

Chapter 4

Discussion and Conclusions

4.1 Introduction

The objective of this concluding chapter is threefold. First, the major findings from the literature review and the analysis of physician supply data are summarized. In addition, although the study has produced many useful findings, not all questions concerning the geographic distribution of physicians in Canada have been or can be answered, given the nature of the study and the limitations of the data. Some of these information or knowledge gaps are identified in Section 4.2. Second, based on our experience in conducting the present study, we identify and discuss, in Section 4.3, several challenges that researchers and health services planners may face in examining physician distribution. Lastly, on the basis of previous discussions, we suggest several potential studies that we think are needed or that could advance our understanding of physician distribution.

4.2 Summary of Major Findings

The review and synthesis of the literature shows how the analysis of the geographic distribution of physicians has evolved from the simple - some may even say simplistic - population-to-physician ratio to something considerably more complex in order to describe the spatial dispersion of physicians with greater conceptual clarity, more precise measures and more sophisticated indices. We have shown the growing awareness that factors other than the numbers of physicians and residents have to be taken into consideration. These include travels by physicians and patients, variations in physician workload and productivity, overlapping scopes of practice of different specialties, medical care utilization patterns and the health status of the population. Different approaches have been used to incorporate these factors into measures of physician distribution or to bypass the difficulties posed. These include using physician FTEs, population adjustments to reflect differences in utilization pattern or health status, ways to capture within-region and out-of-region service provision and service consumption patterns and distances between physicians and patients. In short, it is a progression from measures based on simple head counts to measures that reflect the medical care needs of a population and the capacity of available physician resources to meet those needs.

Ideally, future studies of physician distribution should take some, if not all, of these factors into consideration, though data and information constraints could present a problem. A study of Manitoba's need for generalist physicians (i.e., GPs/FPs, general internists and general pediatricians) by Roos et al. (1996b) is a good example of attempts to move beyond the simple physician-to-population ratio approach. Although the Roos et al. study is not about the geographic distribution of physicians, the fairly elaborate

methodology it has adopted to examine provincial physician supply and needs provides some guidance to future studies of physician distribution. The analysis has incorporated physician service utilization patterns, age-sex composition and health and socioeconomic characteristics of area residents, physician workloads in different regions, physician FTEs, availability of nursing stations in more remote regions (as a proxy for nurses substituting for physicians), the extent of physician contact received within and outside an area, etc. This Manitoba study shows what can be done if pertinent data are available.

The second part of the present study (Chapter 3) is an empirical analysis of physician availability in Canada (although the FTE analyses are based on data from only eight provinces), using as a guide insights gained from the literature review. Since the emphasis is on the spatial distribution of physicians, geographic information systems techniques have been used to visually present some of the results in a series of maps. The major findings and “lessons learned” are highlighted in point form as follows.

In Canada, during the period from 1986 to 1996:

- “ The number of physicians increased by 20.5%, while the overall population of Canada increased by only 13.9%;
- “ “Head count” population-to-physician ratios have improved and recommended population-to-physician ratios were met for GPs/FPs and for most specialist physicians at the national and provincial levels;
- “ FTE-based population-to-physician ratios also show improvement; but when these figures are used, fewer recommended ratios are met;
- “ If the trends that have been observed for female and older physicians continue (i.e., together becoming an increasing proportion of the physician workforce; and both associated with lower average FTE values), it will be more difficult to reach many of those recommended population-to-physician ratios;
- “ While national and provincial numbers of physicians are generally adequate (assuming the validity of the recommended population-to-physician ratios), significant regional variations existed and persist, leading to a “maldistribution” of the physician resources in many parts of Canada;
- “ “Maldistribution” in the form of decreases in the numbers of rural physicians relative to the population in those areas is apparent and can be displayed easily using simple cartographic techniques; in some instances the simpler technique of a dot map is more adequate than the plotting of population-to-physician ratios because of the large geographical units needed to adequately portray the ratios;

