



Innovative Needs-based Approach to Family Physician Planning – Canada

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Final version
September 11, 2008

Prepared for
International Medical Workforce Collaborative Conference
Edinburgh, Scotland, September 2008

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Abstract/Overview

The aim of this paper is to provide an overview of documented attempts to implement needs-based health human resource planning in Canada and discuss an innovative needs-based approach to family physician planning in one Canadian province that facilitates the evaluation of policy options to address the gap between the supply of and requirements for family physicians.

Background/Recent Research in Area

Recently, there have been two exhaustive reviews of documented attempts at needs-based health human resource (HHR) planning worldwide (Tomblin Murphy et al., 2004, Tomblin Murphy et al., 2007a). One of the overall conclusions of both reviews was that HHR planning in Canada has tended to be based on utilization patterns, the supply of health care professionals, and/or budgetary capacity, rather than on the actual health care needs of the population or the health policies governing it. There are several limitations to this approach, two of which are that it does not account for trends in population health need or trends in provider productivity. Improvements in health status would reduce the total service requirements in the population and improvements in productivity would increase the supply of services from the stock of providers. If such trends were to unfold, the forecasts would overestimate the requirements for HHR, and if opposite trends were to unfold, the forecasts would underestimate the requirement.

A further conclusion of these reports was that, although there is a large and growing consensus that planning for health human resources be based on the health needs of the populations they serve, few researchers and research users have attempted to translate population health care needs into HHR requirements. That said, some practical methods for needs-based HHR planning have been proposed, and the knowledge base to support them in fields such as measurement of health needs is growing more and more expansive. For policy makers willing to undertake the challenge, the tools with which to focus HHR planning on peoples' health needs do indeed exist.

Over the past number of years, we have developed (and continue to refine) a practical approach to needs-based planning that has been endorsed and adopted by several provinces in Canada. Some of our most recent work has involved customizing this approach to support planning for family physicians (FPs) in Nova Scotia (Tomblin Murphy et al., 2007b).

