Indicators of Health Status and Health Service Use for the Winnipeg Regional Health Authority

March 2001

Manitoba Centre for
Health Policy and Evaluation
Department of Community Health Sciences
Faculty of Medicine, University of Manitoba

Norman Frohlich, PhD
Randy Fransoo, MSc
Noralou Roos, PhD

ACKNOWLEDGEMENTS

Authors of a research report like this require the input and assistance of a great number of people. We thank those listed below for their specific contributions, and others whose names we have inadvertently left off the list below. The usual disclaimer regarding our sole responsibility applies especially since we have not been able to incorporate all suggestions into the current report.

For help in guiding and refining the main analyses, we thank our MCHPE colleagues Charlyn Black, Patricia Martens, Marni Brownell, Sharon Bruce, Anita Kozyrskyj, Carolyn DeCoster, Diane Watson, and Evelyn Shapiro. We also benefitted from input from others, including Dr. Blake McClarty (WRHA), Dr. Jan Trumble-Waddell (WRHA), Valerie Wiebe (WRHA) and Donna Turner (CancerCare Manitoba), among others.

For programming and technical assistance, we thank our team of Carmen Steinbach, Leonard MacWilliam, Charles Burchill, Randy Walld, David Friesen, Shelley Derksen, Bogdan Bogdanovic, and Pat Nicol.

We also thank our external reviewers for their comments: Ms. Maria Mathews (Health Services Utilization and Review Commission of Saskatchewan), and Dr. Richard Stanwick (Medical Health Officer and Director of Research, Capital Health Region, Victoria, B.C.).

A report like this also requires the assistance of support staff, in this case, Janine Harasymchuk and Carole Ouelette. Finally, we thank the agencies which provided the data for our analyses: Manitoba Health, the Vital Statistics Branch, and CancerCare Manitoba.

We acknowledge the Faculty of Medicine Health Research Ethics Board for their thoughtful review of this project. The Health Information Privacy Committee of Manitoba Health is kept informed of all MCHPE deliverables for Manitoba Health. Strict policies and procedures to protect the privacy and security of data have been followed in producing this report.

The results and conclusions are those of the authors and no official endorsement by Manitoba Health was intended nor should be inferred. This report was prepared at the request of Manitoba Health as part of the contract between the University of Manitoba and Manitoba Health.

THE MANITOBA CENTRE FOR HEATH 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 database to describe and explain patterns of care and profiles of health and illness.

Manitoba has one of the most complete, well-organized and useful databases in North America. The database 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 database, 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.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

EXECUTIVE SUMMARY

This report provides information on the health status and health service use of the population of the Winnipeg Health Region as baseline information for the recently formed Winnipeg Regional Health Authority (WRHA). Administratively, the Winnipeg Region is divided into 12 Community Areas (CA) and further into 25 Neighbourhood Clusters (NC). Our analyses match these definitions to ensure consistency. It is hoped that the data will prove useful in the management of existing and proposed services, and provide a benchmark against which the effects of future changes can be compared.

Most analyses for this report were based on information from fiscal year 1998/99. However, for some analyses, three-year (1996/97 – 1998/99) and five-year periods (1994/95 – 1998/99) were also used. These multi-year values provide more reliable estimates and allow for the examination of trends in the data.

The report addresses the distribution of services across the various areas of the city with emphasis on the extent to which service use in the areas corresponds to the health status of the populations in the areas.

Finding a measure of health status that is independent of health care service use is a difficult problem that has bedeviled many health policy analysts. It is generally acknowledged that no perfect measure exists. Nevertheless, one measure has come to be recognized as an acceptable approximation.

The Premature Mortality Rate (PMR) tells us how many people die before reaching age 75. Though strictly a mortality measure, the premature mortality rate is highly correlated with morbidity indicators (measures of 'sickness' rather than death). So areas where populations have higher premature mortality rates tend to report poorer general health status, more chronic diseases, and more sickness. As a result, the premature mortality rate has been called the best single indicator of health status capturing the need for health care. We use the premature mortality rate throughout the report as our surrogate measure for poor health status, and hence, indirectly, as a measure of need for health care services.

Data on the prevalence of chronic diseases, which are also indicators of poor health, tend to confirm the utility of using premature mortality as a surrogate measure for poor health status. There is a clear and strong relationship between premature mortality rates and several indicators of disease prevalence. Premature mortality rates are also highly correlated with our index of socioeconomic status: the Socioeconomic Factor Index (SEFI). This is consistent with a large body of research showing that those in lower socioeconomic groups have poorer health status.

Using the premature mortality rate as a metric, it is clear that the Winnipeg Regional Health Authority provides health care services to areas in which the health status of the residents are very different. The premature mortality rates for residents of the 12 communities varies by more than a factor of two from the healthiest (Fort Garry) to the least healthy (Point Douglas). But even within some of the communities there are major differences in premature mortality rates. Sub-dividing the communities into the 25 neighbourhoods allows one to identify distinct areas with very different rates of premature mortality, and different utilization rates of various health care services. The most dramatic example of the insight gained by the subdivision of communities can be found by looking at Inkster. That community, having the third highest premature mortality rate, is divided into two neighbourhoods: Inkster East and West. Inkster East has the third *highest* premature mortality rate among the 25 neighbourhoods, while Inkster West has the second *lowest* rate! They are obviously populated by individuals with very different characteristics. Planning for the delivery of services could benefit from taking those differences into account.

We find, as might be expected, that the use of many services is higher in areas with populations of poorer health status. For other services, however, this is not the case. The use of most basic services, such as visits to general & family practitioners, and most measures of hospital use (separations and days) are closely related to need as measured by premature mortality. On the other hand, the use of specialist physicians is not positively related to this measure of need. Indeed, there seems to be no relationship between specialist visit rates and premature mortality rates.

A set of anomalous findings is a group of *negative* relationships between premature mortality rates and the use of a variety of high profile procedures. MRI scans, angioplasty, coronary artery bypass surgery, hip replacement, and knee replacement rates are all higher in areas with areas that are healthier as measured by premature mortality rates. Recent increases in the number of these services performed have not, in general, brought utilization closer into line with premature mortality. Rather, increased volumes have simply increased the differences among the areas, leading to greater variation in utilization rates that are not related to our measure of need. There are, apparently, impediments in the system which lead individuals from areas with poorer health to use these procedures less frequently. On the other hand, no such negative relationships were found between premature mortality rates and rates of coronary catheterization or cataract surgery.

There is wide variation in the utilization rates of personal care homes across areas. Access to personal care homes appears to be positively related to poor health status as indicated by premature mortality rates, but waiting times seem to show no systematic relationship to need.

Preventative services provide the most uniform and discouraging picture. In all three service areas examined: childhood immunization rates, cervical cancer screening rates, and breast cancer screening rates; residents of the healthier areas (as measured by premature mortality) used the services more than did residents from areas with less healthy populations.

In summary, it appears that basic services are being provided in accordance with need as measured by our best indicator of population health status: premature mortality rates. However, a variety of high profile and preventative services do not conform to that pattern. An examination of the causes of these anomalies with an eye to how they might be addressed would serve to bring the full range of services closer in alignment with the health care needs of the Winnipeg population.

1. INTRODUCTION

1.1 Objective

The purpose of this report is to provide information on the health status and health service use of the population of the Winnipeg Health Region. It largely mirrors MCHPE's previous report for the rural Regional Health Authorities (see Black et al., 1999), but provides more detailed information for Winnipeg by dividing it into its 12 Community Areas and further into their 25 sub-divisions, called Neighbourhood Clusters. The report provides baseline information for the recently formed Winnipeg Regional Health Authority, and should be useful in the management of existing and proposed services. The results also provide a benchmark against which the effects of future program changes can be compared.

1.2 The Winnipeg Regional Health Authority (WRHA)

The WRHA was officially formed on December 1, 1999, as a result of the amalgamation of the former Winnipeg Hospital Authority and the Winnipeg Community and Long Term Care Authority. The WRHA is responsible for the health of the Winnipeg population, and for providing health care in Winnipeg, to both Winnipeggers and non-Winnipeg residents.

Figure 1 shows a map of Winnipeg and the 12 communities into which the city has been divided; descriptions of the boundaries of these areas are found in Appendix 2. Ten of the 12 communities have been further sub-divided into smaller neighbourhoods to capture some of the diversity within the communities. The neighbourhoods are shown in Figure 2.

Figure 1: Winnipeg's 12 Community Areas (CAs)

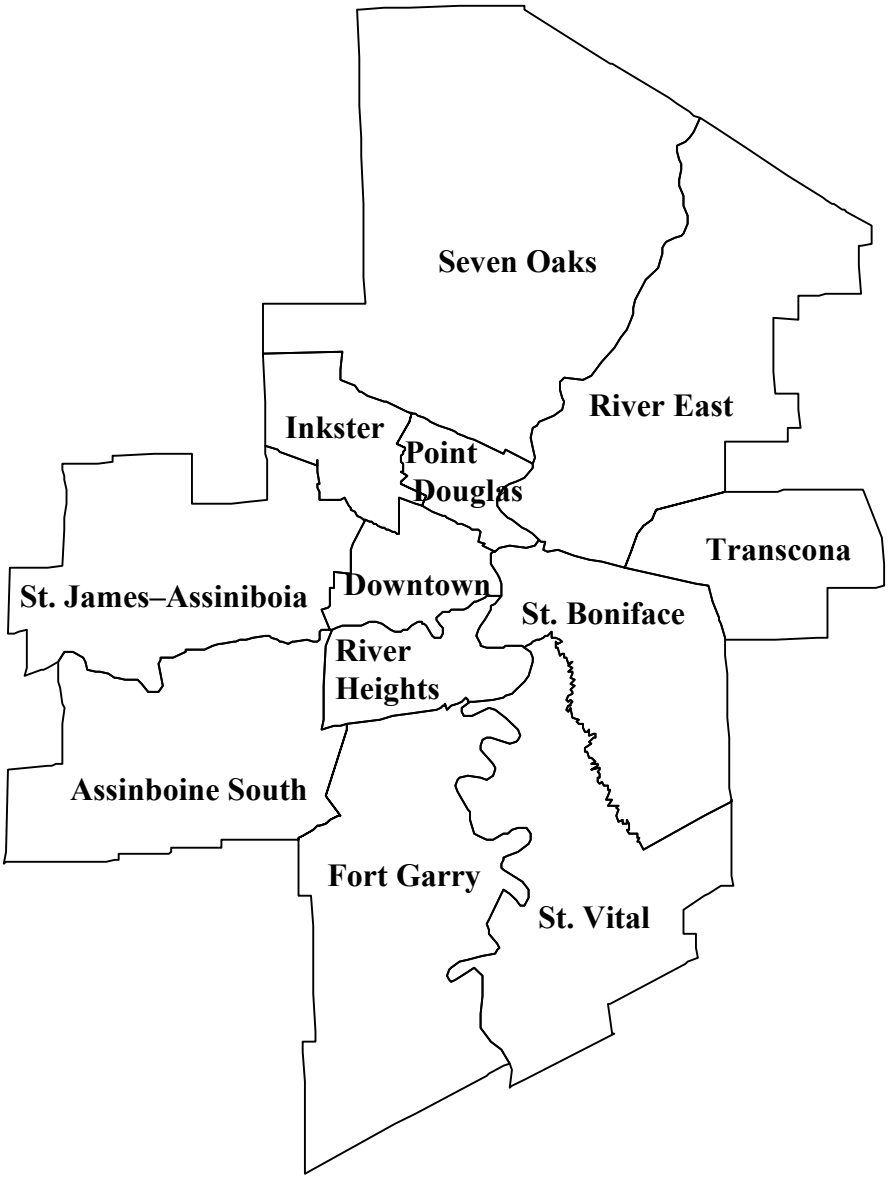
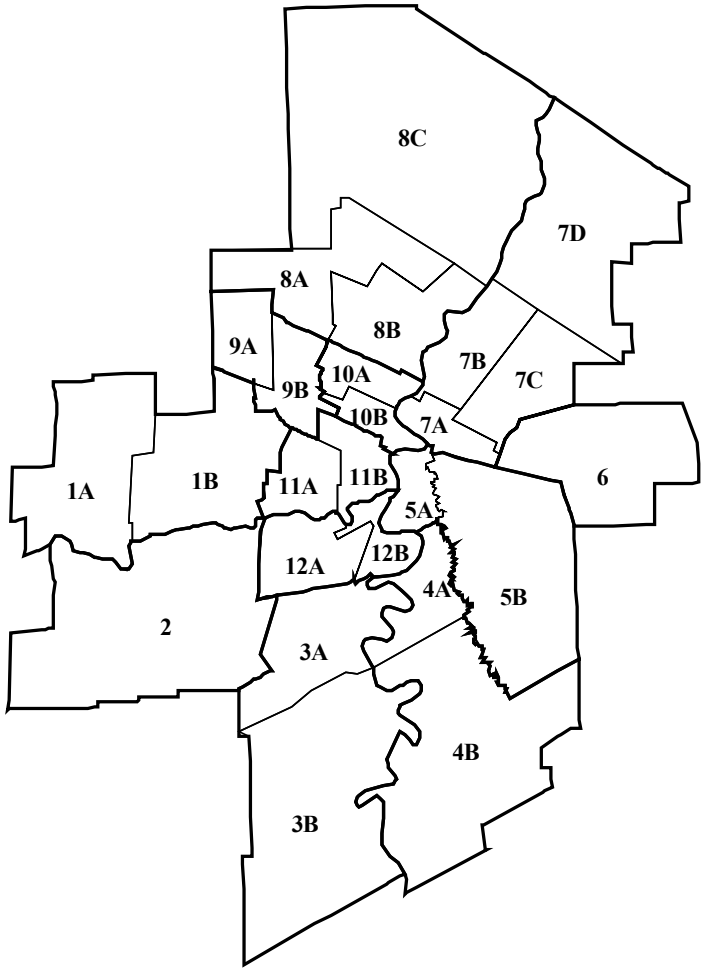


Figure 2: Winnipeg's 25 Neighbourhood Clusters (NCs)



1A	St J - Assin. W
1B	St J - Assin. E
2	Assiniboine S
3A	Fort Garry N
3B	Fort Garry S
4A	St. Vital North
4B	St. Vital South
5A	St. Boniface W
5B	St. Boniface E
6	Transcona
7A	River East S
7B	River East W
7C	River East E
7D	River East N
8A	Seven Oaks W
8B	Seven Oaks E
8C	Seven Oaks N
9A	Inkster West
9B	Inkster East
10A	Pt Douglas N
10B	Pt Douglas S
11A	Downtown W
11B	Downtown E
12A	River Hghts W
12B	River Hghts E

1.3 POPULIS

The mission of the Manitoba Centre for Health Policy and Evaluation (MCHPE) is to provide accurate and timely information to health care decision makers, analysts and providers, so they can offer services which are efficient and effective in improving the health of Manitobans. As part of its responsibilities, MCHPE has developed the Population Health Information System (POPULIS). This system is designed to facilitate the examination of the relationships between the health of the population and health care service use.

Historically, allocations for health care services have been made in response to demands based on population growth, increases in intensity of use, technological imperatives and political pressure. As a result, there has been no systematic plan to match the availability of facilities or the number and specialties of physicians and their locations to the health needs of populations. It has been difficult to arrange such plans because assessments of medical care typically focus on the clinical outcomes of individual treatments and on the quality of care delivered by specific providers and/or institutions, rather than on the health of populations. MCHPE developed POPULIS in the hope of facilitating rational decision making and, ultimately, shifting discussions from a focus on the demand for health *care* to the demand for *health*.

POPULIS focuses first and foremost on the health of the population as the starting point for making sense of all other information. POPULIS makes it possible to compare the health status of residents of different areas, as well as the supply and utilization of health care resources (hospitals, physicians, personal care homes, etc.). Because people often travel for care, local supply and availability do not necessarily determine use patterns. Therefore, POPULIS tracks all use by residents of a given geographical area, regardless of where the use occurred. This population-based approach describes the total utilization profile of all residents of each region, rather than examining care provided by 'in-area' providers or facilities. POPULIS also links data from census files to describe socioeconomic status, which has long been related to health outcomes and need for health care. In general, the lower the socioeconomic status, the poorer the health status and the greater the need for

health care. So, for example, lower levels of education or higher levels of unemployment are usually associated with poorer health status for the population of that area.

1.4 Comparative Information

POPULIS provides decision-makers and the public with information to assess and respond to questions such as:

- How healthy are the residents of the various areas? How much variation is there within these areas?
- Are high-risk populations poorly served by the health care system or do they have poor health outcomes despite high use patterns?
- Are utilization patterns related to need?

This report starts with a comparative analysis of the health status of Winnipeg residents, by communities and neighbourhoods. This is followed by a closer examination of specific indicators of service usage, presented as a series of graphs. The comparative information in this report includes a broad variety of measures encompassing the major service sectors.

The Winnipeg Regional Health Authority (WRHA) has already completed a thorough survey and demographic analysis that can serve as a reference for those interested in the underlying demographics of the city (WRHA, 2000). Accordingly, we have not duplicated their effort here.

The major focus of this report is on providing a comprehensive set of indicators, rather than on extensive analysis or statistical testing for patterns. Whenever possible, we used statistical techniques to identify values that are significantly different (i.e. unlikely to be due to chance) from the Winnipeg average, using 95% confidence intervals. That means that differences have a 95% chance of being due to real underlying causes rather than random variation. Rates significantly above or below the Winnipeg average referred to in the graphs are marked with an asterisk (*). Because small numbers of some events produce highly variable rates from year to year, rates that appear much higher or lower than the average

sometimes do not have an asterisk beside them. This may reflect the small population used to calculate the rate, so the difference does not meet statistical significance.

