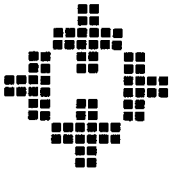
Needs-Based Planning for Manitoba's Generalist Physicians

June 1996



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The Manitoba Centre for Health Policy and Evaluation

The Manitoba Centre for Health Policy and Evaluation (MCHPE) is a unit within the Department of Community Health Sciences, Faculty of Medicine, University of Manitoba. MCHPE is active in health services research, evaluation and policy analysis, concentrating on using the Manitoba health data base to describe and explain patterns of care and profiles of health and illness.

Manitoba has one of the most complete, well-organized and useful health data bases in North America. The data base provides a comprehensive, longitudinal, population-based administrative record of health care use in the province.

Members of MCHPE consult extensively with government officials, health care administrators, and clinicians to develop a research agenda that is topical and relevant. This strength, along with its rigorous academic standards and its exceptional data base, uniquely position MCHPE to contribute to improvements in the health policy process.

MCHPE undertakes several major research projects, such as this one, every year under contract to Manitoba Health. In addition, MCHPE researchers secure major funding through the competitive grants process. Widely published and internationally recognized, they collaborate with a number of highly respected scientists from Canada, the United States and Europe.

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EXECUTIVE SUMMARY

BACKGROUND

The past rate of growth in the supply of physicians has substantially exceeded the rate of growth in the population. Moreover, this growth in the number of physicians has largely taken place in urban areas and has not solved the problem of maldistribution. Several provinces have taken steps to limit the number of physicians and to cap physician expenditures. At the same time they have sought means of deciding how many physicians are needed and where they are needed.

The June 1996 Conference of Deputy Ministers will again focus on managing physician supply. Their efforts are supported by the medical profession: the National Ad Hoc Working Group on Physician Resource Planning was formed by representatives of provincial/territorial medical associations and the Canadian Medical Association. In August 1995 the group issued a report which included a recommended set of planning tools. They recognized that while in the short run in might be necessary to continue to rely on physician to population ratios, it was desirable to move to a needs based planning approach.

Needs-based planning for physician services involves taking account of the characteristics of the population in each area (e.g., age, gender, socio-economic status and health status), their physician contact rates, and the characteristics of local practising physicians (e.g., workload, closeness to retirement). This report describes a needs-based planning approach for Manitoba.

INTRODUCTION

Like other provinces, Manitoba has already taken steps to reduce medical school enrolment to help slow the growth in the number of physicians. Manitoba has also taken steps to halt its previously open-ended physician expenditure policy, by capping the amount of public dollars going to physicians. The latest five year contract between Manitoba Health and the Manitoba Medical Association (MMA) established the Manitoba Medical Services Council to manage insured services, and the Physician Resource Committee to develop a comprehensive Physician Resource Plan for Manitoba. When the Manitoba Centre for Health Policy and Evaluation (MCHPE) was appointed as a member of the Council and the Physician Resource Committee, we agreed to provide data that would be useful in the Committee's deliberations, and to report to

Manitoba Health on issues related to needs-based planning for physicians. The Committee helped MCHPE determine the most useful ways of approaching two difficult issues: the supply and distribution of physicians.[1] As with all MCHPE reports, responsibility for the conclusions drawn and recommendations made remain with MCHPE authors, not with Manitoba Health nor with the Committee which requested many of these analyses.

Study Design

This report focuses on needs based planning for generalist physicians[2], those who deliver general (not subspecialist) care. In rural Manitoba almost all such care is delivered by general practitioners, while in Winnipeg and Brandon, much of this care is delivered by general paediatricians and some by general internists. The basic assumption underlying needs based planning is that in a capped funding environment with a limited physician supply, it makes sense to attract physicians to areas where the population appears to have the greatest need and lowest supply.

The province was divided into 54 Physician Service Areas (PSAs), based on actual physician use patterns of Manitoba residents. We focused on ambulatory visits, the care typically provided by generalist physicians. All ambulatory contacts, including office visits, house calls, emergency room visits, and visits to walk-in clinics were included in determining visit rates. Visits delivered to in-patients were excluded because they are more likely to be provided by specialists, especially in Winnipeg and Brandon. (A second report will focus on needs-based planning for specialists.)

To determine each area's relative surplus or deficit of physicians, we compared each area's actual visit rate to an estimate of their "needed" visit rate. Actual visit rates were determined from the claims routinely filed by both salaried and fee-for-service physicians, and included all

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[1] MCHPE worked closely with the Physician Resource Committee and provided much of the analysis which underlies the Committee's final report, *Recommendations of the Physician Resource Committee for a Comprehensive Physician Resource Plan*. The committee's approach was based on physician to population ratios modified using MCHPE's needs index and in-area service patterns. Given that our two approaches start with fundamentally different methodologies, it is reassuring that the general results are quite similar. For a detailed comparison of the two approaches, contact MCHPE.

[2] The term "generalist physician" is typically used to denote physicians who have received training in the fields of general or family practice, general internal medicine and general pediatrics without advanced training in subspecialty areas (Schroeder, 1985; Grumbach et al., 1995). In this document, "generalist physicians" include general and family practitioners, general internists, and general paediatricians. Our criteria for distinguishing generalists from specialists are listed in the Methods Appendix.

ambulatory visits provided to area residents regardless of where the visit occurred. We estimated need for physician visits using regression analysis, based on the rate at which Manitoba residents actually used physicians in 1993/94. The regression allowed us to adjust for the age, gender, and socio-economic characteristics of area residents (the elderly and the very young, women, and those in poor socio-economic circumstances generally have higher contact rates). We also adjusted our estimate of each area's need for physician contacts according to the health characteristics of area residents, based on the principle that if area residents were less healthy, they should be provided more contact than residents of healthier areas (other things being equal). By comparing the actual with the "needed" visit rates, we identified each area as being relatively under-served or over-served by physicians, and estimated the deficit or surplus of generalist physicians serving residents of each area.

Our analyses also accounted for the different workloads of generalist physicians practising in different regions of the province. Other factors, including the availability of nursing stations, the proportion of physicians nearing retirement, and the amount of physician contact received within and outside the area,were also reviewed. All analyses are based on fiscal 1993/94 data, with an update section focusing on 1994/95 data.

In addition, we examined recent changes in Manitoba's physician supply, as well as evidence bearing on the issue of how patient and physician factors influence visit rates.

KEY FINDINGS

Context

- Manitoba has a physician supply similar to that of Alberta and Saskatchewan, greater than New Brunswick and Newfoundland, and somewhat lower than British Columbia. Only Ontario and Nova Scotia have substantially more physicians per capita than Manitoba. This province also has a relatively rich supply of specialists. Per capita spending on physicians in Manitoba is below the Canadian average with only the 3 Maritime provinces having lower per capita expenditures on physicians.

- Throughout the province, Manitobans have remarkably good access to physicians. In 51 of our 54 areas, 75% or more of the residents made at least one contact with a physician in 1993/94. Average visit rates among Manitobans were much higher than those of Americans.

- Past policies have led to relative surpluses of physicians in areas with mainly healthy populations, and deficits in high need areas.

Deficits and Surpluses

- Most of Northern Manitoba and several areas in Southern Manitoba have relatively high health care needs but are under-served by physicians. This includes the areas of Flin Flon, Norway House/Cross Lake, the remote communities served by Thompson area physicians, as well as The Pas, Island Lake and Oxford House. High need areas in the rural South under-served by physicians include Roblin, Alonsa, East Lake Winnipeg, Grahamdale, East Interlake, Winnipegosis, Coldwell, Piney District and Sioux Valley. Residents of two Winnipeg areas, the Inner and Outer Core, were also found to be under-served relative to their needs.

- A relatively small number of physicians would be adequate to fill the needs of Manitoba's under-served areas. We estimate that 32 to 43 physicians[3] added in Northern areas and 27 physicians in the rural South would eliminate all deficits. (The medical school graduates approximately 80 physicians per year.)

- Some areas close to Winnipeg or Brandon (e.g. Springfield, Morris, Tache, Souris) appear to be under-served based on the supply of physicians located within the area, but their residents are abundantly served by Winnipeg and Brandon physicians. This may be happening as much by patient choice as by necessity, and a closer examination of the reasons for residents' contact patterns is required.

- Winnipeg has a relative surplus of 103 of generalist physicians (GP/FPs, general paediatricians and general internists). The surplus increases to 124 physicians if we incorporate the services provided by public health nurses.

- Not only does Winnipeg have a surplus of physicians relative to the rest of the province, but Winnipeg physicians' services are not well directed towards those residents who would appear to need them most. The Core areas have residents

[3] The lower number is an estimate which incorporates the substantial amount of care currently provided to Northern residents by nurses at nursing stations.

with among the highest needs in the province, yet we estimate they are under-served relative to their extraordinarily poor health.

- Brandon also has a relative surplus of 10 generalist physicians. Although Brandon physicians provide services to residents from outside the city, the majority of their services are provided to Brandon residents.

- There will always be physician turnover and retirements, and some of the areas currently in need of physicians have historically had difficulty in attracting and keeping physicians. However, it is important to appreciate that only a moderate number of physicians are needed to eliminate existing deficits.

- A richer physician supply does not appear to be associated with a lower rate of short stay hospital admissions, or the number of days patients spend in hospital.

Limitations in linking needs to physician supply

- While populations in poor health would logically seem to have the strongest claim to physician services, it does not necessarily follow that investing in more physician services will "buy" better health. Core area residents of Winnipeg perhaps best illustrate this dilemma: they have more physician contact than residents of any other part of the city, yet have the highest hospitalization rate among Winnipeg areas, and the highest premature mortality rate in the province. This suggests that the overabundant supply of physicians in Winnipeg does not result in good health for Core area residents, nor does it likely explain the good health of other Winnipeg residents. Clearly, investments in programs other than health care are needed to improve the health of Manitobans. In a capped funding environment, we recommend shifting physician resources from areas of relative surplus to areas of deficit based on the principle that those in poorer health should be provided more physician visits than those in better health (other things being equal). It should be noted, however, that core area residents, despite their high absolute levels of physician contact, are still under-using physician services relative to other Manitobans, given their demographic, socio-economic and health characteristics.

Cost of Physician Surplus

- If physician contact rates could be reduced to the "needed" visit rates identified in this report, the total physician supply could be reduced by 64-98 FTE physicians, saving $8-12 Million per year (based on $120,000 average annual salary). To meet this goal, physician practice patterns and patient utilization patterns must change.

Physician and patient contributions to visit patterns

- Physician practice patterns appear to contribute at least as much to the observed surplus of visits in Winnipeg as do high use patterns of patients.

Recent changes in physician supply

- The introduction of provisional billing numbers in January 1994, with incentives to practice outside Winnipeg and Brandon, was greeted with consternation among young physicians and has been blamed for acute problems in rural areas. Early evidence of the impact of this policy seems to indicate it did not have the desired effect of attracting Manitoba graduates to rural areas. However, it is difficult to assess the impact of this policy alone because the College of Physicians and Surgeons introduced licensing changes around the same time. Both changes were probably factors in the observed decrease of physicians serving the North and rural South. Conversely, two recent changes may help reverse the trend: the Parklands Family Practice Residency Training Program has successfully placed several physicians in rural practices, and an increase in physician remuneration from Manitoba Health has assisted the Northern Medical Unit in recruiting 5 of these graduates to work in northern communities.

- In the three year period before the introduction of provisional billing numbers there were more physicians entering practice in Manitoba than retirements or departures. The majority of new entrants, especially in rural areas, were foreign trained physicians.

- Despite slightly higher departures of physicians 1994/95 and the (one-time) delay of entry of Manitoba medical graduates[4], Manitoba's physicians provided more visits to Manitobans in 1994/95 than in 1993/94.

Policy directions suggested by these findings

MCHPE worked with the Physician Resource Committee to develop a wide variety of policy options to address the problems of physician surpluses and deficits identified across the province. MCHPE supports the Recommendations of the Physician Resource Committee for a Comprehensive Physician Resource Plan, assuming rapid, meaningful steps are taken which target both the deficits and surpluses. However, ongoing monitoring will be essential to determine whether the policies are having the intended effect.

In the event of failure to reduce the surpluses and to fill the deficits, alternative policies should be considered including those which have been implemented in other provinces based on the restriction of billing numbers. These might include:

- Restrict the issuing of new billing numbers for Winnipeg physicians to allow only a small annual maximum (10-15) of general practitioners, general internists, and general paediatricians to set up practise; direct these practices towards areas of need, that is towards residents of the Core areas of the city.

- Ensure that the number of new Winnipeg practitioners is less than the number departing/retiring.

- Eliminate current fee incentives to general practitioners, general internists, and general paediatricians based in Brandon, and restrict the issuing of new billing numbers for this area until its surplus is reduced.

- Information on supply and contact rates relative to needs, combined with factors such as the number of physicians nearing retirement age and the availability of alternative services (including nursing stations or clinics) should be used to decide where new billing numbers are issued. This information should be updated

[4] Basically, one graduating class had a delayed entry to practice because of changes in licensure requirements from one year to two years of pre-registration training.

annually. The filing of evaluation claims by salaried physicians should be audited to ensure the integrity of the data.

- Reduce the Winnipeg surplus by paying 5 to 10 senior physicians from the fee-for-service pool to take a 1 to 2 year sabbatical from practice to put evidence-based decision making into practice. There is growing recognition that much of medicine is based on practices of unknown efficacy. Surplus physician resources could be used to great potential public benefit to monitor and evaluate existing patterns of practice such as those we have documented in the treatment of hypertension.

- Physician resource planning should be done on the basis of full-time equivalent counts, not head counts. Manitoba has a powerful data base for resource planning. While the contract signed between the MMA and Manitoba Health limits the number of billing numbers that can be active at any given time to 1950, the number of full-time equivalent physicians practising in the province is the more important number to monitor and control.

Given the costliness of a physician surplus and the weak relationship between physician supply and population health, alternative policy approaches should be considered. A longer term strategy for decreasing physician supply (or at least expenditures on physicians) and increasing expenditures on alternative means of improving population health should be developed. We pay a substantial price to train and pay physicians. Evidence from our own and other studies demonstrate that to improve the health of our population, we need to implement approaches other than those dependent upon health care practitioners.

A good case could be made for including payments for physicians as part of the needs based funding allocations given the new regional associations. If per capita allocations for physicians were made for all regions (including Winnipeg and Brandon), the funding inequities across the province would be partially resolved. Regional associations, if they choose to do so, could invest in nurse practitioners, clinical psychologists and other professionals to complement physicians in the delivery of needed services.

Strengths of the analytic approach

- The analyses in this report focus on ambulatory visits provided to Manitoba residents and the physicians who provide the bulk of this care. No distinction is made between care delivered by specialists and that delivered by primary care physicians. This is a strength of the analysis since it represents one of the only ways to do needs based planning across the entire province. In Winnipeg, specialists deliver much of the care which in the rest of Manitoba is delivered by general practitioners. Our analyses are based on the assumption that a population's requirements for primary care services can be met by general practitioners or specialists. Furthermore, we assume that the same type of factors which influence the need for physician contact in other parts of Manitoba influence the need for care in Winnipeg. Ambulatory visits, the basis for our analyses, make up 77% of Winnipeg generalist physician earnings, and 66% of the earnings of generalist physicians in the rest of the province. Subspecialist physicians and surgeons deliver relatively few visits (23% of their earnings), hence their main activities are excluded from this analysis. A second report will focus directly on needs-based planning for specialist physicians.

- Our approach is immune to the major problems facing ratio-based approaches. Ratio approaches focus on the number of physicians in an area, not on the care they deliver, and frequently overestimate the physician contact that area residents receive. Since visit workload varies markedly among physicians and across the province, our approach more accurately tracks the care residents actually receive. Ratio based approaches also typically deal poorly with the fact that physicians in regional centres deliver significant amounts of care to residents who live elsewhere. Our approach credits care to the recipient's area of residence, not the physician's. Therefore, surpluses and deficits in regional centres reflect only the care their residents receive.

Limitations of findings

- This approach estimates need for physicians relative to a provincial average after differences in age, gender, socio-economic risk and health status characteristics of area residents have been accounted for. There is no absolute standard which identifies the minimum (or maximum) number of visits required to keep Manitobans healthy, so we estimate this standard based on how Manitobans actually use physicians, and assume that those who are less healthy will need more contact than those in good

health. While this may be the only practical way to proceed, the limitations of this approach must be appreciated.

- Where non-physician health care providers (e.g. nurses) provide services which would otherwise be delivered by physicians, our approach overestimates the need for physicians. This is an important issue in some of the Northern areas such as the remote communities served by Thompson physicians, Island Lake, Norway House/Cross Lake and Oxford House and Winnipeg's Core areas which are served by public health nurses. We suggest that where nurses and physicians share these duties, negotiations should take place between community leaders and providers of care to determine the mix which best serves the needs of area residents.

- Our estimates of each area's "Need" for physicians are based on recent usage patterns, and may therefore be inflated as a result of the increases in visit rates associated with increased physician supply. (Between 1980 and 1991 physician supply grew by 22% in Winnipeg and 12% in rural Manitoba).

- Our approach excludes visits to hospitalized patients and thus does not directly provide estimates of physicians needed to provide hospital based care. However, we recognize that generalist physicians provide different mixes of services in rural and urban settings; by using different visit workloads for calculating physician surpluses and deficits in different regions, we adjust for the fact that rural physicians do more than provide ambulatory visits.

Our approach does not count physician supply associated with academic teaching needs. Clearly, some proportion of what we identify as surplus Winnipeg physicians should rightly be viewed as resources essential to the training of new physicians for Manitoba. However, Winnipeg-based academic physicians who are conducting research or filling administrative or community health roles would only have contributed to the physician surplus to the extent that they bill (or file evaluation claims) for visit based contact.

CONCLUSION

We have identified a relative surplus of physicians in Winnipeg and Brandon, a significant deficit in the North, and a small deficit in a few areas of the rural South. Given Manitoba's slightly lower than average expenditures on physicians relative to that of other provinces, and our relative approach to estimating physician needs, have we mis-specified the problem or undervalued the role of physicians? We think not. Using an entirely different approach the Physician Resource Committee also concluded that "there appears to be an excess of physicians providing primary care services in Winnipeg." This Committee had the full participation of the Manitoba Medical Association.

There is no evidence that policies such as de-insurance of physician services makes sense as a method of controlling expenditures on physicians. De-insurance does nothing to deal with the physician surplus problem and results in a tax on the sick. Since physicians have at least as much influence over high use patterns as do patients, reducing the physician surplus and moving to population based funding may be the most effective methods of fairly compensating physicians and maintaining a strong medical system with universal access. At this time of fiscal constraint we need to focus on preserving what is best about the Canadian medical system. It makes sense to control physician expenditures and to manage the implications of doing so. We have provided ample evidence of the need to move in this direction, and guidelines on how to do it.

INTRODUCTION

During the 1970's and 80's the physician supply in Canada grew much faster than the population. Even as recently as the five-year period from 1986 - 1991, the Canadian population grew by 7.9%, while the number of physicians increased by 15.8%. Canada is not alone in its growing concerns around the physician surplus. In the United States, particularly with the growth of managed care, large surpluses (up to 60%) of specialists, particularly surgeons are projected, while the numbers of generalist physicians and non-physician providers are judged to be either adequate or in short supply (Kohler, 1994; Weiner, 1994).

The growth in physician numbers did little to resolve the inequities in access to physicians which exist between urban and rural areas, and this growth has been associated with increased health care costs. While in most labour markets such growth patterns would lead to a clearly identified surplus and unemployment, as Tarlov (1995) has noted, "a more than adequate supply" of physicians does not lead to unemployment in the conventional sense. Responses to more than adequate supply include such things as providing more services per patient and decreased patient numbers and work hours.

Pressure to control health care expenditures in Canada by limiting growth in the physician supply resulted in the September 1994 meeting of the provincial-territorial conference of Ministers of Health, which set a timetable for determining how many physicians the country "needs" and where they are "needed."[5] At the same time, most provinces have taken initiatives directed at controlling the supply and distribution of physicians (see Appendix II).

In Manitoba, a 5-year contract was signed between Manitoba Health and the Manitoba Medical Association establishing the Manitoba Medical Services Council to manage the insured medical services program. A Physician Resource Committee was created to develop a Comprenehsive Physician Resource Plan and to co-operate in the management of medical practitioner resources in the province. This committee acts in an advisory capacity to the Medical Services Council.

[5] Not everyone agrees with projections of continued physician surplus. Eva Ryten, Director of the Office of Research of the Association of Canadian Medical Colleges, has provided thought provoking analyses focussing on larger than expected population projections, and projected changes in work patterns of physicians, particularly as they may be affected by an increasing proportion of women physicians. Others believe that gender will have little impact on physician workforce forecasting (Council on Graduate Medical Education, 1995).

With the establishment of the Committee, permanent billing numbers were no longer made available to new medical practitioners. Instead, provisional billing numbers were assigned, and these could not become permanent unless confirmed in accordance with a Physician Resource Plan. In December 1994, an interim plan was submitted and approved by the Manitoba Medical Services Council. This plan recommended that the conversion of billing numbers from provisional to permanent should be limited to physicians who have practised for at least two months North of the 53rd parallel, or at least four months in the rural South (i.e. outside Brandon and Winnipeg). Although this seemed to be a reasonable compromise aimed at directing physicians to the areas in need of their services, it was met with criticism by medical students, who felt coerced into going to under-served areas and felt the entire burden of cost-control fell on them.

Around the same time, the College of Physicians and Surgeons of Manitoba introduced changes to its licensing requirements. Under the new provisions, which took effect in July 1995, potential registrants must complete two years of pre-registration training rather than one. Changes were also made to the regulations on foreign-trained physicians, effectively limiting their duration of service to two years. Prior to this, international graduates (primarily from South Africa and other Commonwealth countries) who agreed to work in areas of need as defined by Manitoba Health could obtain a temporary (maximum 5 year) license, which could subsequently be upgraded to a full license to practise in Manitoba. The new Conditional Register provides rural areas with enhanced opportunities to recruit physicians who do not meet the requirements for full licensure, while simultaneously providing those physicians with a route to full licensure.

MCHPE first began work on issues related to physician resource planning in 1992 at the request of the Deputy Minister of Health following the release of the Barer-Stoddart report (1991), a Canada-wide review of physician resources. Our analyses have benefited from consultations with the Working Group on Needs Based Planning, headed by Mamoru Watanabe (former dean of the Calgary Medical Faculty).[6]

When MCHPE was appointed as a member of the Physician Resource Committee, we agreed to provide data helpful to the Committee's deliberations, and they in turn have helped us determine the most useful ways of approaching these difficult issues.

[6] This Working Group was an offshoot of the Research Group on Physician Resources, sponsored by the Canadian Medical Forum.

This report describes the development of a needs-based approach to physician resource planning and attempts to address the following questions:

1. How many physicians are needed in Manitoba? Where are they needed? Which areas of the province have too few physicians and which too many? How big are the surpluses/deficits?
2. Are there clear benefits to having a "more than adequate" supply of physicians? For example, are there health benefits to the population? Is there a lower rate of admitting patients to hospital?
3. Are there obvious costs associated with a physician surplus? Does the province spend more per capita providing physician services where the supply of physicians is particularly plentiful?
4. What roles are played by patients and physicians in producing the high rates of contact in areas of physician surplus?
5. What are the recent trends in the in- and out-migration of Manitoba physicians?

The goal of this report is to provide a factual basis for dealing with issues of physician supply in Manitoba and to develop a method for future efforts in needs-based planning for physicians.

METHODS & FINDINGS

In deciding how to estimate the need for physicians across the province, we reviewed the relevant literature and activities underway in other jurisdictions. In the end we took an eclectic approach, combining the most useful features of several alternative strategies.

Table 1 outlines our approach and each step is described in detail below. We first divided the province into 54 Physician Service Areas (PSAs) according to where people actually go for physician services. Than by dividing the area population by the number of full-time equivalent physicians located in each area, we estimated the supply of physicians per 1000 residents. We also calculated the total number of physician contact received by area residents, regardless of whether the contact was received in or outside their area of residence. It became clear that while there are marked differences in physician supply across the province, most Manitobans have good access to physicians. (Patients travel, and to some extent, so do physicians.) It was also clear that Winnipeg and Brandon residents receive a substantial amount of care from specialists (particularly from paediatricians and internists) while most rural residents are served by general practitioners. This made it more difficult to identify deficits and surpluses of primary care physicians, because the providers of primary care vary across the province.

Since ambulatory care (office visits[7], as well as visits to emergency rooms, outpatient clinics or house calls) represents the vast majority of patient contacts with physicians, and since these visits constitute the path through which other key services (surgery, diagnostic tests, hospitals) are accessed, we designed our method of planning for physician services around the ambulatory visit patterns and needs of Manitoba residents. We believe this is the most defensible method for assessing deficits and surpluses across a province which has such widely divergent physician supplies and practice patterns. Winnipeg residents receive about 30% of their physician contacts from specialists, whereas for Northern residents, it is less than 10%. It is not possible to identify what is and is not primary care in either of these settings. However, populations which are

[7] All ambulatory visits, including consultations, are included; only visits to in-patients are excluded. This inclusive definition is important if we are to assess physician availability across the entire province. Winnipeg residents receive 47% more consultations than do non-Winnipeg residents (Tataryn et al., 1994). If we were to exclude these, we would systematically underestimate physician contacts delivered to Winnipeg residents.

Table 1: Study Design

I Identify Physician Service Areas

II Measure In-Area Supply and Access to Care

III Estimate Physician Surpluses and Deficits Across the Province

1. Assess need for ambulatory care by area
   - who delivers ambulatory care
   - how people actually use physicians (by age, sex, socio-economic characteristics)
   - adjust for health status

2. Compare actual visits to "needed" visits to identify under-use & over-use

3. Estimate deficit/surplus of physicians delivering ambulatory care
   - identify visit workload of generalist physicians
   - divide visit deficit (surplus) by workload

IV. Review other factors affecting estimates of physician surplus/deficit

- where visits are obtained
- availability of other primary care resources
- physicians near retirement

similar in age, gender, socio-economic risk and health characteristics should presumably have similar needs for contacts with physicians of all kinds. Hence our approach ignores the specialty of the physician delivering these contacts and assesses physician deficits and surpluses across urban and rural Manitoba in a standardized fashion. Across the province, most ambulatory care is delivered by generalist physicians, that is, general and family practitioners, general paediatricians and general internists. Hence generalist physicians are the focus of this report.

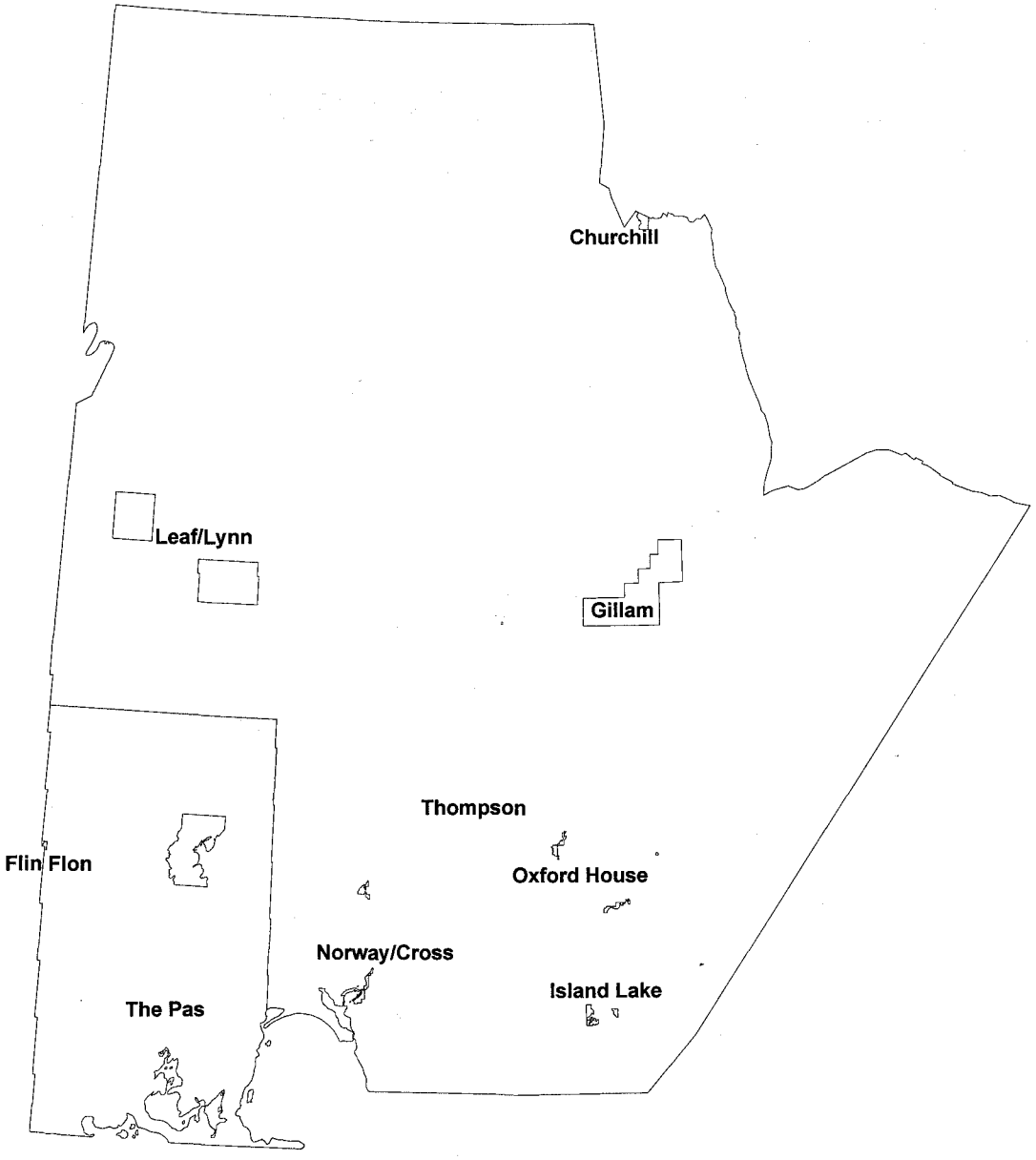
We also review other factors including the availability of nursing stations, the proportion of physicians nearing retirement age, and the proportion of physician contacts which occur within and outside each area.

Identifying Physician Service Areas (PSAs)

In order to assess the relative need for and access to physicians across the province we had to divide the province into meaningful physician service areas. To accomplish this we first focused on areas of the North and the rural South (areas south of the 53rd parallel excluding Winnipeg and Brandon) and examined where residents of these areas seek care. We grouped the communities which use the same pool of physicians into "physician service areas". The service areas typically consist of the physician practice sites plus the smaller nearby towns and districts whose residents seek care from these physicians. We estimated the population of each area using the Manitoba Health population registry. This has been shown to correspond closely with population estimates produced by Statistics Canada Census data and is updated regularly. Where alternative estimates of population counts were available (for example First Nations lists from the Department of Indian and Northern Affairs) we have sensitivity tested our results using the alternative estimates. Unfortunately, the socio-economic data for the Churchill area was unreliable, producing inaccurate values in our analyses. Therefore, we have treated Churchill separately in Appendix III. Note, however, that in all tables and figures in this report, Churchill residents and the services provided to them are included in provincial totals and the subtotals for the larger region referred to as “the North”.

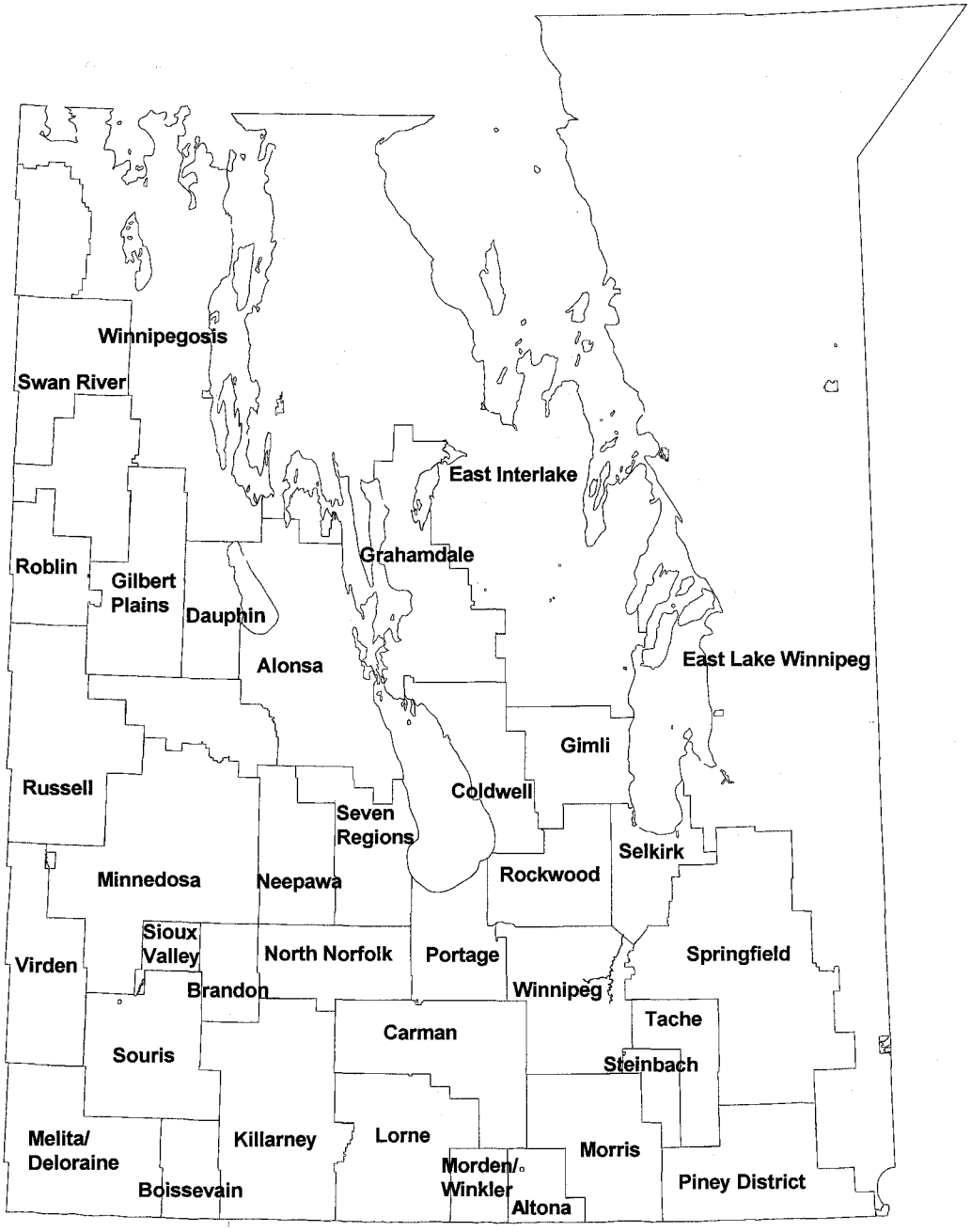
Nine service areas were identified in the North (Figure 1) and 35 in the rural South (Figure 2). Table 2 illustrates the degree to which these physician service areas reflect the use patterns of area residents in the rural South; in most of the areas 60% or more of resident use takes place in area. In developing these areas, only visits to general and family practitioners were assessed although when the areas were built around total contact patterns, the results were quite similar.

