rates &amp; Patterns e.g. Bed Occupation, Inpatient &amp; Outpatient Totals, Surgical, Diagnostic &amp; Consultative Procedures Totals</li> <li>• Demographic, Epidemiology &amp; Population data (see above)</li> </ul>
Integrated	<ul style="list-style-type: none"> <li>• Combinations of above data types</li> <li>• Systems Objectives &amp; Outcomes</li> <li>• Financial Planning</li> </ul>

Based on Lopes et al. (2015, p. 16)

## Appendix D - Workforce Planning Approaches and Mechanisms Synthesis

Approach - Mechanism	Implementing Features	Supportive Features
Supply – Stock Flow	<ul style="list-style-type: none"> <li>• Inflows:               <ul style="list-style-type: none"> <li>○ New Graduates</li> <li>○ Migration</li> <li>○ Hiring Incentives</li> </ul> </li> <li>• Outflows:               <ul style="list-style-type: none"> <li>○ Retirements</li> <li>○ Employment/Career Changes</li> <li>○ Terminations</li> <li>○ Leaves of Absence</li> <li>○ Retention Strategies</li> </ul> </li> </ul>	
Supply - Productivity	<ul style="list-style-type: none"> <li>• Working Smarter:               <ul style="list-style-type: none"> <li>○ Training and Development</li> <li>○ Work Flow/Process Improvement</li> <li>○ Scheduling Efficiency</li> <li>○ Technological Advancement</li> <li>○ Reduced Absenteeism</li> <li>○ Worker Satisfaction/Engagement</li> </ul> </li> <li>• Working Longer:               <ul style="list-style-type: none"> <li>○ Overtime</li> <li>○ Standby and Call Back</li> <li>○ Night and Weekend Work</li> </ul> </li> </ul>	
Supply – Skill Mix	<ul style="list-style-type: none"> <li>• Scopes of Practice</li> <li>• Scopes of Employment</li> <li>• Shared Competencies</li> <li>• Vertical Substitution</li> <li>• Horizontal Substitution</li> <li>• Models of Care and Service Design</li> <li>• Standards of Care and Service</li> </ul>	<ul style="list-style-type: none"> <li>• Manager/Leader Perspectives and Attitudes</li> <li>• Organizational Strategy and Culture</li> <li>• Resource Allocation to Workforce Planning</li> <li>• Data Systems and Environment</li> </ul>
Supply – Worker to Population Ratio	<ul style="list-style-type: none"> <li>• Standardized Ratios</li> <li>• Service Standards and Targets</li> <li>• Population Demographics</li> <li>• Provider Profiles Per Population</li> </ul>	<ul style="list-style-type: none"> <li>• Knowledge, Skills and Abilities of Workforce Planners</li> </ul>
Demand – Economic (Effective Demand)	<ul style="list-style-type: none"> <li>• Current State Assessment and Application to Defining Future Needs</li> <li>• Epidemiological and Demographic Factors</li> </ul>	
Demand – Needs (Potential Demand)	<ul style="list-style-type: none"> <li>• No Bound on Defining Population Needs</li> <li>• Epidemiological and Demographic Factors</li> </ul>	
Demand – Service Targets	<ul style="list-style-type: none"> <li>• Normative Service Targets Based on Current State</li> <li>• Targets Applied to Obtain Future Projections</li> </ul>	
Integrated	<ul style="list-style-type: none"> <li>• Combinations of Supply and Demand Mechanisms</li> <li>• Holistic Systems Based Approach</li> <li>• Alignment with Systems Objectives</li> <li>• Alignment with Financial Planning</li> <li>• Stock Distribution Factors</li> </ul>	