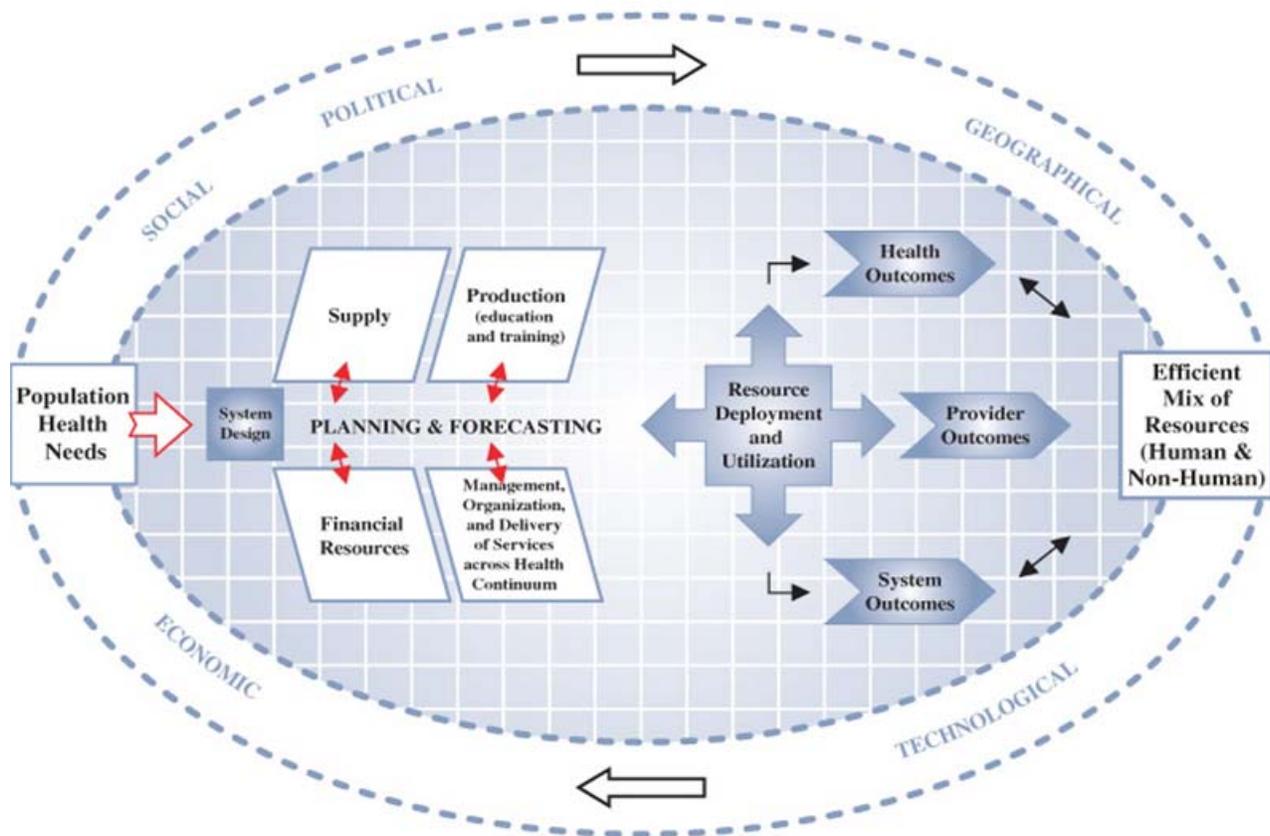
Methods and Data Sources

We use a system dynamics approach (Forrester, 1968; Richardson, 1991; Sterman, 2000) and have implemented our model using Vensim (2002) simulation modeling software. Population projections for Nova Scotia were obtained from Statistics Canada. Data on health needs and some health care utilization data were obtained from the 1996 National Population Health Survey (NPHS) and the 2005 Canadian Community Health Survey (CCHS). Other health care utilization data were obtained from the Nova Scotia Physician Billings Database. Data on the past and current supply of FPs in Nova Scotia were obtained from the Medical Society of Nova Scotia. Dalhousie University supplied data on FP training programs.

Innovations in Modeling Demand

Our work has been guided by a conceptual framework developed by O'Brien-Pallas et al. (2001) that has been adopted as a guiding framework for HHR planning by Canada's Advisory Committee on Health Delivery and Human Resources (ACHDR, 2005). As shown in Figure 1 below, the outer oval of the framework captures the fact that HHR planning takes place within context of an array of social, political, geographical, technological and economic factors.

Figure 1: Conceptual Framework



¹ O'Brien-Pallas, Tomblin Murphy, Birch, 2005 (adapted from ¹ O'Brien-Pallas, Tomblin Murphy, Birch & Baumann, 2001, and O'Brien-Pallas & Baumann, 1997)

Fundamentally, however, HHR planning starts with the population health needs of the jurisdiction for which one is planning (e.g., country, province or region). Across all sectors of care (system design), planning must work with the current practice pool (supply) of providers, acknowledging that that supply is maintained by the production of new providers, and that the flow of services from that supply is influenced by the level of resources allocated to it, by the management and organization (e.g., models) of service delivery. The flow of services from the supply of human resources will also be influenced by the deployment (e.g., in direct clinical care versus administration and research) and utilization (e.g., full- versus part-time) of these resources. These human resources, when supported by non-human resources (e.g., facilities and

technology), yield patient, provider and system outcomes that are optimized when there is an efficient mix of human and non-human resources in the jurisdiction.

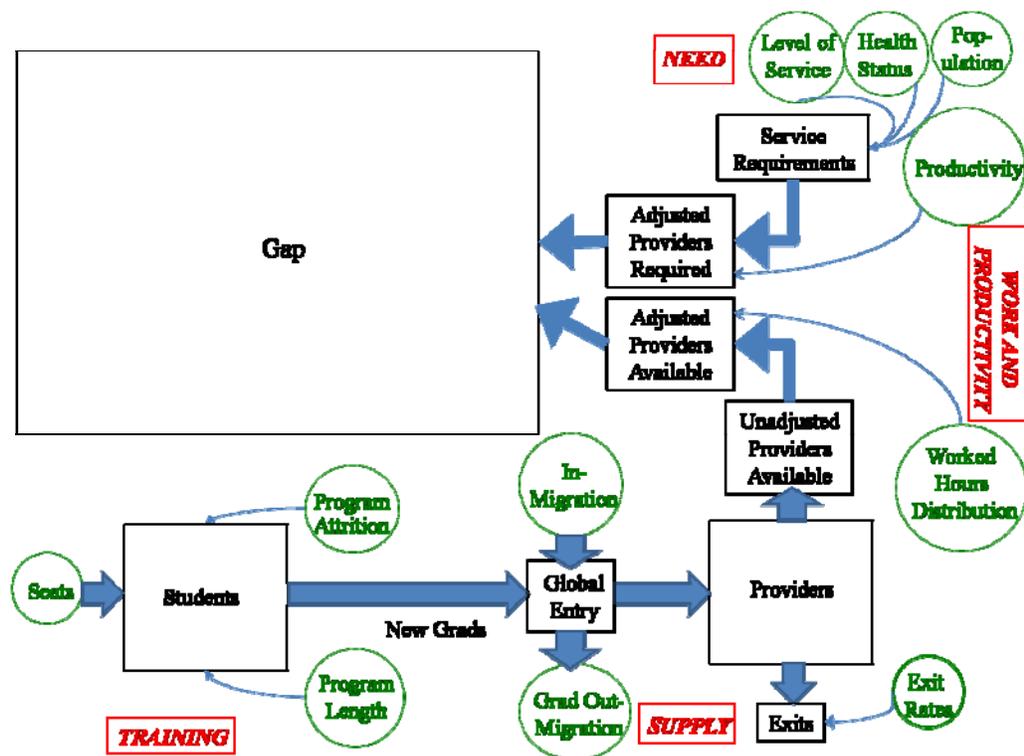
This framework has provided a conceptual foundation for the analytical framework upon which simulations can be based and recommendations generated.