We have focused on graphical presentation of indicators, with less emphasis on detailed interpretation of these graphs. For each indicator, we have provided some background about why the indicator is important, an explanation as to how it was calculated, and some discussion about how to interpret differences. We note a number of significant differences in use and health status, and with a few exceptions, we have not attempted to provide a comprehensive explanation of these differences. Not only would such an attempt go well beyond the mandate of this study, but we also believe that much of this interpretation should be based on an understanding of a variety of local circumstances.

Finally, it should be borne in mind that our indicators are averages and that each area contains individuals with a range of health statuses and utilization levels. For example, not everybody in a 'poor-health' area has poor health. Nevertheless, the averages reflect the overall patterns for residents of each area.

2. METHODS

Information for all indicators is provided at the Community Area (CA) and Neighbourhood Cluster (NC) levels. All residents of Winnipeg (see Appendix 2 for definition) were included in the analyses. Complete details of the methods used are found in Appendix 1.

Most analyses for this report were based on information from fiscal year 1998/99. However, for some analyses involving relatively infrequent events, three-year (1996/97 – 1998/99) and five-year periods (1994/95 – 1998/99) were also used. These multi-year values provide more reliable estimates, and allow for the examination of trends in the data.

Virtually all utilization rates shown in this report have been age and sex adjusted, to account for the different demographics of the various sub-areas of Winnipeg. Areas with more elderly residents would be expected to have higher utilization rates, so the adjustment is done to account for these differences. As a result, rate differences among areas cannot be attributed to differences in population characteristics. This adjustment also accounts for general population aging, so the increasing number of procedures (over time) reported in several sections cannot be attributed to population aging. Confidence intervals (95%, adjusted for multiple comparisons) were used to determine whether any area's adjusted rate was statistically different from the Winnipeg average. Even though statistical difference does not necessarily imply medical or practical significance, it remains important because differences which do not meet an acceptable level of statistical significance may not be 'real' differences at all (that is, they may be due to chance).

For most indicators, data are presented in pairs of graphs: first at the community level (12), then at the neighbourhood level (25). In addition to the bar graphs, we also present scatter-graphs of some indicators against premature mortality rates, to see whether services are being provided in accordance with this strong though imperfect indicator of need. These serve as illustrations of the extent to which groups having poorer health receive more services. However, it is important to remember that the areas analyzed are so large that they do not

represent homogeneous groups. Hence, the relationships identified are only of average scores of all individuals in the area.

We are conscious of tradeoffs which must be made in moving between analyses at the community and neighbourhood levels. The latter are smaller, more homogeneous and more numerous than the former. Their homogeneity and larger number give analyses using them more statistical power than analyses at the community level. On that account, one might pay more attention to the trends identified in the neighbourhood analyses. On the other hand, for relatively infrequent procedures, the populations of the neighbourhoods may be so small that small numbers of procedures per neighbourhood may wash out statistical significance. In most cases reported here there is agreement between the analyses at the two levels, but some attention to cases in which they differ may be warranted.

We use the premature mortality rate as a surrogate measure of need for health care services (see below). The discussion for each indicator includes comment on the nature and strength of the relationship between that measure and the premature mortality rate. We used the Spearman's rank order correlation coefficients for all analyses (Appendix 3). We chose this non-parametric test primarily because premature mortality rates are not randomly distributed.

The correlation coefficient 'r' is a number ranging from +1 to –1, and indicates how much of the variation in – say – physician visits can be accounted for by premature mortality. The statistic is a measure of how close the rankings of the areas are on the two measures. For example, suppose we wanted to compare premature mortality rates and physician visit rates across communities. We would rank the communities in order of their premature mortality rates, from a '1' for the community with the lowest rate, to a '12' for the area with the highest rate. We would also rank the communities according to their physician visit rates, from '1' for the area with the lowest visit rate, up to 12 for the area with the highest visit rate. If the two lists corresponded perfectly, the correlation would be 1. A value of 1 for the statistic would mean that the higher the premature mortality rate the greater the number of visits *and* that the relationship is perfect. That is, if r = 1, we say that all the variation in visits is accounted for by premature mortality. A correlation coefficient of 0.7 would mean

that there was still a strong positive relationship between the two, but some of the community rankings on premature mortality do not quite fit with their ranking on visits. If there is no relationship between the rankings, then the statistic would be zero. The statistic takes on negative values if the relationship between the rankings is inverted; that is, if areas with higher premature mortality rates had lower visit rates.

For simplicity and ease of reading, we note the 'r' values for all correlations (which tell us about the strength of the relationship), but not the 'p' values (which tell us about the level of statistical significance). Relationships which reach at least the $p<0.05$ level are referred to as 'significant,' having less than a 5% probability of being due to chance. Those which do not meet that level of statistical significance are referred to as 'not significant'.

Appendix 3 provides a complete listing of correlation coefficients and statistical significance.

3. HEALTH STATUS AND NEED FOR HEALTH CARE

3.1 Conceptual Background

Tracking the way in which services are provided to various groups, especially society's most vulnerable groups - those with the worst health status - is critical. The elderly and those of lower socioeconomic status are examples of vulnerable groups at high risk for poor health. We would expect them to be among the heaviest users of health care services. Other examples of vulnerable groups might include specific ethnic groups and the very young. Monitoring the relative allocations of health care resources to high-need groups permits tracking the impact of health reform on equity in the delivery of care. A system could be said to have become less equitable if those groups with the poorest health become relatively more disadvantaged.

Birch et al (1993) argue that the allocation of health care resources based on relative need for care involves two different elements: equity and efficiency. It is a question of equity that those suffering poor health receive more treatment. But there is also a question of efficiency involved when one talks about allocating care on the basis of need. A very sick person may be able to benefit less from a given treatment than someone in slightly better health. So, efficiency and equity can conflict. In general, we know little about the effectiveness of specific health care interventions on different groups in a population. To know this we would require information about each group's capacity to benefit, and about the relative efficiency of various treatment alternatives (particularly if non-health care alternatives are considered).

Given these considerations, defining "need" is at best problematic. However, following Birch et al (1993), the concept of relative distribution is central; we can ask the question: "Do those groups in poorest health receive more care than those groups in better health?" While such standards for need do not directly address the question of effectiveness, the evidence is strong that those in poor health have more conditions for which health care can offer prevention, relief from pain, a supportive environment, and palliation of symptoms.

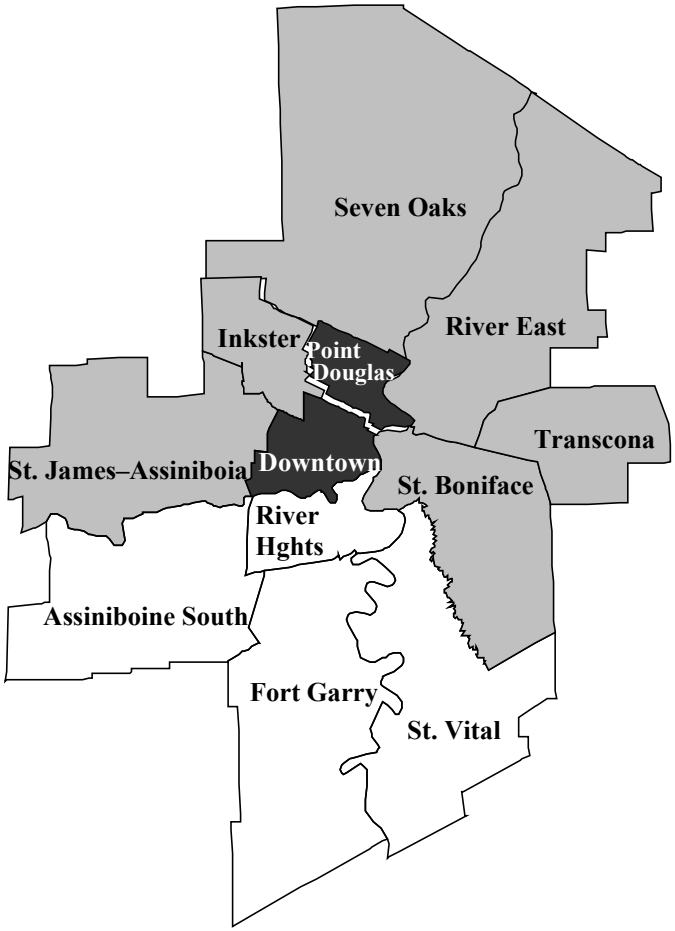
One of the underlying principles of health care in Canada is that it be delivered according to patients' needs. The problem is, there is no universally accepted way to measure the need for health care. However, there is one measure that has emerged from population health research that has gained general acceptance as a useful indicator of need: the Premature Mortality Rate (Eyles et al., 1991; Carstairs and Morris 1991, Eyles et al., 1994).

3.2 The Premature Mortality Rate

The Premature Mortality Rate (PMR) tells us how many people die before reaching age 75. Though strictly a mortality measure, the premature mortality rate is highly correlated with morbidity indicators (measures of 'sickness' rather than death). So areas where the populations have higher premature mortality rates tend to report poorer general health status, more chronic diseases, and more sickness (Mays et al., 1992). As a result, the premature mortality rate has been called the best single indicator of health status capturing the need for health care. It also has the advantage of being calculated as a rate, so it can be age and sex adjusted to account for different population structures in different areas.

Accordingly, premature mortality rates were calculated for all of the Winnipeg communities and neighbourhoods, and were used as a basis for ranking the areas according to need. Figure 3 shows the geographic distribution of premature mortality rates across the communities. It is immediately apparent that the highest rates occur in Point Douglas and Downtown: the two core area communities. Generally, communities in the northern portion of the city have about average levels of premature mortality, while those in the south have lower levels (i.e. they are healthier than average).

Figure 3: Health Status of Winnipeg's 12 Community Areas (CAs)



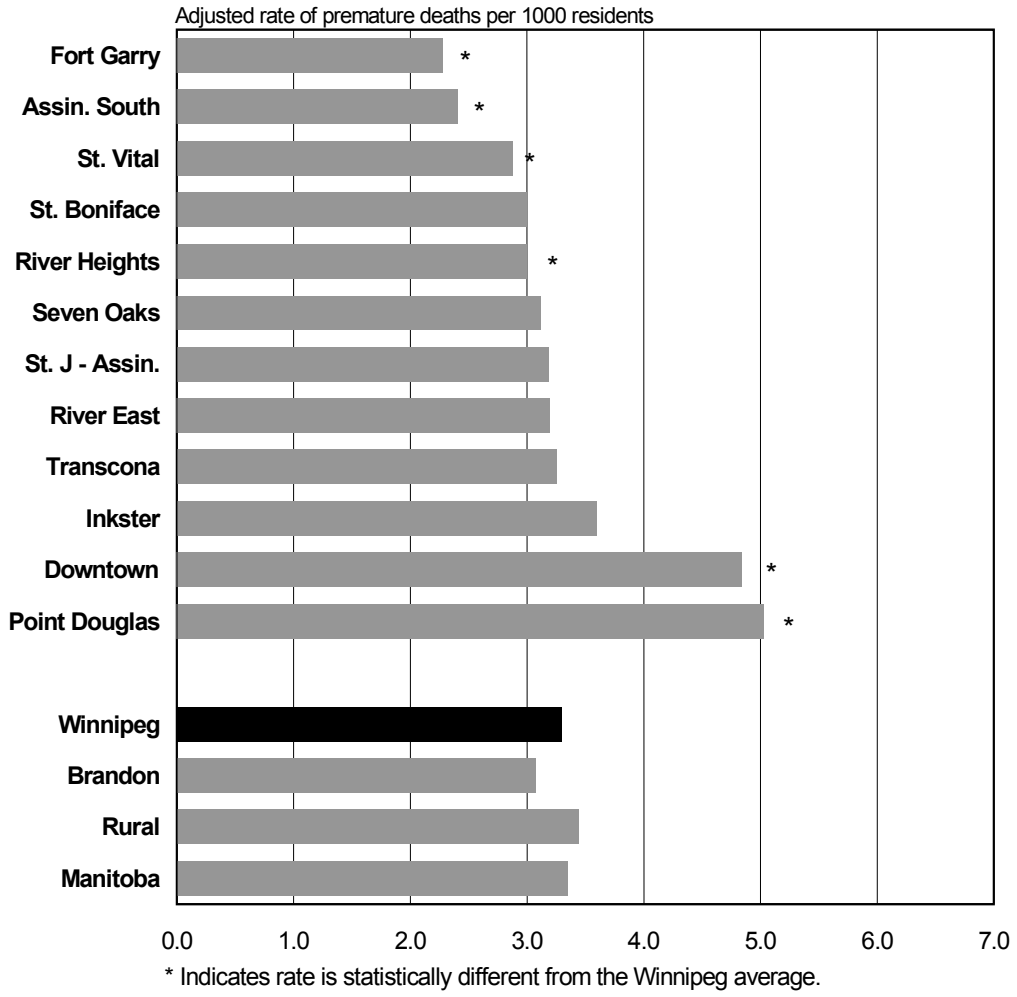
Premature Mortality Rates

- Low
- Average
- High

Fort Garry	2.3
Assin. South	2.4
St. Vital	2.9
St. Boniface	3.0
River Heights	3.0
Seven Oaks	3.1
St. J. - Assin.	3.2
River East	3.2
Transcona	3.3
Inkster	3.6
Downtown	4.8
Point Douglas	5.0

Figure 4 shows the rank order of the communities by premature mortality (top to bottom), along with four comparison areas at the bottom. These comparison areas are: the Winnipeg average, the rate for Brandon (the other major urban centre), the Rural average (from the 10 rural RHAs), and the Manitoba average.

Figure 4: Premature Mortality Rates, by CA, (1994-1998)



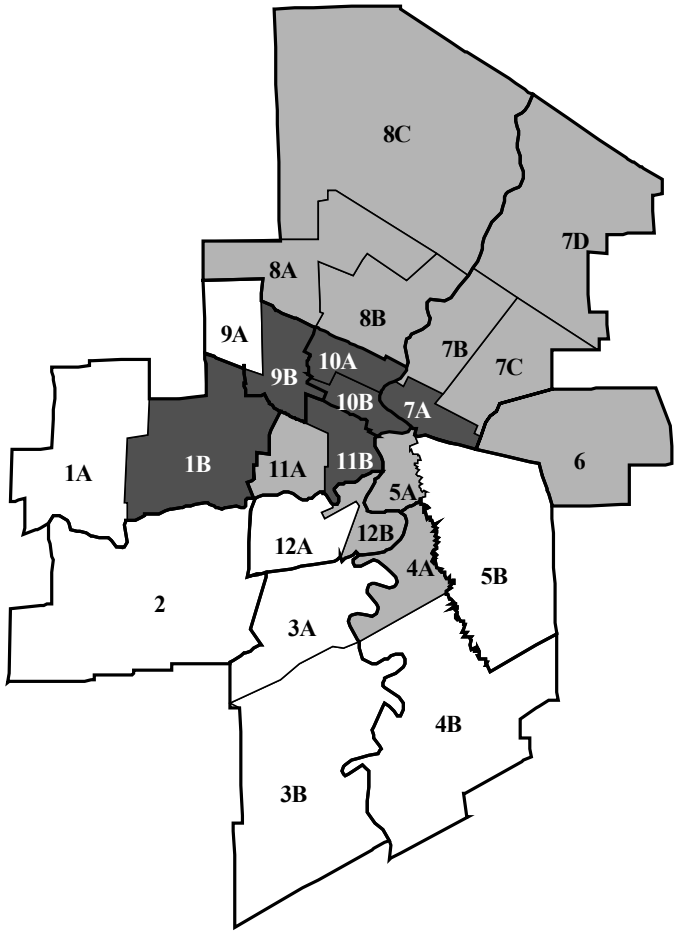
There is great variation in the rate of premature mortality across Winnipeg communities. The community with the healthiest population according to this measure is Fort Garry, at just 2.2 premature deaths per 1000 residents per year (adjusted rate). It is followed by Assiniboine South, St. Vital, St. Boniface, River Heights, Seven Oaks, St. James - Assiniboia, River East, Transcona, Inkster, Downtown and finally Point Douglas: the least healthy community, with just over 5 premature deaths per 1000 residents per year. The premature mortality rates in six of the communities are statistically different from the Winnipeg average: four lower (Fort Garry,

Assiniboine South, St. Vital and River Heights) and two higher (Downtown and Point Douglas). (Although River Heights and St. Boniface have almost identical premature mortality rates, River Heights has more residents, so it's difference is statistically significant, while that for St. Boniface is not.) Premature mortality rates for the remaining communities are not statistically different from the Winnipeg average. The difference between Fort Garry and Point Douglas (the areas with the lowest and highest premature mortality rates) is greater than a factor of two, which emphasizes the wide range of health status within the city.

The ranking of communities according to premature mortality used in Figure 4 is used in all subsequent community graphs in this report, to assist with the understanding and interpretation of the data. In general, if health service use corresponds to need (as measured by premature mortality rates), then the areas listed near the top of the figure should have the lowest levels of use and those at the bottom, the highest. Moreover, there should be a gradual increase as one moves from the more healthy to the less healthy areas. Accordingly, Fort Garry and Assiniboine South at the top of the figures should generally have lower rates, corresponding to short bars, while communities at the bottom of the graph, Downtown and Point Douglas, should have the longest bars for most services. The reader can thus readily determine from the shape of the graph whether services are provided roughly according to this measure of need. Consistent ordering also makes it easier to locate any given area in each graph.