- " If administrative units are used to examine differences between urban/rural physician and population distribution and if one cannot generate the classifications, then the Statistics Canada urban/rural codes are highly recommended; however, they should be used with caution especially for time-series analyses as the administrative/census boundaries of communities can change and have changed considerably over the years;
- " Over the short period of time from 1991 to 1996, the proportions of physicians working in small town and rural areas of Canada decreased from 14.9% to 9.8% while the population rose from 19.2% to 22.2% (Note: these figures are approximate only and should be used with caution because of the boundary changes in census administrative units that occurred during this timeframe);
- " While the majority of Canadians live in close proximity (i.e., less than 5 km) to physicians and hospitals, the distance to these health personnel and facilities is increasing for rural residents as physicians and hospitals are increasingly concentrated in urban and urban fringe areas; and
- " When detailed location data are available, urban/rural dichotomies in terms of both physician and population distribution are best assessed and shown when the researcher is not constrained by pre-defined, and perhaps inappropriate, geographical areas such as census divisions or counties.

What this study has accomplished is to show that there is more to the geographic distribution of physicians than population-to-physician ratios. We have tried to show that physician distribution can be understood and measured in different ways. Some of these approaches have been used in an empirical analysis of physician supply in Canada, which has yielded some useful results. Along the way, we have also explored a number of related issues such as how "rural" and "maldistribution" are understood.

It would be quite unrealistic to expect that all questions concerning the geographic distribution of physicians in Canada can be answered in a single study. Although quite extensive in nature, the present research still leaves some of the questions raised in the Request for Proposal partially answered or unanswered due to data limitations and the nature of the present study. First of all, while it is possible to document the unequal distribution of physicians, it is much more hazardous to infer physician shortage, except in extreme cases. This is because designations of "shortage" or "maldistribution" have to be made against some standards of adequacy. Unfortunately, there are as yet no universally accepted standards. The recommended population-to-physician ratios we have reviewed, even if they are valid, tend to be national standards which may or may not be applicable at sub-provincial levels.

Secondly, it is not possible for this study, which is based on a literature review and an analysis of secondary data on physician supply, to assess difficulties experienced by Canadians in accessing physician services. The level of difficulty in accessing medical care is a function of many factors, the number of physicians in an area is just one of these. Besides, physician supply data cannot be used to infer patients' subjective experience of hardship. It is worth noting that we have not come across a Canadian study that relates objective measures of physician availability with subjective perceptions of accessibility. Lastly, this

study cannot document the social or economic impact of lack of access to physician services. This is another area where hardly any research has been done in Canada.

All this suggests that more research is needed in order to fill existing knowledge gaps. Several suggestions are presented in the last section of this chapter.

4.3 Future Challenges

Although researchers have made great strides in advancing our understanding of the geographic distribution of physicians and in developing methodologies and measures to more accurately describe physician distribution, there are gaps in existing research and there may be changes in health service delivery which may affect physician distribution in the future. Some of the major research gaps and future challenges are briefly discussed as follows.

4.3.1 Provider Substitution

That physicians often provide services beyond the scope of their specialties has been acknowledged by many researchers, but few studies have actually factored specialty substitution into physician supply and distribution measurements. This may be due to difficulties in obtaining reliable data pertaining to specialty substitution.

An even more daunting data problem is the lack of data on discipline substitution. By discipline substitution, we refer to providers in one discipline substituting for those in another. Discipline substitution and the effectiveness of some forms of substitution have been discussed extensively (see, e.g., Abelson and Hutchison, 1994; Office of Technology Assessment, 1986; Manga and Campbell, 1994; Pong, 1997; Pong et al., 1995; Shi et al., 1993). It is well known that some of what physicians do can be done, and can be done quite effectively and possibly at lower cost, by other providers such as audiologists, clinical pharmacists, midwives, nurse anesthetists, nurse practitioners, optometrists, physician assistants, physical therapists, podiatrists, psychologists, etc. in appropriate settings and in collaboration with physicians. As in the case of specialty substitution, the main problem in examining discipline substitution is the lack of relevant, reliable and system-wide data that can be used for research and planning purposes. Since most of the aforementioned categories of practitioner do not receive fee-for-service reimbursement in Canada, the types and extent of their work that can be seen as substitution for physician services are not officially and systematically recorded, thus making meaningful analysis virtually impossible.