It is important to note that traditional HHR planning methods consider only the demography component of this framework, implicitly assuming that the other three factors are constant. Put another way, traditional HHR planning methods assume that the health needs of the population, the types of health care services used to care for them, and the way in which these services are performed do not change. This analytical framework, in contrast, allows planners to explicitly consider the effects of these factors in planning for their health care workforce.

As indicated above, one of the chief challenges facing those seeking to implement a needs-based approach to HHR planning has been identifying a means to translate population health needs into numbers of health care services or health care providers required. A crucial step, therefore, in the evolution of our approach was the development of an analytical framework linking population health needs to health care service requirements (Birch et al., 2007). This is accomplished by defining and multiplying three distinct elements—demography (the number of people potentially needing care), epidemiology (the distribution of illness across the population), and level of service (the amount of service a person is to receive given their level of illness). Multiplying these three factors—demography, epidemiology, and level of service—yields an estimate of the number of services health care services required for a given population. By multiplying this value by a fourth component, the number of health care providers required to perform each service (the inverse of provider productivity), one can then determine the number of providers required to meet the health care needs of the population in question.

The next critical component of our approach was to translate this analytical framework into a simulation model that would simultaneously estimate the number of providers required and the number available, both at present and in the future. The present and future supply of providers is estimated by considering the size and age distribution of the current stock of providers together with past trends in exits and entries to this stock. The model (Kephart et al., 2005) was designed using a system dynamics approach (Forrester, 1968; Richardson, 1991; Sterman, 2000) and implemented using Vensim (2002) simulation. A sketch of the model is shown in Figure 2 below.

Figure 2: Simulation Model (adapted from Kephart et al., 2005)



The purpose of designing the model in this way is not necessarily to predict the future, but rather to integrate knowledge of different components of the HHR system in order to improve understanding of how various factors affect the supply of and/or requirements for health care providers. The model enables policy makers to ‘rehearse’ potential policy changes by altering the value of corresponding variables in the model and examining the effects of this change on the supply of and requirements for a given type of health care provider. In this way, policy makers have available a means of testing and evaluating a variety of policy options in order to determine the most efficient and effective ways to manage HHR. Often, a central concern for policy makers is the ‘gap’, or difference, between the number of providers available and the number required—hence the prominence of this component in the figure above; the model has been designed to calculate the value of this ‘gap’ automatically.

This model has been customized to support planning for family physicians in Nova Scotia in a number of ways:

- The ‘planning horizon’, or simulated length of time the model was run, was set at 15 years, in order to balance focus between short-, medium-, and long-term policy windows used by the Nova Scotia Department of Health.
- The ‘need indicator’ selected was self-assessed health status, since it is the individual’s own assessment of their health status that leads to initial consultations with primary care providers such as FPs. Measures of self-assessed general health status have also been found to correlate with a wide range of health and socioeconomic variables at the population and individual level (Birch et al., 1996).
- In the absence of professional guidelines or other ‘gold standards’ detailing the amount of care a person should receive from a family physician according to their level of need (in

this case, self-assessed health status), service levels from the most recent year of data available were used as ‘baseline’ values for level of service.

- All necessary data specific to the population of Nova Scotia and its family physicians were obtained and ‘loaded’ into the model.

Once populated with data, the model was run and the ‘gap’ between the number of FPs available and required was estimated. A number of policy scenarios were tested to evaluate their potential to reduce the gap.

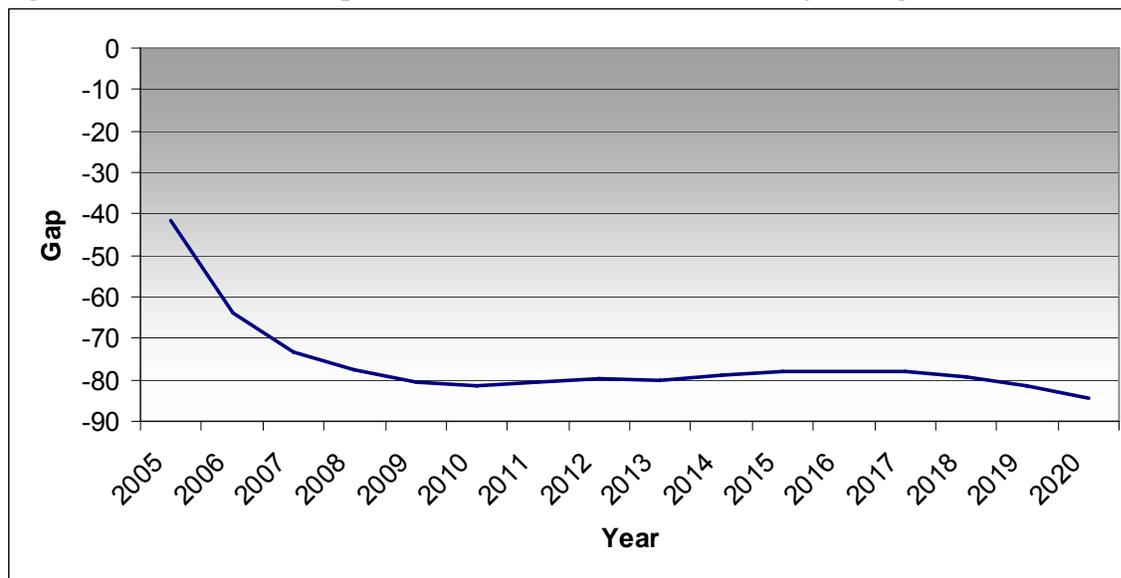
Results

To serve as a reference when interpreting these results, we initially simulated a ‘baseline’ scenario in which there were no changes made to existing FP related HHR policies.