Figure 5 shows the geographic distribution of premature mortality among the 25 neighbourhoods. A comparison of Figure 5 with Figure 3 helps explain why we thought it was important to divide the communities into the smaller neighbourhoods for the purposes of analysis. Nine of the 25 neighbourhoods have premature mortality rates categorized differently from that of the larger communities in which they are located. St. Boniface East, Inkster West, Downtown West and St. James - Assiniboia West have lower premature mortality rates than the communities in which they are located, while River Heights East, St. Vital North, St. James - Assiniboia East, River East South and Inkster East have higher rates than their communities. The most dramatic finding emerging from this segmentation is the community of Inkster, which has average premature mortality, but is divided into two neighbourhoods (Inkster East and West)

Figure 5: Health Status of Winnipeg's 25 Neighbourhood Clusters (NCs)



Premature Mortality Rates

- Low
- Average
- High

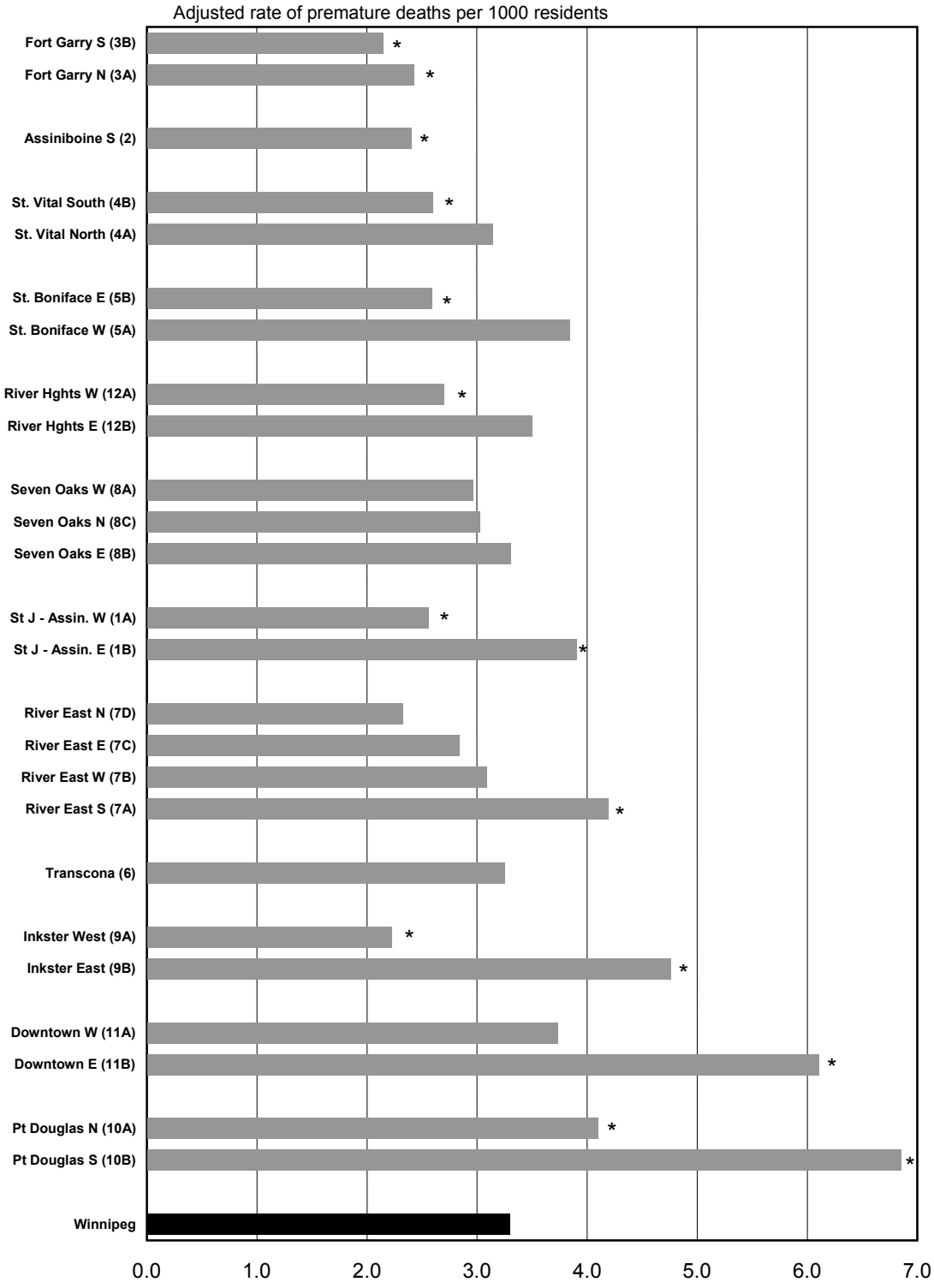
3B	Fort Garry S	2.15
3A	Fort Garry N	2.43
2	Assiniboine S	2.41
4B	St. Vital South	2.60
4A	St. Vital North	3.14
5B	St. Boniface E	2.70
5A	St. Boniface W	3.50
12A	River Hghts W	2.59
12B	River Hghts E	3.85
8A	Seven Oaks W	2.97
8C	Seven Oaks N	3.03
8B	Seven Oaks E	3.31
1A	St J - Assin. W	2.56
1B	St J - Assin. E	3.91
7D	River East N	2.33
7C	River East E	2.84
7B	River East W	3.09
7A	River East S	4.20
6	Transcona	3.26
9A	Inkster West	2.23
9B	Inkster East	4.76
11A	Downtown W	3.73
11B	Downtown E	6.11
10A	Pt Douglas N	4.11
10B	Pt Douglas S	6.85

which have respectively below and above average premature mortality rates. The same is true for the community of St. James - Assiniboia: its West community has below average premature mortality, while St. James - Assiniboia East has above average premature mortality.

Figure 6 shows the Neighbourhood Clusters (NCs) ranked by premature mortality rates, while still preserving the overall community rankings. Therefore, the first pair of neighbourhoods (Fort Garry South and North) are those that make up the most healthy community (Fort Garry), and the last pair of neighbourhoods (Point Douglas North and South) are those that make up the least healthy community (Point Douglas). This ordering of neighbourhoods within communities shows the variations within and between communities.

At the neighbourhood level, there is even more variation in premature mortality rates than among communities: the range is from 2.15 in Fort Garry South to 6.9 in Point Douglas South – a more than threefold variation. Furthermore, the heterogeneity of the neighbourhoods within communities is also evident. While this report cannot explain differences of this sort, appreciating their existence is important in understanding how other indicators of health status and service use vary. Differences of this magnitude, besides being statistically significant, are also substantively important in terms of health service planning. The large differences in premature mortality are likely to correspond to differences in health status and, consequently, to differences in need for health care services. From a planning perspective, this provides evidence regarding where services might best be targeted. This underlines the utility of dividing the communities into their finer component neighbourhoods.

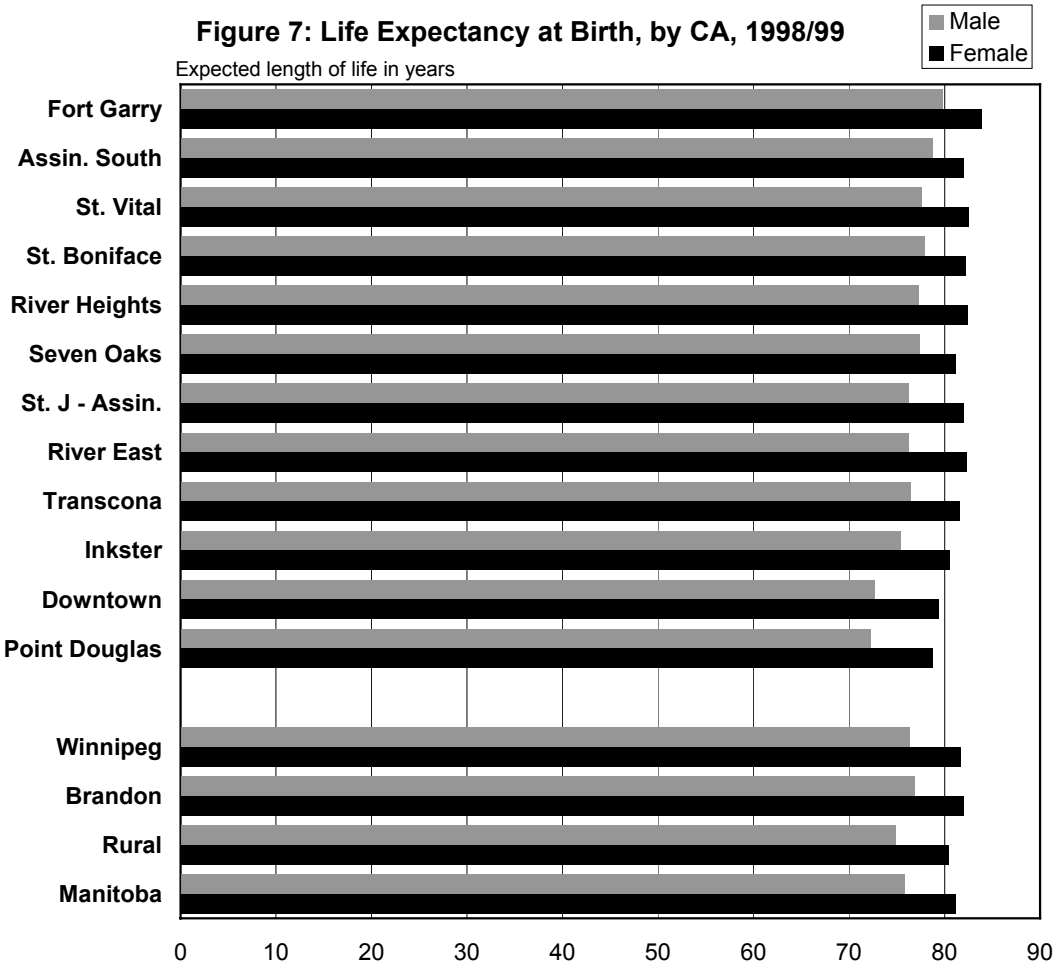
Figure 6: Premature Mortality Rates, by NC, (1994-1998)



* Indicates rate is statistically different from the Winnipeg average.

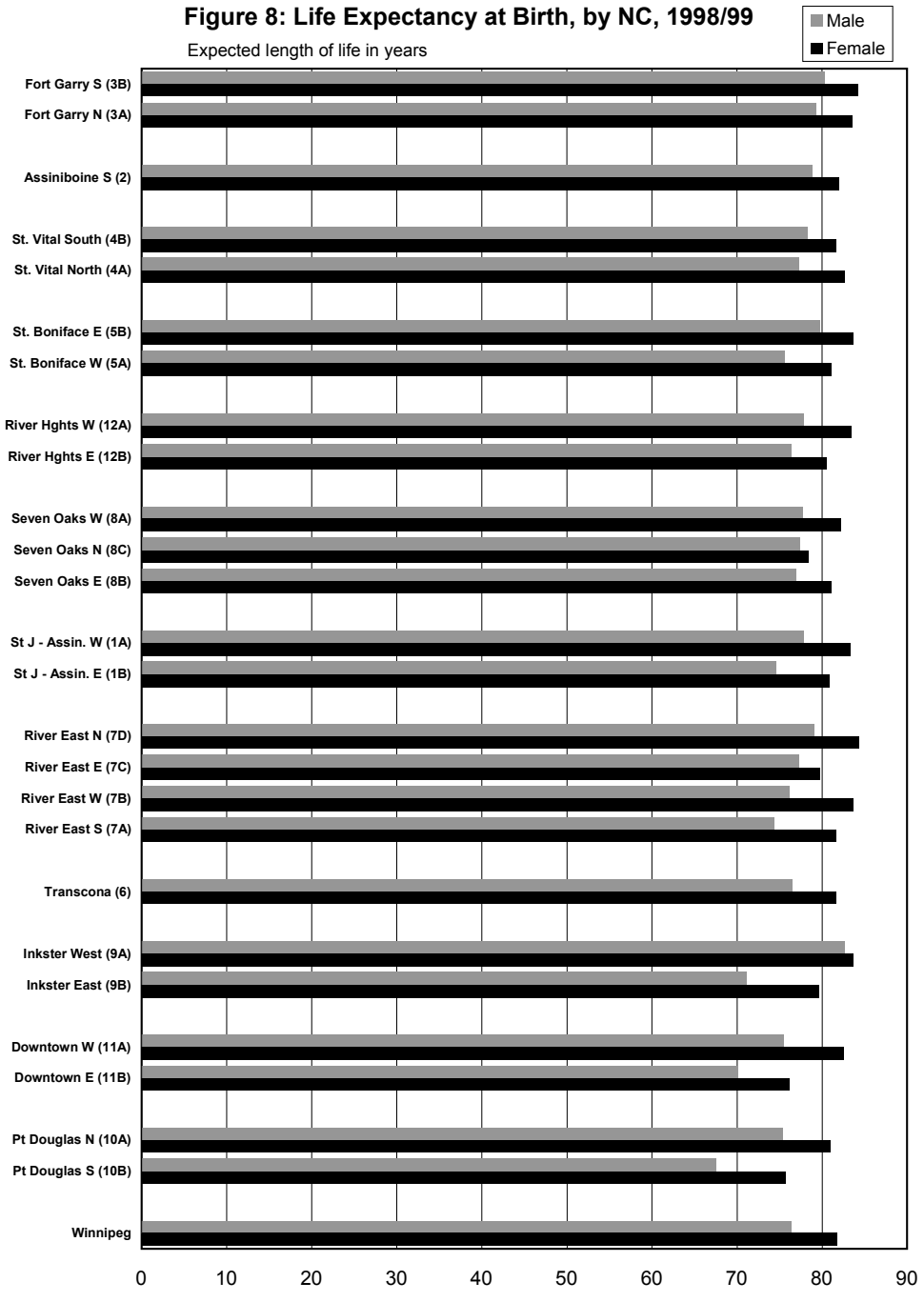
3.3 Life Expectancy

Perhaps the most commonly used measure of health status of a population is life expectancy, typically expressed as the expected number of years of life at birth. We have calculated life expectancy values by gender for each of the Winnipeg areas, and these are shown in Figures 7 and 8. On average, women live longer than men, but there is more variation among men than women. The most remarkable observation is in Inkster West, where men live



considerably longer than men from any other neighbourhood. Among communities, the most long lived populations of both men and women reside in Fort Garry, with average life expectancies of 80 and 83.9 years respectively. The shortest lived reside in Point Douglas, with life expectancies of 72.2 and 78.8 years respectively. Among neighbourhoods, the longest lived men are found in Inkster West with an average life expectancy of 82.7 years, while the longest lived women are from River East N (average 84.3 years). The least healthy

neighbourhood for both genders in terms of life expectancy is Pt Douglas S with averages of 67.5 years for men and 75.7 for women. In terms of the difference between genders within an area, the community with the least difference is Assiniboine South, where women live on



average 3.2 years longer than men, and the highest difference is in Downtown, where women live 6.8 years longer than men. Among neighbourhoods, Inkster West has the least

difference, with men living on average only one year less than women, while the most different is Inkster East, where women live on average 8.4 years longer than men. Remarkably, these two neighbourhoods are in the same community (Inkster). This wide divergence in the relative health of men and women across two neighbourhoods within the same community has implications for the targeting of services and further emphasizes the importance of separating the larger communities into neighbourhoods.

3.4 Socioeconomic Factor Index (SEFI)

A consistently strong, positive relationship between socioeconomic status and health status has been demonstrated around the world, including in Canada: those in lower status groups generally have poorer health. MCHPE has developed a composite measure to track socioeconomic risk in Manitoba: the SocioEconomic Factor Index, shown in Figures 9 and 10. It uses factor analysis to combine data from the Canadian Census, including education levels, unemployment rates, and family characteristics (see Appendix 1 for details). It is expressed on a standardized scale, with the Manitoba average stated as 0. High values correspond to areas that have higher levels of unemployment, lower levels of education, higher levels of single parent families, and low female workforce participation. Low (and negative) values indicate better socioeconomic status. Not surprisingly, the communities which have the lowest SEFI scores (Assiniboine South at –0.76 and Fort Garry at –0.62) also have the lowest premature mortality rates.