The absence of systematic data should not, however, prevent us from taking discipline substitution, as well as specialty substitution, seriously when examining the spatial distribution of physicians, particularly for the purpose of health services and medical workforce planning. The failure to see specialty and discipline substitution as part of a broader health workforce strategy has prevented us from finding viable solutions

to a perpetual problem. As Barer and Stoddart (1992) have advised, “(t)he problem has historically been seen as one of *physician* maldistribution, a view that encourages the search *only* for physician-based solutions, to the exclusion of other possible approaches. Yet regions such as the Northwest Territories and the Yukon Territory appear to have demonstrated that not all rural-area problems need to be addressed by physician solutions and, moreover, that nonphysician solutions are often at least as effective and more enduring... we know of no compelling arguments against using physician substitutes in regions where physician recruitment continues to be problematic” (p. 619; original emphasis).

4.3.2 Data Requirements

We have alluded to the dearth of some types of data and the limitation it has placed on the kinds of analysis that can be performed. The problem of data requirements has been widely recognized. Taylor et al. (1994), for instance, have pointed out that “(a)vailability of data is a limiting factor in being able to operationalize any methodology. In particular, finding data at the level of aggregation desired for identification of the underserved area is often very difficult... At present, decisions regarding the definition of a concept or term that is key in research are often driven by the availability of data” (p. 48).

Some of the identified research gaps are undoubtedly due to the unavailability of appropriate data. We have shown that the population-to-physician ratio, in its rudimentary form, is an unsatisfactory measure and that refinements can be made by factoring in various relevant variables. However, as a measure or an index becomes more elaborate, the amount of data required increases. One of the appeals of the population-to-physician ratio is the very low level of data requirement. Data availability also partly explains the attractiveness of using province, county, health region or census division as the geographic unit of analysis since most population and health data are reported at the province, county, health region or census division level even though such units of analysis may be too aggregated or too “artificial” to be meaningful from the perspective of health services delivery. Definitions of “rural” are similarly dependent on data availability. While it may be overly simplistic to define rural areas as places with less than 10,000 residents or those with a “0” as the second digit in the postal code, such definitions are simple to operationalize and apply. Conversely, complex definitions, no matter how conceptually sophisticated and elegant they may be, often require so much data that they are impractical or even impossible to use. Access to un-aggregated data that can subsequently be aggregated without the limitations of pre-defined geographical units is most desirable. Unfortunately, that form of data is all too frequently unavailable or not made available because of concerns over confidentiality.

As a case in point, it is now fifteen years since Joseph and Philips (1984) argued that there was a great need for more empirical studies on the impact and measurement of distance (however defined) on accessibility to health care. They were speaking of the need to refine the numerical coefficients in the extant mathematical models defining the influence of distance. Ten years later, in a similar review of the literature, the same call for more studies of this nature was made by Ricketts et al. (1994). During the intervening years, few researchers have had access to data and software tools necessary to undertake those studies.

The future directions of research on physician distribution depend, to a considerable extent, on what kinds of data are to be collected and made accessible. Even when data are available, they may not be accessible for research and planning purposes as exemplified by the reluctance on the part of a few provinces to release provincial physician FTE data for the present project. The tradeoff between conceptual or analytical soundness on the one hand and feasibility or practicality on the other is a problem that will continue to plague researchers and health services planners.

4.3.3 *Electronic “Traveling”*

We have discussed the mobility of both patients and physicians and the complications it has introduced to the analysis of physician distribution. More specifically, patient and physician mobility has made analysis based on a defined geographic area untenable. This problem is going to become even more difficult to handle in the future as telehealth is likely to become more pervasive and play an increasingly important role in rural health care. Broadly defined, telehealth is the use of telecommunications technology to overcome geographic distances between health care practitioners and service users for the purposes of diagnosis, treatment, consultation, education and health information transfer. To date, physician and patient mobility means, with few exceptions, travels from one location to another. In the not too distant future, mobility will mean both travels by cars, planes and trains and “travels” on the electronic highway. As telehealth technology becomes more powerful and affordable, interactions over long distances between physicians and patients, as well as between physicians and their colleagues, for medical purposes will become commonplace. Increasingly, face-to-face contacts will be replaced by “virtual” contacts.