When running these simulations, assumptions were made about how the health needs of Nova Scotians will change in the future. While no one can predict with certainty what these changes will be, for the purposes of this investigation we assumed that the health needs of Nova Scotians in the next 10 – 15 years will continue to follow the trends observed over the past decade.

Unless otherwise indicated, this is the assumption that has been made for each of the scenarios presented in this section. The results of the baseline scenario are depicted in Figure 3 below.

Figure 3: Simulated FP Gap Over 15 Years with no HHR Policy Changes



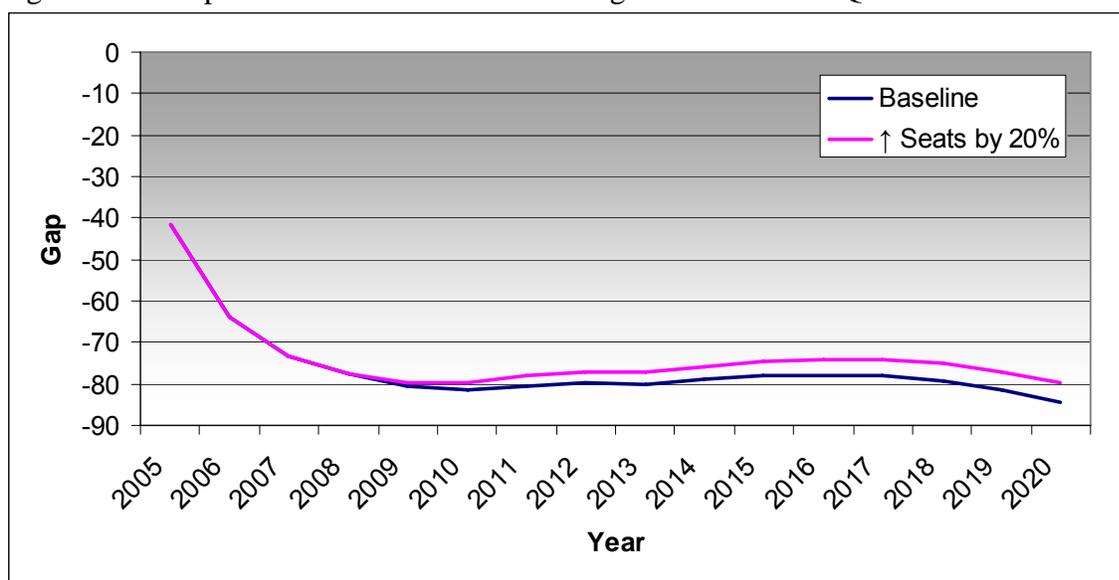
The simulation results shown in Figure 3 indicate that, if current approaches to HHR planning for FPs are maintained, the province appears to be headed from an initial shortage of approximately 40 FP full-time equivalents (FTEs) to a shortage of about 80 FTEs by the year 2010, which will remain relatively constant for the following few years.

To better understand the dynamics of HHR planning for FPs and, to offset such a shortage, we next explored the effects of some potential policy interventions on this shortage.

Increased Training Seats

When faced with differences between numbers of available and required health care professionals, the first place policy makers often turn to as a means of closing this gap is the number of training seats. We have simulated the effects of a 20% increase in FP residency seats (from 40 to 48 seats) on the FP gap. It was then compared to the 'baseline' scenario in which no changes were made to the numbers of seats, with the effects of each scenario shown in Figure 4 below.

Figure 4: FP Gap After 20% Increase in Training Seats vs. Status Quo



As is evident from Figure 4, the effect of an immediate, substantial increase in FP training seats appears minimal, even after 15 years. It leaves a shortage of about 75 – 80 FPs compared to a baseline shortage of around 80 – 85. Possible reasons for this delayed small effect include the lag time of training and the small numbers of additional graduates relative to the size of the existing stock of providers.

Increased Retention of New FP Graduates

One additional reason why an increase in FP training seats does not have the dramatic effect one might expect is that a substantial portion of new FP graduates leave Nova Scotia upon completing their training (this is referred to as graduate out-migration). According to data from the Department of Health (personal communication, June 6, 2007), it is currently estimated that as few as 20% of FPs trained in Nova Scotia will remain in the province to practice after completing their training. Given current and estimated future levels of need for the services of family physicians, and the cost of funding these training seats, it certainly seems worthwhile to investigate the impact of such losses and the potential benefits of reducing the losses. Figure 5 below shows the simulated effects of being able to reduce graduate out-migration by 20%.