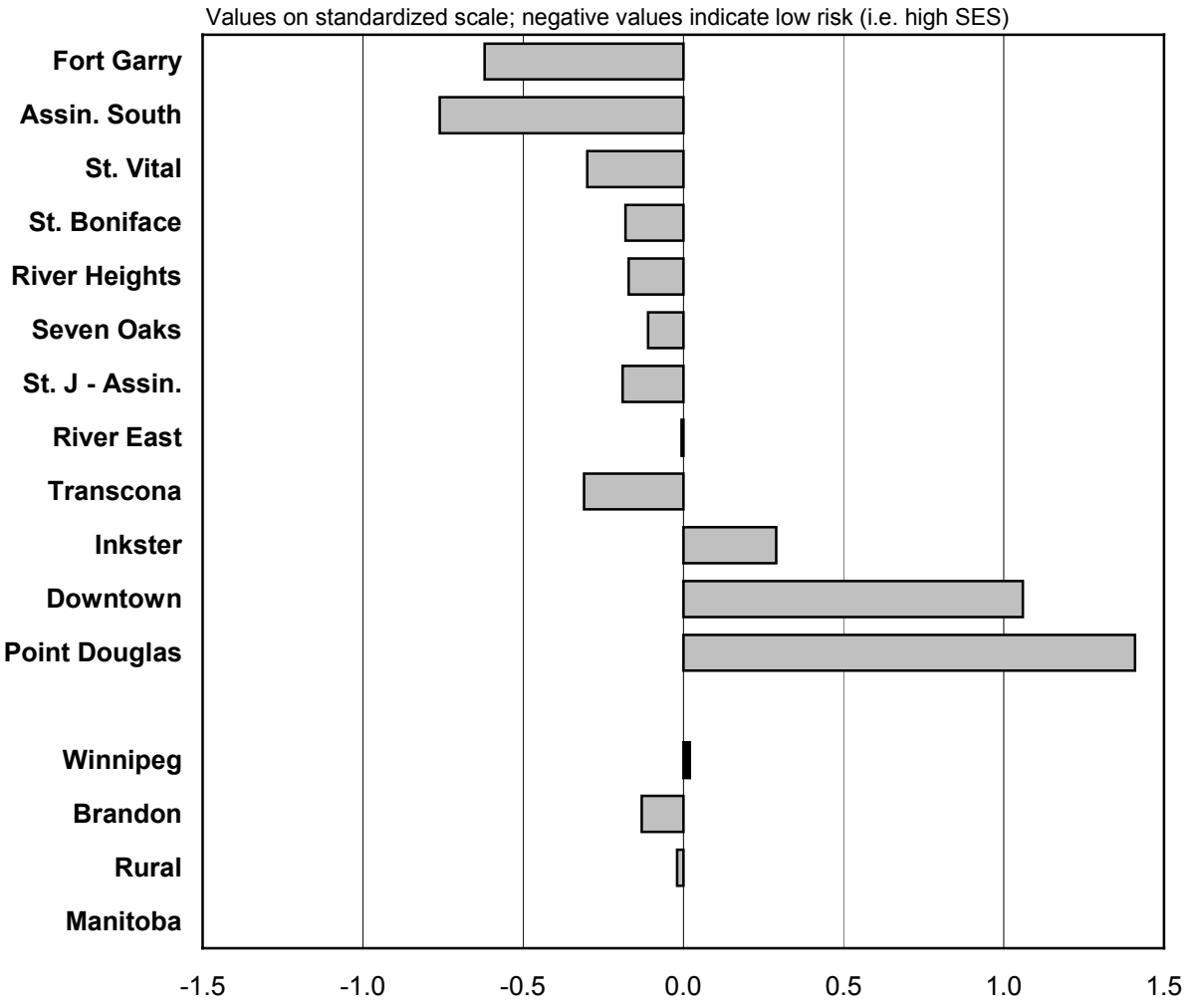
The areas with the highest premature mortality rates, Downtown and Point Douglas, have the highest SEFI scores: 1.06 and 1.41. Figure 9 demonstrates the very close relationship between SEFI levels and premature mortality, with the SEFI scores rising (in general) as premature mortality rises from the top to the bottom of the graph. Figure 10, however, shows the remarkable differences among the neighbourhoods on their SEFI scores, both within and between communities.[1] Here, as with premature mortality, the difference between the best and worst off neighbourhoods is larger than between the corresponding communities. The lowest SEFI is in River East North, at -0.97; the highest in Point Douglas South, 2.53, for a

[1] Recall that neighbourhoods are not listed strictly in order of their premature mortality rates, and so SEFI scores do not increase uniformly as one moves down Figure 10. The order used illustrates the variation in SEFI values for neighbourhoods within each community.

range of 3.49, or 1.6 times the range between communities. Moreover, as with premature mortality rates, the community of Inkster decomposes into two neighbourhoods with very different SEFI scores. Inkster East has an above average SEFI of 1.21 while Inkster West is below average at –0.41.

It is not surprising that there is a strong positive relationship between SEFI values and premature mortality rates. At the community and neighbourhood levels, the correlations are

Figure 9: Socioeconomic Factor Index (SEFI), by CHA, 1996

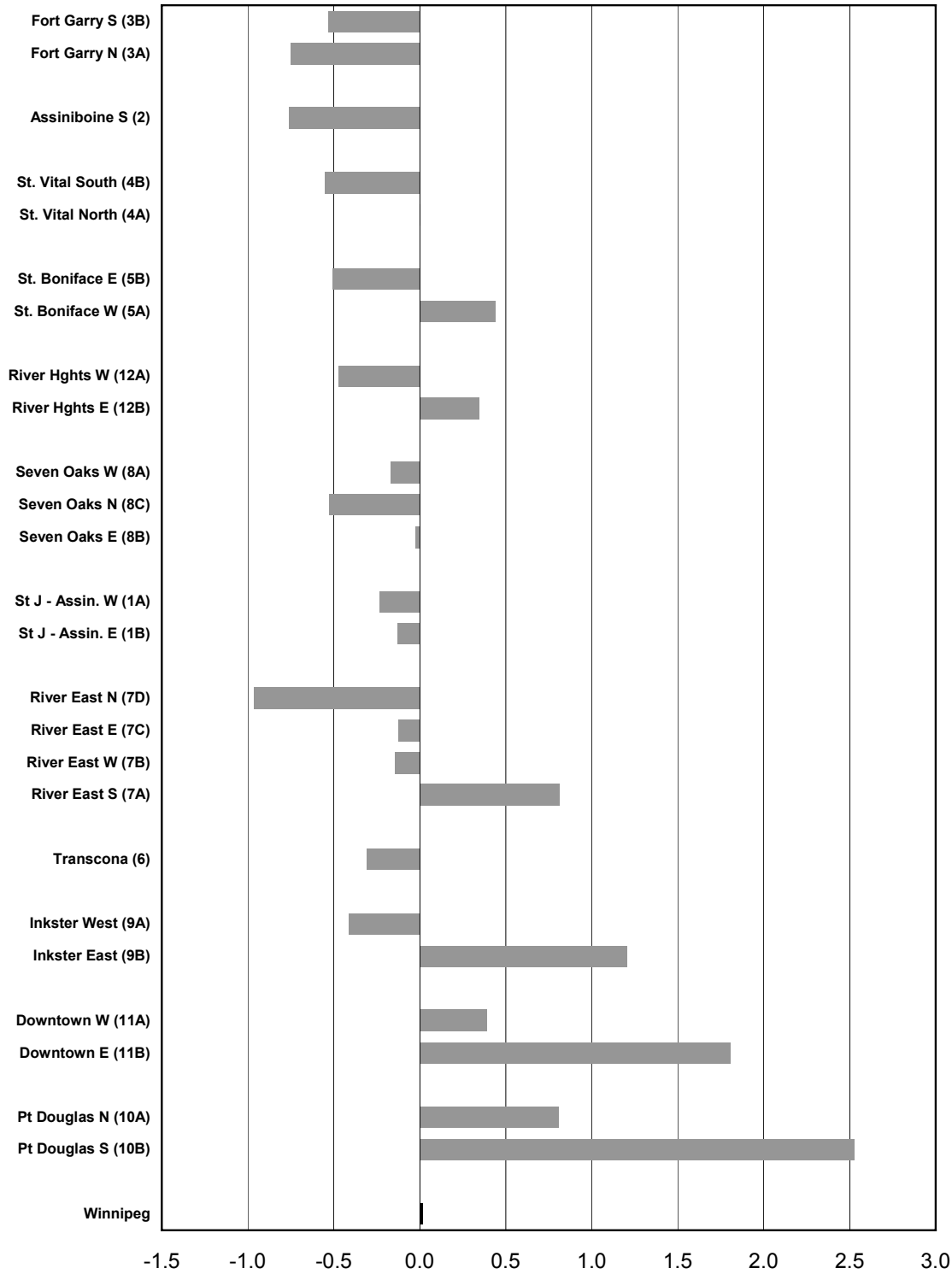


0.98 and 0.96, respectively. Most analyses reported here correlate premature mortality with utilization measures. When the utilization measures are correlated with SEFI values, the

results are essentially the same. Consequently, we report only the relationships between premature mortality and utilization rates.

Figure 10: Socioeconomic Factor Index (SEFI), by NC, 1996

Values on standardized scale; negative values indicate low risk (i.e. high SES)



3.5 Chronic Diseases

Another basic measure of health status is the prevalence of disease. As our population ages, chronic diseases play a larger role in health and health care. People are living longer, and so there are increasing numbers of people living with chronic conditions (i.e. the prevalence of these diseases is increasing). The administrative data used by MCHPE cannot always directly determine who has a given condition, but it reliably reports who receives treatment for those conditions. Therefore, we call these measures ***Treatment*** Prevalence values: they indicate the rates at which residents of each area receive treatment for the given condition[2]. These measures have been validated with survey results and clinical measures.

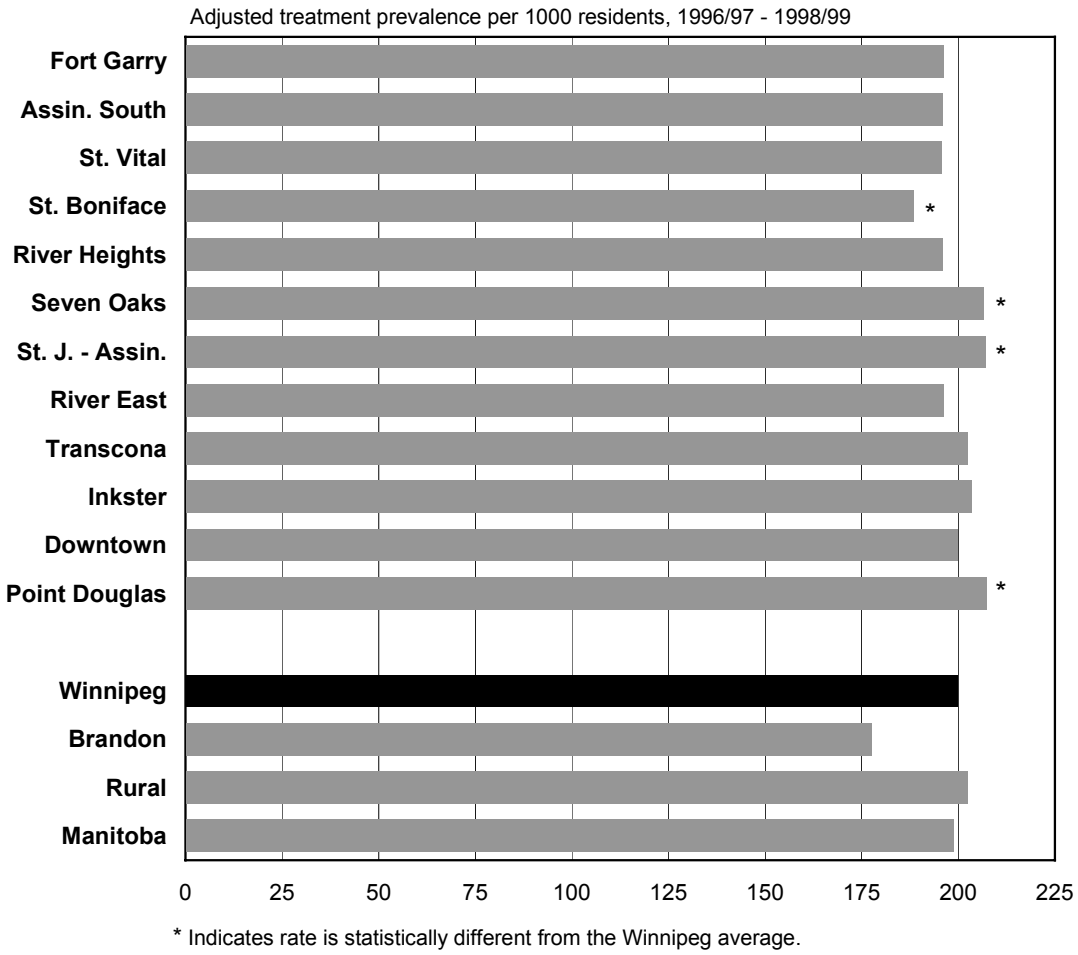
3.5.1 Hypertension Treatment Prevalence

Hypertension (high blood pressure) is related to risk of heart disease and stroke, which are among the leading causes of death in Canada. Cases were counted based on persons having at least one physician claim for hypertension over the three-year period 1996/97 – 1998/99. Figures 11 and 12 show the rates of treatment by community and neighbourhood. There is relatively little variation across the communities: St. Boniface has the lowest rate of 189 and Point Douglas the highest at 207. There is somewhat more variation at the neighbourhood level. River East North has the lowest level (166) in contrast with St. James - Assiniboia West, which has the highest (211). At both levels there is a positive relationship between treatment prevalence and premature mortality rates ($r = 0.64$ for communities and 0.43 for neighbourhoods).

[2] Individuals with lower socioeconomic status (lower incomes, lower education etc.) tend to visit physicians less than their health status would warrant. Those with higher socioeconomic status tend to over visit physicians relative to their health status. Consequently, the treatment prevalence data will be biased in a direction which underestimates disease rates in neighbourhoods of lower socioeconomic status such as Point Douglas.

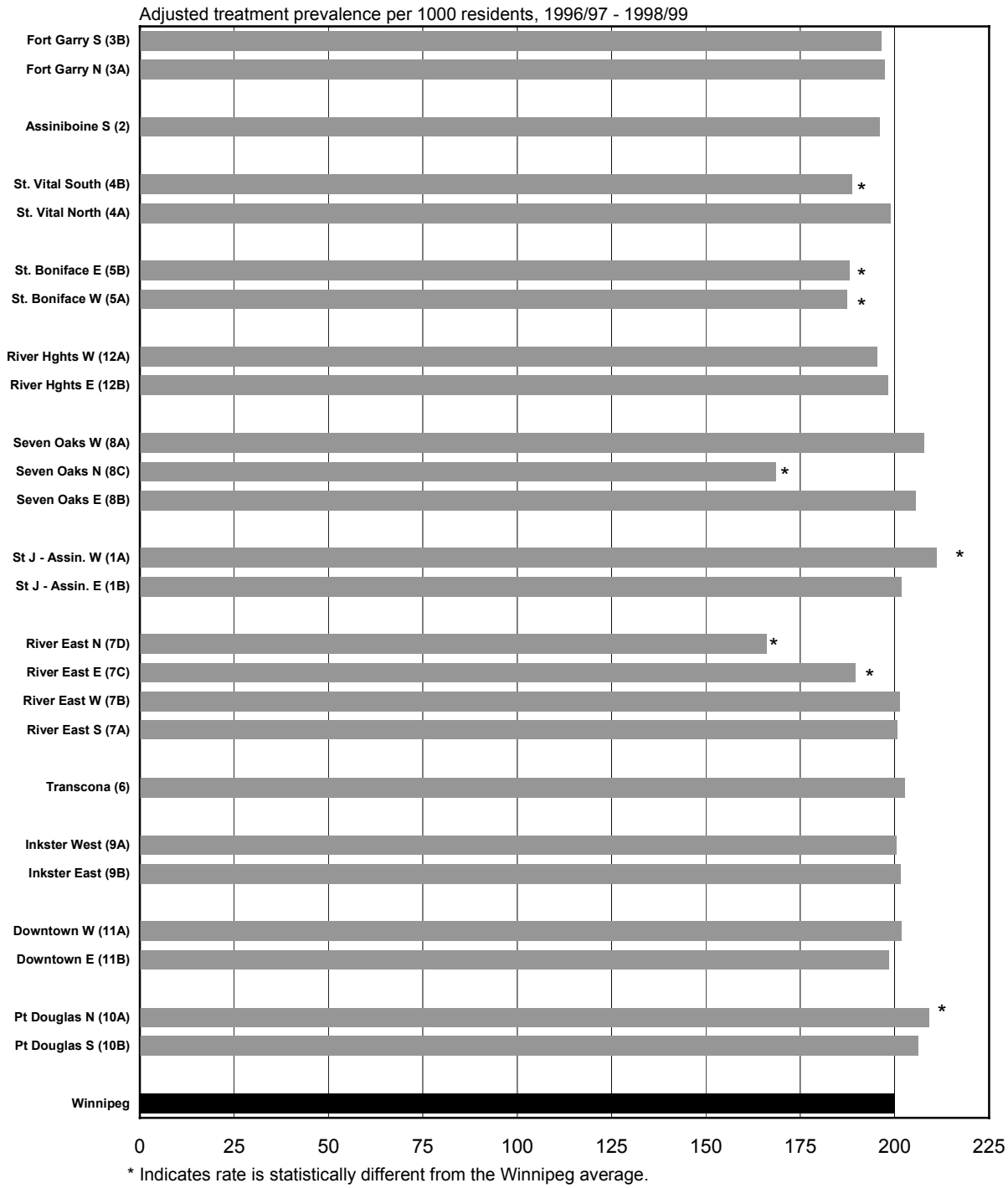
This positive relationship between hypertension treatment prevalence and premature mortality is consistent with the hypotheses that the premature mortality rate is associated with poor health and that the medical system is detecting and treating this particular condition. In the absence of hard data on the actual prevalence of the *condition* rather than the treatment, we are unable to judge whether the strength of the response of the system is at the appropriate level.

Figure 11: Hypertension Treatment Prevalence, by CA



* Indicates rate is statistically different from the Winnipeg average.