How soon telehealth will be widely adopted in Canada depends on a number of factors. The technology is still being refined and tested to ensure safety and clinical efficacy. As well, a number of policy issues like practitioner reimbursement, practitioner licensure, service standards, protection of privacy, liability insurance coverage, etc. still need to be addressed. Interestingly, a number of advisory bodies have already predicted or promoted the wider use of telehealth. For instance, the Saskatchewan Working Group on Physician Need (1997) has commented on the potential of telehealth to increase specialty services in remote areas. Likewise, the Northern and Rural Health Task Force (1995) has recommended the use of teleradiology, video-conferencing and other innovative technologies in order to make available more specialty services to rural communities.

Telehealth could have a major impact on physician workforce policies and planning, especially concerning physician distribution. In their study on physician licensure issues in relation to telehealth, Pong, Hogenbirk and Pearson (in press) have noted that some provinces (e.g., New Brunswick, Ontario and Quebec) have introduced differential fee schedules, hospital-privilege granting and other mechanisms in order to effect a more equal geographic distribution of physicians. As well, some provinces have restricted the issuance of billing numbers to new physicians as a way of indirectly controlling medical care spending. But such policies and approaches could become largely ineffectual if telehealth is widely adopted because it transcends distance and geopolitical boundaries. A physician in another region, province or even country can provide

some services to patients in a rural community without being there in person. The notion of geographic distribution of physicians may have to be reconsidered in light of the advent of telehealth.

In a way, telehealth can be seen as a form of mobility, involving long-distance “traveling” by patients to see their physicians or vice versa by means of telecommunications (Pong, Hogenbirk and Pearson, in press). The major differences between electronic “traveling” and conventional traveling are ease of access, cost savings by patients and volume. As a result, the shape of rural medical service delivery could be altered in substantial ways. If physical mobility has made the task of describing physician distribution more complex and difficult, electronic mobility will likely bring bigger headaches to researchers. However, those headaches should not be insurmountable if data are made available and innovative tools of analysis continue to be explored and introduced.

4.3.4 Physician Availability, Utilization and Health Status

The concern about the uneven geographic distribution of physicians is partly based on the belief that physician availability, medical care utilization and the health status of residents are closely related. The conventional wisdom is that the availability of physicians in a community facilitates access to medical care which, in turn, enhances health status. In reality, the relationships between these three sets of variables are considerably more complex and the available empirical evidence is not entirely consistent. Researchers who wish to study the consequences of the uneven distribution of physicians will have to overcome additional challenges.

With respect to utilization of medical services, some studies show that rural residents have lower utilization rates. Wennberg and Gittelsohn (1973) were among the first researchers to document regional disparities in medical care access and their potential negative consequences. Relying on Medicare data, they found that counties in the northeastern part of the US which had more surgeons exhibited higher utilization rates for some surgical procedures. Studies that report comparable findings include those by Braden and Beauregard (1994), Chiu et al. (1981) and Miller et al. (1995).

However, other researchers have reported no or very weak relationships between physician availability and medical care utilization. Studies belonging to this category include those by Horne (1987), Kleinman and Wilson (1977), McConnel and Zetzman (1993) and Shapiro and Roos (1984). Horne (1987), for instance, compared the age-adjusted utilization rates of nine “underdoctored” and 16 “undoctored” communities in Manitoba with Winnipeg, Brandon, the province as a whole and other communities in their respective regions. His results suggest that while the “underserved” communities had relatively low per capita medical care costs relative to Manitoba, Brandon and Winnipeg, their use of publicly insured medical services was not substantially below similarly sized communities in the same region which had adequate physician supply. Findings such as these have apparently prompted Barer and Stoddart (1992) to assert that although the uneven distribution of physicians across Canada is well recognized, it is less well known that the variation in medical service utilization per capita is considerably smaller.