Figure 5: FP Gap After Reducing Graduate Out-migration by 20% vs. Status Quo

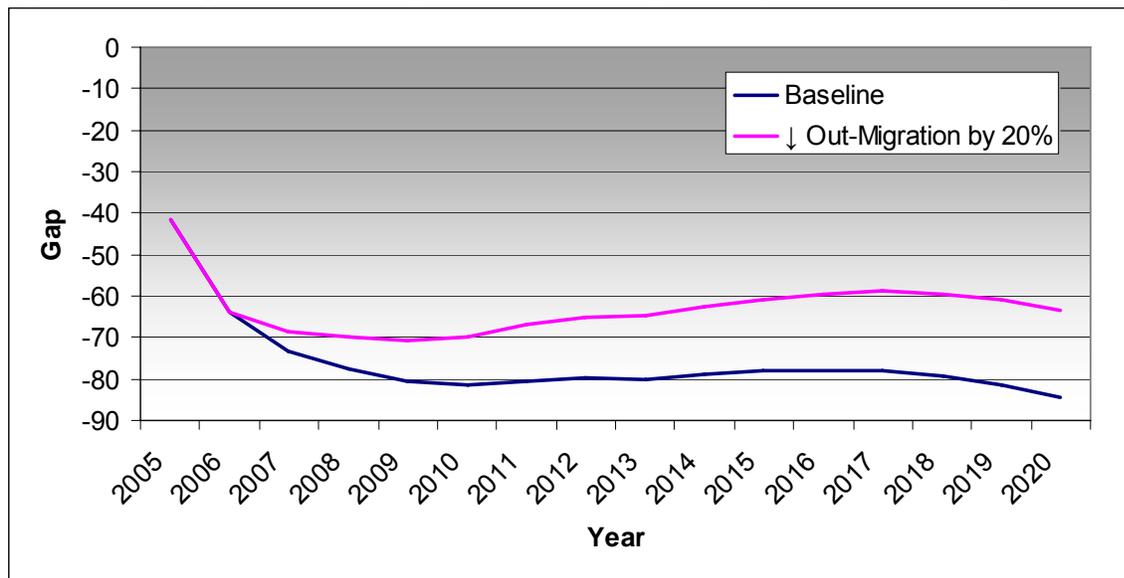
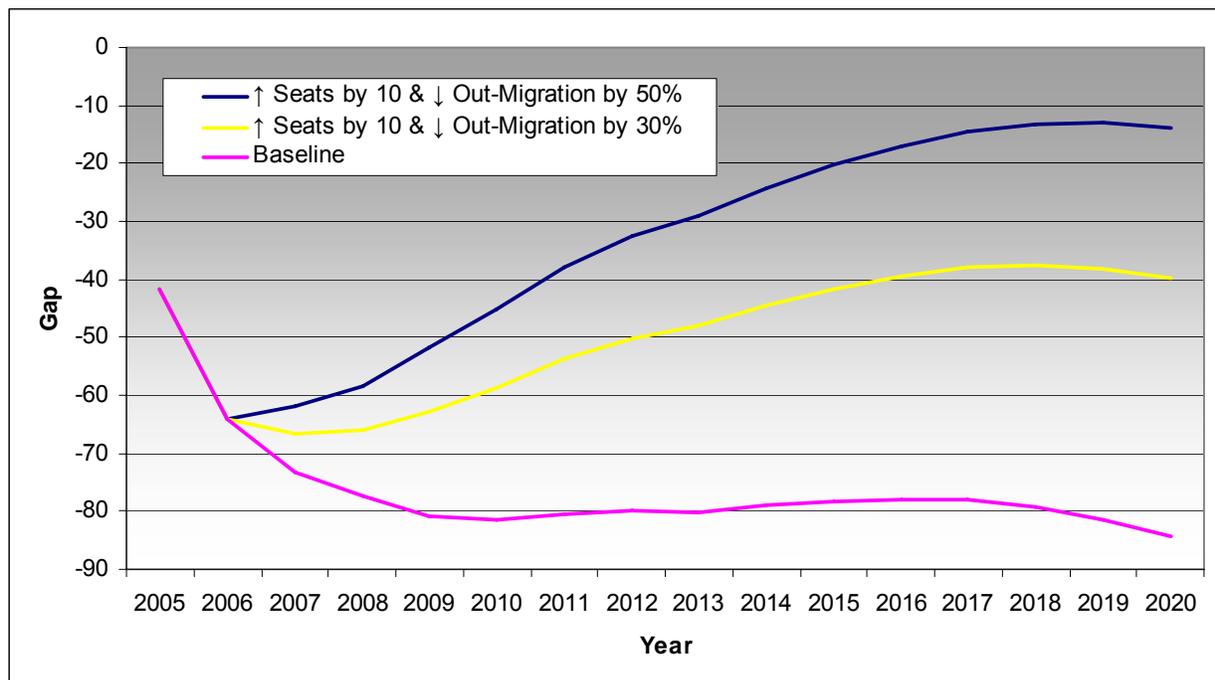


Figure 5 shows that simulated 20% reduction in graduate out-migration resulted in about a 25% reduction in the shortage of FPs. These results suggest that reducing out-migration of newly trained FPs may be an effective way to substantially reduce the shortage in the province, even more so than a comparable increase in FP training seats.