Figure 1: Physician Service Areas in the North



See Appendix Table A4 for listing of communities in each Physician Service Area. Thompson area includes Thompson city and surrounding First Nations communities that receive primary care from Thompson physicians.

Figure 2: Physician Service Areas in the South



See Appendix Table A4 for listing of communities in each Physician Service Area.

Table 2: Distribution of Rural Southern Primary Care Ambulatory Visits by Physician Service Area* (Percent of visits according to where received)

Physician Service Area	% In-Area	% NEXT	% WPG	% BDN	% PLP	% DPN	% SNB	% MW	% SLK	% NPW	% SR	Total Adjac
Alonsa	59.5	6.2	7.1	1.5	4.4	15.2	-	-	-	3.8	-	25.2
Altona	75.1	0.9	5.1	-	0.1	-	0.3	18.1	-	-	-	19.0
Boissevain	83.7	9.9	1.6	3.6	0.1	-	-	0.2	-	-	-	9.9
Brandon	94.2	1.4	1.8	-	0.2	0.2	-	-	-	0.2	-	1.6
Carman	72.8	3.8	8.5	0.5	3.9	-	-	4.9	-	-	-	21.1
Coldwell	66.3	11.1	19.4	0.2	0.6	-	0.1	-	0.2	-	-	11.1
Dauphin	92.1	1.7	2.9	1.0	0.1	-	-	-	-	-	0.3	1.7
East Interlake	67.4	10.4	17.6	0.8	0.3	0.1	0.1	-	1.3	-	-	10.4
East Lake Wpg	57.4	6.0	32.2	0.5	0.2	-	0.2	-	1.7	-	-	7.7
Gilbert Plains	61.0	0.8	1.9	1.0	-	33.8	-	-	-	-	0.3	34.6
Gimli	70.3	7.1	11.0	-	-	-	-	-	1.8	-	-	8.9
Grahamdale	63.5	7.3	25.6	0.5	0.3	0.6	-	-	0.1	-	-	7.3
Killarney	76.7	6.0	2.3	6.9	0.2	-	-	0.3	-	-	-	12.9
Lorne	67.4	7.9	5.9	2.7	0.8	-	-	11.7	-	-	-	19.6
Melita/Deloraine	87.3	6.4	1.7	5.2	-	-	-	-	-	0.1	-	6.4
Minnedosa	77.8	6.8	3.2	9.4	0.4	0.3	-	-	-	0.8	-	17.0
Morden/Winkler	93.1	1.8	3.8	0.2	0.1	-	0.2	-	-	-	-	1.8
Morris	56.1	8.0	26.4	2.0	0.1	-	5.4	1.6	-	-	-	39.8
Neepawa	91.5	2.7	1.8	2.6	-	0.2	-	-	-	-	-	5.3
North Norfolk	52.5	2.9	2.9	9.5	22.0	-	-	-	-	8.3	-	42.7
Piney District	69.4	3.7	10.9	-	-	-	15.3	-	-	-	-	19.0
Portage la Prairie	88.4	0.6	8.2	1.4	-	-	-	0.1	-	0.1	-	8.8
Roblin	78.9	7.1	5.9	1.6	0.2	3.0	-	-	-	-	0.7	7.1
Rockwood	67.3	0.6	29.2	0.1	1.0	-	-	-	0.6	-	-	31.4
Russell	83.1	6.6	4.1	4.1	0.2	0.6	-	-	-	-	-	6.6
Selkirk	50.7	6.0	42.0	0.1	-	-	-	-	-	-	-	48.0
Seven Regions	42.8	1.4	8.0	2.8	25.9	0.3	-	-	-	16.6	-	43.9
Sioux Valley	62.1	2.3	4.2	28.3	1.4	-	-	-	-	-	-	30.6
Souris	69.8	8.6	1.3	19.1	0.1	-	-	-	-	-	-	27.7
Springfield	67.7	2.3	26.7	0.1	-	-	0.8	-	1.7	-	-	30.7
Steinbach	75.3	12.7	11.2	-	-	-	-	0.2	-	-	-	23.9
Swan River	90.4	5.1	2.6	0.7	0.1	0.4	-	-	-	-	-	5.1
Tache	41.3	0.8	36.8	-	-	-	19.9	-	-	-	-	57.5
Virden	77.3	6.7	0.1	11.8	0.1	0.1	0.1	-	-	-	-	6.7
Winnipegosis	26.9	9.3	9.4	1.6	0.3	21.2	-	-	-	-	30.3	60.8

* These values were derived from 3 years of data to ensure stability (fiscal years 1990/91 through 92/93).
"% NEXT" shows the percentage of area residents' visits which went to physicians practicing in adjacent physician service areas, other than: WPG refers to visits to Winnipeg physicians, BDN refers to Brandon, PLP refers to Portage La Prairie, DPN refers to Dauphin, SNB refers to Steinbach, MW refers to Morden-Winkler, SLK refers to Selkirk, NPW refers to Neepawa and SR refers to Swan River. These are the larger centres that attract significant numbers of patients from surrounding areas.
"Total Adjac" is the sum of the percentages in adjacent areas ("Next" + larger centres which are adjacent).

The boundaries for the new Regional Health Authorities were not finalized until after this report was drafted. Figure 3 shows how the RHA boundaries overlap with the PSAs used in this study. MCHPE has since developed a revised set of physician service areas, still reflecting actual service delivery patterns, but with boundaries that match the RHA boundaries.

Winnipeg residents travel all over the city to contact physicians, so we had no clear rationale for developing areas around physician service patterns. However, previous MCHPE reports treating Winnipeg as a single area were fairly criticised for masking the marked socio-economic diversity within the city, diversity which we have shown is strongly related to health characteristics of residents. Therefore, Winnipeg was divided into 9 areas (Figure 4) reflecting the socio-economic characteristics of area residents. Municipalities adjacent to Winnipeg are also shown on this map. Most of the residents of these municipalities (which together comprise the PSA "Winnipeg Adjacent") receive their care from physicians located in Winnipeg.

To help summarize the data and allow broader comparisons, most of our data are also grouped into the four major regions: North, South, Brandon and Winnipeg.

Figure 3: Physician Service Areas and Regional Health Authorities

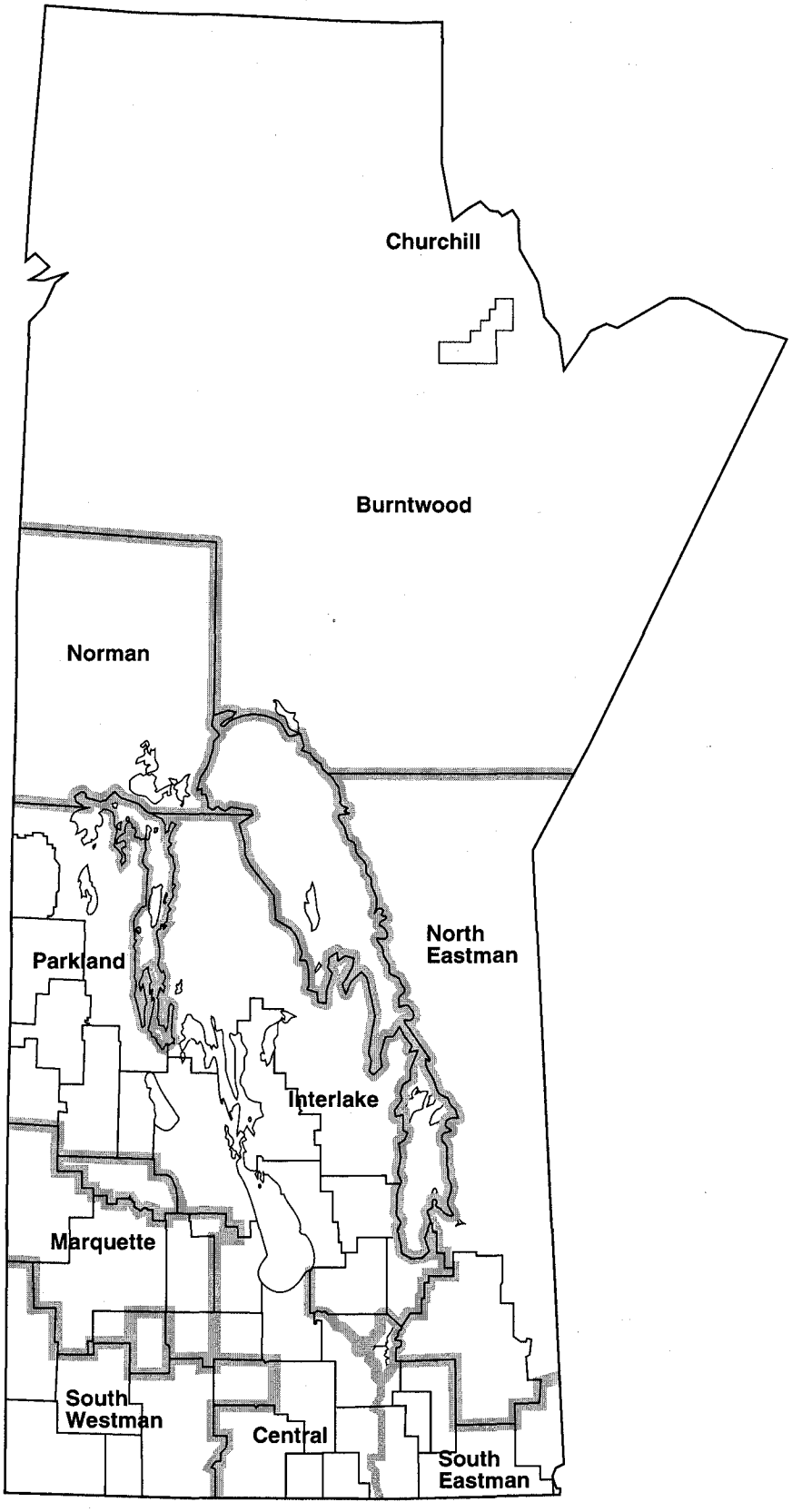
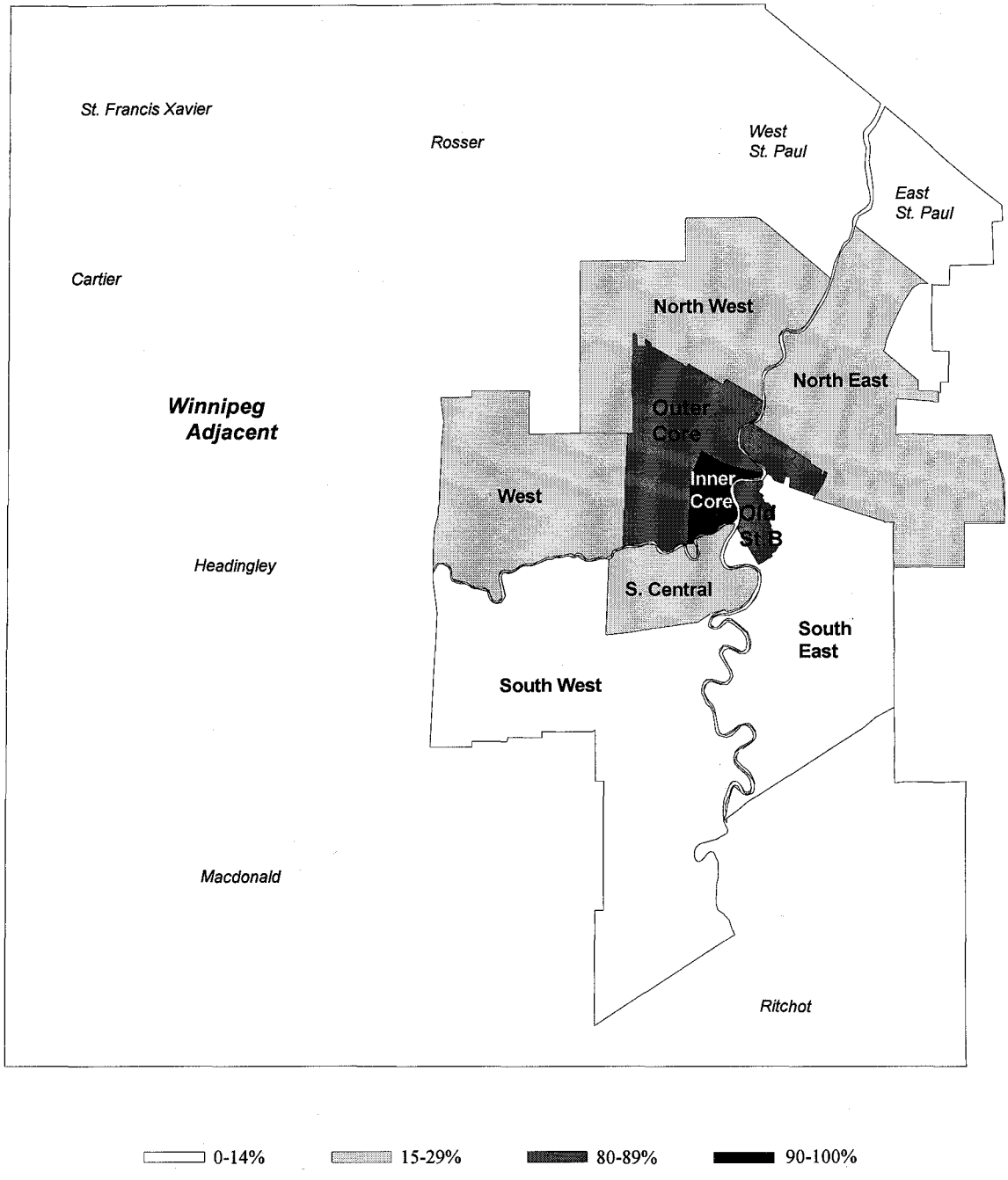


Figure 4: Winnipeg and "Winnipeg Adjacent" areas



Shading indicates percentage of area residents in the two lowest income quintiles.

(Shading applies to areas within Winnipeg only.)

Assessing the In-Area Supply of Physicians

The usual measure of physician availability is the number (or full time equivalent number) of physicians living in an area per 1000 residents.[8,9] As can be seen in Figure 5 there is a marked range in availability across Manitoba, with Dauphin, Brandon, Flin Flon and Winnipeg[10], having the greatest supply relative to their population.

It is unfair to categorize Winnipeg and Brandon as over-supplied based solely on this measure, since specialist[11] physicians in these cities also provide substantial services to residents from other areas of the province. Physicians based in Portage, Dauphin, Steinbach, Morden/Winkler, Selkirk, Neepawa and Swan River also provide services to residents of neighbouring areas. We may overestimate supply in small remote communities such as Norway House because of extensive physician travel patterns.[12] However, despite its limitations, in-area supply has a special meaning to rural Southern and Northern residents who have a strong preference for having services close to home.

[8] Appendix Table A2 contains descriptive data on physician supply and contact across the areas including the percentage of residents contacting a physician during the year, the per capita expenditures for physician services to area residents, a head count of in-area physicians, and the in-area physician supply (FTE) per 1000 residents.

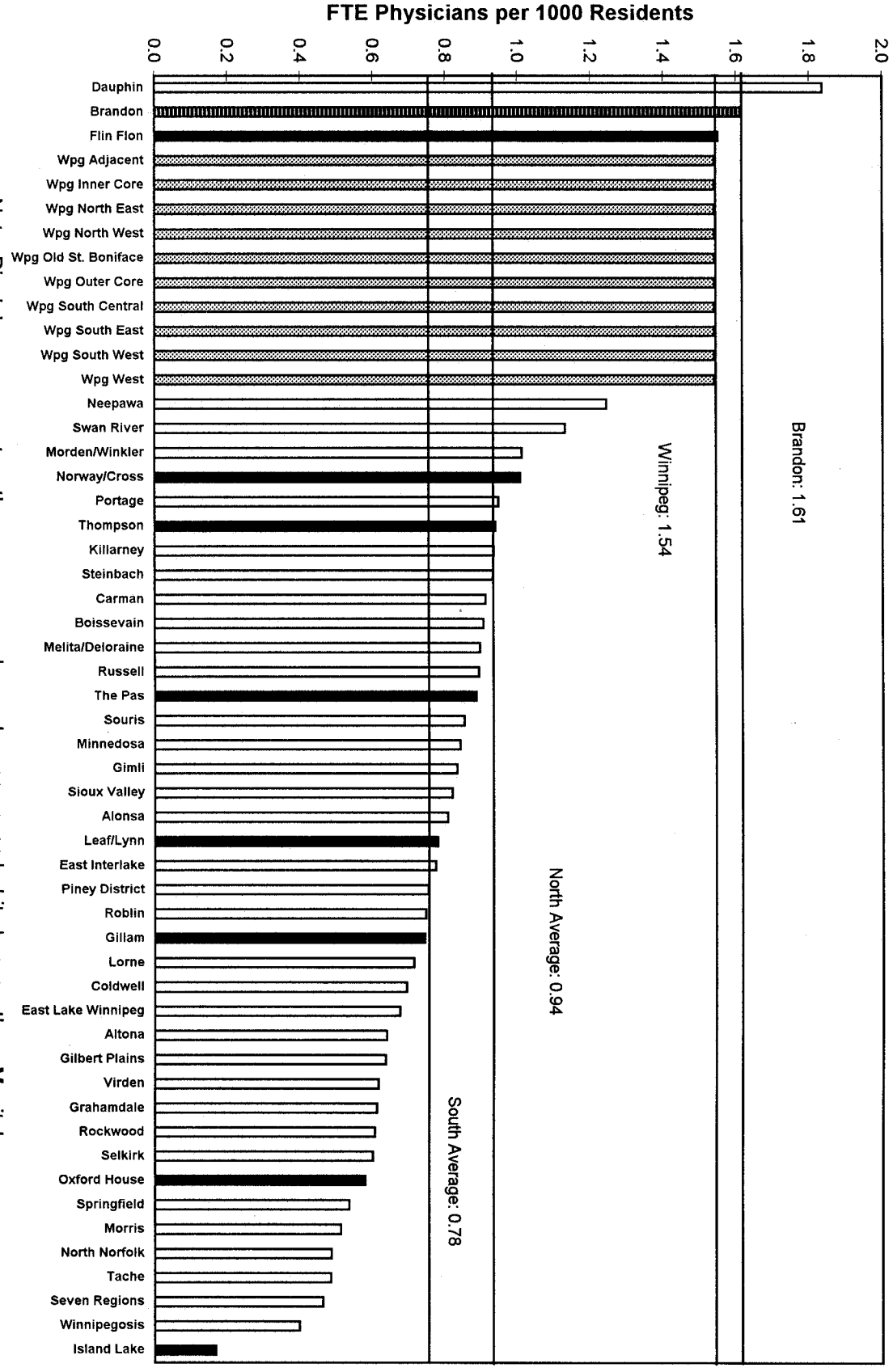
[9] As described in the Methods appendix, we take considerable care in estimating in-area supply including using the Health Canada methodology for counting full-time equivalents, assigning physicians to areas on a monthly basis, and allocating each physician's contributions to each area based on the number of visits provided.

[10] We have identified all areas of Winnipeg as having the same in-area supply since patients travel to various parts of the city to contact physicians.

[11] Data in Figure 5 include all physicians (fee-for-service and salaried) except technical specialists not involved in the direct management of patient care: radiologists, anesthetists and pathologists.

[12] We try to accurately estimate physician supply in rural areas by assigning physicians on a monthly basis to the area to whose residents received the majority of their contacts. For example, fly-in physicians will be credited to a community if, for any month, residents of that community received the majority of that physician's contacts. In 1993/94 we identified 27 physicians with at least one month service credited to Norway House residents; most appeared to provide fly-in service from Thompson. Only 3-4 physicians appeared to be exclusively based in Norway House.

Figure 5: In-Area Physician Supply



Note: Black bars represent northern areas, grey bars urban areas, and white bars southern Manitoba

Note: All Winnipeg areas were assigned the same In-Area Supply value, as patients travel throughout the city for care.

A reviewer[13] from the North observed, "In our region a significant proportion of physician services are provided by doctors who reside in Winnipeg but travel to communities for a few days at a time. It is important for us that a study such as yours identify clearly not only the extent of the supply problem, but also the extent of the recruitment problem as this is likely to influence decisions on matters such as the conditional registry or other strategies developed to deal with the issue of maldistribution of physicians. We also know that where the doctor resides significantly influences the referral pattern for specialist and in-patient services, so it is important to view out of area residence as part of the same problem as the shortage of physician services."

Some areas have a very low in-area supply of physicians. However, several of these areas border on Winnipeg (Selkirk, Springfield, Tache and Morris) and Brandon (North Norfolk) and it is likely that many area residents choose to use physicians in these cities.

As can be seen in Figure 6 there is little relationship between the in-area supply of physicians and the percent of the population which has at least one contact with a physician during the year. Despite wide variations in in-area supply, Manitobans generally enjoy good access to care, with 75% or more of residents in every area except Island Lake and Oxford House contacting a physician at least once during the year.

Relying solely on in-area supply for estimating whether an area needs more or has too many physicians also ignores important factors such as: How healthy is the population? Does the area have many elderly residents (who tend to contact physicians more frequently)? Thus while in-area supply data represent one important characteristic for describing the availability of physicians, it is quite limited in what it tells us about an area's access to care or its need for physician services.

[13] Preliminary drafts of this report were circulated widely among major stakeholders for their feedback on the methods, findings, and interpretation. These comments were very useful in helping us revise the report; we have incorporated excerpts from some of these comments to help illustrate key points.

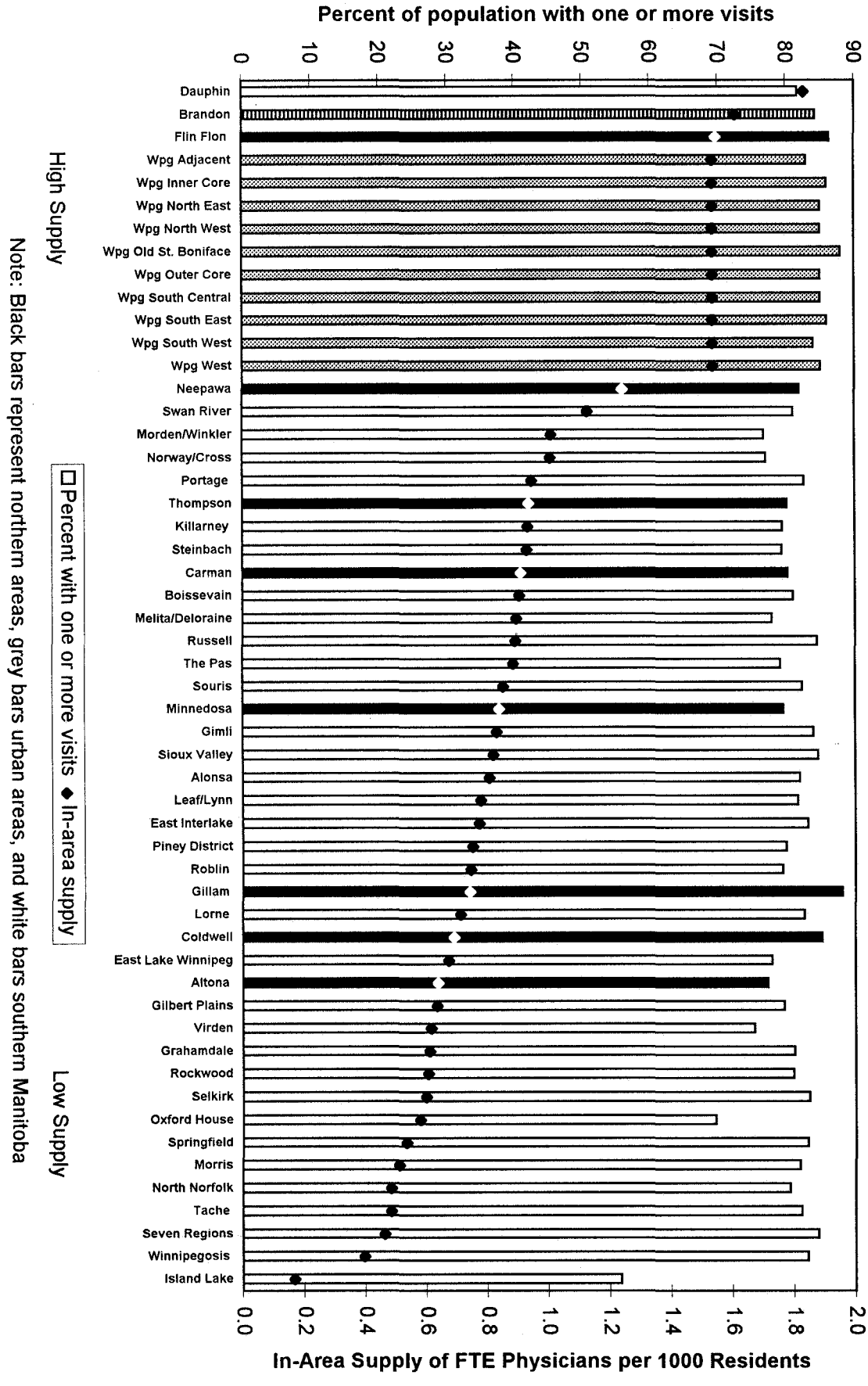


Figure 6: Percentage of Population Visiting Physicians
(Ranked by In-Area Supply of Physicians)

Note: Black bars represent northern areas, grey bars urban areas, and white bars southern Manitoba

Who Delivers Ambulatory Care?

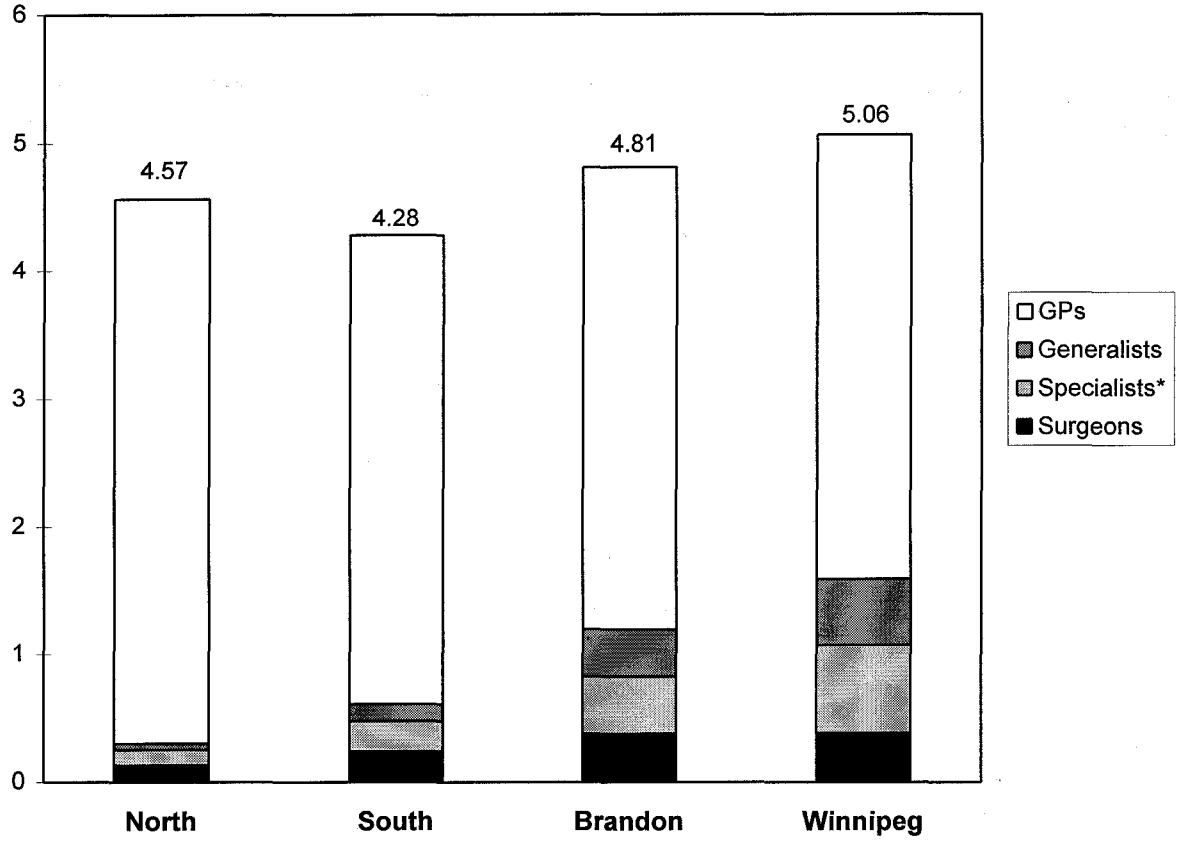
Assessing Need for Ambulatory Care

Figure 7 identifies the ambulatory visits received by residents of the four main regions of the province according to the specialty of the physician contacted. (All visits made by area residents are included regardless of where the visits occurred.) Clearly, general paediatricians and general internists deliver a significant proportion of the ambulatory care[14] received by Winnipeg residents, care which is provided by general practitioners in other parts of Manitoba. General internists and paediatricians plus general practitioners account for 79% of the ambulatory physician visits received by Winnipeg residents, 83% of those received by Brandon residents and 89% and 94% of those received by residents of the rural South and North respectively.

If the present analysis had focused only on care delivered by general and family practitioners, we would have substantially underestimated the amount of physician contact Winnipeg and Brandon residents receive. In order to fairly and accurately assess the need for physician contact across the province, we developed a method which enabled us to reflect the reality of physician practice in Manitoba, encompassing all ambulatory care delivered. Because generalist physicians deliver the majority of this care, our calculations of physician deficits and surpluses apply most directly to them. As can be seen in Figure 7, other medical specialists and surgeons also deliver more ambulatory care to Winnipeg and Brandon residents than to rural and Northern residents. In an upcoming report we will focus on relative access to and need for specialist services across the province.

[14] Ambulatory visits delivered as part of a global tariff (eg. prenatal visits) are excluded from all analyses because we do not know how many such visits occur. We estimate that prenatal visits account for three percent of all ambulatory visits and affects Winnipeg and non-Winnipeg residents similarly (Tataryn et al., 1994).

Figure 7: Visits per Resident, by Physician Specialty



*Includes all Medical and Paediatric Specialists, Psychiatrists and Obstetricians and Gynecologists

Estimating Need for Physicians

What factors influence a population's need for physicians?[15] Presumably any population will have a basic level of need. Even individuals who are basically healthy will need to be seen by a

[15] Any approach to deciding how much physician contact a population "needs" is faced with significant challenges. Need for physician services is different from demand for these services, which in turn is different from utilization of these services. The average 60 year old woman living in Souris makes 5.4 visits per year. Does she need this many visits? Does she demand visits for colds or minor complaints, or is she asked by the physician to return frequently to have her blood pressure checked or her medication monitored? How many visits does she need to obtain optimal health benefits? The answers to these questions remain unknown. In the absence of better research about this issue, the best guide we have for estimating need is to look at actual use, averaged across areas with different characteristics and physician supply. This allow us to examine the impact of demographics, physician supply, and socio-economic and health characteristics on the use of physician services.

physician occasionally[16] to ensure that they make themselves available for preventive services, and for the diagnosis of conditions for which early treatment might be of help. In his paper "Squaring the Circle: Reconciling Fee-for Service with Global Expenditure Control," Evans (1988) identified the importance of age and gender differences across areas for influencing the need for physician services. Thus very young children make frequent contact with physicians, as do the elderly. Other studies have also demonstrated that age, gender, socio-economic status and health status are important factors in determining need for physician services (Birch et al., 1995; Wisconsin Health Services Research Group, 1975).