Figure 12: Hypertension Treatment Prevalence, by NC

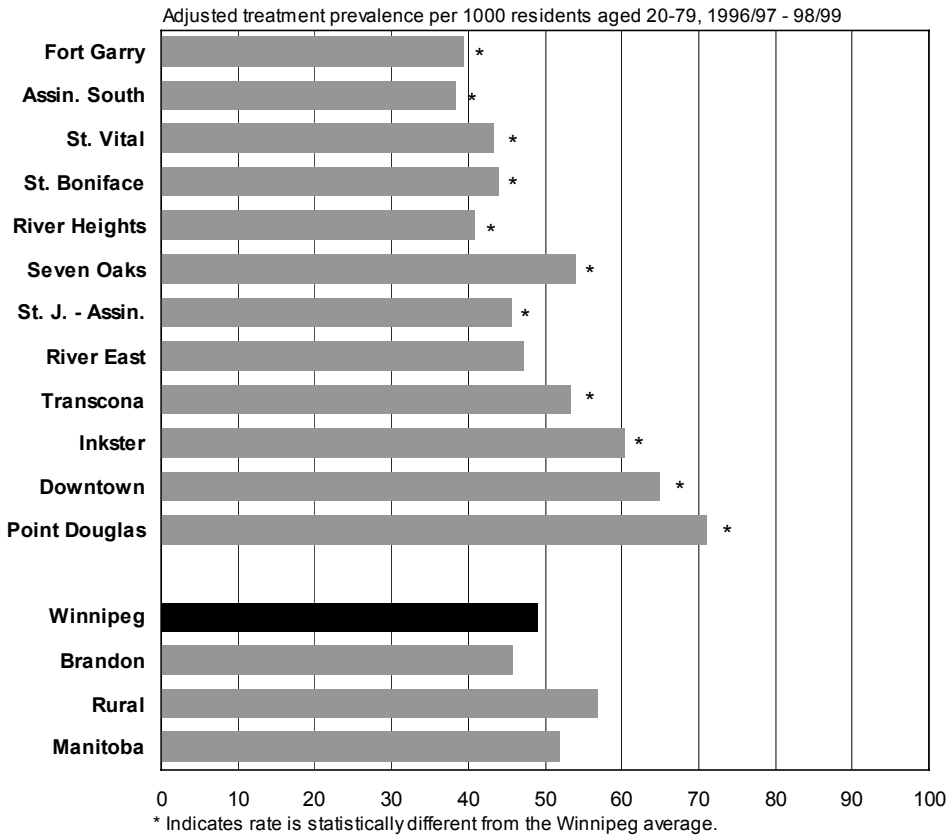


* Indicates rate is statistically different from the Winnipeg average.

3.5.2 Diabetes Mellitus

Diabetes mellitus is a chronic metabolic disease that must be carefully managed to avoid serious deleterious consequences. Diabetes is becoming considerably more common, particularly among Aboriginal peoples. For this analysis, diabetics were defined as those with at least two physician visits, or at least one hospitalization, with a diagnosis of diabetes (Type I or II), in the three-year period 1996/97 – 1998/99[3]. Hence this measure, as with hypertension, is a measure of *treatment* prevalence. Figures 13 and 14 show the rates by community and neighbourhood. There is great variation across areas, and the rates are highly

Figure 13: Diabetes Treatment Prevalence, by CA

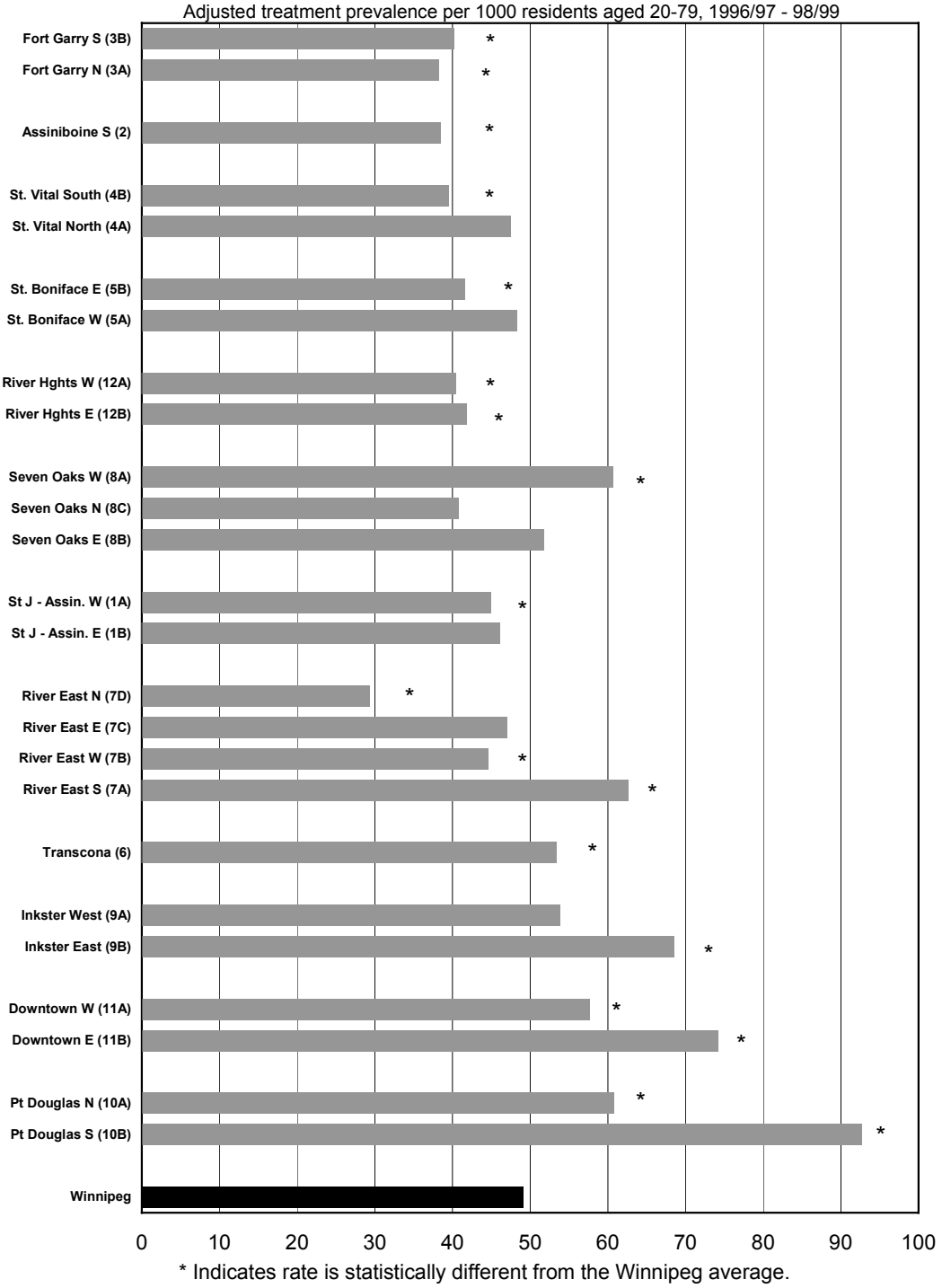


significantly associated with premature mortality rates at both the neighbourhood and community levels (r = 0.77 and 0.94). The community level variation ranges from a low of 38.5 in Assiniboine South to a high of 71 in Point Douglas. The neighbourhood variations

[3] There may be differences in the severity of the cases which enter our definition via physician visits versus hospitalization. Those differences are not explored in this report, but may be of interest for future study.

are even more pronounced. The low prevalence of 29.3 in River East North is in sharp contrast to the high of 92.7 in Point Douglas South, for an almost 3-fold difference in prevalence.

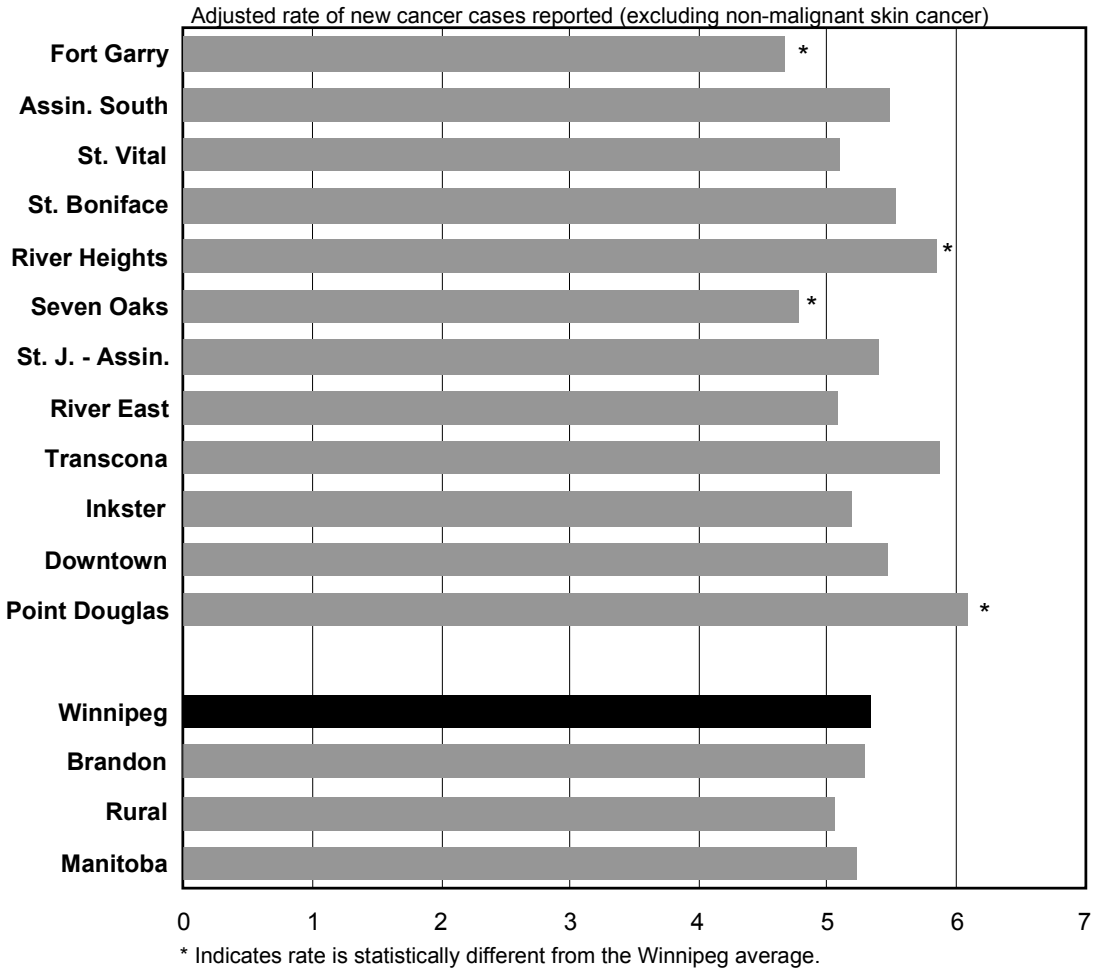
Figure 14: Diabetes Treatment Prevalence, by NC



3.5.3 Cancer Incidence

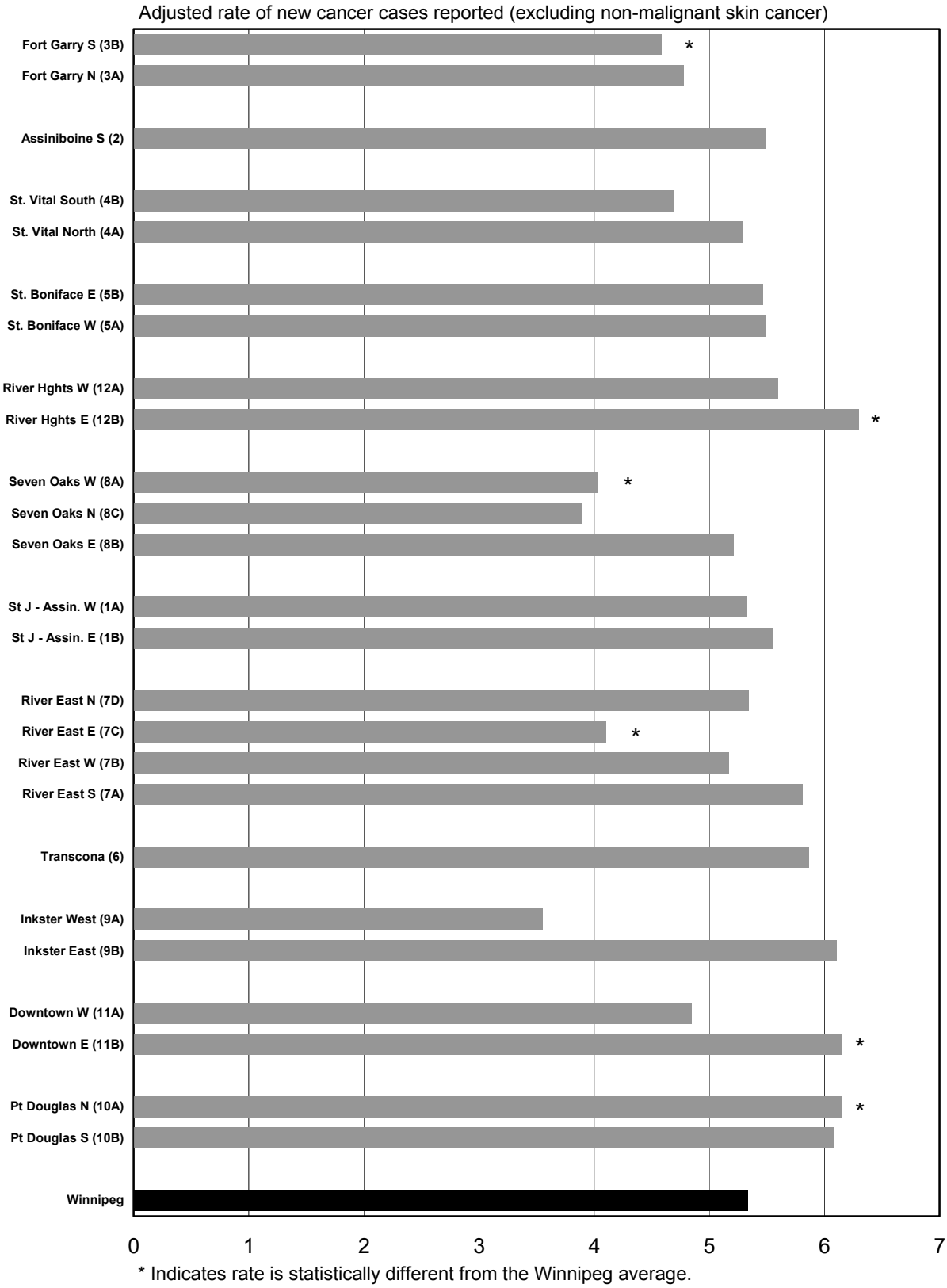
In the case of cancer, defining prevalence is complicated by a number of factors. Therefore, we analyzed the Incidence rate: the rate at which new cases of cancer are being reported. These results were derived from information provided by the Manitoba Cancer Treatment and Research Foundation in 1996 (thus the data is 'older' than other analyses in this report). Since cancer is a legally notifiable disease, the registry is considered highly accurate. Figures 15 and 16 show that there is significant variation in cancer incidence rates across areas. Fort Garry has the lowest incidence (4.6) of all communities, while Point Douglas has the highest (6.1). Again the variation at the neighbourhood level is higher: from 3.6 in Inkster West to 6.3 in River Heights East. The relationship with premature mortality rates is significant at the neighbourhood level (r = 0.68), but not at the community level (r = 0.42).

Figure 15: Cancer Incidence Rates by CA, 1993/94 - 1995/96



Revised 2001-07-12

Figure 16: Cancer Incidence Rates by NC, 1993/94 - 1995/96



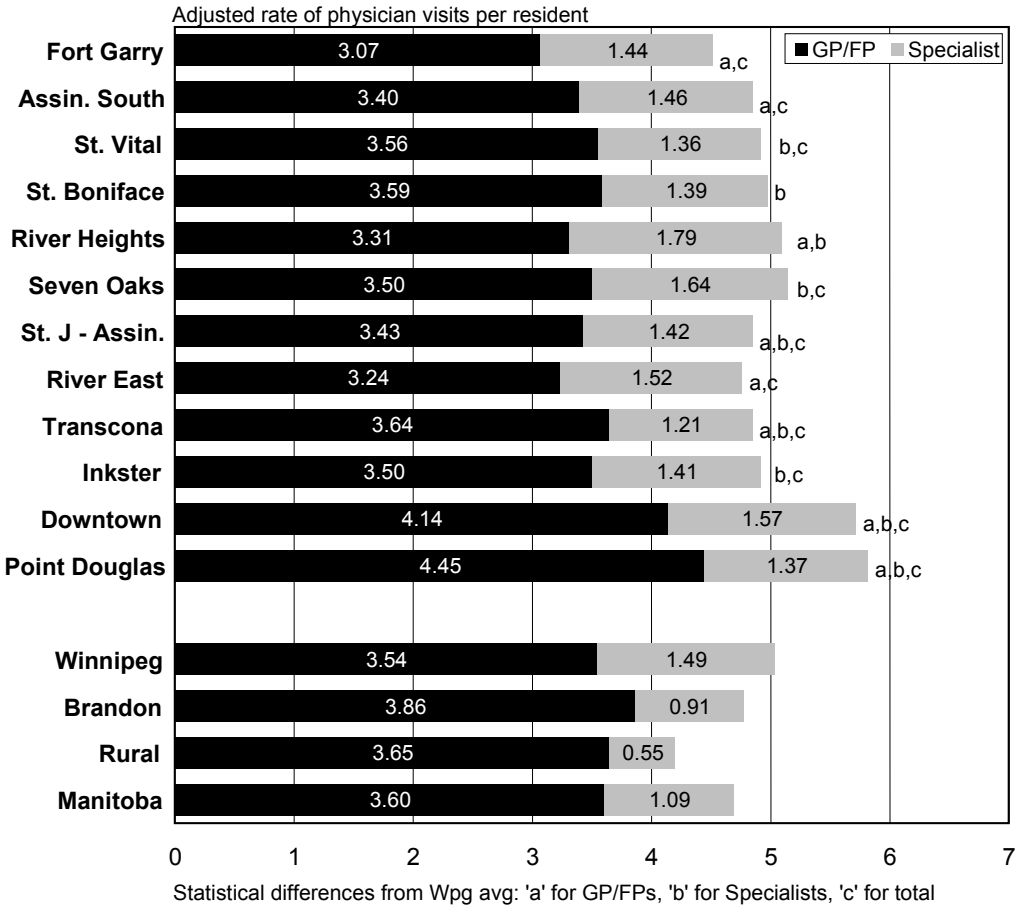
* Indicates rate is statistically different from the Winnipeg average.