Increase in Seats and Increase in Graduate Retention Combined

To address the gap, policy interventions aimed at the training of FPs can have long term effects as seen in the above simulation results. Though they are simulated independently above, the scenarios discussed can occur concurrently; policy-makers can increase training seats while simultaneously focusing efforts on retaining new FP graduates. In Figure 6, the effects of combining an increase of 10 seats with a reduction in out-migration of 30% and of 50% are shown.

Figure 6: FP Gap After Increasing Seats by 10 and Reducing Out-migration



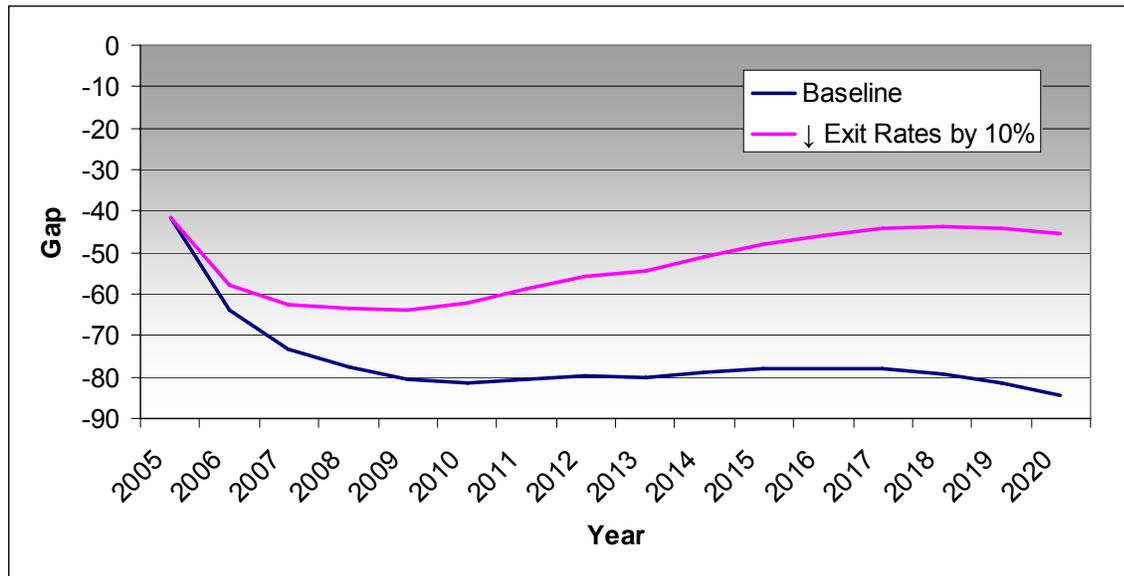
The gap can hence be significantly addressed over the long term with a combination of policies aimed at the training of FPs for work in NS. While seats can have some impact over the long term, as displayed in Figure 4, a reduction in the out-migration rate would contribute to keeping those extra FPs trained in NS.

Improving Retention of Existing FPs

Considering that family physicians perform services essential to the health of Nova Scotians, and considering the substantial investments made in training and recruiting the FPs currently practicing in Nova Scotia, it seems sensible to be conscious of what happens when they cease to practice there, either due to retirement, relocation, or any number of other factors. Further, it seems likely that there may be some substantial benefits to being able to improve the rate at which qualified FPs are retained in the province. This might be achieved through any number of initiatives; for example, providing opportunities for skills development or career advancement.

To this end, we simulated the effects of a 10% decrease in the rate at which FPs do not renew their Nova Scotia practice registrations (termed 'exit rates'), with the results shown in Figure 7 below.