To account for differences in socio-economic status, we used census data to develop a Socio-Economic Risk Index - SERI.[17] High scores on this index identify areas whose residents have high unemployment rates, high rates of single female parent families, low housing values and low participation in the labour force by women. (Please refer to the methods section for a more complete description of the index.) Table 3 illustrates the effect of socio-economic factors on visit rates. Souris is an area characterized by residents with low unemployment rates and high education and therefore has one of the lowest SERI scores in the South. Residents of Melita/Deloraine score close to the provincial average, and residents of Winnipegosis are at high

[16] An otherwise healthy individual may need to see a physician no more often than once every five years or so, unless he or she is in an age group or risk group where a specific screening exam is recommended (Sutherland 1994).

[17] For a complete description of the SERI, see "A Regional Comparison of Socio-economic and Health Indices in a Canadian Province" (Frohlich and Mustard, 1995). The SERI was initially developed from 1986 public use census data at the municipality level (282 data points), and has since been updated using 1991 census data (correlation r = 0.95 at the PSA level). Concerns about this information being out of date may be inappropriate; in fact, a time lag may provide some advantage. One would expect that changes in health status which may be related to changes in socio-economic status need not be manifest immediately. Failing to get your high school diploma does not make you sick immediately, nor does failing to find a job on the first try, opting out of the labor force, or becoming a single parent. However, experiencing some (or all) of these circumstances over a period of many years almost certainly takes a toll on your health. It follows that the socio-economic data one would wish to use to predict health status and need for health care should capture not only the most recent data, but also some historical information as well. Recent work by Hahn et al (1995) also supports this contention. To that end, MCHPE is working to develop another version of the SERI which uses information from both 1986 and 1991 Census data, in an attempt to capture historical information, cumulative values, and trends. Initial analyses combining 1986 and 1991 census data revealed that only 7 PSAs would have markedly different SERI values: Sioux Valley, Seven Regions, Wpg Adjacent, East Lake Wpg, Winnipegosis, Thompson, and Flin Flon. Had the new combined SERI values been used throughout the analyses, the net regional physician deficits (-) and surpluses (+) would have been only slightly different: North -37 (vs -43), South -14 (vs -6), Brandon +11 (vs +10), Winnipeg +122 (vs +103), and the Manitoba surplus would have increased from (minimum) +64 to +81 physicians.

Table 3: Examples of actual visit rates and expected visit rates after adjustments for age, gender, SERI, and premature mortality.

An Area of Southern Manitoba at Low Socio-economic Risk:	Actual* Visits	Expected** Visits
1 year old girl in Souris (SERI = -0.48)	9.3	7.4
1 year old boy in the same area	8.8	8.1
40 year old woman in Souris (SERI = -0.48)	4.1	3.6
40 year old man in the same area	2.6	2.5
60 year old woman in Souris (SERI = -0.48)	5.4	4.2
60 year old man in the same area	4.8	4.0
80 year old woman in Souris (SERI = -0.48)	10.0	6.5
80 year old man in the same area	8.7	7.2
An Area of Southern Manitoba at Average Socio-economic Risk:		
1 year old girl living in Melita/Deloraine (SERI = 0.29)	7.5	7.4
1 year old boy in the same area	6.2	8.2
40 year old woman living in Melita/Deloraine (SERI = 0.29)	2.8	4.3
40 year old man in the same area	2.1	2.4
60 year old woman living in Melita/Deloraine (SERI = 0.29)	5.3	5.5
60 year old man in the same area	4.1	4.5
80 year old woman living in Melita/Deloraine (SERI = 0.29)	11.3	7.8
80 year old man in the same area	9.1	7.7
An Area of Southern Manitoba at High Socio-economic Risk:		
1 year old girl in Winnipegosis (SERI = 2.39)	8.4	9.9
1 year old boy in the same area	9.2	10.7
40 year old woman in Winnipegosis (SERI = 2.39)	6.3	8.4
40 year old man in the same area	3.1	4.6
60 year old woman in Winnipegosis (SERI = 2.39)	6.2	11.4
60 year old man in the same area	4.9	8.2
80 year old woman living in Winnipegosis (SERI = 2.39)	7.3	14.7
80 year old man in the same area	7.8	11.4

* Actual visit rates are not age or sex adjusted.

** Expected visit rates are developed from regression including age, sex and socio-economic characteristics of each area, then adjusted for area residents' health status using premature mortality.

socio-economic risk. The data in Table 3 show that communities with different socio-economic characteristics have residents with different contact patterns: a 60 year old female resident of Souris makes on average 5.4 visits per year; while a 60 year old female resident of Winnipegosis makes 6.2 visits. Age and gender are also important factors: 40 year old women consistently have higher contact rates than do 40 year old men, and the very young and the very old make more visits than do those in middle age.

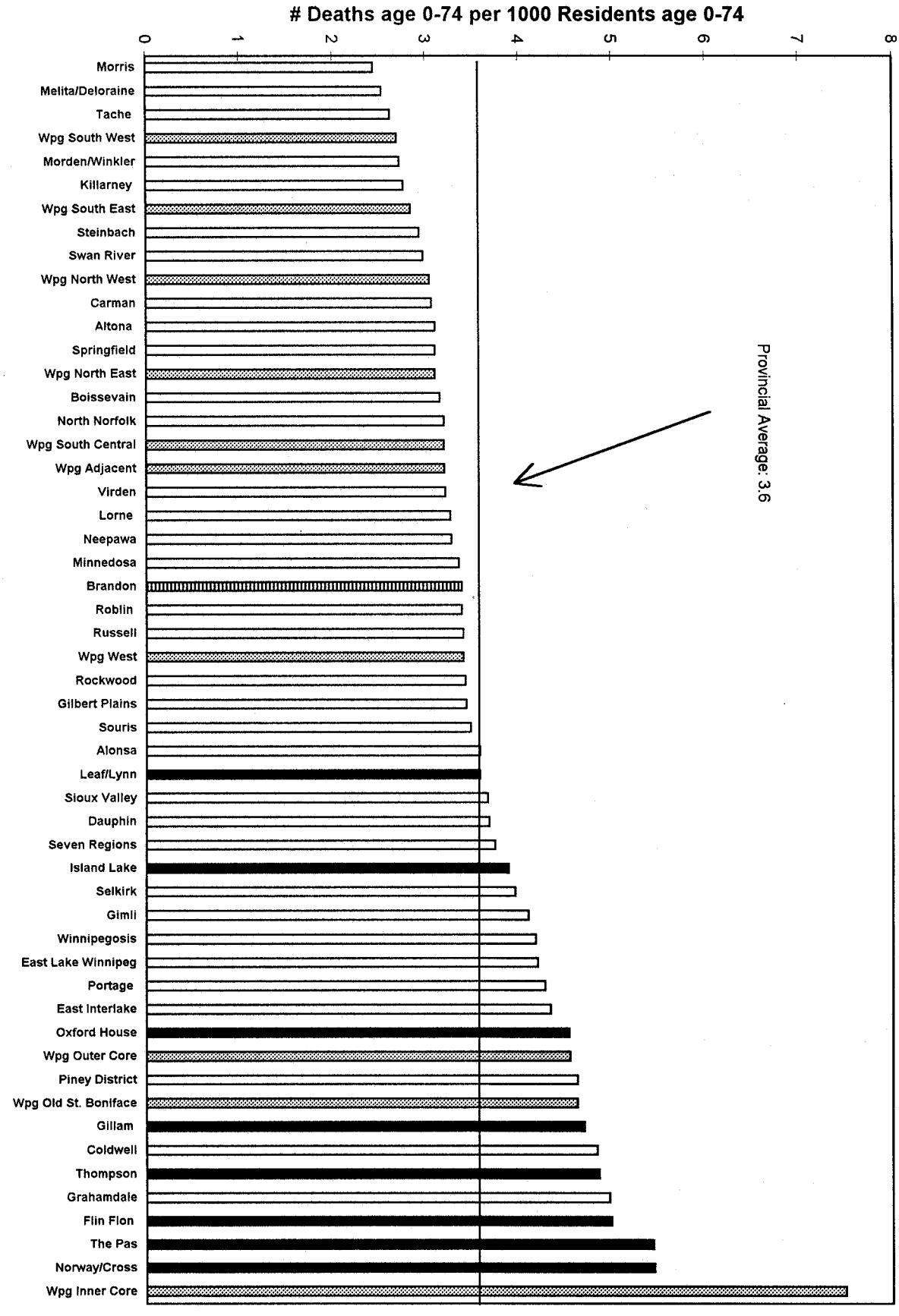
In order to incorporate age, gender and SERI into our estimate of need for physician visits, we performed a regression analysis on actual 1993/94 visit rates using each area's SERI score and age/gender population structure. This provided our first estimate of need for physician contact for each area.

Adjusting for Health Status

The regression analysis described above provides estimates of physician need based on existing patterns of physician service delivery - but these patterns may not be optimal. Our research and that of others has shown that often those who need care most do not get enough - even though the poor have poorer health, they receive fewer preventive services and are less likely to receive the recommended number of prenatal care visits (Mustard and Roos, 1994). The premature mortality rate in Winnipeg's Inner Core is 2.8 times higher and hospitalization rates are 55% higher than for residents of more affluent sections of the city yet Core area residents use only 31% more contacts with physicians, suggesting a low contact rate relative to their poor health status.

Therefore, we adjusted our first estimates of need for physician contact using the premature mortality rates for each area. The mortality rate for individuals aged 0-74 has been suggested as the best single indicator of health status capturing the need for health care (Carstairs and Morris 1991; Eyles et al. 1993). It is currently used in the British formula for allocation of funds from the Department of Health to regional health authorities. It has been shown to be strongly associated to most of the self reported variables and physical measures in the Health and Lifestyle Survey, including self-assessed health, number of symptoms, self reported rheumatism and temporary sickness (Mays et al., 1992).

As can be seen in Figure 8 there is a marked range in this indicator across the province with Morris, Melita/Deloraine, Tache and Winnipeg South West at the far left showing low premature mortality rates - reflecting the good health status of their area residents, and Flin Flon, The Pas,



Note: Black bars represent northern areas, grey bars urban areas, and white bars southern Manitoba.

Figure 8: Premature Mortality Rates

Norway House/Cross Lake, and Winnipeg Inner Core at the far right reflecting their residents' poor health status. Note the strikingly high premature mortality rate for residents of Winnipeg's Inner Core.[18]

To generate our final estimate of each area's need for physician visits, an adjustment was made to our first estimates to account for differences in premature mortality. Areas with residents in poorer health (premature mortality rate above the provincial average of 3.6 deaths per 1000 residents aged 0-74) had their need for physician visits increased, and those whose residents appeared to be healthier than average had their need values decreased. The adjustment ranged from an increase of 38% for residents of Winnipeg Inner Core to a decrease of 17% for residents of Winnipeg South West (See Appendix Figure A1 and Appendix Table A1). See also the Methods Appendix for further explanation and examples.

Therefore, our final estimate of each area's need for physicians accounts for age, gender, socio-economic status and health status, and is expressed as the average number of visits needed per resident per year. There is a remarkable range in these values (Figure 9), from 2.5 visits per year for residents of Winnipeg South West (an affluent area whose residents are very healthy and which is home to relatively few young children and elderly) to 8.9 visits per year for residents of Norway House/Cross Lake, (an area where residents are at high socio-economic risk, in poor health, and where children under age 3 comprise almost 10% of the population). Appendix Table A3 lists each area's premature mortality rate, the percent of the population under 3 years old, the percent 75 years or older, and score on the Socio-Economic Risk Index.

How many physicians are needed in Manitoba? Where are they needed? Which areas have too few physicians, which too many?

Having estimated each area's relative need for contact with physicians, we proceeded to compare the needed rates to the actual physician contact rates for residents of each area.

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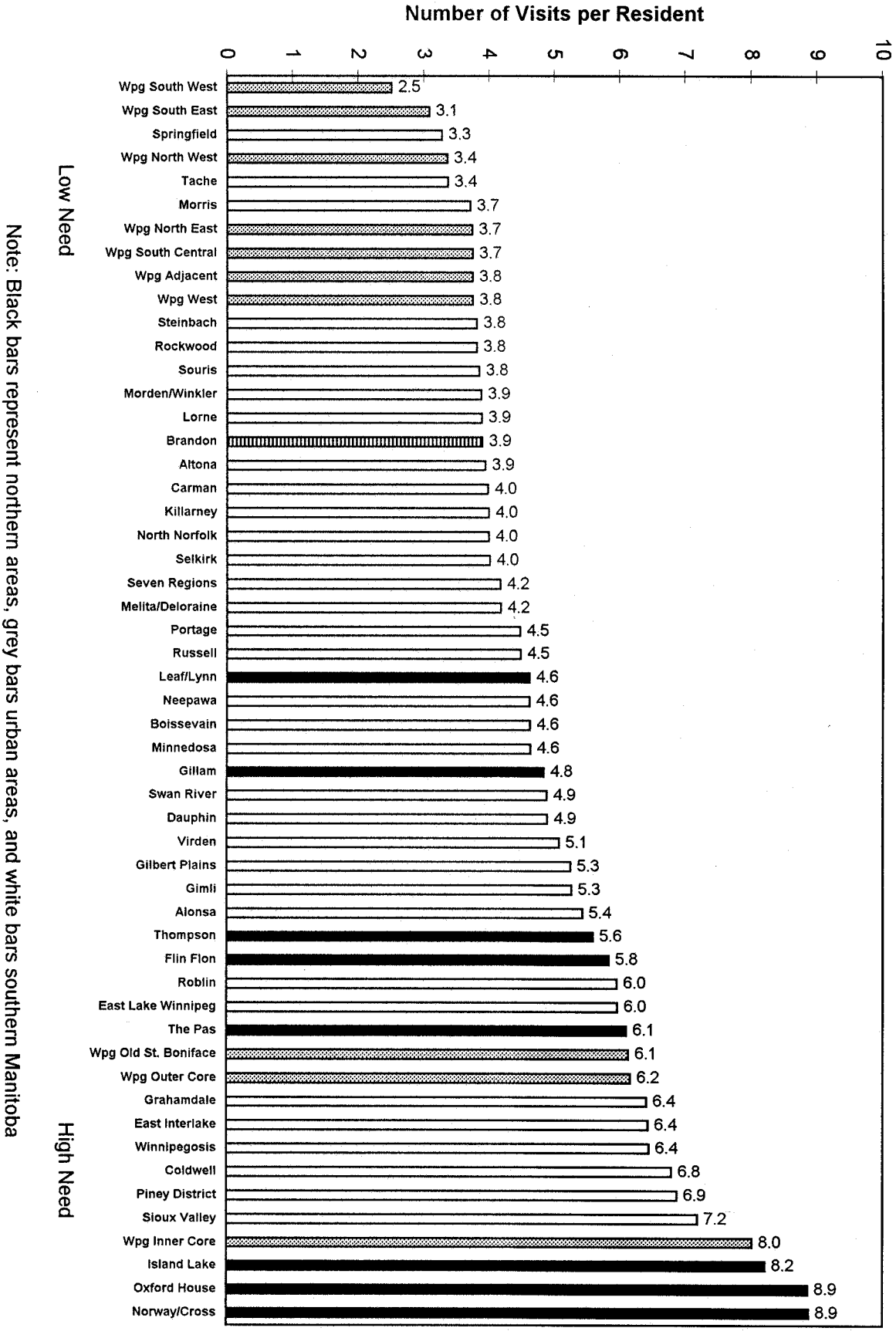
[18] One might be concerned that the premature mortality rate in this area, if it reflected the result of accidents and injuries which were lifestyle related, might not be a good indicator of health status reflecting the need for physician services. We have recently shown that residents of Northern areas with high mortality rates indeed have high mortality rates from injury-related deaths (Frohlich et al, 1994). However, residents of these regions also have the highest rates of death from chronic diseases (Frohlich et al., 1994), and the highest rates of hospitalization for diabetes, hypertension, and pneumonia (Cohen and MacWilliam, 1994). Residents of these regions also have the highest death and hospitalization rates for a series of medical conditions for which medical treatment is believed to be effective in either preventing the condition, finding and treating the condition early to prevent serious consequences, or treating the condition in a late phase, avoiding death or disability. These include such things as hospitalization for diabetic ketoacidosis, many immunizable conditions, and asthma (Cohen and MacWilliam, 1994).



Note: Black bars represent northern areas, grey bars urban areas, and white bars southern Manitoba

Figure 9: Best Estimate of Areas' Need for Physician Visits

Comparing Actual Visit Rates to "Needed" Visits

Figure 10 compares the actual[19] and needed visit rates for 1993/94 across the 54 physician service areas of the province.[20] Visits are included in the "actual" visit count regardless of whether they took place within or outside the physician service area. That is, if a Thompson resident visits a physician in Winnipeg, it is counted as a visit provided to a Thompson resident. The areas are arranged in order of need for visits; with areas on the far right being the areas with highest need for physicians.

As can be seen, there is a marked variation across the areas in how closely their use patterns[21] reflect area residents' needs. All Winnipeg areas, except the Core areas and old St. Boniface, are receiving more physician visits than would be required based on our estimate of population need. Residents of Brandon are also provided more contacts than would be suggested by their need characteristics. Areas bordering on Winnipeg (Selkirk, Rockwood, Springfield, Tache and Morris) and Brandon (Killarney, North Norfolk, Souris and Neepawa) also have higher rates of contact with physicians than would be suggested by their needs. At the other end, many of the small Northern areas (Island Lake, Oxford House and Norway House/Cross Lake), as well as Thompson, The Pas and Flin Flon receive fewer contacts than would be expected given their need profiles.[22] There are also several rural Southern areas which have much higher needs for

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[19] Actual visit rates are crude values obtained directly from the database. In other places, "adjusted" rates are used to remove the influence of age and gender characteristics, thereby allowing valid comparisons among areas.

[20] Status Indians make up a significant proportion of the population of many of the highest need physician service areas. To determine if data aggregated over the entire area accurately represented the physician contact patterns of both Status Indians and other residents, we separately analyzed the visit data for each area with 10% or more Status Indian residents. In most areas, the physician contact rate of Status Indian residents was higher than that for other residents. Exceptions were found in East Interlake and Sioux Valley, where contact rates were almost identical, and in The Pas and Thompson, where contact rates of Status Indians were lower than that of other residents. In Thompson, the difference was substantial: 3.6 visits per year for Status Indians versus 4.7 visits for other residents. This probably reflects access problems, as many Status Indians live in remote communities which do not have resident physicians. Thompson City residents were also at much lower socio-economic risk than residents of the surrounding communities.

[21] We performed analyses to determine the stability of physician contact rates from year to year (see Appendix I). Replications of key analyses using 1994/95 data also revealed similar findings, supporting the robustness of the analysis.

[22] The visit rates of some areas are so low as to question their accuracy. Island Lake does not have a resident physician, so many patients have to travel out of area for care (though the Northern Medical Unit provides fly-in service to the area). See Appendices I and III for further discussion of salaried physicians.

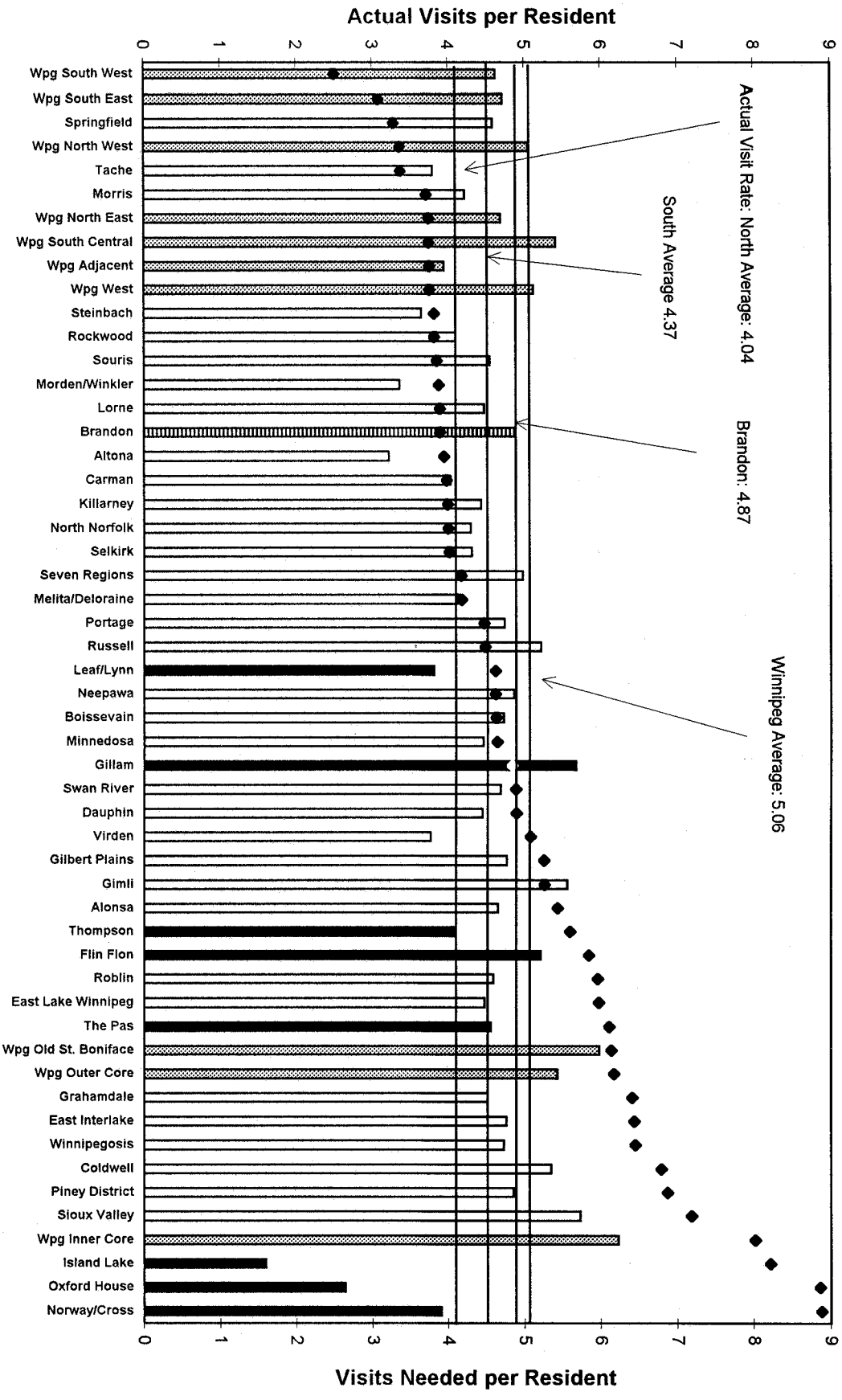

Figure 10: Actual Visit Rates Compared with Needed Visit Rates
(Ranked by Needed Visit Rate)

Low Need — High Need

□Actual Visits ◆Visits Needed

Note: Black bars represent northern areas, grey bars urban areas and white bars southern Manitoba.

physician services than are currently being met, including Grahamdale, Piney District, East Lake Winnipeg, Virden, Roblin, Coldwell, Sioux Valley, Altona, and Alonsa.[23]

Estimating Deficits/Surpluses of Physician Visits

The total number of surplus or deficit physician visits for each area was determined by subtracting the needed visit rate from the actual visit rate, and multiplying the difference by the population of the area. Figure 11 plots the visit surplus/deficit for each area. As can be seen, the biggest surpluses (and deficits) are in the province's largest cities, with Brandon, six of the Winnipeg areas and neighbouring Springfield showing large surpluses of physician visits, and the two Core areas of Winnipeg as well as Thompson, The Pas, and the highest need Northern areas of the province (Island Lake, Oxford House and Norway House/Cross Lake) showing big deficits. To express these visit surplus/deficit values in terms of the number of generalist physicians required to provide that number of visits, we divided the visit surplus/deficit by the workload for that region (described below).

Workloads of Generalist Physicians

Table 4 shows our estimates of physician workloads (the number of ambulatory visits provided per year) by generalist physicians[24] in the four main regions of the province: North, South, Brandon, and Winnipeg. In calculating visit workloads, hospital visits were excluded, to be consistent with their exclusion in calculating visit deficits and surpluses.[25]

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[23] Several of these areas are on the U.S. or Saskatchewan border, and some Manitoba residents receive care from physicians in those jurisdictions. However, many of those physicians have Manitoba Health billing numbers, so those visits are included in the database, and our analyses should not significantly underestimate physician contact by residents of these areas.

[24] For the purpose of calculating workloads, all general practitioners in rural Manitoba were identified as generalist physicians, even though some of them also function as general surgeons.

[25] Hospital contact was excluded because these analyses focus on needs based planning for the generalist physician needs of Manitoba, not on the need for specialists (who provide a substantial number of in-patient visits, especially in Winnipeg and Brandon). This exclusion affects the workloads of physicians reasonably similarly across the province. On a per capita basis, Winnipeg and Brandon residents receive 4% fewer inpatient visits per capita than do residents of the North and rural South.

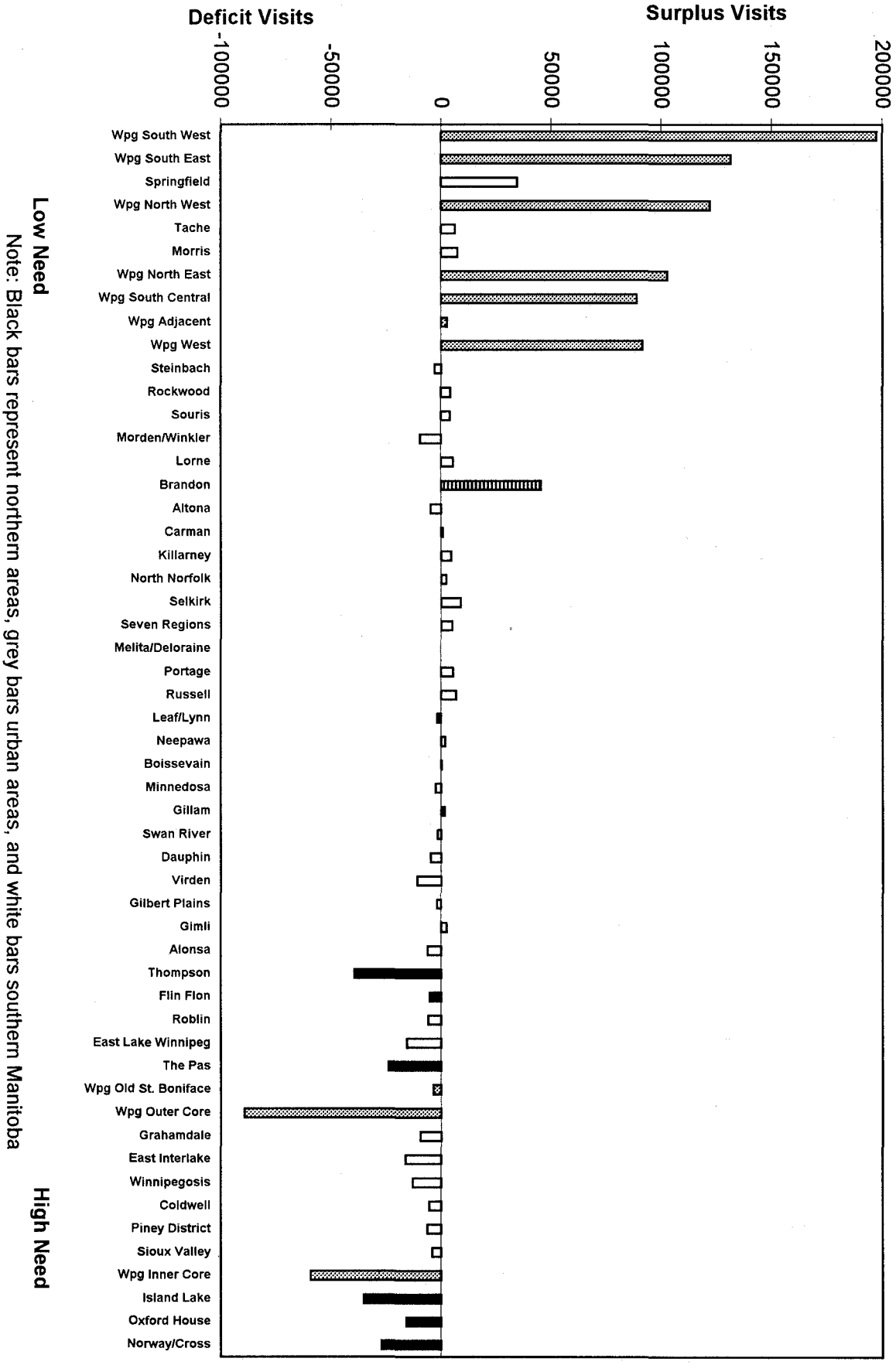

Figure 11: Surplus or Deficit of Physician Visits
(Ranked by Needed Visit Rate)

Note: Black bars represent northern areas, grey bars urban areas, and white bars southern Manitoba

Table 4: Workloads of Generalist Physicians*

(average ambulatory visits/year - includes consults, office, home and emergency room)

	Winnipeg	Brandon	South	North
General Practitioner	5799	4707	4675	3504
General Internist	3043			
General Paediatrician	5901			
Figure Used for Calculating Physician Deficit/Surplus	5696	4707	4675	3504

* Includes only those earning between the 40th and 60th percentile (FTE = 1.0), and excludes subspecialist physicians (see the Methods Appendix).

We estimated workload figures by examining the practices of physicians earning between the 40th and 60th percentile of earnings as suggested by the Health Canada FTE methodology (that is, all 1.0 FTE physicians). Thus we estimate that a physician added to the North will provide an average of 3504[26] visits per year. We developed the Winnipeg average visit workload by taking a weighted average of the general/family practitioner, general internist and general paediatrician workloads.

[26] Because there are relatively few physicians practicing in the North, this number may be unstable. We found the average workload of Northern physicians was higher in the years before and after 1993/94 (in 1994/95, it was 21% higher). Thus our analyses based on the 1993/94 workload may over-estimate Northern physician deficits.

A physician who has worked in the North commented on the differential visit workload of Northern physicians: "I note that the estimated number of visits for the North is 3504. This low number relative to the other areas of the province might be because of the need to travel, weather, and the function of the family practitioner which is more of a consultant than a primary care giver".

The executive director of a rural hospital offered this description of the very broad caseload of a rural physician: "Rural physicians provide obstetrics, anaesthetic, emergency medicine, surgery, chemotherapy and outreach dialysis support. In addition, they provide home visits and community call to both acute care and long term care facilities. This contrasts markedly with how generalist physician care is provided within Winnipeg and Brandon."

Surplus / Deficit of Physicians

The surplus/deficit of generalist physicians for each area was calculated as the visit surplus/deficit divided by the workload value for that region. Overall, we identify a surplus of 64 to 98 generalist physicians in the province (depending on how nursing contacts are incorporated). Winnipeg has a surplus of 102 to 124, Brandon a surplus of 10, the rural South a deficit of 4 to 6, and the North a deficit of 32 to 43.

Table 5 identifies all areas according to need for physicians and surplus/deficit of visits relative to need. The left column contains the highest need areas (including Roblin and Old St. Boniface), the middle column contains the moderate need areas (including Leaf/Lynn, Neepawa and Killarney), and the right column contains the lowest need areas (including Altona, Steinbach, and several Winnipeg areas). Areas in the middle row (including Old St. Boniface, Neepawa, and Steinbach) have physician contact rates within 5% of our estimate of their need for physician services. Areas in the top row (Roblin, Leaf/Lynn, Altona, etc.) have lower visit rates than needed, and areas in the bottom row (Killarney, Winnipeg South West, etc.) have higher than needed visit rates.

Table 5: Surplus or Deficit of Physicians According to Need

	Need for Physicians*		
	High	**Middle**	**Low**
Low Use Relative to Need Visit Deficit	Roblin 1.3 Alonsa 1.4 East Lake Wpg** 1.9 - 3.4 Thompson** 5.5 - 11.3 The Pas 7.0 Flin Flon 1.6 Grahamdale 2.1 East Interlake 3.5 Winnipegosis 2.8 Coldwell 1.2 Piney District 1.4 Sioux Valley 0.9 Wpg Inner Core 10.5 Wpg Outer Core 15.7 Island Lake** 7.4 - 10.1 Oxford House** 2.9 - 4.6 Norway/Cross** 6.6 - 7.8	Leaf/Lynn 0.6 Virden 2.4 Dauphin 1.1 Gilbert Plains 0.5	Altona 1.1 Morden/Winkler 2.1
Use Within 5% of Need	Wpg Old St. B. 0.7	Melita/Deloraine 0 Neepawa (0.4) Boissevain 0 Minnedosa 0.6 Swan River 0.4 Gimli (0.5)	Wpg Adjacent (0.5) Steinbach 0.7 Carman (0.1)
High Use Relative to Need Visit Surplus		Killarney (1.0) Selkirk (1.9) Seven Regions (1.0) Russell (1.4) Gillam (0.4) Portage (1.2) North Norfolk (0.5)	Wpg. South W (34.7) Wpg. South E (23.1) Springfield (7.4) Wpg. North W (21.4) Tache (1.4) Morris (1.6) Wpg North E (18.1) Wpg South C (15.6) Wpg West (16.0) Rockwood (0.9) Souris (0.9) Lorne (1.1) Brandon (9.6)

Values indicate deficit (surplus) physicians serving area residents.

* High need includes those areas with an expected need for 5.4 or more annual visits per resident, middle need between 4.0 and 5.3 visits and low need 3.9 visits or less.

** Indicate areas where First Nations population discrepancies and substantial nursing contacts affect physician deficit estimates. See Table 6 and Table 7.