4. PHYSICIAN SERVICES

4.1 Visit Rates to Physicians

A visit to a physician often represents the entry point to the healthcare system. It frequently leads to follow-up visits, diagnostic tests, consultations with specialists or surgeons, or hospitalization. Figures 17 and 18 show the rates of ambulatory visits to General and Family

Figure 17: Visit Rates to Physicians, by CA, 1998/99

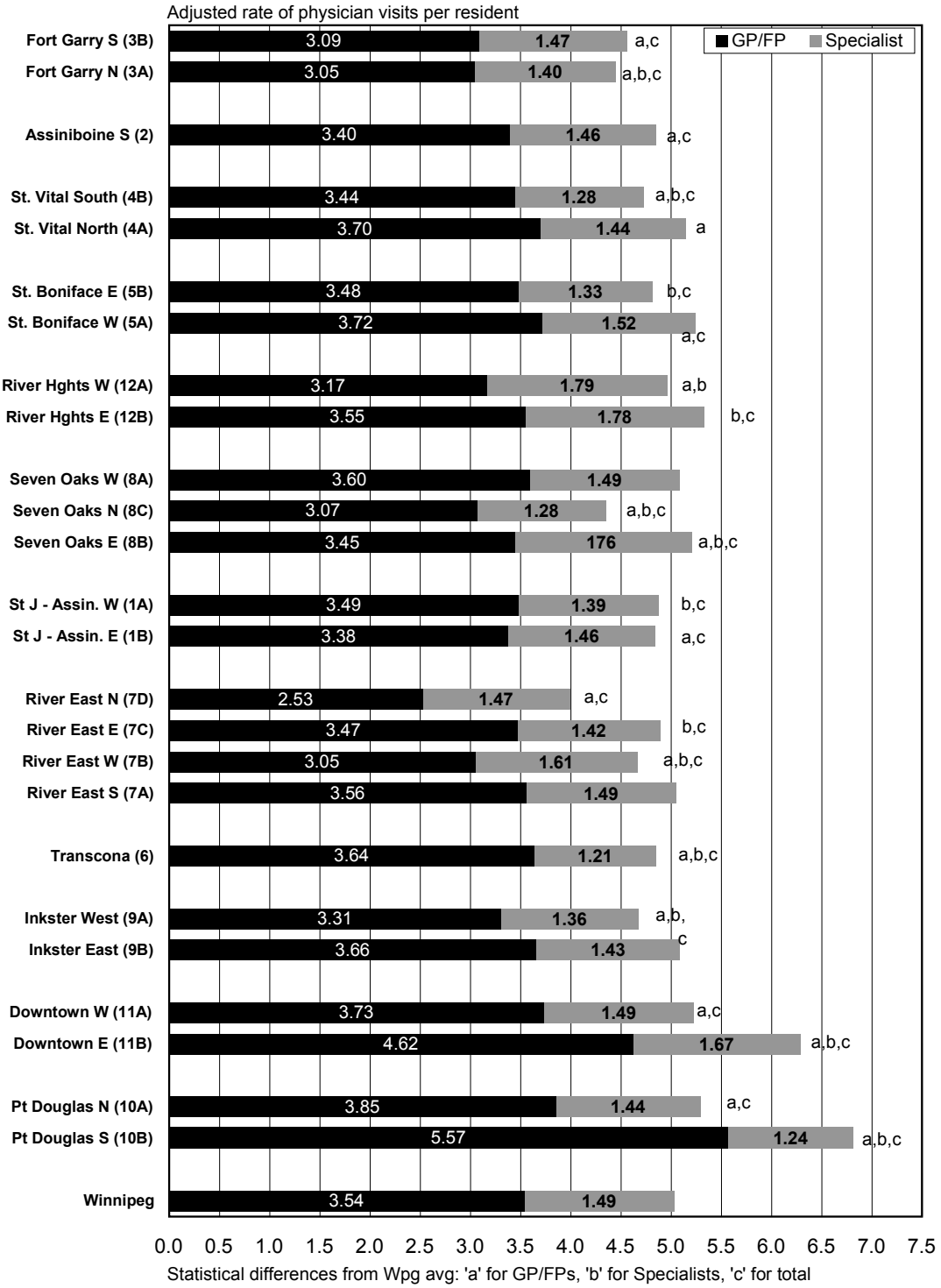


Practitioners (GP/FPs) and Specialists[4]. Ambulatory visits include visits to physician offices, hospital outpatient clinics and emergency rooms[5], home visits, etc – everything except visits to hospital inpatients. Again, we focus on the use of services according to the area of residence of the patient, not the location of the physician. In Figure 17, the bars generally get longer as one moves from the top to the bottom of the figure. This indicates that residents from areas with less healthy populations, on average, tend to make more physician visits.

[4] Specialists include all physicians reimbursed by Manitoba Health as practising in a field other than General or Family Practice. Therefore, all Pediatricians, Internists and Surgeons are included.

[5] The Manitoba Health physician claims data contain Emergency Room claims for HSC and St. Boniface hospitals only, which together provide approximately 50% of all Winnipeg ER visits. The missing ER visits (from the community hospitals) comprise approximately 4% of all physician visits, thus would not significantly affect the patterns seen.

Figure 18: Visit Rates to Physicians, by NC, 1998/99



The relationship between premature mortality and visit rates can be examined more explicitly by looking at the data in a different way. Figures 19 and 20 are scatter graphs of visit rates to GP/FPs only, versus premature mortality rates, by community and neighbourhood. Each point on the scatter graph represents one geographical area: its position on the horizontal axis corresponds to its premature mortality rate, and its position on the vertical axis corresponds to its visit rate to GP/FPs. If there were a positive relationship between these two measures we would expect residents from areas with higher levels of premature mortality to make more visits. Hence the points should rise as one moves from left to right on the graph, and that is in fact what is shown: areas with poorer health have higher average visit rates. The straight line represents the linear tendency within the data (the regression line). The relationship is highly statistically significant at the neighbourhood (NC) level ($r = 0.74$), and significant at the community level ($r = 0.64$).

Figure 19: Visit Rates to GP/FPs vs. Premature Mortality by CA, 1998/99

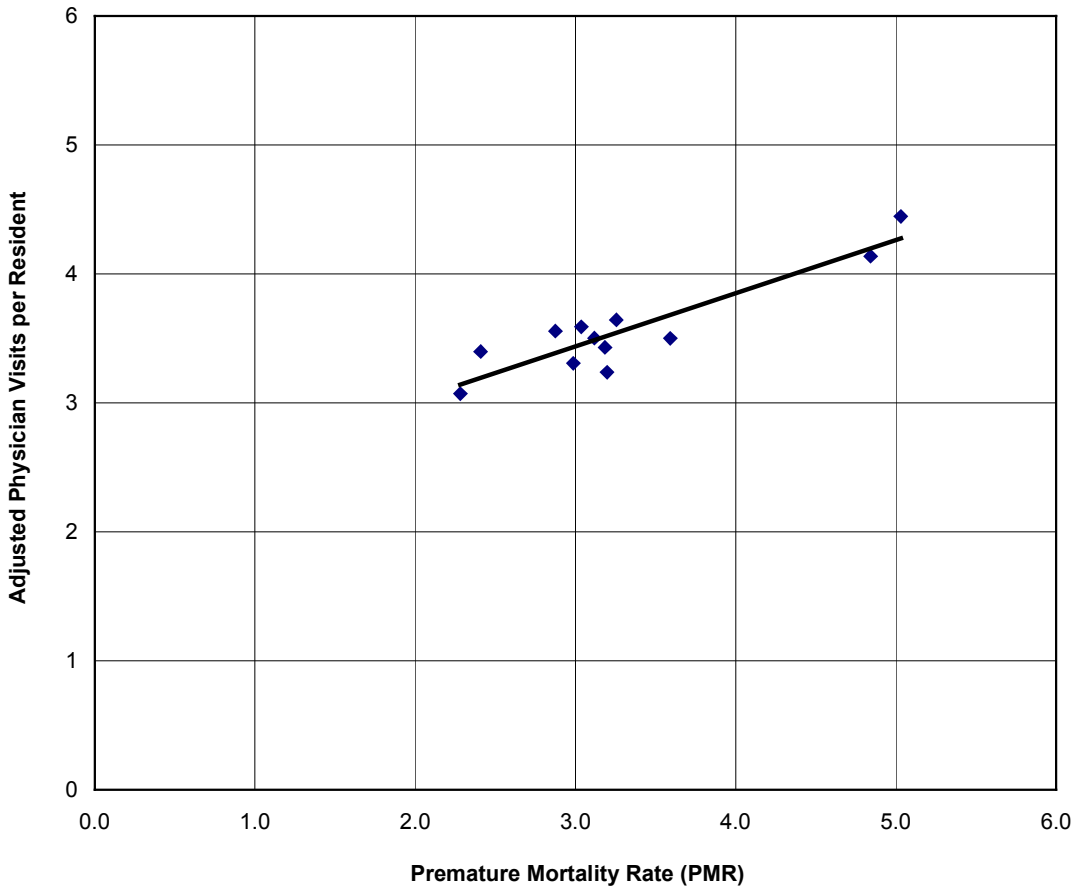
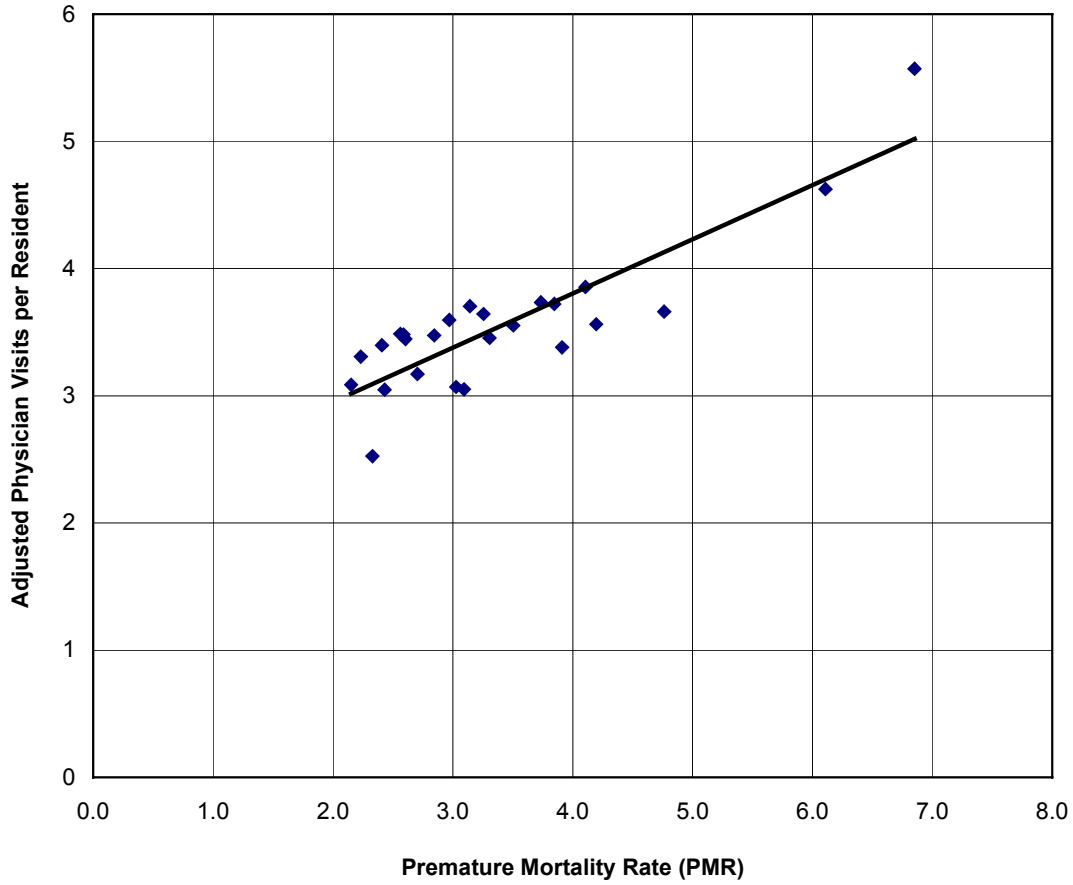


Figure 20: Visit Rates to GP/FPs vs. Premature Mortality by NC, 1998/99



4.2 Visits to Specialist Physicians

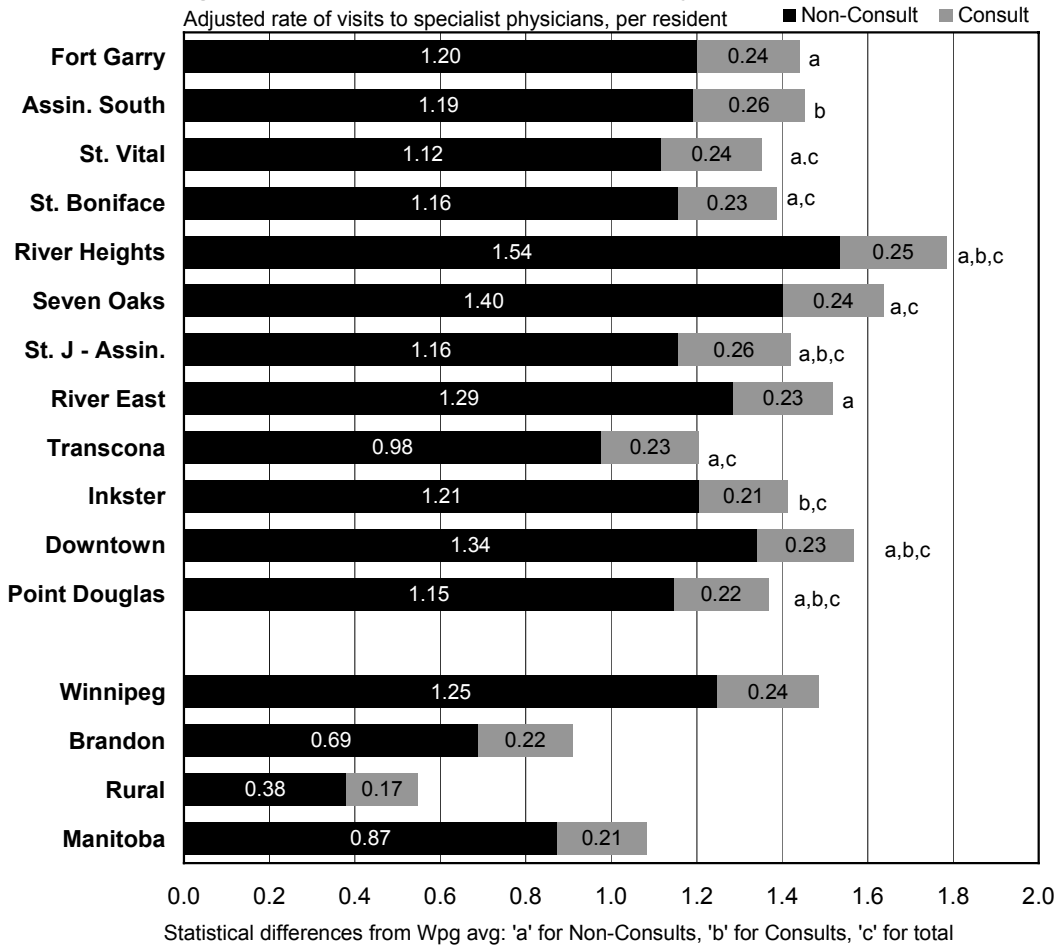
Specialist physicians provide ambulatory visits that can be categorized as two types, determined by whether the visit was a consultation[6] or not. A consultation occurs when a physician requests the opinion of a specialist due to the complexity, obscurity or seriousness of the condition. The consultation is usually a *one-time* visit to the specialist, after which follow-up visits may be provided by the specialist or another physician, but are not normally considered consultations. Therefore, the consultation rate reflects imputed conditions that a physician has deemed to require specialist care. The consultation rates may over or under-

[6] In Manitoba, a 'consultation' has a specific definition, and is associated with a unique service code and a higher fee. Overall, approximately 16% of visits to specialists are billed as consultations, though that proportion varies significantly by specialty.

estimate the prevalence of the relevant conditions. The rate of non-consult visits to specialists, on the other hand, includes the use of specialists without necessarily contacting a GP/FP before each visit (these visits can be initiated by the specialist or the patient). Most non-consultative visits to specialists (55%) are to Pediatricians and Internists, fields which both contain "General Specialists" as well as sub-specialists.[7]

Figures 21 and 22 illustrate that there is considerable variation in visit rates to specialists – with River Heights residents having a rate almost 50% higher than that of Transcona residents, even though Transcona residents have slightly poorer average health status.