The fact that residents in rural and remote communities have poorer health status is less subject to debate. What is still debatable is the sources of poorer health status among rural residents. There is no consensus among researchers that less access to medical care is the cause of poorer health status. Most believe that the relative lack of health care resources, including physician resources, in rural and remote areas is a contributing factor, but not the only one and may not even be the most important one. Weller (1981), among others, has identified the broader problems of deteriorating community infrastructure, inadequate socioeconomic development and adverse effects of cultural change among indigenous populations as reasons for poor health conditions among residents in northern communities in Canada. He is of the opinion that unless there are substantial improvements in the standard of living, expansion of health services alone will not change the bleak picture. Similarly, Barer and Wood (1997) have argued that while differential access to physician services is commonly seen as contributing to regional variations in population health status, the relationship between physician availability and population health status within a wide observable range of physician supply is not obvious.

In their study of contacts with physicians in Ontario, Pitblado, Pong and Jacono (1995) have found that low utilization of physician services is not an exclusively rural phenomenon and that the relationships between health behaviours, utilization of physician services and health status are not simple and straight-forward. Such complex relationships suggest that while the uneven distribution of physicians is an important issue, ensuring the availability of physicians and reasonable access to medical care is just the first step in enhancing rural health. The kind of medical care provided, appropriateness of utilization, integration or lack of integration of medical care with other health services, promotion of a healthier lifestyle, etc. are equally important. A broader perspective has been advocated by some authors. For instance, Rosenthal and Frederick (1984) have suggested that the *physician/population* ratio should be changed to the *physician/population health status* ratio. In a similar vein, Taylor et al. (1994) have noted an emerging focus on the health care *system*, and not just on the number of individual physicians practising in a particular area in relation to the number of people living there.

4.4 Suggestions for Further Research

The identification of research gaps in Section 4.2 and the discussion of future challenges in Section 4.3 have provided some clues to where future research is deemed necessary. A number of suggestions are presented as follows.

- " The ability to measure physician supply in terms of FTEs is an important advance in medical workforce research and planning. However, as noted previously, there are still gaps in how FTEs are calculated, such as the exclusion of non-fee-for-service physicians or clinical care not funded through fee-for-service. This problem will become more serious as an increasing number of physicians are shifting to non-fee-for-service payment schemes. Fortunately, as the Canadian Institute for Health Information will soon collect data on non-fee-for-service physicians, this problem may be partially addressed.

Another problem is the inability to identify physicians in one specialty who provide services in another. The need to address this issue is particularly important for rural physicians who tend to perform a much wider range of procedures as part of their medical practice than their urban counterparts. Although there is no consensus among health services planners on whether or not to count uncertified specialists as specialists, the issue of specialty substitution is an important one in understanding or documenting physician distribution.

There is even less information on the extent of discipline substitution. In fact, we are not even sure if midwives, nurse practitioners, etc. are substituting for, supplementing or complementing physicians, or duplicating physicians' work. The roles of these practitioners and their implications for physician supply, particularly in rural areas, need to be examined. It would be useful to examine the efficiency and effectiveness of different configurations of health practitioners, their acceptance by rural residents and their implications for physician resources planning.

“ Traveling long distances to seek medical care is a fact of life for many people living outside major urban areas. Although researchers are increasingly taking patient travels into consideration, travel behaviours have not been studied extensively. For instance, most studies, including our analysis in Chapter 3, use as-the-crow-flies distance to represent the distance between patient and physician. This is not always satisfactory because many communities are separated by rivers, lakes, mountain ranges and wilderness. There is a need to replace straight-line distance with road distance and/or with distance measurements that reflect alternative modes of transportation. Technically, with the rapid developments in the science of geographical information systems and computer hardware, this should not be difficult. To date, however, except for selected sub-provincial areas and a small number of provinces, detailed digital road networks have not been available for the country as a whole. Even the currently available commercial network datasets are relatively crude and very expensive.