As can be seen in Table 5, all high need areas are under-served relative to need, and should be considered the "hot spots" in terms of priorities for needs-based planning for physicians. This includes The Pas which we have identified as needing 7 additional physicians as well as Roblin, Alonsa, East Interlake and others. Conversely, those areas in the lower right corner, including most areas of Winnipeg, Springfield, Tache, Morris, Brandon, etc., need fewer physicians than are currently providing services to area residents. Areas where a range of values is given (such as East Lake Winnipeg and Thompson) are areas where nursing station contacts and alternative population estimates affect our analysis, as discussed below. Thus one might conclude that past policies have led to a surplus of physicians in areas with basically healthy populations, and a deficit in areas with high needs for health care.

A physician commented: "I do not believe there were any policies, but rather, the situation existed where the doctor went to an area that he/she was comfortable, and could make a living practising medicine, and which, unfortunately, was most often Winnipeg".

Review of Other Factors Affecting Estimates of Physician Surplus/Deficit

Several other aspects of physician service areas and their residents will be important in assessing an area's need for physicians. Those which we have identified and discuss below include: where visits are obtained, the availability of other primary care resources such as nursing stations, and how many physicians are near retirement age.

Where are Visits Obtained?

The data on in-area supply (Figure 5) confirmed that physicians are not distributed equally across the province. Our measure of physician surpluses/deficits does not consider where residents get their services, only that visits were received. Figure 12 shows the percent of physician visits obtained in-area.[27] Some of the areas which we judge to have a surplus of visits relative to their need obtain a significant proportion of their visits from physicians outside their region of residence. This includes Springfield, Morris and Tache which border on Winnipeg and whose

[27] The results in Figure 12 are somewhat different from those presented in Table 2 for two reasons: Figure 12 shows 1993/94 data only, whereas Table 2 was based on fiscal years 1990/91 through 1992/93, and Figure 12 includes ambulatory visits to all physicians (except technical specialists), while Table 2 assessed visits to general practitioners and family practitioners only.

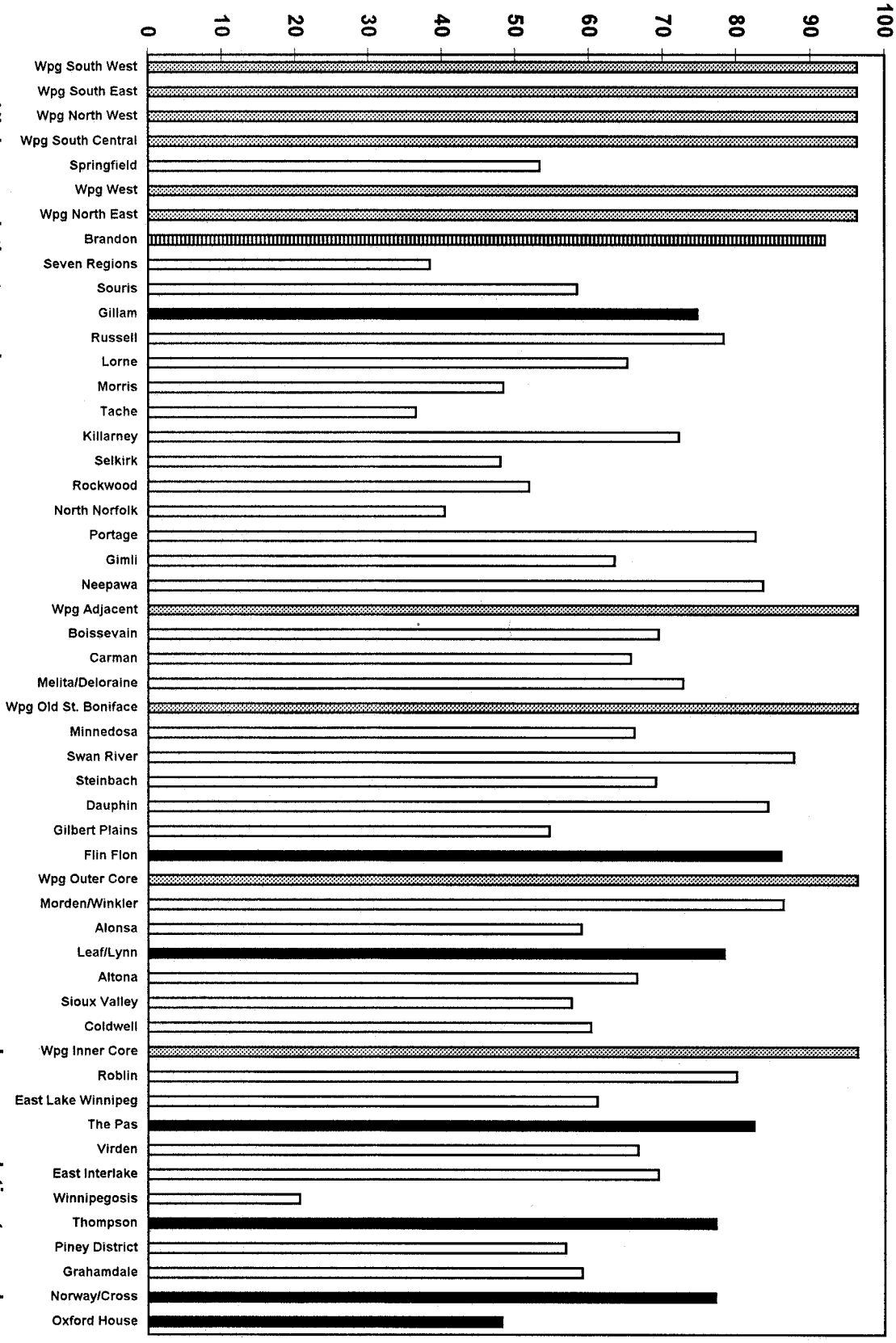

Figure 12: Percent of Visits Obtained In-Area
(Sorted by Ratio of Use to Need for Physicians)

Note: Black bars represent northern areas, grey bars urban areas, and white bars southern Manitoba.

Note: All Winnipeg areas were assigned the same % In-Area value, as patients travel throughout the city for care.

residents receive a large proportion of their visits from Winnipeg physicians, and Seven Regions, whose residents receive many of their services from Portage physicians. Several areas identified as over-served may in fact have relatively few physicians in-area; this may or may not represent a problem. Some residents choose to see physicians in other areas (closer to their workplace, for instance).

Many of the under-served areas are not just disadvantaged by low contact rates, they are also disadvantaged from the perspective of having few physician services available in-area. The small Northern areas of Oxford House and Island Lake have no resident physicians, hence all their care is received from physicians who travel to the area, or by residents travelling out. Norway House / Cross Lake areas, as well as a few relatively remote, under-served southern areas including Piney, Grahamdale, East Interlake and Winnipegosis, also receive few of their contacts from in-area physicians.

Availability of other Primary Care Resources

Many of the areas identified in Figure 10 as having a high need for physician visits but a low contact rate include isolated communities of First Nations residents, much of whose care is provided by nurses at nursing stations. It is therefore important to understand that these communities are not without care. Public health nurses and nurses at community health centres also provide services (such as immunization) which, in some areas, are delivered by physicians. Preliminary data indicate that Winnipeg residents, particularly core area residents, are the major recipients of public health nursing visits.

Table 6 identifies those areas which have large Status Indian populations.[28] Along with the base population estimate derived from the Manitoba Health population registry (Population Estimate I) we also used data supplied by the Federal Department of Indian and Northern Affairs (Population Estimate II), as it is thought that Manitoba Health underestimates the number of status residents in these areas. As the table shows, the population estimates for these areas using the federal data are 10 to 32% larger than those from Manitoba Health (note: these differences do not affect the total population of the province; only the distribution among our 54 areas).

[28] There were other areas for which population data were different, but their impact on the analysis was insignificant: Grahamdale, Seven Regions, East Interlake, The Pas, Russell, Winnipegosis, Sioux Valley, Coldwell, Roblin, Morris, Portage, Alonsa, Lorne, Minnedosa, Virden, Selkirk, and Piney District.

Table 6: Alternative Population Estimates for Areas with Large Aboriginal Populations

Area	Population Estimate I	Population Estimate II	Percent Difference
Thompson	26,138	28,820	10%
Norway/Cross	5,517	6,439	17%
Oxford House	2,609	3,198	23%
Island Lake	5,356	7,046	32%
East Lake Winnipeg	10,702	13,869	30%

Population Estimate I is based on the Manitoba Health population registry.
Population Estimate II is based on data supplied by Indian and Northern Affairs Canada.

Table 7 illustrates how these different population figures affect our estimate of the size of the physician deficits in these areas. For example, using Manitoba population data (Estimate I), we estimate that the Island Lake area needs 10.1 more physicians, while federal data (Estimate II) suggests a deficit of 13.3 physicians. Table 7 also shows the number of nursing station contacts for each area reported by the federal Medical Services Branch. If we assume that 50% of these contacts provide primary care which substitute[29] for care typically delivered by physicians, the physician deficit for Island Lake falls from 13.3 to 7.4 physicians.[30] (50% is an arbitrary number we use for purposes of illustration, 25% or 75% may be more appropriate).

[29] We do not suggest that physicians should replace the care currently delivered by nurses.

[30] The data on contacts occurring at nursing stations represent best estimates based on 1994 data from the Medical Services Branch. We have not worked with these data previously and we can't assess their accuracy; they may contain some contacts from out of area residents. We also assume that a contact approximates a primary care visit.

Table 7: Modifying Physician Deficits To Account for Different Population Estimates and Nursing Contacts

	Using Pop Est I		Using Pop Est II		Using Nursing Stations*		
	Visit Deficit	MD Deficit	Visit Deficit	MD Deficit	Nursing Contacts	Visit Deficit	MD Deficit
Thompson	39,730	11.3	43,806	12.5	48,861	19,376	5.5
Norway/Cross	27,474	7.8	32,066	9.2	17,578	23,277	6.6
Oxford House	16,228	4.6	19,892	5.7	19,529	10,128	2.9
Island Lake	35,403	10.1	46,574	13.3	41,286	25,931	7.4
East Lake Wpg.	16,053	3.4	20,804	4.4	23,660	8,974	1.9

Visit deficits were calculated as : (Actual Visit Rate - Needed Visit Rate)* Population

Physician deficits were calculated by dividing the visit deficits by the physician workload for the region (3504 visits in Northern areas, 4675 visits for East Lake Wpg).

* For the analysis including Nursing Station Contacts, the visit deficits from population estimate II were reduced by 50% of the number of nursing contacts

Using the same algorithm for public health nursing contacts in Winnipeg's Core areas (approximately 240,000 contacts per year) would reduce the combined core areas' physician deficit from 26.2 to 5.1 FTEs.

Physicians Near Retirement

One important characteristic of physician supply not captured by our contact measures is the proportion of physicians serving an area who are of retirement age. Areas more dependent on older physicians may have a greater need to recruit new physicians. In estimating the proportion of physicians who are of retirement age we use the full-time equivalent measure which allows us to more accurately estimate the effect which retirements will have on the delivery of medical care. That is, for older physicians only practising one morning a week, retirement will have much less effect on the area than those practising full time. For the four major regions of the province, the percentage of FTE physicians who were 65 years or older in 1993/94 varied as follows: 7.2% in Winnipeg, 2.4% in Brandon, 4.3% in the rural South and 0.5% in the North. Across the 54 physician service areas, Souris, East Lake Winnipeg and Killarney were the areas most

dependent on older physicians (20% or more). In all other areas, less than 10% of the physician supply was over age 65.

Also relevant is the large proportion of physicians in the province who are less than 45 years of age (41% - see Table A5). Typically physicians' most productive years are from age 45-54, so we might expect higher physician output over the next several years even without increases in the number of physicians.

Where are the Deficits? Where are the Surpluses?

Table 8 lists the physician surplus or deficit for each area along with information on several other relevant factors including the area's relative need for physicians (low need indicating a healthy area with relatively few elderly or very young), the percent of care received in-area (areas with a low percentage of visits provided in-area may have a stronger case for additional physicians than those with a higher percent in-area), whether the area has a significant proportion of physicians approaching retirement age, and whether a nursing station is located in the area.

Almost all areas in the North have substantial physician deficits, including those served by nursing stations. In total, we estimate that an additional 32-43 physicians are required to overcome the deficits in the North.[31]

In the South, Springfield stands out with a relatively large surplus of 7.4 physicians. However, caution must be exercised in interpreting this result: a substantial proportion (53%) of their visits are provided by Winnipeg physicians, hence half of the surplus physicians are likely located in Winnipeg. Selkirk, Rockwood, Morris and Tache also appear slightly over-served, though their residents too obtain a large proportion of their care out of area. While these areas may want to add physicians to ensure residents can obtain care closer to home, use patterns should be monitored to ensure that additions in rural areas do not result in increased surpluses in Winnipeg or Brandon (if care is successfully repatriated), or in marked over-servicing where physicians are added (if many patients still receive services out of area).

[31] The estimates of physician deficits in the North are affected by alternative population numbers from Indian and Northern Affairs and by incorporating visits to nursing stations. See Tables 6 and 7 for a further discussion of these data and their impact on our analyses.

Table 8: Size of Physician Deficit/Surplus in Each Area

			Pertinent Characteristics of Area			
	Deficit* (physicians)	**Surplus*** (physicians)	Need for Physicians	Nursing Stations	Percent Visits In-Area	20% or more of Physicians near Retirement
North	**31.6-43.0**	**0.4**				
Leaf/Lynn	0.6	-	moderate		78	
Gillam	-	0.4	moderate		75	
Thompson**	5.5-11.3	-	high	yes	77	
Flin Flon	1.6	-	high		86	
The Pas	7.0	-	high		82	
Island Lake**	7.4-10.1	-	high	yes	40	
Oxford House**	2.9-4.6	-	high	yes	48	
Norway/Cross**	6.6-7.8	-	high	yes	77	
South	**25.4-26.9**	**21.3**				
Springfield	-	7.4	low		53	
Tache	-	1.4	low		36	
Morris	-	1.6	low		48	
Steinbach	0.7	-	low		69	
Rockwood	-	0.9	low		52	
Souris	-	0.9	low		58	yes
Morden/Winkler	2.1	-	low		86	
Lorne	-	1.1	low		65	
Altona	1.1	-	low		66	
Carman	-	0.1	low		66	
Killarney	-	1.0	moderate		72	yes
North Norfolk	-	0.5	moderate		40	
Selkirk	-	1.9	moderate		48	
Seven Regions	-	1.0	moderate		38	
Melita/Deloraine	-	-	moderate		73	
Portage	-	1.2	moderate		83	
Russell	-	1.4	moderate		78	
Neepawa	-	0.4	moderate		84	
Boissevain	-	-	moderate		69	
Minnedosa	0.6	-	moderate		66	
Swan River	0.4	-	moderate		88	
Dauphin	1.1	-	moderate		84	
Virden	2.4	-	moderate		67	
Gilbert Plains	0.5	-	moderate		55	
Gimli	-	0.5	moderate		63	

			Pertinent Characteristics of Area			
	Deficit* (number)	**Surplus*** (number)	Need for Physicians	Nursing Stations	Percent Visits In-Area	20% or more of Physicians near Retirement
Alonsa	1.4	-	high		59	
Roblin	1.3	-	high		80	
East Lake Wpg.**	1.9-3.4	-	high	yes	61	yes
Grahamdale	2.1	-	high		59	
East Interlake	3.5	-	high		69	
Winnipegosis	2.8	-	high		21	
Coldwell	1.2	-	high		60	
Piney	1.4	-	high		57	
Sioux Valley	0.9	-	high		58	
Brandon	**-**	**9.6**	**low**		**92**	
Winnipeg	**5.8-26.9**	**129.4**			**96**	
South West	-	34.7	low		96	
South East	-	23.1	low		96	
North West	-	21.4	low		96	
North East	-	18.1	low		96	
South Central	-	15.6	low		96	
Adjacent	-	0.5	low		96	
West	-	16.0	low		96	
Old St. Boniface	0.7	-	high		96	
Outer Core	15.7	-	high	yes	96	
Inner Core	10.5	-	high	yes	96	
Manitoba	**62.8-96.8**	**160.7**				
Total Manitoba Surplus		**64-98**				

* Note: The number of physicians "deficit" or "surplus" was calculated by comparing the actual visit rate with the final estimate of visits needed by area residents (based on age, gender, socioeconomic characteristics and premature mortality). The difference was multiplied by the population of the area to get the deficit or surplus of physician visits, which was then divided by the average workload of physicians that serve the area to arrive at the number of surplus/deficit physicians.

** Note: See Table 7 for derivation of estimates of physician deficits using alternative estimates of the aboriginal populations and accounting for contacts with nursing stations.

All of the high need areas in the rural South, as well as some of the moderate need areas, show small physician deficits: for most areas, one or two physicians are all that is required. Virden and Winnipegosis need three, and East Lake Winnipeg and East Interlake both need four. Note, however, that a few of the healthy, low need areas in Southern rural Manitoba also show small deficits of 1-2 physicians, including Steinbach, Morden/Winkler and Altona. Overall, we estimate that 26-27 physicians added to the rural South would overcome the physician deficits in all areas.

The greatest surpluses are seen in Winnipeg and Brandon. Most areas of Winnipeg have surpluses, totalling 129 physicians, while the Core areas have a deficit of approximately 5-26 physicians, resulting in a net surplus of 103-124 physicians in Winnipeg. (The higher surplus estimate acknowledges the significant amount of primary care delivered by public health nurses to Core area residents.) Brandon shows a surplus of 10 physicians.

Since generalist physicians deliver the greatest proportion of ambulatory visits, we have built our analysis of deficits and surpluses around their practice characteristics and it is appropriate to assume that general practitioners, general internists and general paediatricians are the physicians contributing to the surplus or needed to meet the deficits identified. This is something of an oversimplification since other specialists including psychiatrists, obstetricians and medical subspecialists such as cardiologists, neurologists and dermatologists also deliver much more of their care to Winnipeg and Brandon residents than they do to residents of the rural South and North (Figure 7). They also contribute to the surpluses and deficits identified. Based on the analyses to date we can only state that specialists' care patterns also contribute to the surplus of care provided to Winnipeg/Brandon residents and to the deficit of care experienced by rural residents.

How Many Generalist Physicians are Needed to Provide Services to Area Residents?

While our analyses to this point have focused on whether there is a relative deficit or surplus of physicians serving each area, we have also been asked to state the net number of physicians needed in each physician service area. Table 9 organizes the data needed to answer this question. The first column identifies the total number of physician visits (all ambulatory visits to all physicians) needed by area residents, obtained by multiplying the number of visits needed per person by the population of the area. The second column lists the percentage of area residents' 1993/94 ambulatory visits which were provided by generalist physicians. (Generalists provided

Table 9: Estimated Number of Generalists (Gen.) Needed in each Area*

AREA	Total Visits Needed for Area Residents	% of Visits to Gen.	# Gen. Visits Needed for Area Residents	Workload of Regional Gen.	# Gen. Needed for 100% In-Area	Add for Gen.** serving Out-of-Area residents	Subtract for residents seen Out-of-Area**	Final # Gen. Needed for Area*
			(A*B)		(C/D)			(E+F-G)
	A	B	C	D	E	F	G	H
North	**434,953**	**94**	**405,048**	**3504**	**115.6**	**19.3**	**13.4**	**121.5**
Leaf/Lynn	11,867	95	11,302	3504	3.2	0.6	0.4	3.4
Gillam	8,403	93	7,789	3504	2.2	0.3	0.4	2.1
Thompson	146,184	95	138,266	3504	39.5	3.8	5.1	38.2
Flin Flon ***	50,917	96	48,987	3504	14.0	10.2	1.2	23***
The Pas	95,544	96	92,103	3504	26.3	2.3	2.9	25.7
Island Lake	43,998	78	34,179	3504	9.8	0.1	1.0	8.9
Oxford House	23,123	90	20,922	3504	6.0	0.1	1.2	4.9
Norway/Cross	48,996	95	46,383	3504	13.2	1.8	1.1	14.0
South	**1,583,252**	**89**	**1,416,445**	**4675**	**303.0**	**55.6**	**89.7**	**268.9**
Springfield	87,094	87	75,679	4675	16.2	1.9	8.6	9.5
Tache	50,822	87	44,096	4675	9.4	2.4	6.2	5.6
Morris	55,174	88	48,612	4675	10.4	1.6	5.1	6.8
Steinbach	73,045	89	64,839	4675	13.9	3.8	3.1	14.5
Rockwood	56,838	85	48,411	4675	10.4	1.6	4.6	7.3
Souris	22,491	90	20,293	4675	4.3	1.0	1.7	3.6
Morden/Winkler	73,611	92	67,625	4675	14.5	2.9	0.9	16.6
Lorne	35,567	92	32,732	4675	7.0	1.0	2.4	5.6
Altona	27,555	90	24,879	4675	5.3	0.7	1.3	4.7
Carman	52,374	87	45,629	4675	9.8	2.3	2.6	9.5
Killarney	41,754	91	37,884	4675	8.1	0.9	1.7	7.3
North Norfolk	30,375	90	27,347	4675	5.8	0.3	3.4	2.7
Selkirk	118,029	82	96,587	4675	20.7	2.3	9.7	13.3
Seven Regions	24,836	93	23,198	4675	5.0	0.7	3.4	2.3
Melita/Deloraine	24,447	89	21,763	4675	4.7	0.7	0.7	4.6
Portage	91,853	90	82,593	4675	17.7	6.2	1.8	22.0
Russell	41,060	93	38,387	4675	8.2	1.1	1.4	7.9
Neepawa	31,694	93	29,482	4675	6.3	2.7	0.6	8.4
Boissevain	11,010	90	9,911	4675	2.1	0.6	0.4	2.3
Minnedosa	70,562	90	63,421	4675	13.6	1.1	3.2	11.5
Swan River	47,319	96	45,321	4675	9.7	4.2	0.5	13.3
Dauphin	54,983	91	50,023	4675	10.7	4.9	1.3	14.3
Virden	43,377	84	36,290	4675	7.8	0.9	1.7	7.0

AREA	Total Visits Needed for Area Residents	% of Visits to Gen.	# Gen. Visits Needed for Area Residents	Workload of Regional Gen.	# Gen. Needed for 100% In-Area	Add for Gen.** serving Out-of-Area residents	Subtract for residents seen Out-of-Area**	Final # Gen. Needed for Area*
			(A*B)		(C/D)			(E+F-G)
	A	B	C	D	E	F	G	H
Gilbert Plains	23,766	93	22,015	4675	4.7	0.3	1.6	3.5
Gimli	42,347	90	38,059	4675	8.1	2.1	2.5	7.7
Alonsa	44,095	93	40,973	4675	8.8	1.2	2.7	7.2
Roblin	26,558	94	24,964	4675	5.3	0.8	0.6	5.6
East Lake Wpg	63,867	89	56,868	4675	12.2	1.1	2.7	10.6
Grahamdale	33,417	91	30,531	4675	6.5	0.7	1.5	5.7
East Interlake	62,794	90	56,715	4675	12.1	1.2	2.0	11.3
Winnipegosis	49,431	95	46,971	4675	10.0	0.2	5.9	4.4
Coldwell	27,284	90	24,653	4675	5.3	0.9	1.3	4.9
Piney District	22,448	90	20,225	4675	4.3	0.5	1.3	3.5
Sioux Valley	21,370	91	19,469	4675	4.2	0.6	1.1	3.6
Brandon	**180,171**	**83**	**149,147**	**4707**	**31.7**	**10.2**	**2.7**	**39.1**
Winnipeg	**2,793,366**	**79**	**2,206,302**	**5696**	**387.3**	**45.6**	**10.6**	**422.3**
TOTAL	**4,991,741**	**83**	**4,176,943**		**837.6**	**130.6**	**116.4**	**851.8**

* This is the number of Generalist physicians needed to provide ambulatory visits only - excluding hospital services, surgery, etc.

** Out-of-area data include out-of-province visits as well. For out-of-area contacts, only ambulatory visits to generalist physicians were counted, to avoid including visits to specialists unavailable within an area. For out-of-province contacts, ambulatory visits to all physicians were counted, as out-of-province physicians could not be identified as generalists or specialists.

*** This analysis suggests considerably more physicians for Flin Flon than our analysis in other tables because the latter was based on the needs of Manitoba residents only, whereas this analysis includes visits by out of province residents as well.

85% or more in most areas; even residents of Winnipeg received 79% of their visits from generalist physicians.) The number of generalist visits needed (column 3) is the product of the total number of visits needed from all types of physicians (column 1) and the percentage delivered by generalists (column 2).

Column 4 shows the average visit workload of generalist physicians for that area (North 3504, rural South 4675, Winnipeg 5696 and Brandon 4707). These workload figures can vary from year to year, particularly those of the North and rural South, which are based on relatively small numbers of physicians. The varying size of the workloads also reflects the realities of practice in the different settings. Generalists in the North and rural South are almost all general practitioners but many of them spend more time seeing patients in hospital, delivering anaesthetics, or doing surgery than do general practitioners in Winnipeg. Therefore, the workload measure helps to adjust for the fact that physicians perform somewhat different roles in different parts of the province. By dividing the number of generalist visits needed (column 3) by the workload (column 4), we obtain the number of generalist physicians needed to serve area residents (column 5). However, this represents the number of generalists needed to serve residents of that area only - and assumes that all services are delivered in-area.

Two further steps are required to account for patient and physician mobility: Column 6 identifies the number of generalist physicians needed to provide the services which residents of other areas (including those from out of province) seek in the area. Note that areas such as Brandon, Flin Flon and Portage provide a substantial number of services to out of area and out of province residents (the equivalent of 10.2 FTE, 10.2 FTE and 6.2 FTE generalists respectively). Winnipeg is credited with 45.6 FTE physicians serving non-Winnipeg residents, which includes 36.8 physicians serving other Manitobans (largely from neighbouring PSAs) and 8.7 FTE physicians serving out of province residents. This is no doubt an overestimate since it includes visits to all physicians (including specialists) made by out of province residents. Column 7 identifies the number of generalist physicians from other areas (including out-of-province physicians) currently providing visits to each area's residents. The final column lists the net number of generalist physicians needed in each area, given residents' needs, services provided to out of area residents, and travel patterns of area residents who obtain care elsewhere (Col 5 + Col 6 - Col 7).

There are several important limitations to the data in Table 9. First, the values are FTE counts, so if a physician is recruited and establishes a very large practice, fewer additional physicians would be needed. Second, most of the values refer to needs for generalist physicians only - ignoring needs for other types of physicians including psychiatrists, surgeons and other subspecialists.

Third, nursing contacts are not included in this analysis. Finally, values for Northern areas are subject to significant variability due to changes in physician workload values (the 1993/94 workload value was lower than that for previous 2 years and 21% lower than that in 1994/95.)

However, Table 9 can be used for developing estimates of how many generalist physicians (or physicians and nurses if some substitution algorithm is developed) each area might support given the assumptions described above.[32] This table also gives some idea of the increased surplus of generalist physicians which would exist in Winnipeg if areas whose residents are currently served by Winnipeg physicians were successful in recruiting (up to 37 physicians beyond the 103-124 previously identified).

Alternative Approaches to Estimating Physician Needs: Which Areas are Recruiting?

An obvious approach to assessing where physicians are needed would be to identify areas which are recruiting physicians to fill vacancies. This is of course exactly what has happened over the years and there are strong pressures for this tradition to continue. There are benefits of this practise: if an area wants a physician and makes an effort to make its offer attractive, the physician may be more likely to come and to make a long term commitment.

However, if one examines a sampling of those areas which were actively recruiting physicians in 1995 (as reported to us by the Manager of Manitoba Health's Standing Committee on Medical Manpower[33]) the list includes (among others): Leaf/Lynn, Norway House/Cross Lake, St. Rose du Lac (part of the Alonsa Physician Service Area); Grandview (part of Gilbert Plains), Emerson (part of Morris), Pinawa (part of Springfield), Roblin, Eriksdale (part of Coldwell) and Souris. Some of the recruiting areas, including Morris and Springfield, are low need areas whose residents have a surplus of physician contacts (although many of them occur in Winnipeg).

As can be seen from the above list (and from Appendix Table A4 which lists each of the communities contained in the physician service areas), it is typically a single, small community which is trying to recruit a physician, whereas many of our physician service areas contain

[32] Direct comparisons between the figures in column 8 and the data provided elsewhere in this report (in-area supply and deficit/surplus values) are potentially misleading because the in-area supply figures incorporate all physicians, including specialists, while those in Table 9 only count generalist physicians. The values for Flin Flon are particularly discordant because of the large number of out-of-province patients seen by Flin Flon physicians.

[33] Other communities may be placing their own advertisements directly. The communities listed are cited as examples only.

multiple small towns and villages. While our service areas were constructed to accurately describe how and where residents currently seek care from physicians, for most areas, there is little or no co-ordination across communities of the recruitment process. With the reorganization into Regional Health Authorities, a more co-ordinated approach to physician recruitment should be possible.

Are There Advantages to Having a Physician Surplus?

There are obvious advantages in having physicians available: when arms are broken, sutures are needed for serious cuts, or medications are needed to alleviate pain. However, are there advantages in having a "more than adequate" supply of physicians?

Does a Physician Surplus Provide Health Benefits?

Ongoing work at MCHPE focuses on whether populations which have a more than adequate supply of physicians over time realize health benefits from the extra supply. To date we have found no such evidence. The method we developed for this report calculates need on the basis of age/sex/SERI and premature mortality. With these data we have undertaken a preliminary analysis of whether populations which have a surplus of physician contacts (beyond their needed visit rate) are healthier, other things being equal. To do this we calculated the expected premature mortality rate in each area (taking into account age, sex and SERI) and then compared this with the actual premature mortality rate to see whether an area's rate was higher or lower than expected. Thus if a given area had an expected premature mortality rate of 3.0 per 1000 based on area residents' age, gender and SERI characteristics, but an actual premature mortality rate of 2.5, then area residents were healthier than expected. The difference can be called the residual premature mortality. Having estimated the need for physician visits, and knowing actual levels of physician visits, we can also see whether the area has a higher or lower level of physician visits than estimated. Actual physician visits minus needed visits represents the residual in physician visits. If additional physician visits contribute to better health, we expect a relationship between the two residuals. Higher than expected levels of physician visits should be associated with lower than expected premature mortality (better health) and the converse should hold for lower than expected visits. However, when the two sets of residuals were compared, no significant relationship was found ($r^2 = 0.001$), leaving us with the tentative conclusion that additional physician resources do not significantly improve health status.

Much of what physicians do will not be detected by changes in an area's premature mortality rate. However, we have also found rates of physician contact to be not associated with improvements in individuals' quality of life (Roos and Havens, 1991). Elderly Manitobans who had regular contact with physicians over a twelve year period were no more likely to age successfully than those who did not. Successful aging in this study was defined using both administrative and interview data, and included whether an individual not only lived to an advanced age, but also continued to function well at home and remain mentally alert.[34]

Physician Supply and Hospital Use

One concern about a low supply of physicians is that it could become difficult to treat patients on an ambulatory basis; hence where physician supply is low, there might be higher than necessary rates of hospital use. It has also been suggested that the low hospitalization rates observed for Winnipeg residents (Frohlich et al, 1994) might be the result of the very generous supply of physicians in Winnipeg and the high rate of physician contact available to Winnipeg residents. Figure 13 shows the rate of short stay hospital admissions across the physician service areas of the province (the areas are ranked according to the in-area supply of physicians per 1000 residents, illustrated by the diamonds). There appears to be no relationship between the availability of physicians and rate of short stay hospital admissions (admissions for 59 days or less: $r = 0.004$, $p=0.98$). However, these data are somewhat difficult to interpret for two reasons: first, they ignore differences in health status and need across areas; it may be that when these factors are controlled for, areas with more physicians have lower hospital use. To clarify this issue, we used a regression analysis to examine the relationship between the in-area supply of physicians and area residents' use of hospitals, controlling for need. No relationship was found between in-area supply and area residents' rate of short stay admissions or rate of hospital days per 1000 residents ($p>0.1$). Secondly, Winnipeg physicians and residents use hospitals differently than others: they are more likely to use hospitals for non-acute reasons and hence analyses which focus only on short stay admissions tend to underestimate Winnipeg residents' hospital use (Black et al., 1993).

[34] Over 100 separate indicators of demographic and socio-economic status, social supports, health and mental status in 1971 were available as potential predictors of successful aging. The degree to which the elderly had regular contact with the health care system was measured with a high degree of accuracy. Neither the percentage of years in which individuals made one or more visits, nor the percentage of years in which two or more visits were made was associated with successful aging. Those who aged successfully were shown to have greater satisfaction with life in 1983 and to have made fewer demands on the health care system than those who aged less well (Roos and Havens, 1991).