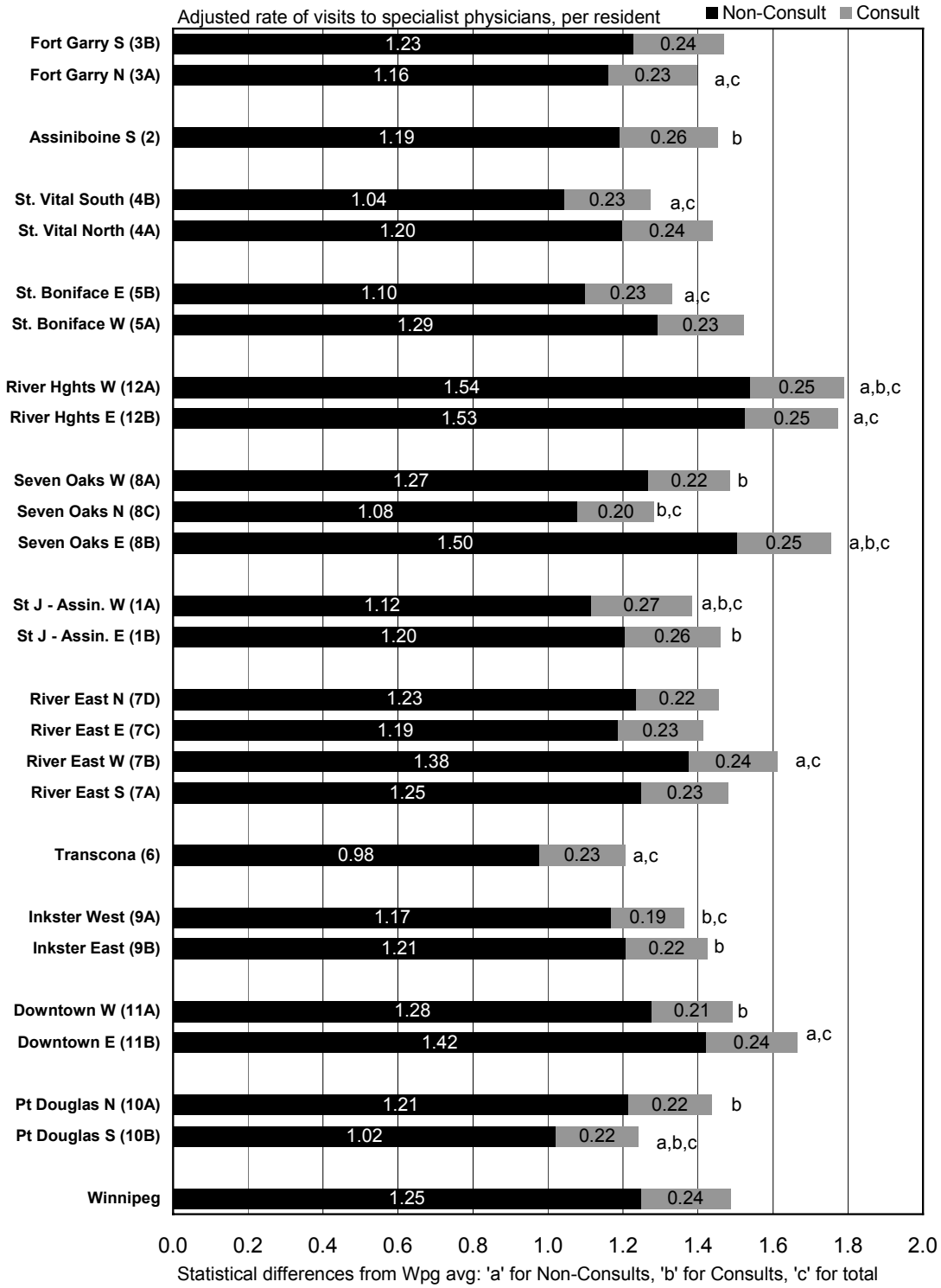
Figure 21: Visit Rates to Specialists, by CA, 1998/99



[7] Services provided by sub-specialist pediatricians are known to be under-represented in the claims database. However, most of these specialists are hospital-based, so we believe that relatively few ambulatory visits are missed because of this limitation.

The largest component of the difference comes from non-consultative visits, which show no relationship with premature mortality rates (r = -0.06 for communities, 0.24 for

Figure 22: Visit Rates to Specialists, by NC, 1998/99



neighbourhoods). Consultations have a mixed pattern: there is no relationship at the neighbourhood level (r = -0.08) but a significant negative relationship at the community level (r = -0.75). That is, residents of the less healthy communities have lower consult rates to specialists, the opposite of what one might expect.

The total visit rates to specialists (consults and non-consults) are not related to premature mortality rates. This means that specialist visits are not well targeted to areas with less healthy residents. When one looks at the scatter plots of specialist visits versus premature mortality (Figures 23 & 24), this lack of targeting is clear. There is no relationship between premature mortality rates and total visits to specialists at either the community or neighbourhood level (r = -0.18 for communities and 0.20 for neighbourhoods). There is substantial variation in rates, but no trend toward higher rates for less healthy areas. Indeed, as noted above, the variation in rates across areas is around 50% at both levels, and areas with populations of similar health status exhibit very different rates.[8]

[8] The visit rates patterns in Figure 21 are total visits, and so reflect repeat visits by individuals who make more than one visit. However, the pattern of visits when repeat visits are removed is very similar. Those two visit patterns show a very strong relationship (Pearson's r = 0.91 for CAs and 0.96 for NCs). Therefore, the reported visit patterns are not distorted by including repeat visits by residents.

Figure 23: Specialist Visit Rates vs. Premature Mortality by CA, 1998/99

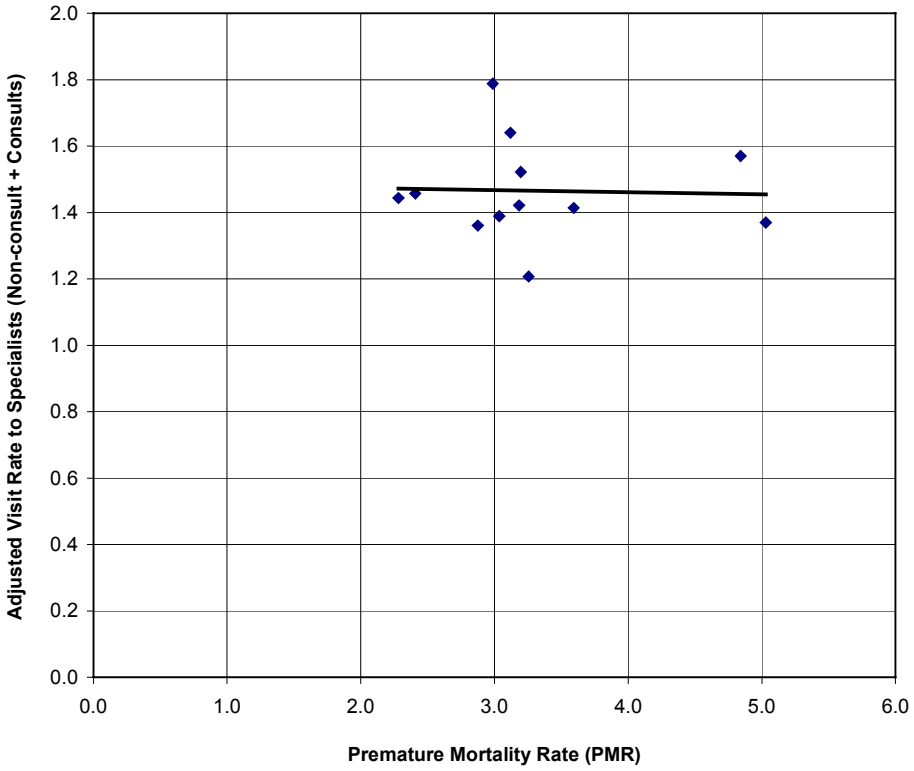
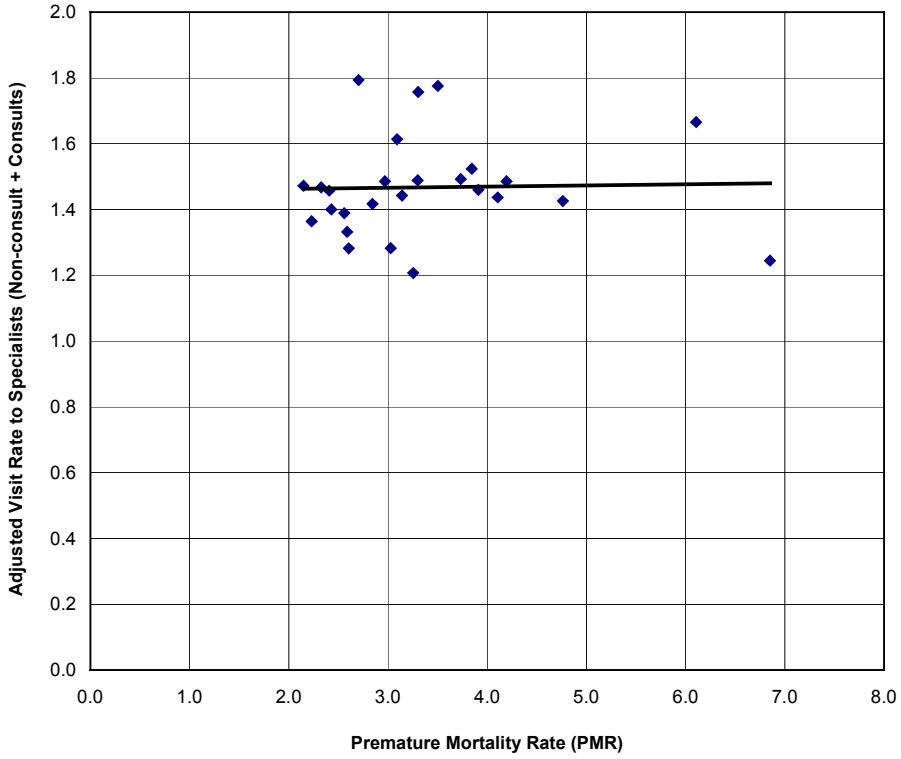


Figure 24: Specialist Visit Rates vs. Premature Mortality by NC, 1998/99



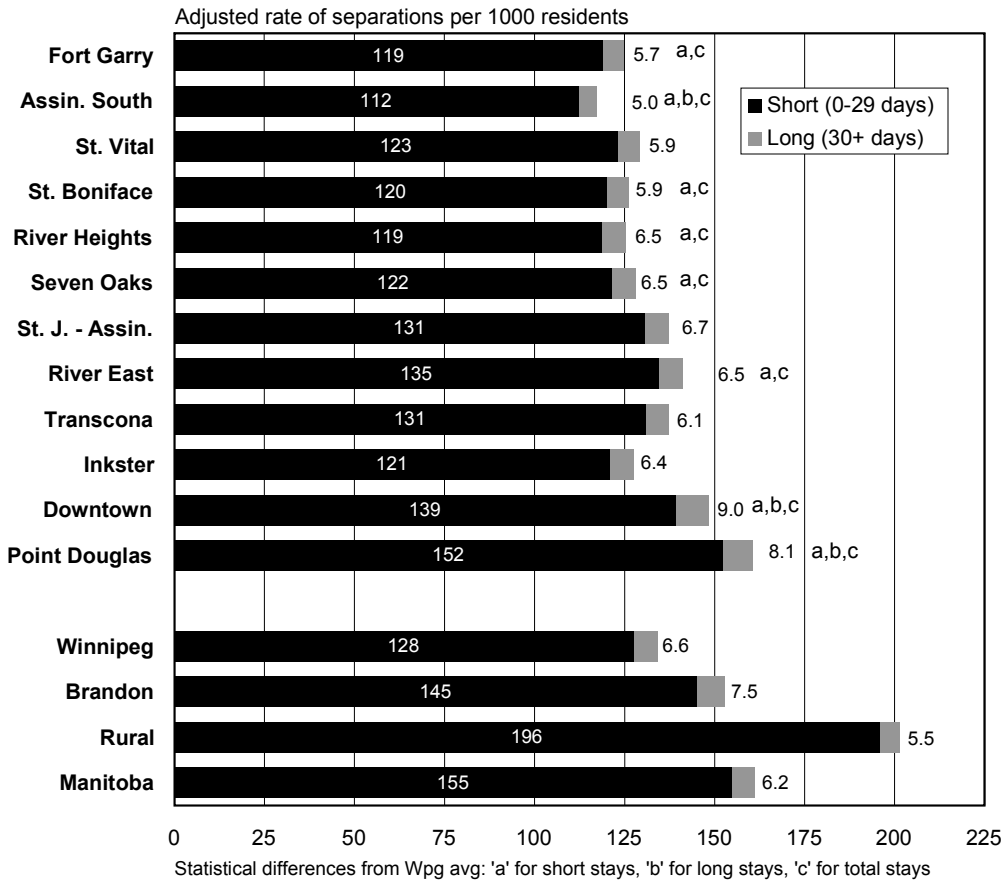
5. HOSPITAL SERVICES

The amount of care provided by hospitals depends primarily on two factors: the number of patients treated, and the length of stay of each patient. Therefore, it is important to examine both the frequency of use and the number of days used.

5.1 Frequency of Hospitalization

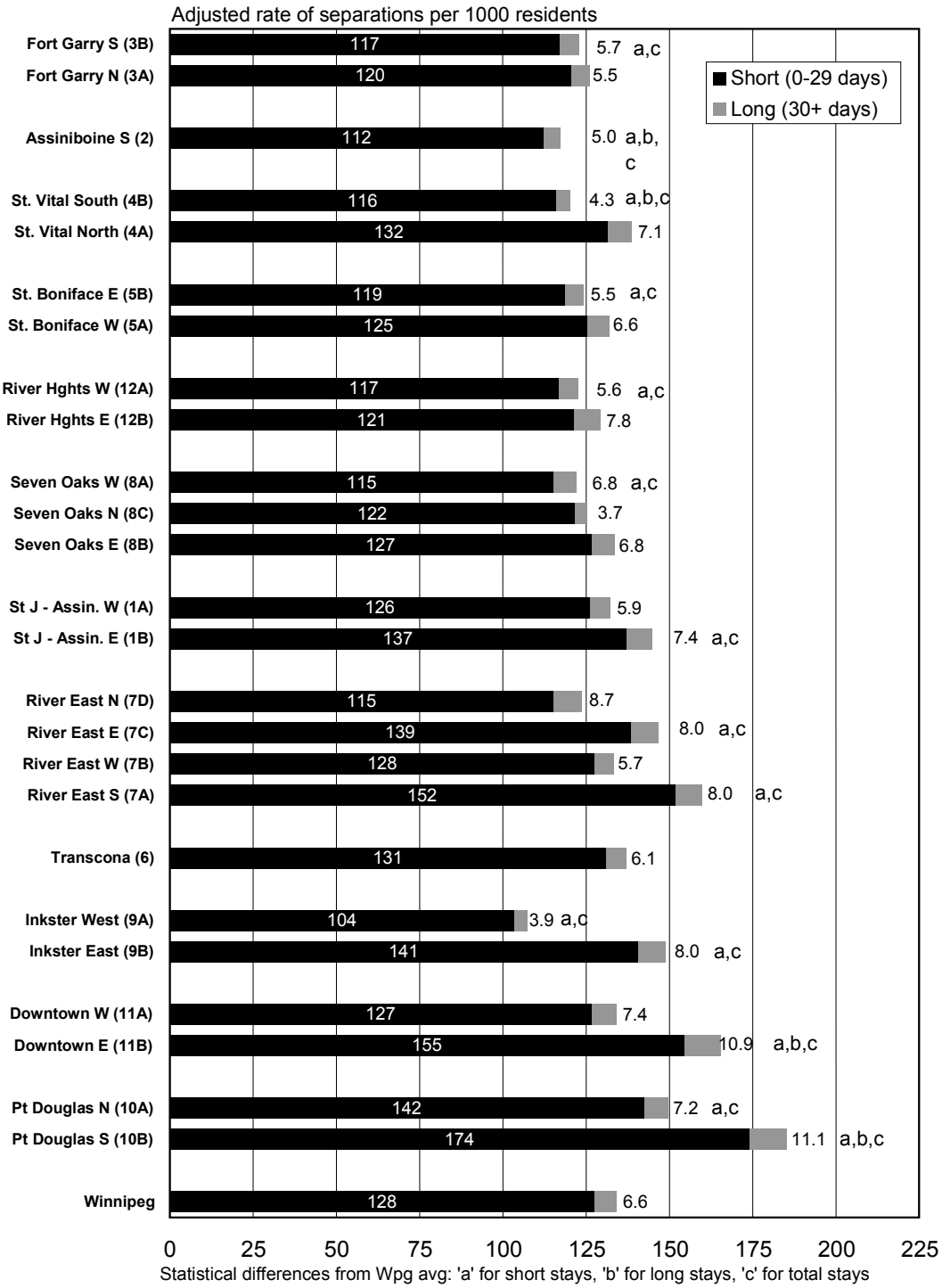
Figures 25 and 26 show the hospitalization rates for the communities and neighbourhoods. This includes both short- and long-stay patients (outpatient surgery cases are included with short-stay patients). These represent the frequency of hospitalization for all residents, not the number of individuals hospitalized (thus one resident hospitalized 3 times in the year counts as 3 hospitalizations). The hospitalization rates for residents of the communities range from

Figure 25: Hospital Separation Rates, by CA, 1998/99



117 in Assiniboine South to 161 in Point Douglas. There is much greater range in the neighbourhoods: from 108 in Inkster West to 185 in Point Douglas South. Long stay patients (30+ days) account for relatively few hospital admissions as compared to short stay patients (0-29 days). Therefore, as demonstrated below, long stay patients account for a larger proportion of total hospital days.