Figure 7: FP Gap After 10% Reduction in Exit Rates vs. Status Quo



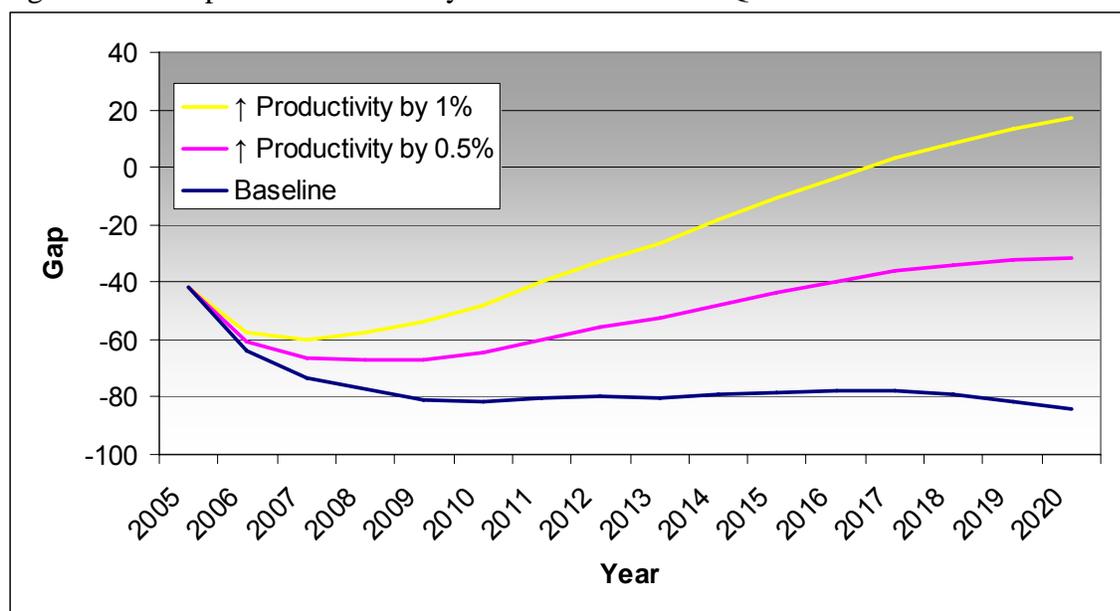
The results shown in Figure 7 indicate that even a relatively modest reduction in FP exit rates can yield a substantial reduction in the shortage of FPs, in both the short and long term.

Improving FP Productivity

When discussing changes to family physician productivity, it is important to understand that increasing their productivity is not a matter of demanding that physicians work harder; it involves providing them with resources such as support staff, interprofessional teams, appropriate technology, and effective organization so as to allow them to remain as focused as possible on doing what they have trained to do—provide quality patient care. Thus, increasing productivity means increasing the services produced per hour; it does not mean working more hours.

To assess the potential benefits of facilitating increased FP productivity, we have simulated the effects of two separate, relatively modest increases: 0.5% per year and 1% per year. A 0.5% per year increase, for example, would mean that an FP who usually treats 35 patients per day would (through enhanced technology, improved equipment, or team-based care delivery) be able to treat an additional 40 patients per year. The results of this scenario are shown in Figure 8 below.

Figure 8: FP Gap After Productivity Increases vs. Status Quo



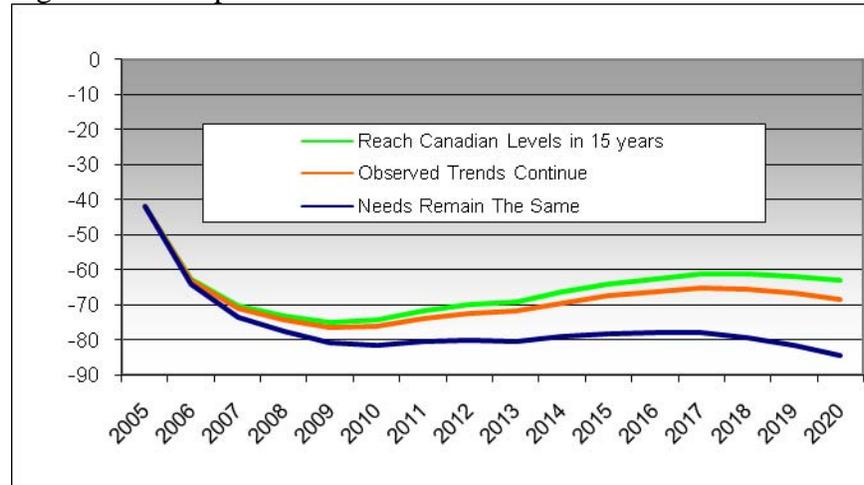
The results shown in Figure 8 indicate that even small improvements in FP productivity could potentially substantially reduce or even eliminate the shortage of FPs. Thus it seems that initiatives aimed at improving the productivity of family physicians may be well worth considering.

Improving the Health of Nova Scotians

A less direct, seldom considered, but potentially very beneficial method of reducing the shortage of health care providers in a region is to improve the health of its residents, thus reducing the need for the health care services. Though no one can predict how the health of Nova Scotians will change in the future, we can estimate the effects of specific changes on the need for the services provided by family physicians.

For the purposes of this investigation, we have simulated three different scenarios related to changes in the health needs of Nova Scotians. The simplest of these assumes that current levels of health in the province will remain the same (this is an implicit assumption of most existing HHR planning models). A second assumes that levels of health in the province will continue to follow trends observed in health surveys over the past decade. In the third scenario, the effects of Nova Scotians' health gradually improving to the level of Canada as a whole in 15 years are simulated. The results of these three scenarios are shown below in Figure 9.

Figure 9: FP Gap Under Three Needs Scenarios



Although the health of a province is certainly a difficult factor to manipulate (or even predict), these simulations highlight the potential benefits of health promotion initiatives and other programs aimed at improving the overall health of Nova Scotians, in contrast to the potential HR challenges should the health of Nova Scotians continue to decline as observed over the past 10 years.