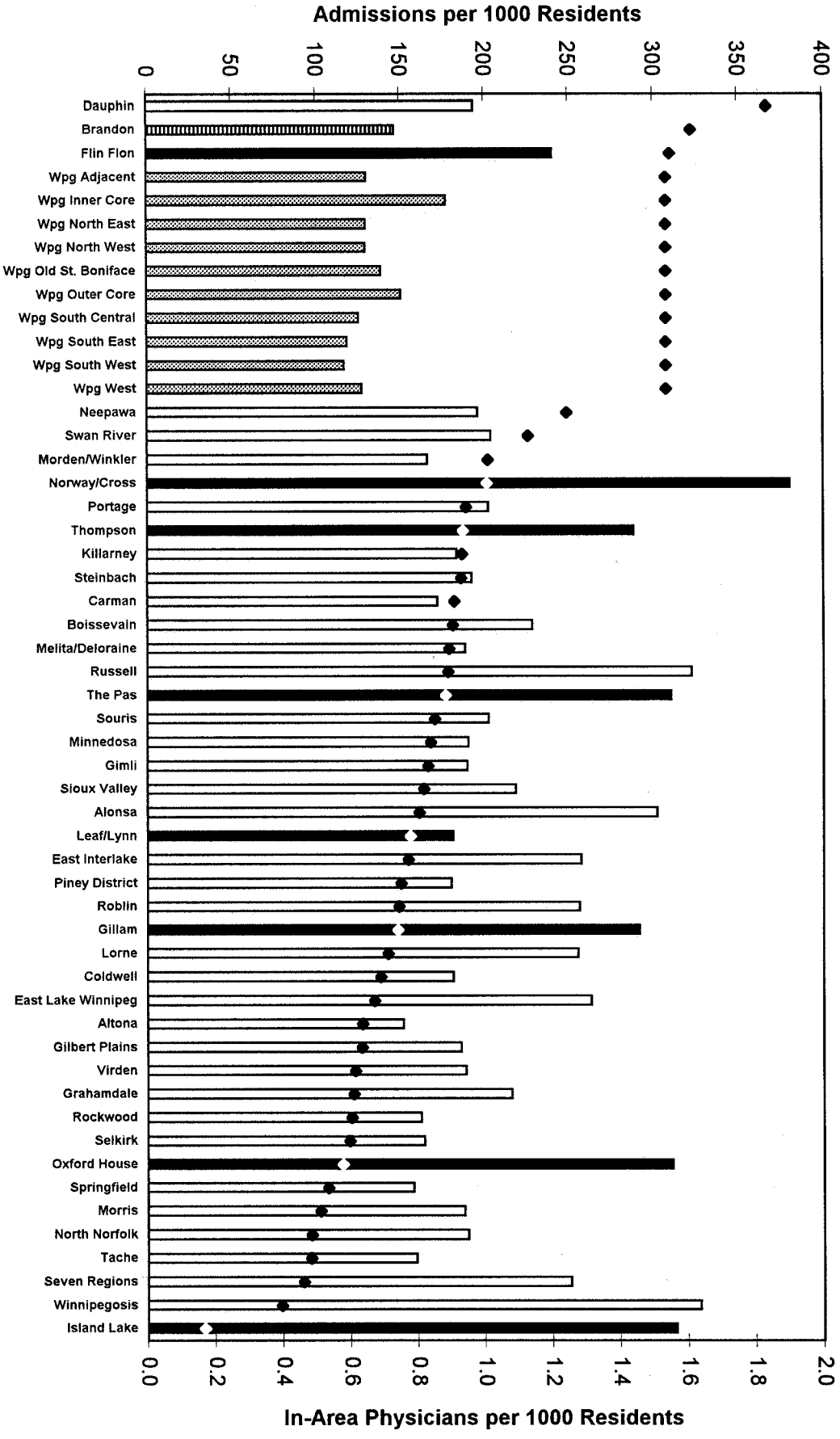

Figure 13: Rate of Short Stay Admissions
(Ranked by In-Area Supply of Physicians)

Note: Black bars represent northern areas, grey bars urban areas, and white bars southern Manitoba

Are there Disadvantages to Having a Physician Surplus?

While we are most familiar with concerns about having too few physicians (expressed by communities which are recruiting physicians), there may be reason for concerns about over-treatment of patients in areas of physician surplus (Franks et al. 1992).

The main problem with a physician surplus is that the province may be over-investing in physician services. Using our needs-based planning approach we estimate that there is a surplus of 64-98 physicians in Manitoba. Given that the average 1.0 FTE generalist physician earned $120,000,[35] this surplus is expensive, costing Manitobans approximately $7.7-11.8 million per year.

Figure 14 illustrates the per capita expenditures which the province makes to deliver physician services to residents of each area. The areas are ordered by our indicator of health status, premature mortality. (The expenditure data has been age and gender adjusted so that the differences are not influenced by the fact that an area may have more elderly residents.) Figure 14 also illustrates the proportion of area residents' expenditures which are spent on consultations, contacts with specialists (that are not consultations), and contacts with general practitioners.

Expenditures are influenced by various factors including the percent of the population who make at least one contact during the year, the average number of contacts made, and the nature of these contacts (whether they are consultations and whether they are with a specialist or general practitioner). Consultations cost more than office visits, and a given treatment delivered by a specialist costs more than if delivered by a general practitioner.[36] Figure 14 shows that there is no simple relationship between health status and expenditure levels for the 54 areas. Some of the high expenditure areas are areas of poor health (Winnipeg's Inner Core, Gillam), but the province

[35] This is the average earnings of generalist physicians rated at 1.0 FTE (those used in the calculation of generalist workloads - see Table 4). Note that earnings are "gross" amounts, and deductions must be made for expenses and overhead costs. Another common approach to calculating average earnings is to include all physicians (regardless of specialty), count using heads instead of FTEs, and exclude those earning less than $40,000 per year. Using those criteria, the average is approximately $154,000 per physician.

[36] While it is generally true that specialists are paid more for visits than are general practitioners, obstetricians are paid the same fee for prenatal care (regardless of the number of visits) and delivery as are general practitioners. Thus even though specialist obstetricians deliver more prenatal contacts to Winnipeg residents than non-Winnipeg residents, they do not contribute to differential expenditures on Winnipeg residents in the same way as do psychiatrists, paediatricians and internists.

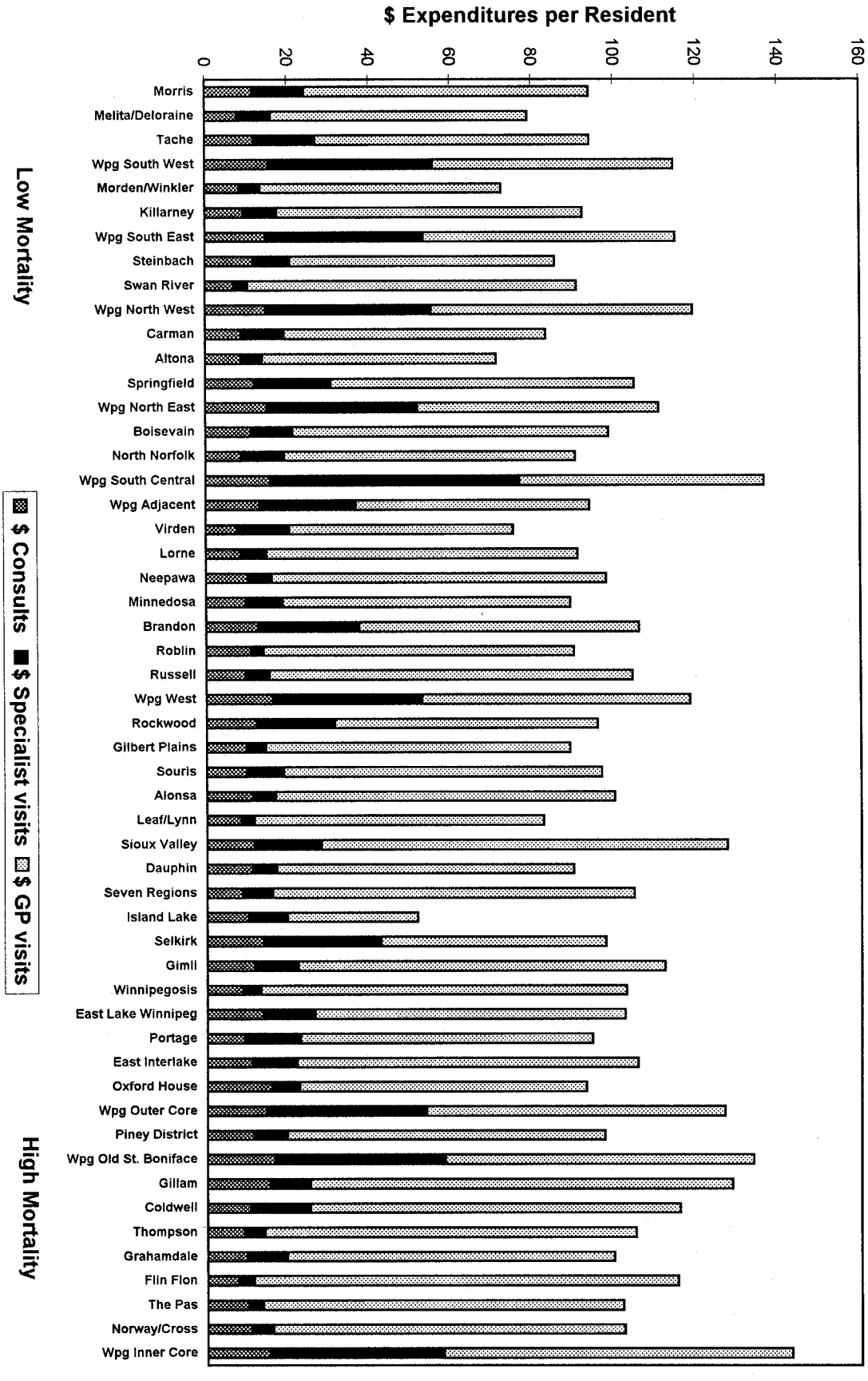

Figure 14: Physician Expenditures by Type of Visit
(Sorted by Premature Mortality Rate of Area Residents)

also spends more delivering physician services to residents of some of the healthiest areas (Winnipeg South West, Winnipeg South Central). These areas had high rates of contact with specialists, high rates of consults and high overall expenditure levels. Areas with high supply or high use relative to need were not routinely those areas with the highest expenditures per resident. Correlation and regression analyses by physician service areas (treating Winnipeg as one area) were not helpful in understanding the factors associated with high (or low) physician expenditures.

Even though we found no clear explanation of what drives expenditure patterns, we found marked differences in what the province invests per person delivering ambulatory physician care to residents of North, the rural South, Brandon, and Winnipeg. As Figure 15 shows, the province spends much more providing physician services to residents of Winnipeg and Brandon than to residents of other areas.[37] This is particularly true of expenditures on care delivered to children, much of which, in Winnipeg and Brandon, is provided by paediatricians (the province spends almost 50% more per Winnipeg child than per Northern child, and 28% more per Winnipeg child than per rural Southern child). There is also a marked difference in expenditures on adults aged 15-64; the province spends 34% more providing care to Winnipeg residents than to residents of the rural South reflecting in part the higher rate of visits provided to Winnipeg residents but also the fact that much more care to Winnipeg adults is provided by specialists,[38] largely internists and psychiatrists (Tataryn et. al, 1994).[39]

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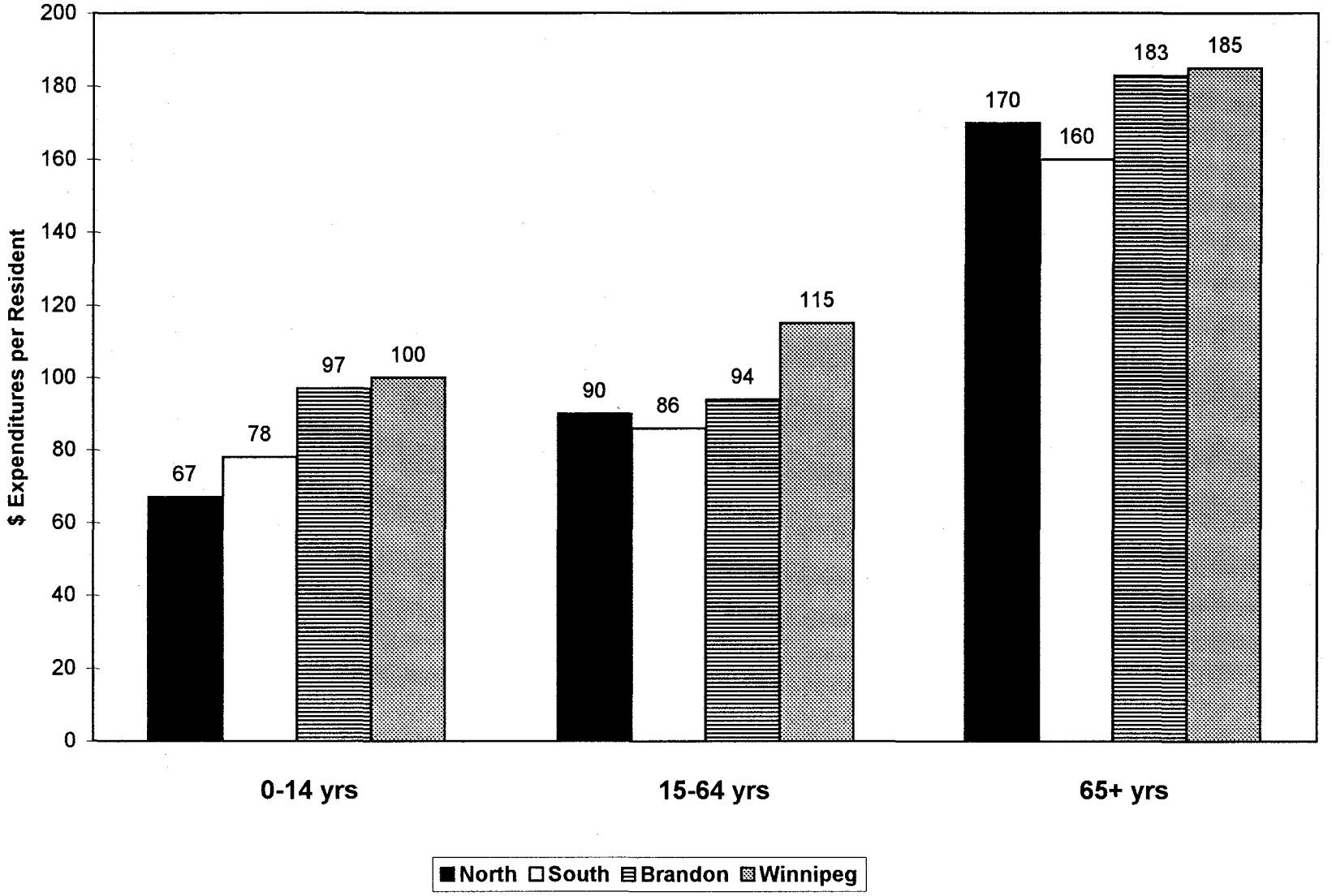
[37] We estimate that residents of Winnipeg, Brandon and rural South have quite similar needs for physician contact. Given their age, gender, socio-economic and health characteristics, we estimate Winnipeg residents need on average 4.2 visits per year, compared with 3.9 visits for Brandon residents, and 4.4 visits for residents of the rural South. In contrast we estimate that residents of the North need on average 6.3 visits per year, reflecting their relatively poor health status and the age distribution of their residents.

[38] As part of our investigation into the relationship between physician supply, expenditures, and hospitalization patterns, we also investigated the relationship between the percent of residents' physician contacts which were with specialists and/or consults, and their rate of hospitalization. We found areas whose residents relied more on general practitioners had a higher rate of short stay hospital admissions, although their total hospital use (days per 1000 residents) was unrelated to the relative amount of specialist care received. We focussed on the percent of visits which were consults or to specialists, not the absolute number of visits. We will investigate the possible underuse of specialists by rural Manitobans in our next report on planning for specialist physicians in Manitoba.

[39] While Figure 15 reports expenditures for ambulatory physician visits per resident, similar results are obtained if we include expenditures on physician visits which occur in hospital. That is, expenditures per Winnipeg resident aged 15-64 for all visits including those to hospitalized patients is $127, compared with $95 per resident of the rural South. Note that if residents of Dauphin or Springfield contact a Winnipeg based specialist, the cost of this visit is credited to their area of residence.

Figure 15: Provincial Expenditures Providing Physician Visits

(by Age and Region of Residence)



Physician and Patient Contributions to Contact Rates

Who is responsible for the physician contact patterns observed? Readers have expressed concern that if there were fewer physicians, patients would be required to wait longer or do without, possibly to the detriment of their health.

> As a spokesman for one of the physician organizations observes: "It does not follow that by taking physicians out of a community, people will stop demanding or needing the medical services they provide." Another reader commented: "The underlying assumption is made that every physician visit is valid and should be perpetuated. We feel that some verification is required, given the frequency with which one hears of the abuse of the system."

There is recognition that there are major differences in how frequently people visit their physicians, as well as how often physicians see individual patients. Manitoba Health has a Medical Review Committee (MRC) and a Patient Utilization Review Committee (PURC) to examine major departures from the norm. The MRC contacted 123 physicians, providing educational letters or requiring the physicians to explain their practise patterns, while the PURC identified 78 patients as exceeding reasonable limits on visit rates (Manitoba Health Annual Report 1994/95 p.70-71).

This process, while valid, explains only a small portion of the variation in visits. Many feel that the way to reduce high physician contact rates, and therefore high expenditures, is to educate the patient, either through the use of public education campaigns or co-payments with physicians informing patients as to when it is appropriate to seek care. Unfortunately, the fee-for-service system of remuneration offers no incentive for physicians to encourage patients to use care appropriately (in fact, it provides a disincentive). Regardless, there is only weak evidence that such approaches have any positive impact. Public education campaigns have only minor impact (Brown & Goel, 1996), and co-payments have been shown to reduce service use by the sick and poor (Lohr et al., 1986). Another suggestion is to transfer the responsibility for payment of services from the government to the patient through deinsurance. Deinsurance would require the patient to pay the cost of certain types of services, such as an annual health examination. The assumption behind these suggestions is that patients tend to overuse physicians, driving up expenditures because the service is "free."

Yet research here and elsewhere has found that physicians also play an important role in determining visit rates, and thus expenditure patterns. (Henke & Epstein, 1991; Grumbah & Jamison, 1990). While the first visit in any episode is typically at the discretion of the patient, the second and subsequent contacts involve both patient and physician preferences. To attempt to shed some light on this issue, we analyzed Winnipeg residents who had at least 1 physician contact for hypertension in each of two consecutive years.[40] These patients were divided into two groups based on the total number of ambulatory contacts (but not consultations) they had with all physicians in 1993/94. The low use group, consisting of those who had less than 15 visits (86% of hypertensive patients), averaged 7 visits per year. In contrast, the high use group (those with 15 or more visits) averaged 22 visits per year. Among high use patients, 23% contacted 8 or more different physicians during the year. These data suggest that patients contribute to some of the high contact rates observed.[41]

To try to examine this issue from the physician perspective, we reviewed the practice patterns of Winnipeg general practitioners who were active for at least 10 months and who saw 50 or more adult (aged 25-74) hypertensive patients.[42] As can be seen in Figure 16, some Winnipeg based family practitioners saw their adult hypertensive patients on average 4 times a year (a low recall rate), while others saw their patients on average 7 or 8 times a year (a high recall rate).

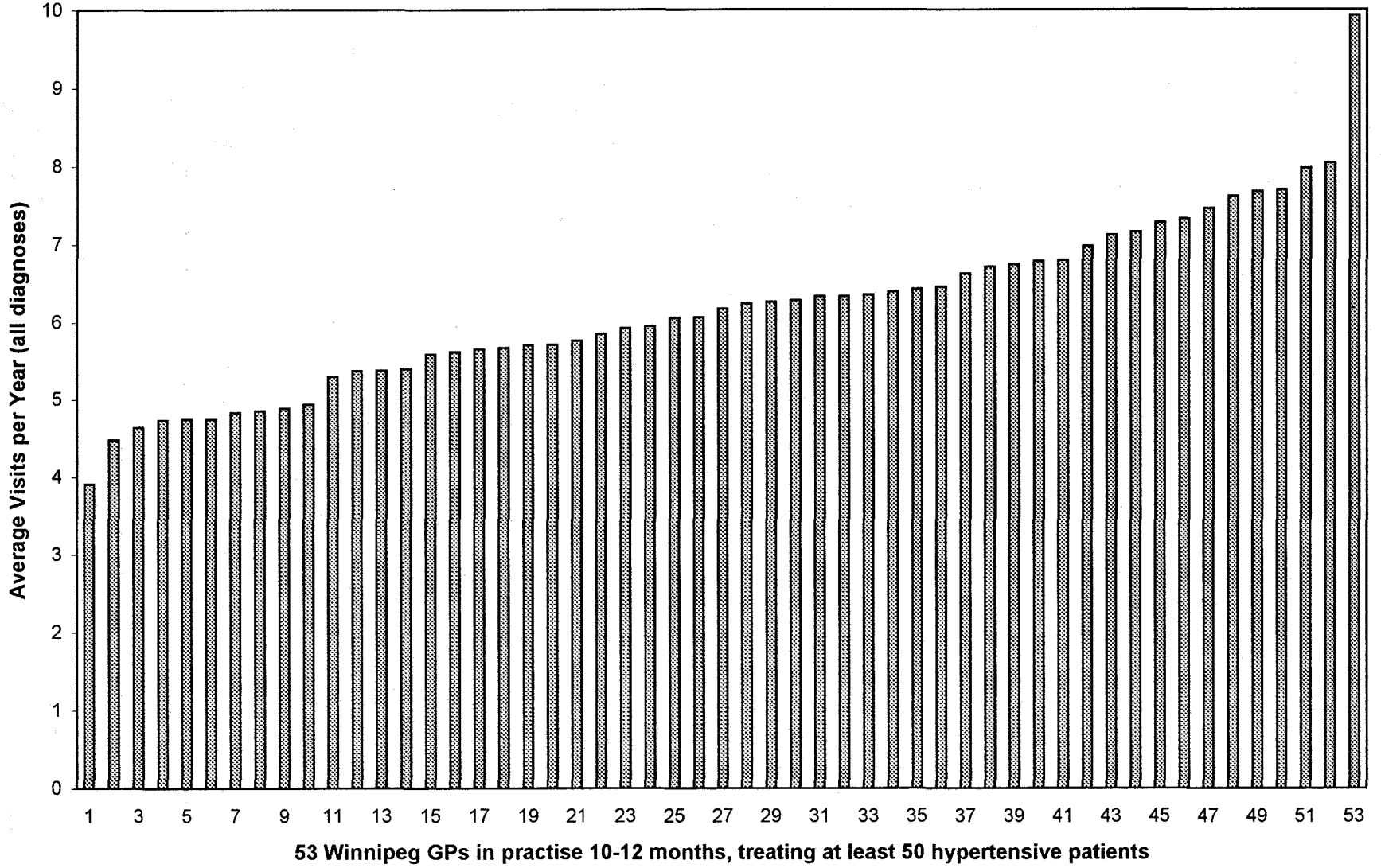
[40] We have identified individuals as having hypertension if they had at least one physician contact in both 1993/94 and 1994/95 during which hypertension (ICD9-CM 401) was listed as the diagnosis on the claim submitted for visit payment. Claims data have been found to offer a reasonably reliable method for identifying individuals with chronic disease (Young et.al., 1991). A recent unpublished Manitoba study found that 89% of those with two claims containing a hypertension diagnosis in the prior year reported to an interviewer that they had the condition hypertension (personal communication L. Roos).

[41] No conclusions regarding whether these contact patterns were appropriate can be drawn from this brief analysis. Many of these patients were very ill, with multiple clinical problems.

[42] While 101 physicians met our criteria, we randomly selected 1/2 of the physicians to keep the graph readable. Note that all visits to the physician by their hypertensive patients (regardless of the diagnosis) were counted in calculating these averages.

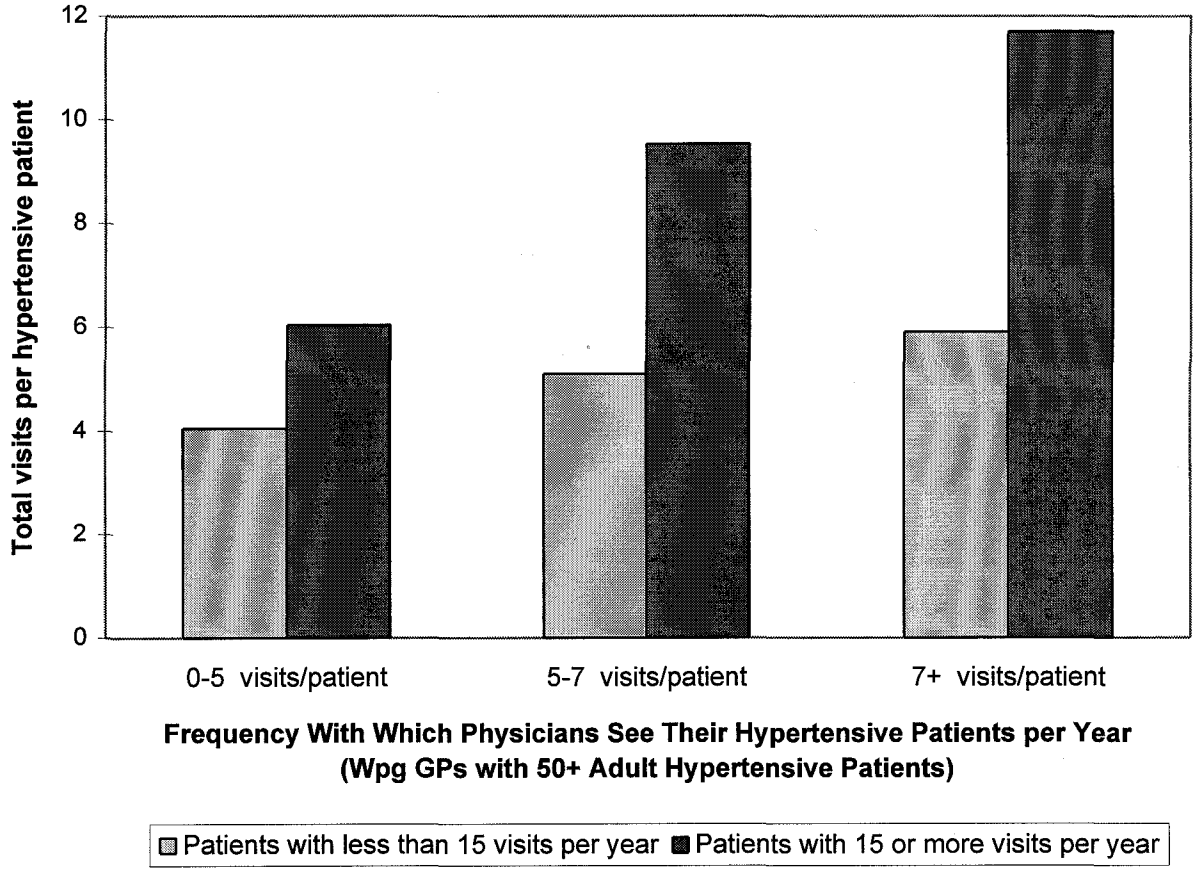
Figure 16: Physicians' Annual Rate of Contact with their Hypertensive Patients

(# visits for all diagnoses) 1994-95



The next step was to see if high and low use patients behaved differently when they saw physicians with different practise patterns. Figure 17 shows that high use patients (those who make 15 or more visits) averaged 11.7 visits to physicians with high recall rates, but only 6.0 visits to physicians with low recall rates. The same trend was observed for low use patients contacting physicians with low and high recall rates.

Figure 17: High and Low Use Hypertensive Patients' Use of Physicians, by Physician Practice Style



Since each physician had at least 50 hypertensive patients, and most 75 or more, it is likely that physician preferences for a more or less visit intensive practice style were more important than

patient characteristics in determining contact rates.[43] There is no evidence to suggest which practice style is more effective or that the highest rate of contact represents the highest quality care. It is also likely that these marked differences in practice style exist in the care of patients with other chronic and acute diseases. These differences in practice style however strongly suggest that the supply of physicians in Winnipeg is not necessarily the major determinant of physician availability or the amount of care delivered.

Is the Overall Supply of Physicians in Manitoba Adequate?

In attempting to assess questions of overall physician supply, it is useful to compare Manitoba to other provinces. As can be seen in Figure 18, Manitoba is relatively well supplied, with a physician supply similar to that in Saskatchewan, Alberta and BC; only Ontario and Nova Scotia have a markedly greater supply of physicians.[44] Figure 18 also shows that Manitoba has a relatively rich supply of specialist physicians. While the overall supply of physicians in Manitoba would seem to be adequate, per capita spending on physicians is relatively low - with only PEI, Nova Scotia and Newfoundland having lower per capita expenditures on physicians (Health Canada 1996). Comparative data on life expectancy, the most commonly used measure of health status, show that Manitoba scores at the Canadian average (Figure 19).

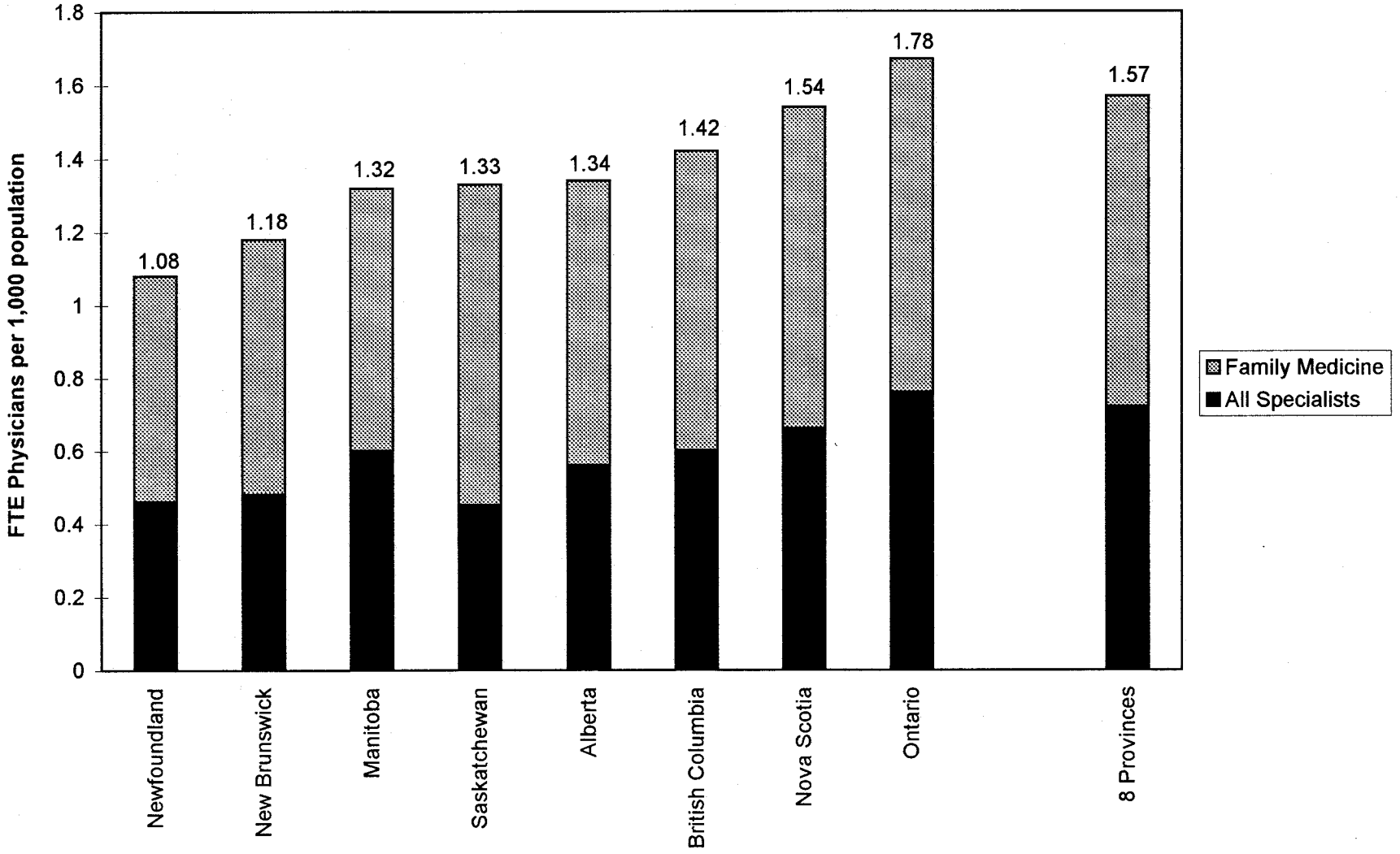
Trends in the Manitoba Physician Supply: What is the Source and Size of Additions and Departures?

Table 10 summarizes data on the additions and departures from the Winnipeg and non-Winnipeg physician supply over the fiscal years 1991/92 through 1993/94. Over the three year period, 227 physicians (who contributed 74.2 FTEs) were added to the Winnipeg physician supply, while 180 (who contributed 49.8 FTEs) departed. (Head counts and FTE numbers are not the same because practitioners enter and leave the work force at different times during the year and

[43] While it is true that newly diagnosed patients typically undergo more frequent testing and hence likely receive more contacts than patients whose disease is well controlled, each physician had at least 50 patients (most 75 or more) and so even several new patients in a single physician's pool should not have skewed their average recall rate. Some physicians with the highest recall rates had practices serving residents of the most affluent parts of the city, while others served core area residents.

[44] More recent data on the number of physicians per population confirms Manitoba's adequate supply. In 1993, Manitoba was shown to have a physician supply larger than Alberta, Newfoundland, Saskatchewan, PEI and New Brunswick, but less than Ontario, B.C., Quebec and Nova Scotia (Health & Welfare, 1994). We present the 1991 data because it is based on full-time equivalents and therefore somewhat more informative.

Figure 18: 1990-91 Supply of Physicians In Canada: Specialists vs Family Medicine



Source: Health and Welfare Canada. Supply and Distribution of Physicians in Canada, 1992.