There is also a need to examine the very concept of “distance”. Distance may be expressed in at least the following ways: Geodesic distance, i.e., km between two points; time needed to cover distance via a specified mode of transportation; actual transport costs in terms of dollars; “perceived distance” as reflected in how individuals or groups view distances; or combinations of these. These various perspectives on distance are not new, but few of the alternatives or combinations have been used by researchers because of the difficulty in acquiring appropriate data. For instance, are there Canadian data on how far people are willing to travel to access the services of a GP/FP or a specialist?

It is probably true that to date, most of the traveling is done by patients who seek medical care. But the popularization of telehealth technology will likely change the picture. Increasingly, physicians, particularly specialists, will “travel” to where patients are located by means of telecommunications. As noted earlier, this will likely have a major impact on rural health care delivery and our understanding of physician distribution. Research in this area is urgently needed.

- " Physician distribution in most areas will continue to be in a state of flux. This is not only because of personnel turnover, population growth and decline, retirement and recruitment, expansion and contraction of services, etc., but also because of changes in health care policies. Major policy initiatives, such as the adoption of non-fee-for-service payment models or resource-based relative value schemes, changes in medical education, etc. could affect the practice patterns and activity levels of physicians, which in turn could alter the production of clinical services. Thus, the study of physician distribution goes beyond the analysis of workforce and population data; it also involves examining the impact of health care policies and the relationships between physician distribution and other aspects of the health care system.

- " The findings from the literature review and the analysis of physician supply data have suggested that there may not be a single standard of adequacy regarding physician supply or a single solution to the problem of inadequate access to physician services. Residents, as well as physicians, in different communities may view and respond to the problem differently, depending on their individual experiences, their health status, local or regional arrangements in the provision of health services, provincial health care policies, the broader socioeconomic and political context, the community structure, etc. The quest for the elusive one-size-fits-all solution is likely to be unfruitful, if not misguided.

Studies based on national or provincial data on physician supply, such as the present one, can identify broad trends and the “big picture”, but cannot reveal the uniqueness of individual communities and the complexity of the many factors that interact and impinge on access to medical care. They cannot answer questions like: Why some communities can attract and keep physicians while others cannot? Why two communities with similar physician-shortage problems exhibit very different health-status conditions? How do residents in different communities cope with physician shortage. Anecdotal evidence and mass-media stories suggest that different communities deal with their unique problems in different ways.

It would be extremely useful to conduct a comparative study of eight to ten rural communities in different parts of the country in relation to access to physician services. In addition to documenting the number of physicians and where they are located, it would examine what the physicians do and how they practise; physicians’ concerns and how they think medical care can be improved; how residents in the studied communities access services and to what extent they access services; the residents’ assessment of their health care needs, their knowledge of the availability of health services and their perceptions of the adequacy of medical care; residents’ travel patterns in relation to physician visits; etc.

In addition, as health care delivery is not an isolated activity, the study would examine how the seeking and delivering of medical care interrelate with other activities and how health care as an institution is meshed with other institutions. In other words, a considerable amount of “contextual” data would need to be collected. Needless to say, such a study would have to rely on both

quantitative and qualitative research methodologies. Where feasible, it would use secondary data from various sources. As well, it would rely on primary data collected through surveys, interviews, focus groups and observation.

A comparative study of this nature should yield a wealth of information about the availability of physicians and the problems of access to physician services in rural areas and how such problems are perceived and dealt with in different communities. As well, the ways physicians see the problems can be compared with the ways patients or the community understand the situations. Such information supplements the types of data used and the kinds of analysis conducted in the present study. The information and findings of such a study could inform policy decisions and program design.

- " Last but not least, more in-depth research will not be possible without adequate data. As we have suggested, some of the research gaps could be the result of data inadequacies. Research and data development can be seen as complementary activities, one feeding the other. In suggesting future research, we also urge more effort be devoted to generating and making available the necessary data to support research and planning efforts.