Combined Policy Initiatives

A number of the individual policy scenarios simulated above yielded promising results, suggesting that some of them might be sufficient to dramatically reduce or even eliminate the shortage of family physicians in the province. A multi-faceted approach, combining several simultaneous policy interventions, might be even more effective in increasing the degree to which the supply of family physicians in Nova Scotia matches the numbers required.

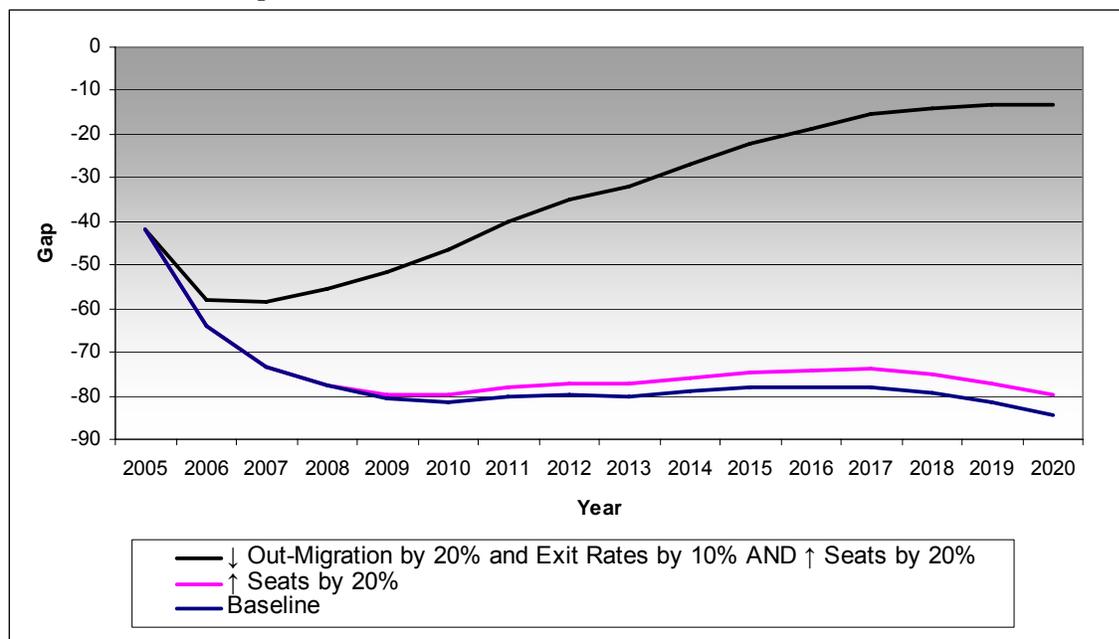
An important factor to consider when weighing multiple policy initiatives is that an intervention aimed at improving one particular variable in the system may simultaneously improve other variables. For example, policies aimed at increasing in-migration of FPs from other regions (e.g., providing innovative opportunities for skills development and career advancement) may well result in lower exit rates and/or improved productivity among existing FPs and increased retention of new FP graduates.

As another example, consider the effects of simply increasing training seats. On its own, this intervention had little or no short-term impact on the shortage of FPs, and modest impact in the long-term. In light of the expense associated with funding these extra seats, it makes sense to ensure that as many new graduates as possible remain in Nova Scotia to practice family medicine.

The substantial out-migration of graduates (80%) is perhaps the main reason why we do not see dramatic benefits from increased training seats for family physicians. We therefore simulated the potential benefits of combining a seat increase with initiatives to improve retention of both

existing and newly graduated FPs. Figure 10 below shows the simulated effects of these combined initiatives, compared with the effects of the seat increase alone.

Figure 10: FP Gap Under Combined Seat Increase & Improved Retention vs. Seat Increase Only vs. Status quo



These results demonstrate clear benefits to using multiple policy initiatives; reducing exit rates and graduate out-migration in combination with an increase in training seats results in a much larger reduction in the FP shortage compared to increasing the seats alone; clearly a much better return on the investment in extra seats.

Discussion

Using tools such as the analytical framework and simulation model described above, needs-based HHR planning *is* possible. If governments, unions, regulatory bodies, and other stakeholders invest in improvements to the quality and quantity of data available to support this type of planning, the process will only become more user-friendly.

In the case presented, evidence from our model suggests that the existing shortage of family physicians will worsen in the near future before stabilizing. Our simulations suggest that one-dimensional policy interventions such as simply increasing training seats will likely not be optimal for reducing this shortage. Combining several policy interventions is likely to be markedly more effective. Results suggest that this shortage can be substantially reduced, and possibly even eliminated, by a well-coordinated, multifaceted portfolio of policy interventions aimed at improving different components of the HHR planning system with respect to family physicians.

The analytical framework and the simulation model described above are useful tools to identify such a combination of policy options. The model's base in evidence, capacity for continuous 'updates' as new and better data become available, and its ability to fuel discussion with its dynamic displays of policy effects advance the coordination of multifaceted policy interventions.

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