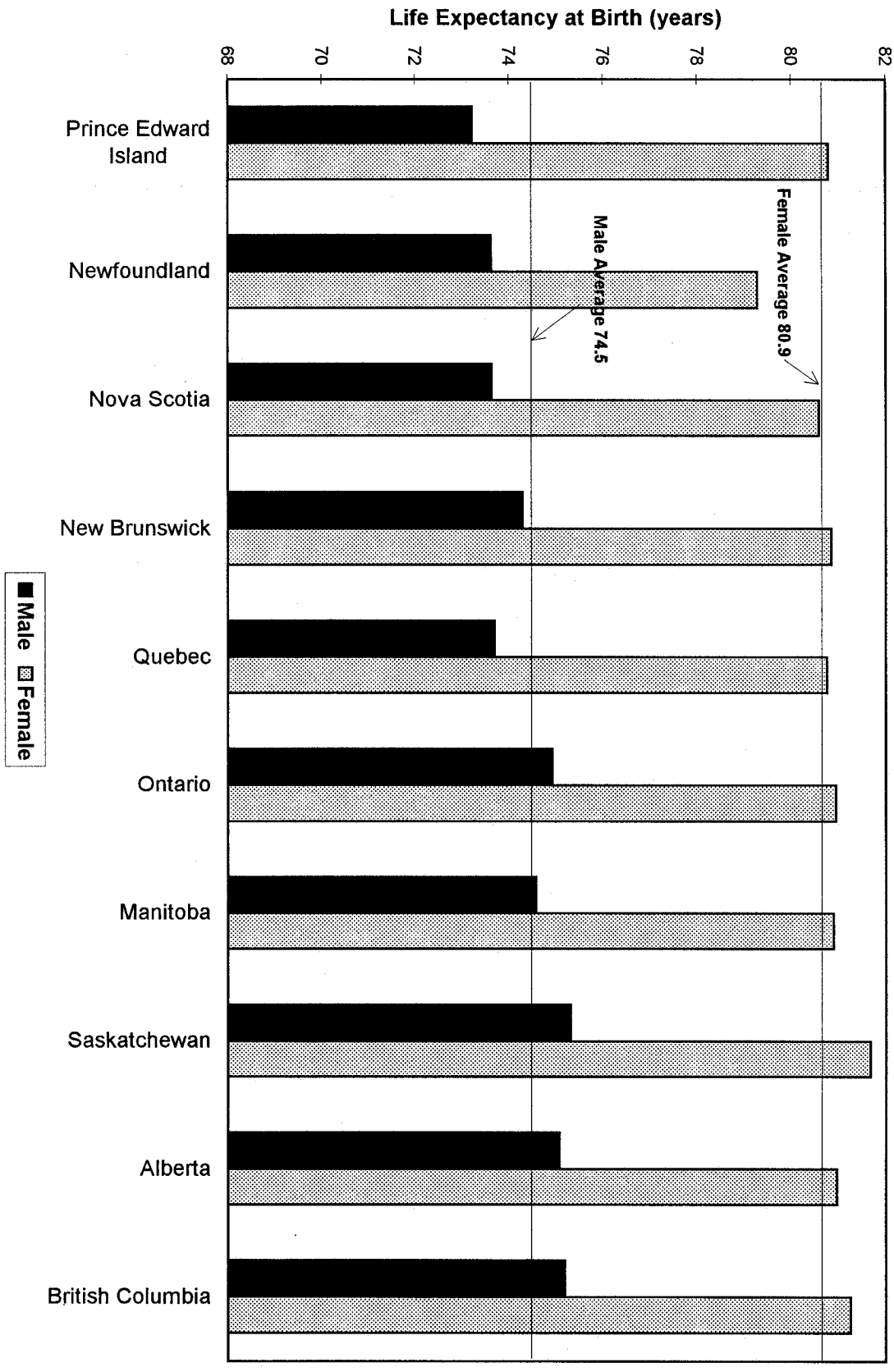


Figure 19: Life Expectancy at Birth in Canada by Province

Source: Life Tables, Canada and Provinces, 1990-92. Statistics Canada Cat. No. 84-537

Table 10: Additions and Deletions from the Winnipeg and Non-Winnipeg Physician Supply 1991-93

Winnipeg

	Full-time Equivalents				Head Counts			
	1991	1992	1993	Total	1991	1992	1993	Total
New Physicians	22.8	28.3	23.1	74.2	66	77	84	227
Departing Physicians	13.6	20.7	15.5	49.8	57	60	63	180
Part Year	3.6	0.8	1.8	6.2	12	6	10	28
All Year	964.8	956.2	982.3		1116	1110	1122	
Total *	1004.8	1006.0	1022.6		1251	1253	1279	
Net Change: New-Departing	**9.2**	**7.6**	**7.6**	**24.4**	**9**	**17**	**21**	**47**

Non-Winnipeg

	Full-time Equivalents				Head Counts			
	1991	1992	1993	Total	1991	1992	1993	Total
New Physicians	24.1	24.7	24.2	73.0	65	64	63	192
Departing Physicians	12.7	29.1	11.7	53.5	38	68	40	146
Part Year	5.0	1.1	2.9	9	14	10	12	36
All Year	358.2	351.8	364.7		397	388	389	
Total *	400.0	406.7	403.5		514	530	504	
Net Change: New-Departing	**11.4**	**-4.4**	**12.5**	**19.5**	**27**	**-4**	**23**	**46**

Departing physicians are those who were in full time practise the previous year and left in the current year. Part year identifies those who initiated and left practise in the current year. All year identifies those who were in practise the full year and had been in practise the previous year.

* The total number of physicians is the sum of contributions from new, departing, part year and all year physicians. The net change is the contribution of new physicians minus that of departing physicans, and therefore only an indication of the magnitude of the change in physican supply. Net changes cannot solely explain changes in totals from year to year.

because new physicians and departing physicians may not be carrying a full workload.) Physicians arriving and departing during the same year delivered the equivalent of 6.2 FTEs of service (28 heads). If these patterns remain steady (which is a big if, since January 1994 saw the regulatory changes mentioned earlier in this report), we can use these figures to estimate how long it would take to reduce the Winnipeg surplus. That is, if on average 17.5 FTE physicians leave Winnipeg practice every year (in 1993 the equivalent of 15.5 physicians left practice in Winnipeg, and for the two previous years 20.7 and 13.6 left), and if disincentives to practice in Winnipeg meant that only ten new generalist physicians were added per year, it would take almost 15 years for the full-time equivalent supply of generalist physicians to fall by 100 (the current estimated surplus). There are a number of assumptions in this calculation, including that the established Winnipeg physicians (the 'all year' group) do not substantially change their activity level or earnings patterns. However, as can be seen in Table 10, there was an increase of 26.1 FTE (2.7%) in Winnipeg in 1993 (from 956.2 to 982.3) from increased earnings in the all year group. If this trend were to continue, it would take even longer to reduce the Winnipeg surplus. Note that these data also illustrate the importance of using FTE counts rather than head counts to manage the physician supply, since in most categories, there are more heads than FTEs.

Table 11 identifies characteristics of the physicians who contributed most to the recent changes in the Winnipeg and rural physician supply from 1991-1993. Not surprisingly, most of the additions came from the youngest group of physicians. Foreign graduates played a major role in Manitoba, comprising over 75% of the new rural physicians, and 35% of the new Winnipeg physicians. Manitoba graduates contributed little to rural Manitoba's needs (10%). The average annual decrease to the Manitoba physician supply from retirements alone is small: the equivalent of approximately three physicians per year.[45]

The data in the bottom section of Table 11 show that the number of specialists in rural Manitoba has decreased slightly. In Winnipeg, specialists continue to be added, but only at a fraction of the rate of GPs, suggesting that the current surplus of specialists in Winnipeg may slowly resolve itself if these trends continue (though the addition of general internists and general paediatricians to Winnipeg should not be encouraged).

[45] As can be seen in Appendix Table A5, Manitoba has a relatively young physician supply, both in general practice and the specialties. There may be some increase in retirements over the next ten years, but the biggest physician cohorts are in the 35-49 year age range.

Table 11: Characteristics of Net Changes to the Physician Supply 1991-1993 (in Full-Time Equivalents)

	Winnipeg				Non-Winnipeg			
	1991	**1992**	**1993**	**Total**	**1991**	**1992**	**1993**	**Total**
Place of Graduation:								
Manitoba	2.7	2.9	5.8	11.4	1.8	-1.8	2.1	2.1
Canada	3.1	3.0	-1.6	4.5	1.5	-0.5	1.1	2.1
Foreign	3.4	1.8	3.5	8.6	8.2	-2.1	9.3	15.4
Total	9.2	7.7	7.6	24.5	11.5	-4.4	12.5	19.6
Age of Physician:								
20-34	13.9	9.5	9.6	33.0	11.9	5.4	14.3	31.6
35-64	-2.0	0.4	-2.1	-3.7	-0.1	-8.6	1.0	-7.7
65+	-2.8	-2.2	0.1	-4.9	-0.4	-1.2	-2.8	-4.4
Total	9.2	7.7	7.6	24.5	11.5	-4.4	12.5	19.6
Specialty:								
GP	6.9	9.4	6.9	23.2	8.8	-2.4	14.8	21.2
Specialist	2.3	-1.7	0.7	1.3	2.7	-2.0	-2.3	-1.6
Total	9.2	7.7	7.6	24.5	11.5	-4.4	12.5	19.6

We also examined the age distribution of physicians. Appendix Table A5 shows that the number of specialists is particularly high in the cohort of physicians currently aged 35-49, and that the tendency towards increased numbers of specialists was a relatively recent phenomenon.

Updating the Analyses with 1994/95 Data

As with every project undertaken by MCHPE, a major commitment is made to refining and testing all analyses to reduce the number of errors and to explore validity and reliability issues as much as possible. In addition, a preliminary report is circulated widely so that those knowledgeable in the area and those with a stake in the results have an opportunity to critique the report, and we have an opportunity to undertake revisions. Inevitably this means a delay in the release of the report, and the timeliness of the data is eroded. Whenever possible we attempt to

update reports with more recent data, even though these updates will not have received the same widespread dissemination and scrutiny; nor can they be totally integrated into the body of the report (lest they also become "timeliness challenged."). Thus while this report and methodology were developed using 1993/94 data, as was the report of the Physician Resource Committee, we here update the critical pieces of the report using the most recent data available: April 1, 1994 through March 31, 1995. As stated earlier, 1994/95 was an unusual year for assessing physician supply in Manitoba because licensure changes restricted the entry of both foreign and Manitoban trained physicians into practice.

Changes in Physician Supply

Table 12 shows the changes in physician supply which took place up to and including 1994/95. The impact of the restrictions on entry are seen in both the Winnipeg and Non-Winnipeg data; in 1993/94, 84 physicians entered practice in Winnipeg and 63 outside Winnipeg; while in 1994/95 these numbers dropped to 55 and 23 respectively. Despite all the publicity, departures appear to have been up only slightly; 66 physicians left Winnipeg in 1994/95 compared to 63 in 1993/94, while 46 physicians (up from 40) who practised outside Winnipeg left Manitoba in 1994/95. However, these numbers likely underestimate the departures somewhat, as they reflect only physicians who officially cancelled their billing numbers in 1994/95. If we count physicians who still had an active billing number in 1994/95 but who had not used it during the last several months of the year, we identify approximately 30 more physicians in this category in 1994/95 than in previous years. Thus it is possible that these data underestimate the departures which actually occurred, at least in terms of head counts. However, head counts often tell us little about how much service was delivered (not every physician who leaves had a full-time practice); the full-time equivalent counts provide more accurate data on how changes in supply have affected the amount of care delivered to Manitobans. As these data suggest, there was little change in the amount of care delivered to Manitobans. There was the equivalent of 5.6 fewer FTE physicians delivering services to Winnipeg residents, and the equivalent of 1.3 fewer FTE physician delivering care to non-Winnipeg residents. In rural Manitoba the loss of services from the failure

Table 12: Additions and Deletions from the Winnipeg and Non-Winnipeg Physician Supply 1991-94

WINNIPEG

	Full-time Equivalents				Head Counts			
	1991	1992	1993	1994	1991	1992	1993	1994
New Physicians	22.8	28.3	23.1	18.1	66	77	84	55
Departing *								
Physicians	13.6	20.7	15.5	20.2	57	60	63	66
Part Year	3.6	.8	1.8	0.4	12	6	10	7
All Year	964.8	956.2	982.2	978.3	1116	1110	1122	1152
Total **	1004.8	1006.0	1022.6	1017.0	1251	1253	1279	1280
Net Change:								
New-Departing	**9.2**	**7.6**	**7.6**	**-2.1**	**9**	**17**	**21**	**-11**

NON-WINNIPEG

	Full-time Equivalents				Head Counts			
	1991	1992	1993	1994	1991	1992	1993	1994
New Physicians	24.1	24.7	24.2	5.5	65	64	63	23
Departing *								
Physicians	12.7	29.1	11.7	13.6	38	68	40	46
Part Year	5.0	1.1	2.9	0.0	14	10	12	0
All Year	358.2	351.8	364.7	383.1	397	388	389	417
Total **	400.0	406.7	403.5	402.2	514	530	504	486
Net Change:								
New-Departing	**11.4**	**-4.4**	**12.5**	**-8.1**	**27**	**-4**	**23**	**-23**

* Departing physicians were those in full time practise the previous year who left in the current year. Part year identifies those who initiated and left practise in the current year. All year identifies those physicians who were in practise the full year and had been in practise the previous year.

** The total number of physicians is the sum of contributions from new, departing, part year and all year physicians. The net change is the contribution of new physicians minus that of departing physicians, and therefore only an indication of the magnitude of the change in physican supply. Net changes cannot solely explain changes in totals from year to year.

to attract new entrants was offset by increased activity of those physicians who were practising all year.[46] In summary, there was little decrease in Manitoba's physician supply in 1994/95, despite new restrictions on entry to practice.[47]

Table 13 compares the in-area supply of physicians practising in each of the areas in 1993/94 and 1994/95. (FTEs per 1000 residents; the 1993/94 values are identical to those in Table A2.) Confirming the data contained in Table 12, no area experienced a substantial change in the number of full-time equivalent physicians serving the area. While there was a small decrease in the number of physicians in Manitoba (as reflected in the head counts in Table 12), we show no overall decrease in services provided, because other physicians were expanding their practices.

Table 13: In area supply, 1993/94 and 1994/95

(FTE physicians per 1000 residents)

AREA	1993/94	1994/95
NORTH	**0.94**	**0.92**
Leaf/Lynn	0.78	0.80
Gillam	0.74	0.66
Thompson	0.94	0.95
Flin Flon	1.55	1.50
The Pas	0.88	0.88
Island Lake	0.17	0.17
Oxford House	0.58	0.41
Norway/Cross	1.01	0.94
SOUTH	**0.78**	**0.77**
Springfield	0.53	0.52
Tache	0.48	0.53
Morris	0.51	0.50
Steinbach	0.93	0.93
Rockwood	0.60	0.59
Souris	0.85	0.76
Morden/Winkler	1.01	1.11

[46] We find a large increase in workload among Northern physicians in 1994/95 over 1993/94, and the increase was not due to increased reporting of evaluation claims by salaried physicians (in fact, reports of encounters by salaried physicians were down in 1994/95.)

[47] Most of the 1994 graduating class had a delayed entry to practice because of the change from one year to two years of pre-registration training.

AREA	1993/94	1994/95
Lorne	0.71	0.72
Altona	0.64	0.65
Carman	0.91	0.77
Killarney	0.93	0.86
North Norfolk	0.48	0.59
Selkirk	0.60	0.60
Seven Regions	0.46	0.44
Melita/Deloraine	0.89	0.97
Portage	0.95	0.93
Russell	0.89	0.83
Neepawa	1.24	1.43
Boissevain	0.90	1.01
Minnedosa	0.84	0.80
Swan River	1.13	1.09
Dauphin	1.84	1.83
Virden	0.61	0.60
Gilbert Plains	0.63	0.50
Gimli	0.83	0.79
Alonsa	0.81	0.78
Roblin	0.74	0.79
East Lake Winnipeg	0.67	0.65
Grahamdale	0.61	0.60
East Interlake	0.77	0.74
Coldwell	0.69	0.66
Winnipegosis	0.40	0.31
Piney District	0.75	0.69
Sioux Valley	0.82	0.80
BRANDON	**1.61**	**1.59**
WINNIPEG	**1.54**	**1.54**
MANITOBA	**1.27**	**1.26**

Changes in Physician Contacts Delivered

Overall physician visit rates in 1994/95 increased by 2.3% over 1993/94 levels (4.88 vs 4.77 visits per resident). Because we have standardized these rates, this increase is over and above increases expected from an aging population. Given the perceived exodus of physicians from Manitoba, the increased delivery of physician contacts was unexpected. Separate analyses revealed that visit rates to salaried physicians decreased, while visit rates to fee-for-service

physicians increased, suggesting that many physicians were responding to decreases in the fee schedule with increased visit rates.[48]

1994/95 marked the second year of the current contract between the Manitoba Medical Association and Manitoba Health. The contract made the MMA responsible for reductions of 2% of total expenditures on physician services for both 1993/94 and 1994/95, to be achieved by changes in the fee schedule (ie. decreased reimbursement for many services, including routine office visits). However, as the contract was not signed until the end of 1993/94, no reductions were achieved in that year. In 1994/95, fees were decreased, but because physicians were seeing their patients more frequently, total expenditures did not fall as expected. Therefore, reimbursements to physicians for the first 6 months of 1995 were reduced by 3.5% to achieve the overall expenditure reductions mandated by the contract.

As can be seen by comparing Table 14 with Table 4, average visit workloads generally increased between 1993/94 and 1994/95. Winnipeg general practitioners' workload was 5934 visits per year in 1994/95, up 2%; Winnipeg general internists' workload was 3581, up 18%; rural South general practitioners' workload was up 6% to 4958, and the workload of general practitioners in the North was 4234, up 21%. Only Brandon physicians showed a small (2%) decrease in their visit workloads.[49]

[48] Only fee-for-service physicians revealed increased visit rates. For example, between 1993/94 and 1994/95 there was a 3.6% increase in the number of regional exams (tariff 8509) performed by fee-for-service physicians. Over the same period there was an 8% decrease in the number of these exams reported by salaried physicians.

[49] There is likely some instability in the workload figures for Winnipeg general internists and for general practitioners in the North since both are based on the practices of a small number of physicians. While the internists have little influence on the Winnipeg average workload, the instability of Northern workload numbers are more problematic.

Table 14: Workloads of Generalist* Physicians, 1994/95

(average ambulatory visits/year - includes consults, office, home and emergency room)

	Winnipeg	Brandon	South	North
General Practitioner	5934	4623	4958	4234
General Internist	3581			
General Paediatrician	5902			
Figure Used for Calculating Surplus/Excess	5832	4623	4958	4234

* Includes only those earning between the 40th and 60th percentile (FTE = 1.0), and excludes subspecialist physicians (see the Methods Appendix).

There has long been a debate about whether physicians seek a target income (Tarlov, 1990; Reinhardt, 1985; Grumbah & Jamison, 1990), responding to fee changes by changes in their practice patterns. The world is complex and the target income hypothesis is not likely a full explanation for the data. However, between 1993/94 and 1994/95 some physicians did change their practices quite markedly. One general practitioner with a large number of hypertensive patients saw them on average 4.1 times a year in 1993/94, but 4.9 times a year in 1994/95, a 23% increase in contact rate. Another general practitioner who saw hypertensive patients on average 7.1 times a year in 1993/94, saw them 7.9 times a year in 1994/95, a 12% increase. Not all physicians responded to the reduced fees in the same way: one physician's average visit rate dropped from 5.7 to 4.8 times a year; another's from 8.6 to 7.6. But overall, physicians working in the fee-for-service system increased the number of visits delivered; salaried physicians did not.

Change in Physician Deficits and Surpluses

The 1994/95 physician deficits and surpluses were calculated by assuming each area had the same level of need for physician visits as in 1993/94. This seems a reasonable assumption given

that the age, gender, socio-economic and health characteristics of areas change very slowly. 1994/95 data were used for actual visit rates and physician workload values.

As Table 15 suggests, in 1994/95, the total Manitoba physician surplus increased from 64 to 88, with Winnipeg and Brandon showing small increases in their surpluses, the rural South moving from a small deficit to a small surplus, and the North showing a smaller deficit. The explanation differs a bit in each area but is largely driven by the fact that physicians were providing more services.[50] The estimates of 1994/95 physician surplus and deficits for each physician service delivery area are shown in Table 16, along with comparable figures from 1993/94. Note nursing station visits and public health nurse visits have been excluded from these calculations.

Table 15: Estimates of Physician Deficits (-) and Surpluses (+) 1993/94 and 1994/95

REGION	1993/94	1994/95
Winnipeg	+102.5	+111.5
Brandon	+9.6	+11.8
South	-5.8	+1.8
North	-42.6	37.0
Total	**+63.7**	**+88.1**

[50] Here the relativity of our approach allows interesting policy considerations. We did not re-estimate our need coefficients using 1994/95 data. Had we done so, we would have renormalized the coefficients using the increased number of physician visits delivered in 1994/95. This would have slightly increased our estimate of the number of visits needed, and decreased the physician surplus somewhat. However, from a policy perspective, the rationale for funding an increasing number of physician visits, beyond the 1993/94 visit rate, is unclear.

Table 16: Deficits (-) and Surpluses (+) by Physician Service Areas 1993/94 and 1994/95

AREA	1993/94	1994/95
NORTH	**-42.6**	**-37.0**
Leaf/Lynn	-0.60	-0.40
Gillam	+0.41	+0.11
Thompson	-11.35	-9.26
Flin Flon	-1.58	-1.60
The Pas	-6.97	-5.41
Island Lake	-10.11	-8.45
Oxford House	-4.63	-4.17
Norway/Cross	-7.84	6.84
SOUTH	**-5.8**	**+1.8**
Springfield	+7.41	+7.31
Tache	+1.35	+1.84
Morris	+1.59	+1.87
Steinbach	-0.68	+0.11
Rockwood	+0.90	+1.35
Souris	+0.88	+0.97
Morden/Winkler	-2.12	-1.88
Lorne	+1.13	+1.57
Altona	-1.08	-0.68
Carman	+0.13	+0.50
Killarney	+0.97	+1.24
North Norfolk	+0.48	+0.48
Selkirk	+1.87	+2.32
Seven Regions	+1.03	+0.74
Melita/Deloraine	-0.02	+0.34
Portage	+1.17	+1.31
Russell	+1.44	+1.68
Neepawa	+0.36	+0.97
Boissevain	+0.05	+0.51
Minnedosa	-0.59	-0.25
Swan River	-0.43	-0.06
Dauphin	-1.08	-1.20
Virden	-2.41	-1.86

AREA	1993/94	1994/95
Gilbert Plains	-0.48	-0.46
Gimli	+0.50	+0.39
Alonsa	-1.36	-1.12
Roblin	-1.31	-1.33
East Lake Winnipeg	-3.43	-3.30
Grahamdale	-2.12	-2.24
East Interlake	-3.50	-3.33
Coldwell	-1.24	-1.30
Winnipegosis	-2.83	-2.67
Piney District	-1.41	-1.32
Sioux Valley	-0.93	-0.72
BRANDON	**+9.6**	**+11.8**
WINNIPEG	**+102.5**	**+111.5**
South West	+34.69	+35.71
South East	+23.12	+23.80
North West	+21.43	+22.13
North East	+18.07	+20.43
South Central	+15.62	+16.18
Adjacent	+0.47	+0.56
West	+16.04	+17.26
Old St. Boniface	-0.69	-1.01
Outer Core	-15.72	-14.58
Inner Core	-10.48	-8.94
MANITOBA	**+63.7**	**+88.1**

Note: these estimates do not incorporate visits provided by nurses.
See Tables 6 and 7.

DISCUSSION

It is clear from our analyses and those of others that there is no "magic formula" for calculating the number of physicians needed to serve a defined population. While we would argue that our approach is one of the more sophisticated attempts to assess the adequacy of physician supply relative to need, no approach can claim perfection. Lomas, Barer and Stoddart (1985), in their classic critique of the Macdonald Report, reviewed the strengths and weaknesses of the various methods for undertaking physician manpower planning: needs based, demand based and utilization based approaches. The approach we have used in Manitoba is a hybrid which overcomes many of the weaknesses of prior efforts.[51]

By modelling a population's need for physician services on current utilization patterns, we (as others before us) run the risk of over-estimating the need for physician services, since this approach tends to assume that all services delivered were needed, even though we have demonstrated that there are marked differences in how frequently physicians see patients with similar chronic conditions. This approach also assumes that all services currently provided by physicians must be provided by physicians, when in fact at least some of the services could be provided by nurses and other health professionals. Thus if midwives and nurse resource centres become more available, they would reduce the need for physician services.

A Northern hospital administration observes: "We agree that the availability of nursing stations does influence the need for physician services in the North and have no difficulty with the lower number of physicians identified as being required because of this. It seems to us, however, that if this model of service delivery is appropriate for remote Northern communities, it should be equally or probably even more appropriate for larger population centres where all the backup facilities for nurses would be available. Hence, in order to be fair to the remote Northern communities, it would only seem appropriate that the report identify a comparable proportion of physicians services that could be replaced by clinical nursing service in all the physician service areas and adjust the deficits/surpluses accordingly. This would provide a more accurate indication of the relative urgency of the physician requirements of all the areas. It would also identify, both for each area and for the province, the degree to which the physician maldistribution problem could be addressed by an alternative and probably less costly option."

[51] As Contandriopoulos and Fournier (1988) suggest, if one considers the utilization of services rather than the number of physicians residing in a region, one can overcome to a large extent many of the limits associated with physician population ratios.

However, given the sensitivities around this subject, the headlines which occur when physicians "Head South", the concerns expressed by the Canadian Medical Association about the future supply of physicians, and the public's high regard for their doctors, we have designed the study to ensure that any biases in the analyses serve to overestimate the need for physicians. By building our needs estimates primarily around current delivery patterns, we built in the assumption that all services delivered were needed, and that they needed to be provided by physicians.

Could we be wrong that there is a surplus of physicians in Manitoba? If the number of generalist physicians was decreased, would this produce long waiting lists for appointments? Although Manitoba has fewer physicians per capita than some provinces (Ontario and British Columbia), our supply is similar to that of the other prairie provinces and higher than that of Newfoundland and New Brunswick. It also provides some perspective to know that Manitobans currently receive considerably more visits from physicians than do Americans. Analyses we have done using data from the US National Ambulatory Care Survey found that Americans average only 3.2 physician visits per year, while Manitobans make on average 5.0 visits.[52] Winnipeg residents' physician contact rate is even higher. If, as suggested by the Manitoba Medical Services Council (the joint management committee of the Manitoba Medical Association and Manitoba Health), some of the frequent reasons for contact such as an annual physician exam are unnecessary, our physician need estimates are too high, and our estimated provincial surplus of 64 to 98 physicians is too low.

A member of the Manitoba Nursing Union observed: "As nurses, we are actively promoting changes to the health care system which will provide better and more cost-effective primary health care. The MNU has argued for a more community-centred approach to primary health care. A cornerstone of this approach is an interdisciplinary health care work force, which acknowledges and utilizes the skills of nurses in providing primary care. Within the current structure of the health care system, there are significant barriers to the implementation of an integrated community health centre model of delivery. The over-supply of physicians delivering primary care must be addressed in order for change to occur. As long as physician over-supply persists, the movement toward more efficient use of nursing resources will be limited."

[52] In another study, Fuchs and Hahn (1990) observed that although the U.S. spends substantially more providing physician services than is spent in Canada or Manitoba, these higher expenditures do not result in Americans receiving more care. American physicians are paid more, and spend more on overhead.

Our approach is designed to take into account the key factors affecting residents' need for physician services, including age, gender, socio-economic and health characteristics. Other studies have used similar factors in assessing the health care needs of populations.[53,54] In particular, our use of separate adjustments for premature mortality and socio-economic status (in addition to demographic factors) is supported by a recent study of health need indicators in Quebec: Birch et al. (1995) found that their socio-economic index was the best single predictor of residents' self-reported health status, but the inclusion of mortality data provided additional explanatory power. That is, separate adjustments for socio-economic status and mortality were not redundant; mortality-based adjustments added explanatory power beyond what was provided by socio-economic variables. The same is true of our approach.

An alternative approach might have been to restrict the analyses to general practitioners only, and to assume that in urban centres where some specialists provide primary care services, the number of GPs per population should be less than in rural areas. (This was the approach taken by the Physician Resource Committee.) However, it is only after doing an analysis such as the one undertaken here that it is possible to estimate how much lower that ratio should be.

There are other factors which we have not incorporated into our estimates of how many physicians an area needs. For example, populations which are growing or declining will have different profiles for needs projections. However, since the population of Manitoba is changing

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[53] The Wisconsin Health Services Research Group (1975) developed an Index of Medical Underservice by weighting four factors: percent of the population aged 65+, percent below poverty, the infant mortality ratio, and the primary physician to population ratio. This approach was used by the Bureau of Community Health Services in the preliminary designation of medically under-served areas for the federal HMO program. The approach was later criticised (Kleinman and Wilson, 1977) because there was little or no difference found between under-served areas and adequately served areas in terms of physician contacts per resident (not a problem with our approach). Medically under-served area residents were found to report poorer health status and used some preventive services less than did adequately served areas.

[54] By basing our assessment of an area's need for physicians on an empirical assessment of how different types of people actually use physicians, we overcome many of the criticisms of the needs-based planning approach in Britain which relies on the Jarman Index (Smith, 1991; Talbot, 1991; Carr-Hill and Sheldon, 1991). The Jarman index was developed by surveying general practitioners about factors which they thought increased their workload, including the percentage of the population under five years old, in lower social classes, unemployed, or living in overcrowded conditions. These factors were then derived from census data and weighted according to the importance which general practitioners gave them. It has been determined that this approach does not accurately reflect the factors which affect physicians' workload and may have the perverse effect of generating longer list sizes or workloads per physician (Carr-Hill and Sheldon, 1991).

quite slowly, and since the over/under-supply everywhere except Winnipeg is relatively small, we feel this factor does not significantly affect our projections.

Winnipeg has a surplus of 102-124 physicians, many of whom are specialists delivering primary care, yet a shortfall in medical care for Core area residents given their extraordinarily poor health. We estimate a need for 5-26 more physicians in these areas of the city (the uncertainty being due to difficulties in estimating the primary care contributions made by public health nurses). Our surplus estimate for Winnipeg likely underestimates the actual surplus located in the city, since Winnipeg-based physicians who provide services to non-Winnipeg residents are proportionally credited to those areas. If rural areas which now rely on Winnipeg are successful in recruiting physicians, the Winnipeg surplus would be even greater.

The identified surplus of 64-98 physicians is expensive, and reducing it would seem an attractive alternative to de-insuring services as a method for controlling costs. Reducing fees to Winnipeg physicians represents another alternative for controlling expenditures, as a small decrease would release enough funds to provide for substantial fee increases to physicians in high need, under-served areas. This kind of needs-based funding allocation is the primary recommendation of the Physician Resource Committee. It remains to be seen if physicians will accept such a policy. Currently de-insurance and prescribing guidelines are the cost-saving measures being sought by the Manitoba Medical Association (Patel, 1996).

Northern areas have strong claims to being under-served, as their physician contact rates are low in relation to the population's need for health care. We estimate a deficit of 32-43 physicians in the North, depending on how nursing station contacts are counted. Even if the deficit estimates are overstated due to the atypically low Northern physician workload in 1993/94, the North still has the only major physician deficit in the province (average workloads of Northern physicians tend to be lower than those in other areas due to travel times). Redressing these inequalities may require substantial shifting of resources and/or new forms of physician resource management. To that end, two recent changes are providing promising early results: the Parklands Family Practice Residency Training Program has successfully placed several physicians in rural practice, and an increase in physician remuneration from Manitoba Health has assisted the Northern Medical Unit in recruiting 5 of these graduates.

The Director of the Northern Medical Unit commented, "When the province increased the remuneration package, our phones started ringing with inquiries from physicians."

This latter finding, though preliminary, suggests that physicians can be successfully recruited to high need Northern and rural areas by increasing financial incentives, consistent with the major recommendation of the Physician Resource Committee.

Targeting high need Northern areas which include large native populations is complex. As one reader observed, "The issue of federal/provincial responsibility for these communities is unresolved to date. Planning for areas beyond the province's mandate is tricky at best; perhaps the perspectives of federal and native counterparts should be obtained before reaching conclusions and making recommendations on the needs of these jurisdictions."

The shortfall in rural Southern areas involves a relatively small number of physicians: one or two in most "high" or "moderate" need areas, three in Virden and Winnipegosis, and four in East Lake Winnipeg. Wherever an area relies on very few physicians, there is a continuing sense of crisis. It is important to appreciate, however, that the solution to this problem does not lie in graduating or recruiting large numbers of new physicians. We estimate that 26-27 physicians added to the rural South would eliminate the physician deficits in all areas. Meeting this need should be manageable through co-operative arrangements across areas for recruitment and scheduling. Physicians might be shared among communities, working part time in several communities where there is not enough work for a full-time physician in a single community. The same could also be accomplished using a small pool of salaried physicians, which might also provide improved continuity of care.

A representative of a rural organization describes the situation: Based on the analysis, the report concludes that many rural communities require only one or two physicians to correct their shortages. However, the report rightly goes on to point out that these same areas can be in a continuing state of crisis due to the fact that they are relying on a small number of physicians. These crisis situations have developed in rural communities when physicians leave due to their frustration with working long hours and being on-call a great deal of time without any supports or back-up from other physicians. Our membership has indicated that there are areas of the province which have had success with groups of doctors from neighbouring communities working together to ensure that there is a reasonable rotation of shifts. As well, more salaried positions may help to attract physicians to rural Manitoba.

While it is true that the findings of this report seem to support continued recruitment of foreign physicians willing to commit for 3-5 years in an under-served area (since past Manitoba graduates have not filled these positions), it is argued by many that foreign recruitment should be viewed as a short-term gain only. In the past, most of these physicians moved their practises to Winnipeg after their contract, thus adding to the over-supply of physicians in Winnipeg. If the early success of the Parklands Family Practise Residency Training Program continues, and if significant financial incentives work, Manitoba may be able to become self-sufficient in training physicians for the high need areas of the provinces.

Despite the overall surplus of physicians in Winnipeg, we identify a deficit of contacts made by Core area residents relative to their high need for medical care. Although Inner Core residents already have a somewhat higher rate of contact than do residents of other areas, they are still under-using relative to their poor health. They have low rates of receiving preventive services, and high rates of chronic disease and hospitalization for conditions which should be avoidable with good medical care.

One physician questioned whether residents in high need areas such as the North or the Winnipeg Core have the same capacity to benefit from medical or other services as do residents of low need areas such as those of South Winnipeg, an area we identify now as over-served. Evidence suggests that high risk patients are in fact those most likely to benefit from medical interventions. French physicians and public health authorities developed a prenatal care program using physicians and midwives to target pregnant women. Poorly educated mothers were hardest to involve but benefited most (Papiernik et al., 1985). In a Martinique test of the program, the risk of pre-term birth in the disadvantaged group was reduced to the level of the privileged group (Goujon et al., 1984).

Physicians are clearly needed for treating patients with acute disease and trauma. It is important, however, to consider whether more medical care is the answer to poor health in all under-served areas, or whether societal investment in early childhood interventions, improved sanitation, and the creation of meaningful employment would have a greater impact on the health of individuals and families. It is not surprising that we did not find a strong relationship between physician supply, use rates, and health characteristics of the population. Increasingly, questions about the role of medical care in improving the health of populations are being raised (Grantham-McGregor et al., 1991; Weikart, 1989; World Bank, 1993), so society's expensive investment in medical care must be weighed against the wide range of needs of residents of high risk areas.

Our analyses demonstrate that the province spends more per capita providing physician services to Winnipeg and Brandon residents, at least in part because more of it is delivered by specialists. We are not the first to observe that care provided by specialists is more expensive than that provided by family practitioners, even after controlling for case mix (Greenfield et al., 1992). Have we ignored or undervalued the role which specialists play in delivering ambulatory care to Winnipeg residents? While we are continuing to investigate this issue, to date we have identified no evidence to suggest that Winnipeg residents derive significant benefits from having a higher proportion of their primary care delivered by specialists. For example, elderly residents of Winnipeg score no better than their non-Winnipeg peers on interview based measures of health status ("In general would you say your health is ...") or functional status (Shapiro et al., 1996). The same pattern is true for mortality based measures such as life expectancy and, as we have shown, premature mortality. Furthermore, although we have not presented the analyses here, Winnipeg family practitioners provide more care than do specialist physicians to those most in need of care, those at high socio-economic risk and the elderly. Others have also observed that there is no difference in the quality of the primary care provided by general practitioners, generalist or subspecialist physicians (Greenfield et al., 1995; Franks et al., 1993) and some research suggests that family physicians may provide more effective first-contact access to health care than is provided by either general internists or paediatricians (Parchman and Culler, 1994). In Germany, there has been a deliberate move to combine controls on the number of physicians with measures to encourage family practitioners over specialists (Henke et al., 1994).

No attempt has been made to build academic teaching needs into this assessment of physician deficits and surpluses although some proportion of what we identify as surplus Winnipeg physicians should rightly be viewed as resources essential to the training of new physicians for Manitobans. However, Winnipeg-based academic physicians who are conducting research or filling administrative or community health roles would only contribute to the estimates of physician surplus to the extent that they bill (or file evaluation claims) for visit based contact. Note that in-area *supply* calculations credit all Winnipeg based physicians to Winnipeg. Our approach based on *visits* is free of this problem.

POLICY DIRECTIONS

Our findings suggest the need for conservative targets concerning how many physicians are needed in Manitoba. The data also argue against policy initiatives such as user fees and the de-insuring of various medical services as methods of putting more money into the physician payment pool. Given that Manitoba's overall physician supply is "adequate to more than adequate", needs-based planning with a commitment to ensuring that physicians are equally available across the province is a strategy of cost control that makes sense.

MCHPE has worked with the Physician Resource Committee to develop a wide variety of policy options to address the problems of physician surplus and deficits identified. MCHPE supports these options assuming rapid, meaningful steps are taken which target both the deficits and surpluses and as long as the success of these policies are monitored. In the event of failure to reduce the surpluses and to fill the deficits, alternative policies should be considered including those which have been implemented in other provinces based on the restriction of billing numbers. These might include:

Decrease the physician supply serving Winnipeg/Brandon residents by:

- Issuing new billing numbers for practice in Winnipeg only under extraordinary conditions, with a small annual maximum (10-15 per year) for general practitioners, general internists, and general paediatricians whose practice serves Core area residents. (Based on 1991-1994 data it would take 15 years of restricted additions to eliminate the surplus we have identified.)

- Ensure that the number of new Winnipeg practitioners is less than the number departing/retiring.

- Eliminate current fee incentives to general practitioners, general internists, and general paediatricians, Brandon-based and restrict the issuing of new billing numbers for this area until the surplus is reduced.

- Reduce the Winnipeg surplus by paying 5-10 senior physicians from the fee for service pool to take a 1-2 year sabbatical from practice to put evidence based decision making into practice. There is growing recognition that much of medicine is based on practices of unknown efficacy. Surplus physician resources could be used to great potential public benefit to monitor and evaluate existing patterns of practice such as those we have documented in the treatment of hypertension.

Information on supply and contact rates relative to needs, combined with factors such as the number of physicians nearing retirement age, the availability of alternative services (including nursing stations or clinics) and community isolation, should be used to decide where new billing numbers are issued. This information should be updated annually.

- Physician resource planning should be done on the basis of full-time equivalent counts, not head counts. Manitoba has a powerful data base for resource planning. While the contract signed between the Manitoba Medical Association and the province limits the number of billing numbers that can be active at any given time to 1950, number of full-time equivalent physicians practising in the province is much more important than the number of heads.

- Steps should be taken to ensure that salaried physicians accurately file evaluation claims. While salaried physicians may have additional responsibilities not well captured by current tariffs, evaluation claims are an invaluable administrative means for monitoring the expenditures of public funds. In a few areas, they now appear to be substantially under-reported, particularly in Churchill.

A longer term strategy for decreasing the physician supply (or expenditures on physicians) and increasing expenditures on alternative means of improving population health should be developed. We pay a substantial price to train and pay physicians. Evidence from our own and other studies demonstrate that we need approaches other than adding health care practitioners to improve the health of our population.

As one physician observed: "One of the assumptions which I find most troubling is that primary care interventions are effective in changing the 'health' of a population in some identifiable cause/effect relationship".

A good case could be made for including payments for physicians as part of the needs based funding allocations given the new regional health authorities.[55] If per capita allocations for physicians were made (including Winnipeg), the inequities across the province would be partially resolved. Regional associations, if they chose to do so, could invest in nurse practitioners, clinical psychologists and other professionals to complement physicians.

A rural hospital administration proposed the following: Fund the Northern and Regional Health Authorities on a per capita basis for generalist and specialist physicians. The formula could take into account the age/sex adjusted populations of each region, including Winnipeg and Brandon. If there was a way of quantifying need for both generalist and specialist physician supply, this could also be factored into the equation. In this way the under-serviced regions would have appropriate money to attract and develop generalist and specialist physician practices. The urban centres which presently have an over supply of physicians would lose their funding base that retains the status quo. To me, this would be a more effective way to correct the physician supply problem than trying to deal with it through adjusting billing numbers. It would also give the regions the ability to either develop their own physician programs or to purchase those program from urban centres. The key element is that the Health Authority would have the funding to make that choice.

[55] This is the approach recommended in The Victoria Report on Physician Remuneration, the July 1995 report of the Federal/Provincial Territorial Advisory Committee on Health Services.

CONCLUSION

We have identified a surplus of physicians in Winnipeg and Brandon. Have we undervalued the role of physicians generally? Has our relative approach to estimating need for physician services mis-specified the problem? We think not. Using an entirely different approach the Physician Resource Committee, which had the full participation of the Manitoba Medical Association, also concluded that "there appears to be an excess of physicians providing primary care services in Winnipeg."

There is no evidence that more money, particularly in the form of user fees, is needed, or that de-insurance makes sense as a method of controlling expenditures on physicians. De-insurance does not deal with the physician surplus problem and results in a tax on the sick. Since physicians have at least as much influence over high use patterns as do patients, reducing the physician surplus and moving to population based funding may be the most effective methods of fairly compensating physicians while maintaining a strong medical system with universal access. At this time of fiscal constraint we need to focus on preserving what is best about the Canadian medical system. It makes sense to control physician expenditures and to manage the implications of doing so. We have provided ample evidence of the need to move in this direction, and guidelines on how to do it.

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APPENDIX I: METHODS

Study Period

Unless otherwise noted, data for this report is from the Manitoba Health data base for the fiscal year 1993/94 (April 1, 1993 to March 31, 1994). Location of residence was determined by the municipal code of the resident, except in the case of Status Indians, who were assigned on the basis of postal code, because the registry file assigned the region of residence as the First Nation band location, and individuals often live elsewhere.

Development of Physician Service Areas (PSAs)

In an effort to identify patterns of medical help-seeking within the rural and remote regions of the province, we used the administrative data to identify physician service areas on the basis of where general practitioners were providing their services and where residents were receiving services from these physicians. The starting point for grouping municipalities was based on Manitoba Health physician service areas developed by Andrea Zajac. We then examined successive groupings of rural municipalities, assessing the percentage of ambulatory visits provided to area residents by physicians whose practice is primarily in the area. The final set of areas was selected on the basis of the best overall fit from both a population and physician perspective. In this process ambulatory visits to general practitioners for the fiscal years 1990/91, 1991/1992, and 1992/93 were examined. (Three years of data were used to increase the stability of the results.) Appendix Table A4 identifies the towns, villages, rural municipalities and First Nations communities that make up each area.

Population Values and Population Based Rates

Population values for each area were determined from the Manitoba Health Population Registry file. In calculating rates of events (eg. Visit rates), population as of the midpoint of the year were used. For rates which required a number of years of data to ensure stability (eg. premature mortality), five years of data were used (calendar years 1989-1993). Estimates derived from the Manitoba Health Population registry have been shown to closely track population estimates drawn from Census data.

Premature mortality

Premature mortality (death before age 75) is an important indicator of the general health of a population; high premature mortality rates indicate poorer health. The premature mortality rate is calculated as the number of deaths of people aged 0-74 years, divided by the number of residents between 0 and 74 in the area. This value is standardized to account for age/sex differences in populations. Five years of data (1989-1993) were used to ensure stability of the rates.

Socio-Economic Risk Index (SERI)

The SERI is a composite index of six measures of socio-economic status that mark environmental, household, and individual conditions which put residents of a particular area at risk for poor health, *and hence are associated with higher need for health care.* The following six variables were chosen (from a pool of 23) for their strong relationship to health status and utilization of health care resources:

1. The percentage of people unemployed between the ages of 15 and 24,
2. The percentage of people unemployed between the ages of 45 and 54,
3. The percentage of single parent female households,
4. The percentage of high school graduates between the ages of 25 and 34,
5. The percentage of females participating in the labour force, and
6. The average dwelling value.

The first three variables are negatively related to health status (high values being associated with poor health), while the last three are positively related to health status. The SERI integrates data from all six of these variables into one composite indicator of socio-economic status. SERI values were calculated for each physician service area on a standardized scale, with the provincial average corresponding to a SERI value of 0. Negative values represent areas at lower risk, while higher values represent areas at higher risk. For a thorough explanation and discussion of the SERI, see Mustard and Frohlich (1995).

PSAs and SERI values for the city of Winnipeg

Most of the province was divided into PSAs based on groupings of physicians and their catchment area as described above. However, this method could not be used in the city of Winnipeg, because patients travel all over the city for treatment. Therefore, a different method was needed to divide the city into PSAs. Census data were used to characterize the 800 enumeration areas in Winnipeg according to mean household income, mean education level of women, and labour force participation. Mean household income data provided maximum

sensitivity to distinguish areas, so was used to divide Winnipeg into 9 PSAs. Some enumeration area boundaries do not coincide precisely with postal code boundaries (which were used to establish area of residence). Therefore, SERI values for some Winnipeg PSAs were calculated as weighted averages of the SERI values for the enumeration areas which made up the PSA.

Estimating "Need" for Physician Visits

Our analysis of residents' need for physician visits is based on several assumptions: first, we assumed that on average, Manitobans receive visits in a way that reflects the needs of their age, gender, and socio-economic characteristics. Second, we assumed that individuals with similar characteristics require a similar number of physician contacts regardless of where they live. Finally, we assumed that areas with residents in poorer health should be provided more visits than areas with healthier residents, other things being equal.

We used a two step process to generate estimates of the need for physician visits in each area, expressed as the average number of visits needed per resident per year. (A numerical example is provided below). Step 1 accounted for those factors which have been shown to influence a population's need for physician visits: differences in the age/sex structure of the population and the socio-economic characteristics of the area and its residents. The Step 1 values were produced by a regression analysis in which actual 1993/94 visit rates were regressed against age/gender distribution and SERI values for each region (using 21 age groups, and including all interaction terms). Essentially, this analysis results in a description of the Manitoba population's receipt of physician visits in 1993/94 according to demographic and socio-economic factors.

The second step modified the Step 1 values to account for differences in the health status of area residents (as measured by premature mortality rates). This extra step was done to recognize the desirability of providing more visits to areas whose residents were in poorer health, other things being equal. We modelled the relationship between each area's premature mortality rate and our Step 1 estimate of need using regression analysis, producing a slope of 0.56. For those areas whose premature mortality rate was higher (lower) than the provincial average (3.58 deaths per 1000 residents aged 0-74), we multiplied the difference between the area's premature mortality rate and the province's premature mortality rate by .56. This value was then added to (subtracted from) the Step 1 need estimate.

Example of calculation of Need values:

Springfield and Grahamdale residents had similar actual visit rates in 1993/94 (see values below), but Springfield's age/gender characteristics and much lower SERI value result in a lower Step 1 need estimate for Springfield than for Grahamdale. In the second step, Springfield resident's good health status (indicated by lower than average premature mortality) results in a reduction of the Step 1 need estimate to the Final need estimate, while Grahamdale's higher than average premature mortality rate results in an increase from the Step 1 to the Final need estimate.

	Springfield	**Grahamdale**
Actual 93/94 Visit Rate	4.58	4.51
SERI Value	-0.66	1.74
Step 1 Estimate of Need (from regression with age, gender, and SERI, plus interactions)	3.55	5.63
Premature Mortality	3.10	4.97
Provincial Average Mortality	3.58	3.58
Mortality adjustment	(3.10-3.58)*.56	(4.97-3.58)*.56
Final Need Estimate	3.28	6.41

Actual and needed visit rates for each area are listed in Appendix Table A1; SERI values and selected health status indicators are listed in Appendix Table A3.

In a few areas (Island Lake, Norway House/Cross Lake, Thompson, East Lake Winnipeg and Oxford House), physicians provide a relatively small proportion of the primary care contacts, ranging from 17% to 69%. But because these areas have some of the least healthy, highest need populations in the province, we did not want to exclude them from the analysis. To help make up for the lack of physician visits, nursing station contacts were included in the regressions used to estimate need.

Ratio of Actual to Needed Visit Rates

Needed visit rate refers to the final need estimate produced by the methods described above. Actual visit rates are the average number of visits actually provided to residents of each area in 1993/94. The ratio of the actual to the needed visit rate provides an indication of the degree to which residents were over- or under-served by physicians, based on population need characteristics. High use relative to need indicates a visit surplus (a ratio of 1.30 suggests residents used 30% more visits than needed), while low use relative to need indicates a visit

deficit (ratios below 1.0 indicate that residents received fewer visits than needed). Ratio values for each area are listed in Appendix Table A1.

Physician Supply and Access/Use of Physicians

Contact with Physicians

Because physician resource planning includes ensuring that populations have adequate access to physicians, we have measured access to care, the physician contact rate, and the average expenditures on physician contact which the province makes for each area's residents. All three of these contact measures count services used by the residents of an area, regardless of where the service actually took place. The number of visits per resident is a measure of the total ambulatory utilization of the residents of an area, and is defined as the total number of visits made by residents of an area, divided by the total number of residents living in the area. The percentage of area residents who have at least one contact with physicians during the year is an important measure of the ability of people in each area to access physicians. Cost per resident is useful because it is influenced by both the number of visits per resident and the expenditures per visit. (Note that we do not include the costs of lab tests, injections etc. which may occur during a visit). Expenditures per visit are influenced by the nature of the visit: whether it was to a specialist, and whether it was a routine office visit or a consultation. When listing and comparing these values across areas, we use age and sex adjusted values of cost per resident and expenditures per visit.

Ambulatory physician visits include office visits, consultations, outpatient/emergency department visits, visits to persons in Personal Care Homes, and visits to patients in their own homes. Visits to patients admitted in hospital are not included. Ambulatory care delivered as part of a global tariff, such as for the six-week post-operative care period, are excluded from this analysis because we do not know how many such visits occur. The biggest exclusion under this rule is for prenatal visits. Since some prenatal visits are also billed fee for service, we excluded all prenatal visits from this analysis. We estimate that prenatal visits account for approximately 3% of all ambulatory visits and affect Winnipeg and non-Winnipeg residents similarly (Tataryn et al., 1994). However, for areas with very high birth rates, we will slightly underestimate the need for physician resources.

Physicians Included and Excluded

Tables and figures describing physician deficits and surpluses are developed from the ambulatory visit activity of Manitoba physicians. While visits to all physicians are included, general/family practitioners, general medical specialists, and general paediatricians deliver 80% or more of the ambulatory physician visits for most areas, so our surplus and deficit calculations apply primarily to these groups.

For the in-area supply calculations, the tables documenting additions and deletions from the physician supply, and the table describing the age characteristics of Manitoba physicians, all physicians who filed at least one fee-for-service or evaluation claim with Manitoba Health in each fiscal quarter of 1993/94 are included (except radiologists, pathologists and anaesthesiologists). Thus all medical and paediatric subspecialists as well as surgeons and psychiatrists are included. Technical specialists (anaesthesiologists, radiologists and pathologists) were excluded because radiologists and pathologists deliver few direct patient contacts, and for all three groups, most or all of their earnings come from hospitals and hence their workload and movement is difficult to track.

Types of Physicians

Generalist physicians include general and family practitioners plus general internists and general paediatricians. We classified physicians as general internists or general paediatricians using a combination of characteristics of their practices as revealed in the claims data, their self-identification in the administrative system (how they are registered as a specialist with Manitoba Health and on Manitoba Medical Association files), and by having knowledgeable individuals categorize physicians as subspecialists or generalists. Since our databank contains no names or addresses of physicians all data was provided us in a form which maintained the anonymity of individual data.

General internists met all of the following criteria:
(1) registered as an internist (mdbloc 01)
(2) Office Visit was most frequently billed tariff
(3) certified in no other field(s)
(4) not identified as a specialist by either of two key informants

General paediatricians met all of the following criteria:
(1) registered as a paediatrician (mdbloc 02)
(2) Office Visit was most frequently billed tariff
(3) consultations made up less than 30% of all ambulatory visits
(4) certified in no other field(s)
(5) not identified as a specialist by any of three key informants

Full-time Equivalence

We used the Health Canada FTE methodology to count physicians based on annual payment benchmarks within specialties. The lower and upper benchmarks correspond to the 40th and 60th percentiles of physician payments by specialty. (Only physicians with at least one claim per quarter are included in the determination of the benchmark values.) Physicians with total payments below the lower benchmark were counted as a fraction of one FTE, equal to the ratio of total payments to the lower benchmark. For example, a physician earning $25,000 in a specialty in which 40% of physicians earned at least $50,000 would be counted as 0.5 FTE. Physicians with total payments between the lower and upper benchmark values are counted as 1.0 FTE. Physicians with payments above the upper benchmark are counted as 1 FTE plus the natural log of the ratio of payments to the upper bound. Thus a physician earning $200,000 in a specialty in which 60% earned at least $150,000 was counted as 1 + ln (200,000/150,000), or 1.287 FTE. Since there are different earning levels among specialties, benchmarks were developed for each specialty group independently. Problems were encountered in internal medicine and the paediatric sub-specialties because of the large proportion of university-based specialists whose practices are not accurately reflected in the physician claims files. For these two groups the Health Canada methodology resulted in a marked overestimate of physician supply (compared to data supplied by the specialist subcommittee of the Physician Resource Committee, the Dean of Medicine, and several key informants from those departments). Our solution for internists was to exclude physicians earning less than $40,000 from the benchmark calculations (this increased the benchmark values and reduced the total FTE counts appropriately). For subspecialist paediatricians, several mathematical approaches were tried but did not provide results consistent with other sources. Therefore, each subspecialist Paediatrician was counted as 1.0 FTE. (Generalist paediatricians were counted using normal Health Canada methods.)

In-area Supply

An FTE value was determined for each physician based on total payments, using the Health Canada FTE methodology described above. Physicians were assigned on a monthly basis to the area from which most of their patients were drawn. The physician's total FTE value was then allocated among the areas in proportion to the *number of visits provided* while they practised in each area. For example, a physician may be assigned to area A and area B for six months each, but if they provided twice as many visits while in area A, then area A will be credited with a greater proportion (2/3) of the total FTE value. This method helps to account for the substantial mobility of many rural physicians, while still allocating FTE contributions according to activity levels, not just the location of the physician.

Physician Workload

Average workload values (the number of ambulatory visits provided per year) were calculated based on physicians who, in fiscal 1993/94, (1) billed in all 4 quarters, (2) had total billings of at least $40,000, and (3) provided at least 400 ambulatory visits. In order to produce workload figures which fairly represented visit rates of typical physicians, we included only on those between the 40th and 60th earnings percentiles (1.0 FTE physicians). Outside Winnipeg, only General Practitioners were included; for Winnipeg, workload was calculated as the weighted average of the workloads of general & family practitioners, general internists, and general paediatricians.

Physician Surplus/Deficit

These figures were calculated by multiplying the difference between the actual and needed visit rates by the population of each area, and dividing by the average workload of generalist physicians in that region.

Salaried Physicians

Our methodology is dependent on accurate reporting of physician contacts. While salaried physicians are in most instances required to report contacts via evaluation claims, there is some concern that these are under-reported. If this were true we would underestimate the visits and supply of physicians available to areas served by salaried physicians. Our earlier work estimated that between 90 and 98% of all ambulatory visits are documented through the claims system and available to analyses such as developed here (Tataryn et al., 1994). Previous work in Central and

Westman regions suggests that when one controls for age and other key characteristics, workloads of salaried and fee-for-service physicians are quite similar.

Because we are working with some very small areas for this analysis, we assessed reporting patterns in each of the physician service areas to detect anomalies using the following approach. For each area[56] we compared the number of physicians (head counts) to the number of full-time equivalent physicians based on fee for service billings and evaluation claims. Since there seemed to be some tendency for there to be fewer FTEs per salaried head count than per fee-for-service head count, we attempted to see how much we might be underestimating salaried physician supply by using the fee-for-service ratio of heads to FTE (to estimate the supply of salaried FTE physicians). This approach suggested that we might underestimate the North's supply by 4.5%, the rural South's by 3.2% and Winnipeg's by 0.5%. However, when we applied this approach to each of the physician service areas individually, none showed substantial under-reporting, so no adjustment was made.

We also compared the number of claims filed by salaried and fee for service physicians for visits which occurred in hospital emergency and outpatient departments with the number of such visits reported by the hospitals on HS-1 forms - as indicated by visits to general and special clinics, outpatient day and/or night care programs and total visits to emergency units. For each hospital we calculated the number of visits which were undocumented in billings data (visits from HS-1 forms minus visits from physician claims). We then divided these visits by the physician workload for the area to estimate the number of physicians under-counted using billings data. Overall, we estimate that we are missing 25 urban physicians and 26 rural physicians. Most of the urban difference, 25 physicians, are emergency room physicians who do not file evaluation claims (from Seven Oaks, Victoria, Misericordia, Concordia and Grace hospitals). The rural hospitals where we underestimated by more than one physician were Selkirk, Thompson, the Pas, Flin Flon, Swan River, Portage, and Brandon. The impact of these missing data would be to underestimate the Winnipeg surplus by approximately 25 physicians and to overestimate the deficits in the North (by approximately 6-8 physicians) and in the rural South (18-20 physicians).

[56] Note that we were only able to do this for salaried physicians who reported under individual billing numbers. Some clinics are allowed to use one billing number for reporting the services of multiple physicians. In general the earnings under these numbers were small, with only Leaf/Lynn and Winnipeg areas showing more than one FTE physician. Winnipeg has other salaried physicians which are not counted as part of this analysis, including salaried emergency room physicians at the non-teaching hospitals, and contacts delivered through the Manitoba Cancer Treatment and Research Foundation. Hence the Winnipeg surplus is actually higher than that reported.

Stability of Physician Supply and Contact Rates over Time

Our ability to draw inferences about physician use patterns depends on the consistency of the patterns are that we are documenting. Newspaper accounts document the major concerns of rural residents when a physician retires or leaves the area, suggesting substantial instability in the availability of physicians and hence perhaps contact rates for rural Manitobans.

Appendix Figure A2 illustrates visit rates for two years, ranking areas from left to right according to the average number of physician visits made by area residents in 1993/94 (the rates are age and sex adjusted to allow valid comparison). The figure shows remarkable stability in the rates with which residents contact physicians. Almost all of the areas with high contact rates in 1993/94 also had high contact rates in 1992/93. Some areas, most notably Gilbert Plains and Gillam, showed an increase in visit rate from 1992/93 to 1993/94, while others, including Leaf/Lynn, Piney District, and Coldwell, showed a decrease. However, the overall pattern is one of consistency in physician contact over the two year period, suggesting that our observations about well served and poorly served areas are likely accurate. Note that all physician visits by area residents were counted in these rates, regardless of whether the visits were to physicians located in the patient's area of residence or to physicians who practised in other areas.

A direct examination of the stability of in-area physician supply over a three year period also revealed a steady pattern. Even among the areas with very few physicians, there were no major (greater than 20%) changes in availability from 1991/92 to 1993/94. Appendix Figure A3 shows the in-area physician supply for each area, ranked from most stable on the left (Winnipeg) to the least stable on the right (Oxford House). The values graphed on the figure are standardized values, showing that for Oxford House in 1992 there were approximately 17% more physicians than the average of the three years, whereas in 1991 there were about 83% of the three year average number of physicians. Using the deviation around the mean allows valid comparison of large centres, such as Winnipeg, with smaller areas, which have much smaller physician supply values. For example, a change of five physicians over the course of three years in Winnipeg, where there were 1027 FTE physicians, would have little impact on the stability coefficient, whereas a change of five physicians in Thompson (which had 24.5 FTE physicians) would have a large impact on the coefficient.

Note that the stability index does not directly show the number of physicians in each area, it merely addresses the relative magnitude of change in physician supply. To determine whether

there are more or fewer physicians in the various areas one must look at the pattern of the symbols for each year. Areas such as Melita/Deloraine, which have a low circle, a dash in the middle and a high square are areas with yearly increases in the number of in-area physicians. Those with a circle at the top, followed by a dash in the middle and a square on the bottom are areas whose in-area physician supply has diminished each year. Portage would be an example of such an area, although the fact that it is closer to the left side of the figure suggests that Portage has a relatively stable physician supply. On the other hand, Winnipegosis has a very unstable physician supply which has been decreasing over the past three years.

Changes in Values from First Draft

Since the first draft of this report, which was circulated among some 75 key stakeholders, we have made several modifications to our methods to improve the accuracy of the values reported. Most importantly, we've corrected our FTE benchmark calculation method to include only physicians who billed in all four quarters of the fiscal year. This restriction, which is part of the Health Canada methodology, reduced the number of low-earning physicians included in the pool used to calculate the benchmark values, and therefore increased the benchmark values, which resulted in lower FTE counts of physicians. The In-Area Supply numbers are therefore lower than those listed in the first draft.

In addition, we have gathered input from additional informants, improving the accuracy of our classification of Paediatricians and Internists into generalist/specialist groups.

We also improved our estimates of physician workloads. Our previous method simply divided the total number of visits provided by all generalist physicians by the total number of generalist FTEs. This mean value represents the average of all generalist physicians, but the mean can be unduly influenced by unusually high or low practice patterns. Therefore, we adopted a new method to more fairly estimate the workload of a typical 1.0 FTE generalist physician: the number of visits provided by all 1.0 FTE physicians, divided by the number of 1.0 FTE physicians. Workload values for the North, rural South and Brandon were only slightly affected. The new Winnipeg workload value is about 35% higher (5696 vs 4224 visits per year), probably reflecting the greater proportion of part-time practitioners in Winnipeg. The new (higher) workload values result in lower deficit/surplus values for all areas (except Brandon, where the workload value dropped slightly).

APPENDIX II: Other Canadian Initiatives to Accomplish Needs-Based Placement of Physicians

Across Canada there have recently been initiatives in most provinces directed at controlling the supply and location of physicians. The Nova Scotia physician policy development paper was presented in March 1993. This report recognized an over-supply of FTE family physicians in Nova Scotia, and also suggested the development of a comprehensive incentive/disincentive package to promote a more equitable regional distribution of physicians. A prior report of the 1989 Nova Scotia Commission on Health Care noted that not only is the annual increase in the number of physicians much greater than the annual population increase (2.2% vs. 0.4%), but the rate of per capita physicians' services is also increasing. Given the high cost of medical care it was suggested that limitations into practice needed to be considered, thus the physician policy report recommended an impact analysis for the addition of new physicians, capitation and salaried payment systems, and a ceiling on the annual rate of growth of expenditures.

In 1992 the physician resource plan for New Brunswick was presented by the government. It too attempted to deal with inequities in the geographic and specialty distribution of physicians in the province by using incentives to move physicians to rural areas and disincentives to practice in urban areas. Currently fee-for-service payments are capped. As they moved toward regionalization of health care, the physician resource committee suggested that the regions will need to maintain control over the number of new physicians entering practice in each area. The provincial government intends to maintain control over the entry of new physicians into practice by limiting the annual budgets of health regions. Regional hospital corporation boards have been given the mandate to manage the number and distribution of physicians, and they can do this because of the link between hospital privileges and billing numbers. New physicians cannot obtain a billing number unless they have hospital privileges, and they cannot get privileges unless their presence is consistent with the annual quota for the region.

Restrictions on new physicians entering fee-for-service practice via restriction of billing numbers have been implemented in Ontario, which is the province with the highest supply of physicians in Canada. There has been a temporary moratorium on new physicians entering the fee-for-service practice, unless they have completed either undergraduate or at least one year of post graduate medical education in Ontario. Although the Health District Councils only act in an advisory planning role (that is, they do not make budgetary decisions), global fee-for-service payments to physicians and other health care professionals have been capped.

Alberta has taken aggressive action to cutback health care costs with the recent provincial fiscal statement aimed at balancing the budget. Alberta Health is in the process of transferring responsibility for the delivery of health care services to the Regional Health Authorities, and a temporary restriction on new physicians receiving billing numbers was instituted.

Reductions in the payment schedule have also been instituted to control the location of new practices in British Columbia, Newfoundland and Quebec. In B.C., as in Ontario, local medical graduates are favoured by being exempt from a recently introduced 50% fee differential. New physicians may receive a 50% or a 100% billing number, depending on whether they have hospital privileges. Quebec remunerates at 70% of the fee schedule for the first three years of practice for new physicians who locate in large metropolitan areas. These incentive programs have apparently been effective in attracting new general practitioners to rural and remote areas (Contandriopolous et al 1996). Newfoundland has also reduced payments to general practitioners locating in over-served areas. They are currently remunerated at 50% of the payment schedule. The original plan identified only St. Johns as an over-served area, but the revised plan includes other areas of the province. Many of these measures are temporary, pending long-term recommendations from the various Physician Resource Committees, but the trend towards limitations to uncontrolled entry into medical practice is clear.

APPENDIX III: CHURCHILL

The Physician Service Area of Churchill was not listed in the tables and figures of this report because the census data (which determines the SERI value, and therefore several other values in the analysis) are unreliable due to the small population. The following list shows the values for the Churchill area, along with corresponding averages (or totals) for the North and the entire province:

	Churchill	**North***	**Manitoba***
Population	**1,122**	69,410	1,139,072
% aged 0-2 yrs	6.46	7.01	4.41
% aged 75+ yrs	**1.26**	1.86	5.91
Premature Mortality	5.65	5.03	3.58
SERI	**0.29**	3.69	0.00
In-area FTE physicians	**1.89**	0.94	1.27
% of visits in-area	**32%**	75%	84%
% pop with 1+ visits	41%	73%	80%
Actual Visit Rate	**1.17**	4.53	4.78
Needed Visit Rate	5.28	6.26	4.38
Net Physician Deficit	1.4	39-46	64-98 surplus

* Note that values for the larger region referred to as "The North" and provincial totals include all Churchill residents and services provided to them - both in this table and in the entire report.

As the table shows, Churchill has a very small population, and in particular, fewer elderly than other Northern areas (and far fewer than the province as a whole). The SERI value we calculated for Churchill is much lower than other Northern areas, and was determined to be invalid because of the unreliability of census data for the area. The low SERI value, in turn, affected our estimate of needed visits for Churchill residents. The result is that our estimated deficit (1.4 FTEs) is too low; the Churchill area probably needs more than 1.4 additional FTE physicians to serve area residents. Exactly how many more, however, is impossible to determine using our method.

Churchill's actual visit rate appears extremely low. This may be due to under-reporting of evaluation claims by salaried physicians, or may reflect a reality of extremely low visit rates to physicians. If a higher value was reported, our estimate the physician deficit would be lower. Similarly, the percentage of physician visits provided in-area also appears very low, and may be subject to the same recording problems as visit rates.

Table A1: Actual Visit Rates, Estimates of Visits Needed (Step 1 and Final), and Ratio of Actual to Needed Visits

		A	B	C	
Region	**Population**	**Actual* Visits per Resident**	**Step 1 Estimate: Age, sex, SERI Adjusted Visits Needed per Resident**	**Final Estimate: Visits Needed per Resident**	**Ratio of Actual to Needed Visits (A/C)**
NORTH					
Leaf/Lynn	2569	3.81	4.62	4.62	0.82
Gillam	1737	5.67	4.21	4.84	1.17
Thompson	26138 - 28820	4.07	4.88	5.59	0.73
Flin Flon	8722	5.20	5.05	5.84	0.89
The Pas	15640	4.55	5.07	6.11	0.74
Island Lake	5356 - 7046	1.60	8.04	8.21	0.20
Oxford House	2609 - 3198	2.64	8.33	8.86	0.30
Norway/Cross	5517 - 6439	3.90	7.83	8.88	0.44
SOUTH					
Springfield	26559	4.58	3.55	3.28	1.40
Tache	15076	3.79	3.91	3.37	1.12
Morris	14856	4.21	4.36	3.71	1.13
Steinbach	19166	3.65	4.18	3.81	0.96
Rockwood	14911	4.09	3.90	3.81	1.07
Souris	5847	4.55	3.90	3.85	1.18
Morden/Winkler	18985	3.36	4.36	3.88	0.87
Lorne	9141	4.47	4.07	3.89	1.15
Altona	6991	3.22	4.21	3.94	0.82
Carman	13165	4.03	4.27	3.98	1.01
Killarney	10460	4.43	4.46	3.99	1.11
North Norfolk	7603	4.29	4.22	4.00	1.07
Selkirk	29423	4.31	3.80	4.01	1.07
Seven Regions	5961	4.97	4.08	4.17	1.19
Melita/Deloraine	5855	4.16	4.76	4.18	0.99
Portage	20543	4.74	4.08	4.47	1.06
Russell	9161	5.22	4.58	4.48	1.17
Neepawa	6861	4.86	4.80	4.62	1.05
Boissevain	2381	4.72	4.87	4.62	1.02
Minnedosa	15215	4.46	4.77	4.64	0.96

		A	B	C	
Region	**Population**	**Actual* Visits per Resident**	**Step 1 Estimate: Age, sex, SERI Adjusted Visits Needed per Resident**	**Final Estimate: Visits Needed per Resident**	**Ratio of Actual to Needed Visits (A/C)**
Swan River	9690	4.68	5.23	4.88	0.96
Dauphin	11236	4.44	4.84	4.89	0.91
Virden	8539	3.76	5.29	5.08	0.74
Gilbert Plains	4524	4.76	5.34	5.25	0.91
Gimli	8045	5.55	4.98	5.26	1.06
Alonsa	8114	4.65	5.44	5.43	0.86
Roblin	4456	4.58	6.07	5.96	0.77
East Lake Winnipeg	10702 - 13869	4.47	5.62	5.97	0.75
Grahamdale	5213	4.51	5.63	6.41	0.70
East Interlake	9757	4.76	6.01	6.44	0.74
Winnipegosis	7669	4.72	6.11	6.45	0.73
Coldwell	4018	5.34	6.08	6.79	0.79
Piney District	3266	4.85	6.29	6.87	0.71
Sioux Valley	2973	5.72	7.14	7.19	0.80
BRANDON	46297	4.87	4.00	3.89	1.25
WINNIPEG					
Wpg South West	93024	4.63	3.01	2.50	1.85
Wpg South East	80792	4.71	3.50	3.08	1.53
Wpg North West	72291	5.05	3.67	3.36	1.50
Wpg North East	108803	4.69	4.01	3.74	1.25
Wpg South Central	53559	5.41	3.97	3.75	1.44
Wpg Adjacent	13997	3.94	3.97	3.75	1.05
Wpg West	66892	5.12	3.86	3.75	1.37
Wpg Old St. Boniface	24135	5.97	5.54	6.13	0.97
Wpg Outer Core	120212	5.42	5.63	6.17	0.88
Wpg Inner Core	33298	6.22	5.82	8.02	0.78

* Note: Actual visit rates represent actual utilization: total visits provided to area residents divided by the population of the area (not adjusted for age, sex or other factors).

Table A2: Physician Supply and Contact Indicators

Area	Population	Percent with One or More Contacts	Cost per Resident	Visits/ Resident	Head Count (Physicians)	In-Area Supply FTE Physicians	In-Area Supply per 1000 Residents
NORTH	**69410**	**78**	**99.42**	**4.53**	**79**	**65.2**	**0.94**
Leaf/Lynn	2569	82	82.48	4.03	NA	NA	0.78
Gillam	1737	99	128.55	6.15	NA	NA	0.74
Thompson	26138 - 28820	80	104.97	4.67	34	24.49	0.94
Flin Flon	8722	86	115.17	5.32	16	13.53	1.55
The Pas	15640	79	101.85	4.93	17	13.83	0.88
Island Lake	5356 - 7046	56	51.54	2.11	NA	NA	0.17
Oxford House	2609 - 3198	69	92.85	3.54	NA	NA	0.58
Norway/Cross	5517 - 6439	77	102.15	4.77	11	5.56	1.01
SOUTH	**356362**	**81**	**93.89**	**4.28**	**342**	**277.9**	**0.78**
Springfield	26559	83	105.00	4.62	18	14.18	0.53
Tache	15076	82	94.25	4.08	8	7.29	0.48
Morris	14856	82	94.06	4.21	14	7.58	0.51
Steinbach	19166	79	85.58	3.74	21	17.83	0.93
Rockwood	14911	81	95.79	4.19	14	9.00	0.60
Souris	5847	82	96.74	4.29	NA	NA	0.85
Morden/Winkler	18985	77	72.58	3.32	21	19.19	1.01
Lorne	9141	83	91.06	4.23	7	6.50	0.71
Altona	6991	77	71.23	3.18	NA	NA	0.64
Carman	13165	80	83.30	3.81	19	11.99	0.91
Killarney	10460	79	92.48	4.11	15	9.77	0.93
North Norfolk	7603	80	90.56	4.21	NA	NA	0.48
Selkirk	29423	83	97.63	4.32	24	17.58	0.60
Seven Regions	5961	85	104.54	5.01	NA	NA	0.46
Melita/Deloraine	5855	78	79.00	3.69	10	5.24	0.89
Portage	20543	83	94.31	4.69	16	19.43	0.95
Russell	9161	84	104.41	4.98	7	8.17	0.89
Neepawa	6861	82	98.02	4.44	6	8.54	1.24
Boissevain	2381	81	98.63	4.35	NA	NA	0.90
Minnedosa	15215	79	89.11	4.13	20	12.77	0.84
Swan River	9690	81	90.92	4.37	10	10.95	1.13
Dauphin	11236	82	89.75	4.11	20	20.63	1.84
Virden	8539	75	75.27	3.51	6	5.25	0.61
Gilbert Plains	4524	80	89.01	4.22	NA	NA	0.63
Gimli	8045	84	112.03	5.10	9	6.68	0.83
Alonsa	8114	82	99.94	4.58	7	6.53	0.81
Roblin	4456	79	90.09	4.31	NA	NA	0.74

Area	Population	Percent with One or More Contacts	Cost per Resident	Visits/ Resident	Head Count (Physicians)	In-Area Supply FTE Physicians	In-Area Supply per 1000 Residents
East Lake Wpg.	10702 - 13869	78	102.37	4.74	9	7.20	0.67
Grahamdale	5213	81	99.63	4.59	NA	NA	0.61
East Interlake	9757	83	105.46	4.82	11	7.54	0.77
Winnipegosis	7669	83	102.74	4.85	NA	NA	0.40
Coldwell	4018	85	115.74	5.32	NA	NA	0.69
Piney District	3266	80	97.35	4.32	NA	NA	0.75
Sioux Valley	2973	85	127.35	5.64	NA	NA	0.82
BRANDON	**46297**	**84**	**106.01**	**4.81**	**83**	**74.7**	**1.61**
WINNIPEG	**667003**	**85**	**119.94**	**5.07**	**1279**	**1026.8**	**1.54**
South West	93024	84	114.02	4.73	1279	1026.8	1.54
South East	80792	87	114.62	4.84	1279	1026.8	1.54
North West	72291	85	118.69	5.11	1279	1026.8	1.54
North East	108803	85	110.38	4.72	1279	1026.8	1.54
South Central	53559	85	136.01	5.16	1279	1026.8	1.54
Adjacent	13997	83	93.09	4.20	1279	1026.8	1.54
West	66892	85	117.62	5.00	1279	1026.8	1.54
Old St. Boniface	24135	88	132.94	5.62	1279	1026.8	1.54
Outer Core	120212	85	126.01	5.44	1279	1026.8	1.54
Inner Core	33298	86	142.15	6.21	1279	1026.8	1.54
MANITOBA	**1139072**	**84**	**109.98**	**4.78**	**1783**	**1444.6**	**1.27**

Percent with one or more contacts is the percentage of the population of an area that has contacted a physician at least once in the year. Cost per resident is the average cost of physician visits per resident. Higher costs tend to indicate greater use of specialists. Head count is an estimate of the number of physicians providing services to the residents of an area. Visits per resident is the average number of physician visits for residents of the area for fiscal year 1993-94 (age and sex adjusted to make areas comparable). In-area supply shows the number of FTE physicians providing services to the residents of an area. Details about the computations of in-area supply are provided in the methods appendix.

NA indicates less than 5 FTE physicians in that area.

Table A3: Factors Influencing an Area's Need for Physicians

AREA	% Population 0-2 yrs	% Population 75+ yrs	0-74 Mortality	Socio Economic Risk Index
NORTH	**7.01**	**1.86**	**5.03**	**3.69**
Leaf/Lynn	5.63	0.65	3.58	1.16
Gillam	7.75	0.40	4.70	0.59
Thompson	7.17	0.83	4.86	1.60
Flin Flon	4.47	4.56	4.99	1.17
The Pas	5.88	2.50	5.44	1.52
Island Lake	10.14	1.37	3.89	7.23
Norway/Cross	9.86	1.95	5.45	6.23
Oxford House	9.99	2.07	4.54	7.36
SOUTH	**4.22**	**7.07**	**3.42**	**0.29**
Springfield	3.36	5.11	3.10	-0.66
Tache	4.82	2.79	2.62	-0.03
Morris	4.59	6.01	2.44	0.21
Steinbach	5.13	5.19	2.93	0.10
Rockwood	3.88	5.01	3.42	-0.22
Souris	3.77	8.28	3.48	-0.48
Morden/Winkler	4.79	7.20	2.72	0.17
Lorne	4.34	8.50	3.26	-0.29
Altona	4.27	6.75	3.10	-0.02
Carman	3.95	9.03	3.06	-0.09
Killarney	3.82	8.93	2.76	0.06
North Norfolk	4.20	7.37	3.19	-0.05
Selkirk	3.56	5.15	3.96	-0.40
Seven Regions	6.84	5.82	3.74	-0.14
Melita/Deloraine	3.48	10.05	2.53	0.29
Portage	4.46	6.76	4.28	-0.19
Russell	3.93	8.10	3.40	0.23
Neepawa	3.02	11.30	3.27	0.33
Boisevain	3.39	10.66	3.15	0.42
Minnedosa	3.25	10.64	3.35	0.29
Swan River	3.80	9.89	2.97	0.77
Dauphin	3.19	11.11	3.68	0.32
Virden	3.78	10.44	3.21	0.87
Gilbert Plains	1.95	11.18	3.43	0.78

AREA	% Population 0-2 yrs	% Population 75+ yrs	0-74 Mortality	Socio Economic Risk Index
Gimli	3.37	8.94	4.10	0.44
Alonsa	4.41	7.46	3.58	1.32
Roblin	4.13	9.71	3.38	1.74
East Lake Wpg	6.97	3.33	4.20	1.99
Grahamdale	5.19	5.31	4.97	1.74
East Interlake	5.40	5.38	4.34	2.24
Winnipegosis	5.89	5.65	4.18	2.39
Coldwell	3.97	6.18	4.84	2.11
Piney District	3.26	10.09	4.63	1.71
Sioux Valley	5.48	6.91	3.66	3.36
BRANDON	**4.35**	**6.27**	**3.38**	**-0.31**
WINNIPEG	**4.24**	**5.69**	**3.58**	**-0.24**
South West	3.86	4.03	2.69	-1.26
South East	4.39	3.48	2.84	-0.67
North West	4.15	4.47	3.04	-0.50
North East	4.22	4.53	3.10	-0.16
South Central	3.40	8.96	3.19	-0.46
Adjacent	5.04	2.73	3.20	-1.22
West	3.55	6.21	3.40	-0.47
Old St. Boniface	3.88	11.21	4.63	0.00
Outer Core	5.12	6.47	4.55	1.59
Inner Core	4.69	10.06	7.50	1.59
MANITOBA	**4.41**	**5.91**	**3.58**	**0.00**

Note: % Population 0-2 indicates the percentage of the area's population under 3 years of age. % Population 75+ indicates the percentage of the area's population 75 years of age or older. 0-74 mortality refers to the premature mortality rate of the area; the Socio Economic Risk Index is the measure developed to identify areas at high risk for poor health due to high unemployment, low education, etc. Details of these measures are provided in the methods appendix.

Table A4: Listing of Communities Included in Each Physician Service Area with Observations about Recruitment and Nursing Stations.

Southern Physician Service Areas

Alonsa	
Alonsa LGD - south	
St. Rose du Lac	has trouble recruiting [1]
St. Rose RM	
Ebb and Flow First Nation	
Ochre River RM	
Alonsa LGD - north	
Lawrence RM	
Waterhen First Nation	
McCreary RM	
McCreary	has trouble recruiting
Crane River First Nation	
Altona	
Altona	
Rhineland RM	
Gretna	
Boissevain	
Boissevain	
Morton RM	
Brandon	
Brandon	
Cornwallis RM	
Elton RM	
Carman	
Carman	high turnover, has trouble recruiting
Dufferin RM	
Grey RM	
Victoria RM	
South Norfolk RM	
Roland RM	
Treherne	
Notre Dame	has trouble recruiting
St. Claude	has trouble recruiting

[1] Note: Information regarding recruitment problems was obtained in 1993/94 from the Manager of the Standing Committee on Medical Manpower, and from a survey conducted by the Manitoba Health Organizations. It is not meant to be exhaustive, and is provided for illustrative purposes only.

Coldwell		
Coldwell		
St. Laurent RM		
Eriksdale RM		recruiting
Lake Manitoba First Nation		
Dauphin		
Dauphin		
Dauphin RM		
East Interlake		
Peguis First Nation		
Bifrost RM		
Fisher		
Fisher River First Nation		
Arborg		has trouble recruiting
Jackhead First Nation		
Unorganized territory		
East Lake Winnipeg		
Fort Alexander First Nation		
Alexander		
Berens River First Nation	6 bed nursing station	
Lttle Grand Rapids	4 bed nursing station	
Pine Falls		
Powerview		
Poplar River First Nation	4 bed nursing station	
Bloodvein First Nation	2 bed nursing station	
Hollow Water First Nation		
Little Black River		
Victoria Beach RM		
Unorganized territory		
Gilbert Plains		
Gilbert Plains		
Gilbert Plains RM		
Grandview RM		
Grandview		has trouble recruiting
Ethlebert		
Ethlebert RM		
Gimli		
Gimli		
Gimli RM		
Armstrong		
Winnipeg Beach		
Riverton		
Dunnottar		

Grahamdale
- Grahamdale
- Siglunes RM
- Fairford First Nation
- Lake St. Martin First Nation
- Little Saskatchewan
- Dauphin River First Nation

Killarney
- Killarney
- Argyle RM
- Turtle Mountain RM
- Roblin RM
- Riverside RM
- Strathcone RM
- Oakland RM
- South Cypress RM
- Glenboro
- Wawanesa
- Cartright

Lorne
- Lorne RM
- Pembina RM
- Thompson RM
- Louise RM
- Manitou
- Pilot Mound — has trouble recruiting
- Swan Lake First Nation
- Somerset
- Crystal City — has trouble recruiting

Melita/Deloraine
- Melita
- Deloraine
- Edward RM
- Brenda RM
- Winchester RM
- Albert RM
- Arthur RM
- Waskada

Minnedosa	
Minnedosa	
Strathclair RM	
Miniota RM	
Woodworth RM	
Park LGD - south	
Hamiota	has trouble recruiting
Shoal Lake	intermittent problems
Shoal Lake RM	
Erickson	
Blanshard	
Saskatchewan RM	
Hamiota RM	
Harrison RM	
Rapid City	
Rolling River First Nation	
Clanwilliam RM	
Minto RM	
Keeseekoowenin First Nation	
Odanah RM	
Morden/Winkler	
Morden	
Winkler	
Stanley RM	
Plum Coulee	
Morris	
Morris RM	
De Salaberry RM	
Niverville	
Franklin RM	
Montcalm RM	
St. Pierre	has trouble recruiting
Roseau First Nation	
Emerson	
Neepawa	
Neepawa	
Rosedale RM	
Lansdowne RM	
Langford RM	
North Norfolk	
North Norfolk RM	
North Cypress RM	
Carberry	recruiting
McGregor	

Piney District
- Piney
- Stuartburn
- Buffalo Point First Nation

Portage La Prairie
- Portage La Prairie
- Portage La Prairie RM
- Long Plains First Nation
- Dakota Tipi First Nation
- Dakota Plains First Nation

Roblin
- Roblin
- Shell River RM
- Hillsburg RM
- Park LGD - North
- Valley River First Nation

Rockwood
- Rockwood RM
- Woodlands RM
- Stonewall
- Teulon

Russell
- Russell
- Birtle — has trouble recruiting
- Waywayseecappo First Nation
- Shellmouth RM
- Birtle RM
- Rossburn
- Rossburn RM
- Silver Creek RM
- Ellice RM
- Bincarth
- Russell RM
- Boulton RM
- St. Lazare
- Birdtail Sioux First Nation
- Gamblers First Nation

Selkirk
- Selkirk
- St. Andrews RM
- St. Clements RM
- Brokenhead First Nation

Seven Regions	
Sandy Bay First Nation	
Westbourne RM	
Gladstone	having problems recruiting
Glenella RM	
Lakeview RM	
Sioux Valley	
Sioux Valley First Nation	
Rivers	recruiting
Daly	
Souris	
Souris	
Whitehead RM	
Whitewater RM	
Sifton RM	
Glenwood RM	
Hartney	
Cameron RM	
Springfield	
Springfield RM	
Brokenhead RM	
Beausejour	
Lac du Bonnet RM	
Whitemouth RM	
Pinawa	advertising
Lac Du Bonnet	
Reynolds	
Garson	
Steinbach	
Steinbach	
Hanover	
Swan River	
Swan River	
Swan River RM	
Minitonas	
Minitonas RM	
Benito	
Bowsman	
Tache	
Tache RM	
St. Anne RM	
St. Anne	
La Broquerie RM	

Virden
- Virden
- Wallace RM
- Pipestone RM
- Elkhorn
- Archie RM
- Oak Lake
- Oak Lake Sioux First Nation

Winnipeg: Inside the perimeter, plus:
- East St. Paul RM
- West St. Paul RM
- Rosser RM
- St. Francois Xavier RM
- Cartier RM
- Headingly
- MacDonald RM
- Richot RM

Winnipegosis
- Winnipegosis
- Mountain LGD - North
- Mountain LGD - South
- Pine Creek First Nation
- Mossey River RM
- Shoal River First Nation
- Indian Birch First Nation
- Unorganized territory

Northern Physician Service Areas

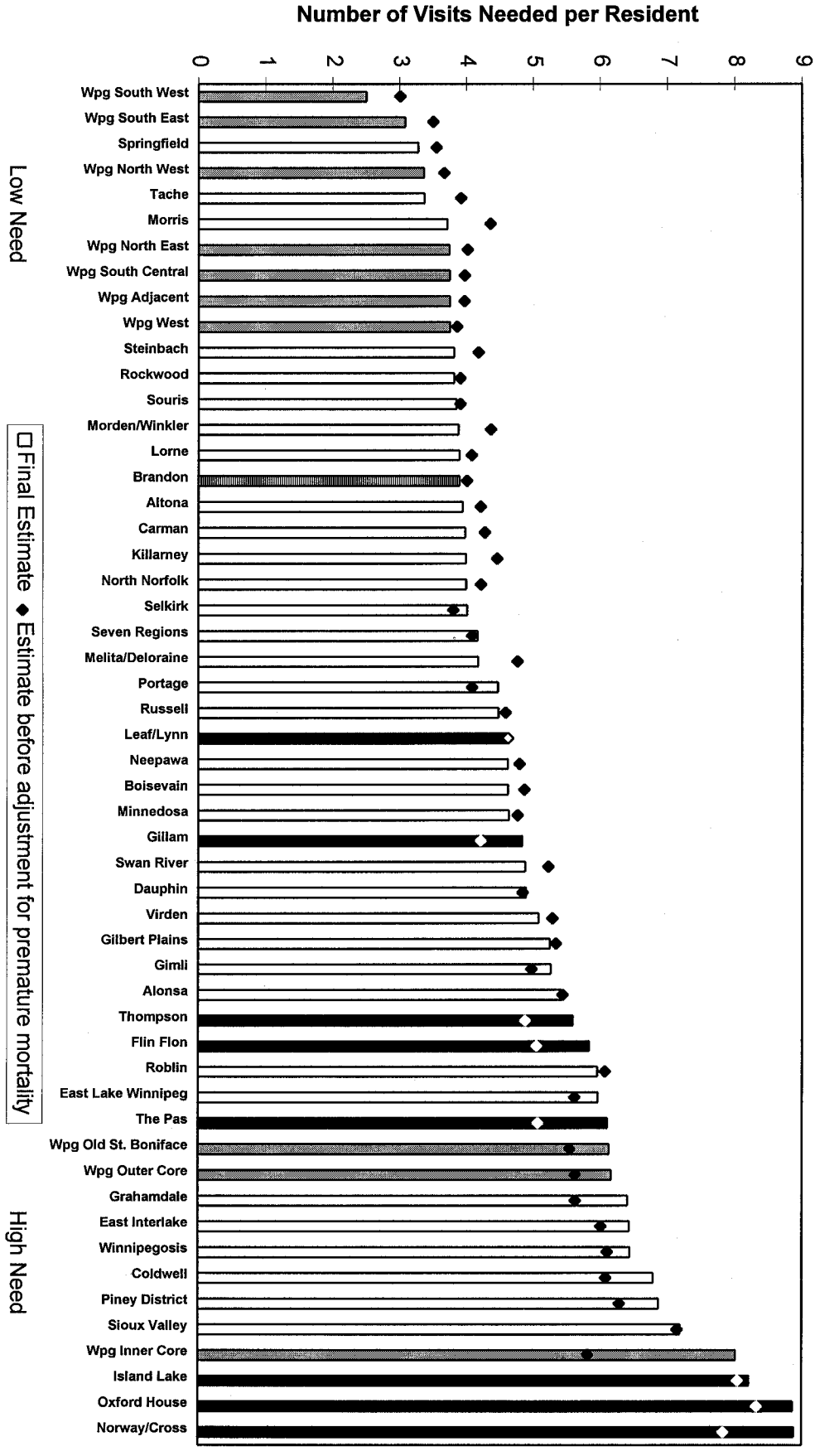
The Pas		recruiting
The Pas		
Consol		
The Pas First Nation		
Chemahawin First Nation		
Grand Rapids		
Grand Rapids First Nation		
Moose Lake First Nation		
Unorganized territory		
Flin Flon		recruiting
Flin Flon		
Snow Lake		
Thompson		recruiting
Thompson City		
Nelson House First Nation	10 beds in 2 nursing stations	
Mathias Colomb First Nation	4 bed nursing station	
Split Lake First Nation	4 bed nursing station	
Shamattawa First Nation	4 bed nursing station	
York Factory First Nation		
Northlands First Nation	2 bed nursing station	
Barren Lands First Nation	3 bed nursing station	
Churchill First Nation		
War Lake		
Gillam		
Gillam		
Fox Lake First Nation		
Churchill		has trouble recruiting
Churchill		
Leaf/Lynn		concerned about losing physician
Leaf Rapids		
Lynn Lake		
Norway/Cross		
Norway House		
Cross Lake	4 bed nursing station	
Oxford House		
Oxford House First Nation	3 bed nursing station	
God's Lake First Nation	4 bed nursing station	
God's River First Nation		
Island Lake		
Garden Hill First Nation	3 bed nursing station	
St. Teresa Point First Nation	3 bed nursing station	
Wasagamack First Nation	1 bed nursing station	
Red Sucker Lake First Nation	2 bed nursing station	

Table A5: Age Characteristics of Manitoba Physicians (in Full Time Equivalents)

Age in 1993	General Practitioners	Specialists	Age Group Subtotal	Age Group Subtotal as % of Total
less than 35 yr	216.1	58.7	274.8	19.3
35-39	137.0	109.5	246.6	17.3
40-44	133.9	92.0	225.9	15.8
45-49	90.7	109.8	200.5	14.1
50-54	59.6	82.5	142.1	9.9
55-59	55.6	57.8	113.4	8.0
60-64	60.0	65.0	125.0	8.8
65-69	27.8	38.5	66.3	4.7
70-74	11.6	10.4	22.0	1.5
75+	4.1	5.5	9.6	0.7
Total	796.4	629.7	1426.1	100

Figure A1: Best Estimate of Areas' Need for Physician Visits

Illustrating the impact of adjusting for Premature Mortality



Note: Black bars indicate northern areas, grey bars urban areas, and white bars southern Manitoba.

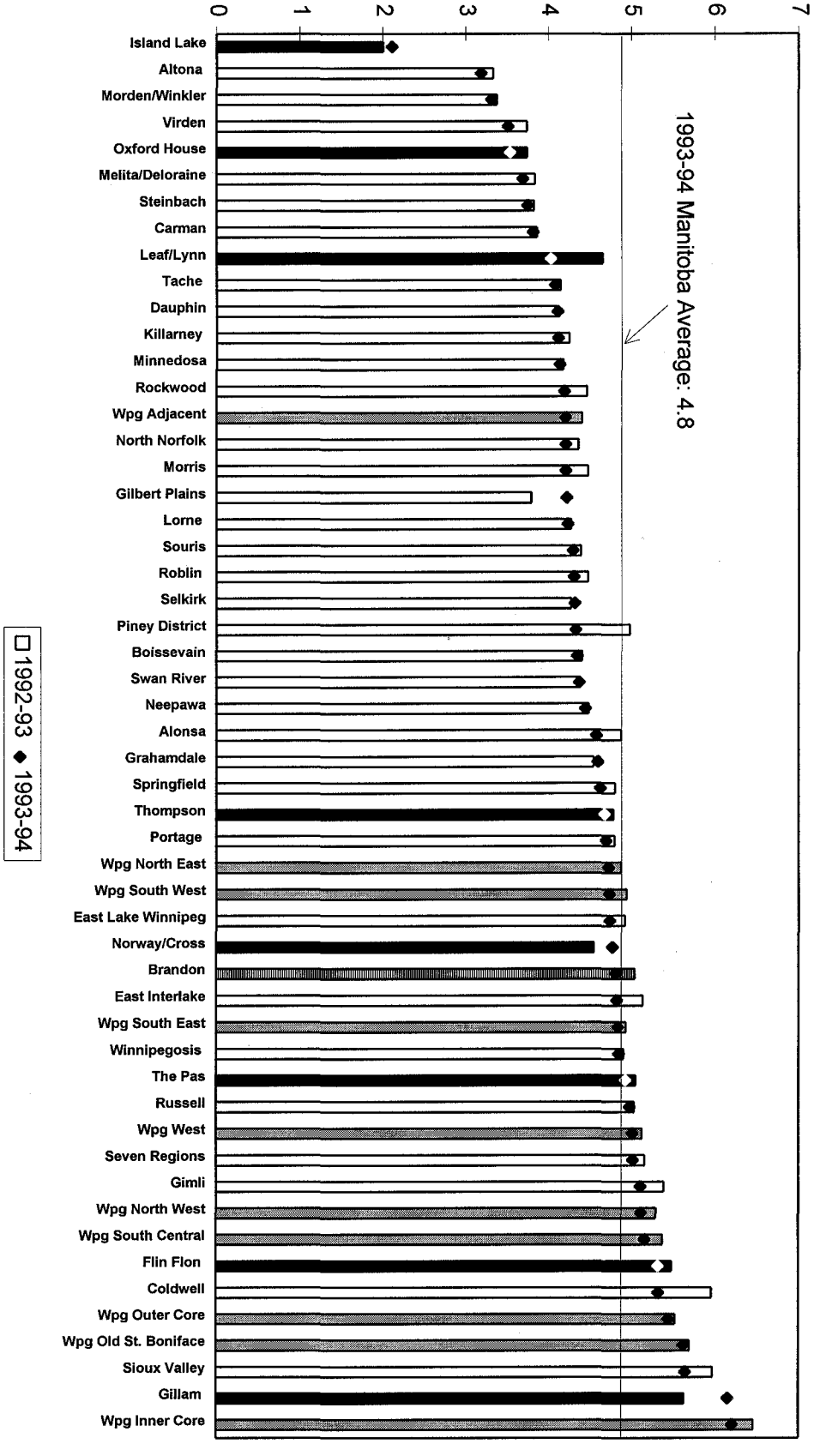


Figure A2: Physician Visits per Resident in Manitoba Over Two Years

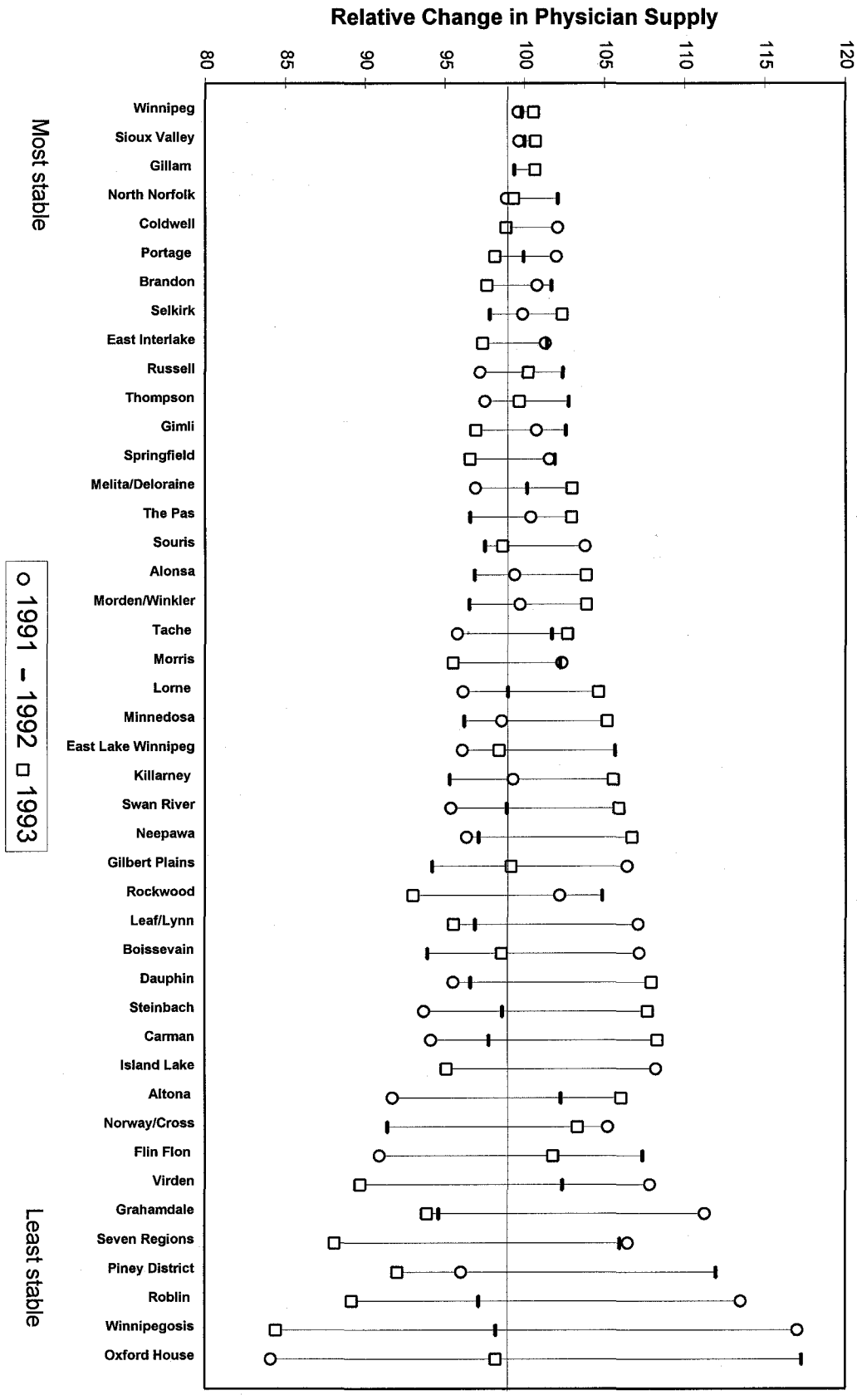


Figure A3: Stability of In-Area Physician Supply (FTE)
(ranked from most to least stable)

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