Figure 26: Hospital Separation Rates, by NC, 1998/99



Figures 27 and 28 are scatter-plots that show there is a strong positive relationship between total hospitalization rates and premature mortality rates: the less healthy areas have higher hospitalization rates as evidenced by the up-sloping line. It is worth noting that the dispersion of rates is much lower in these scatter plots than in the plot of visits to specialists (Figures 23 and 24, noted above). Hospitalizations do not seem to show as much random variation: i.e. distance from the average trend line. Consequently, they appear to be more closely tied to our surrogate measure of need. This relationship is highly significant at both the community and neighbourhood levels ($r = 0.81$ and 0.83, respectively). Within the total, both the short- and long-stay separation rates are significantly related to premature mortality rates, at both the community and neighbourhood levels ($r > 0.65$ for all four relationships).

Figure 27: Hospital Separation Rates vs Premature Mortality by CA, 1998/99

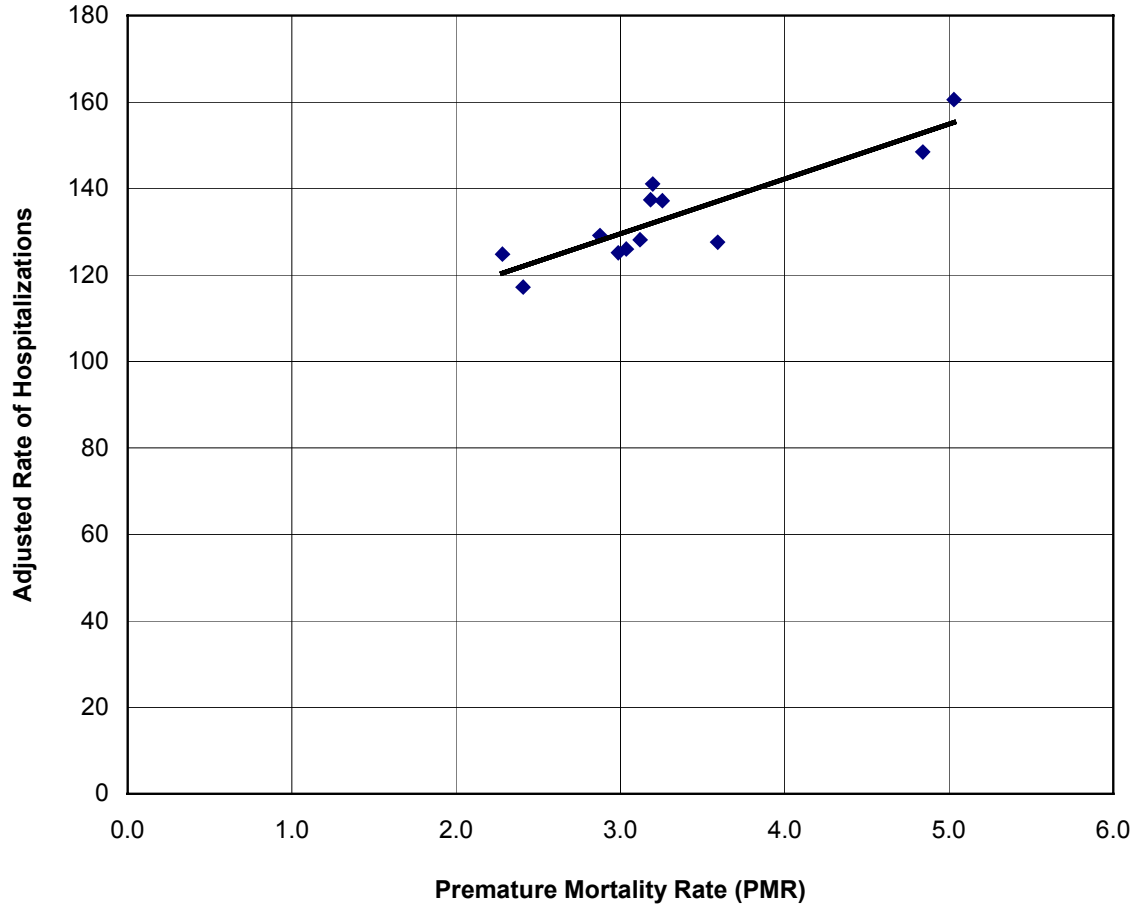


Figure 28: Hospital Separation Rates vs Premature Mortality by NC, 1998/99

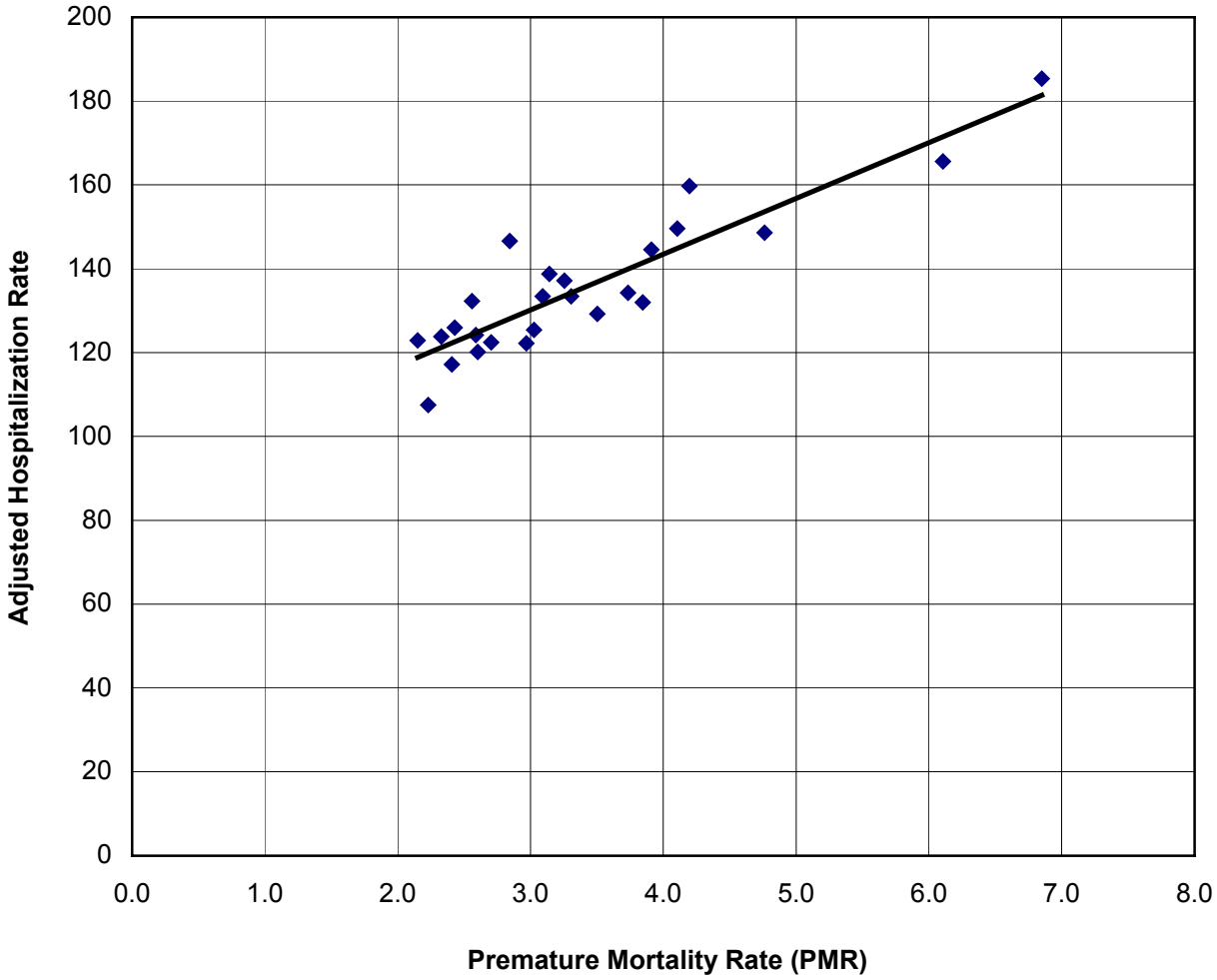
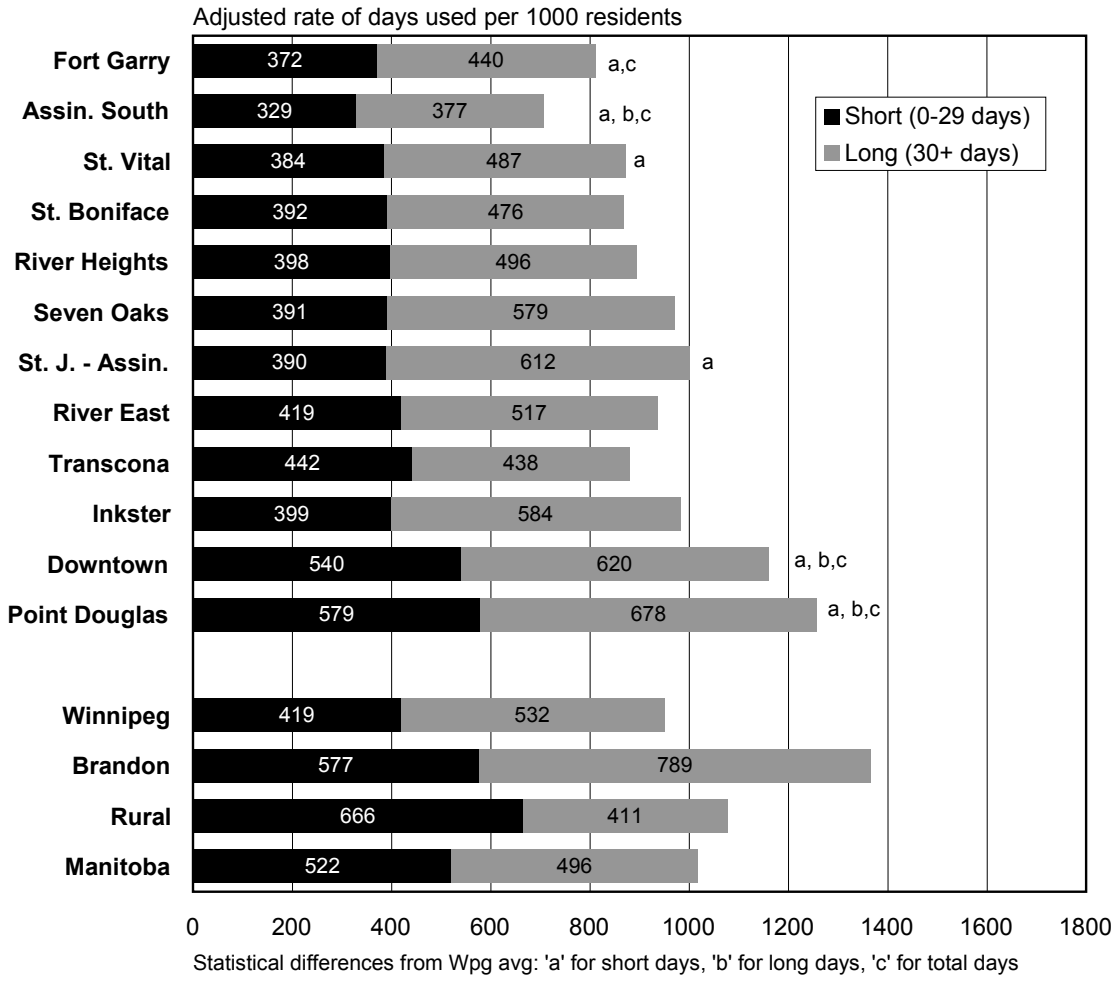


Figure 29: Days of Hospital Care, by CA, 1998/99

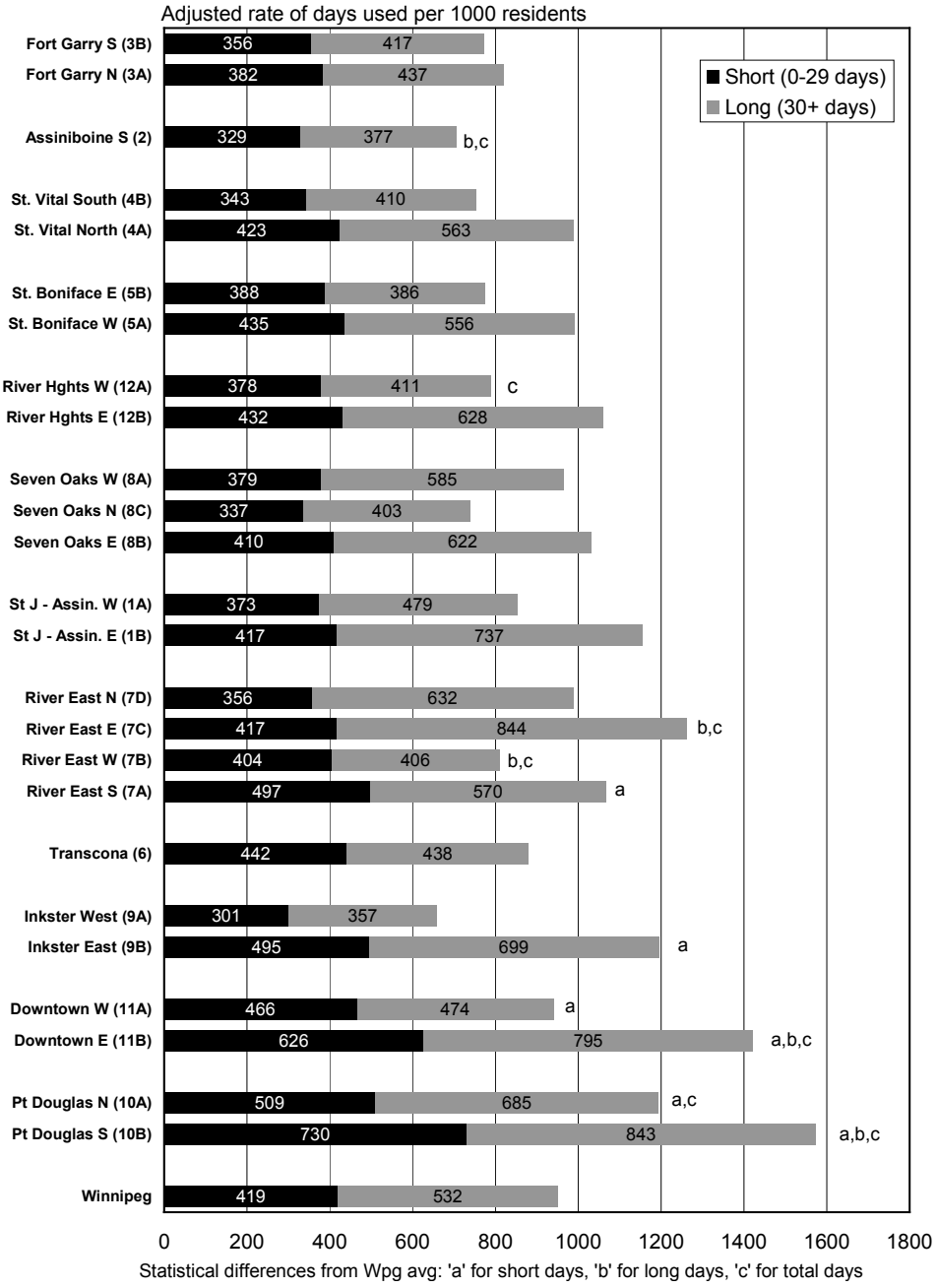


5.2 Days of Hospital Care

The total number of days of hospital care provided depends on both the number of patients admitted and the length of stay for each patient. Therefore, rates of days used are an indicator of the total use of hospital resources. Figures 29 and 30 show the total days of care by community and neighbourhood, separating days used by short-stay patients from those used for long stays (30+ days). Even though, as noted above, long stays are much less frequent, they use up more than half of all days provided. There is a wide range between Point Douglas, the community whose residents have the highest rate 1257 days, and Assiniboine South, with only 706 days. The gap between the neighbourhoods is even greater: the Point Douglas South neighbourhood has a rate of 1573 days, versus Inkster West with only 658 days. The relationships between days used and premature mortality rates (not

shown) are similar to those found for separations. There is a highly significant correlation between total days and premature mortality rates (r = 0.85 for communities and 0.78 for neighbourhoods); a highly significant relationship between days used for short stays and premature mortality rates (r = 0.90 and 0.89), and a significant relationship between days used for long stays and premature mortality rates (r = 0.73 for communities and 0.64 for neighbourhoods). So hospital day use, at both community and neighbourhood area levels, is related to this measure of need.

Figure 30: Days of Hospital Care, by NC, 1998/99



5.3 Location of Hospitalizations

In which hospitals do each area's residents spend most of their hospital days? The following series of pie charts, Figures 31 – 42, show where residents of each community spent their hospital days. For this analysis, we looked only at the 7 hospitals in Winnipeg (which provided more than 94% of all hospitalizations of Winnipeg residents). In each graph, the hospitals appear in the same (descending) order of days provided for all Winnipeg residents, clockwise from the top: Health Sciences Centre, St.Boniface, Grace, Seven Oaks, Victoria, Concordia, and Misericordia (since in fiscal year 1998/99, the Misericordia was still functioning as an acute care hospital). For each community, the hospital providing the most days is shown in black; the second most in dark grey, the third in medium grey, and all others in light grey.

It appears that the community hospitals are serving their catchment areas: Victoria hospital provides the plurality of days for residents of Fort Garry; the Grace for St. James - Assiniboia and Assiniboine South; Concordia for River East and Transcona; and Seven Oaks for residents of Seven Oaks and Point Douglas. Pluralities in the communities with either no community hospital or in close proximity to a teaching hospital (St. Boniface, St. Vital, River Heights, Inkster, and Downtown) favour one of the teaching hospitals most often.

Figure 31: Hospitals Used by Patients From Fort Garry

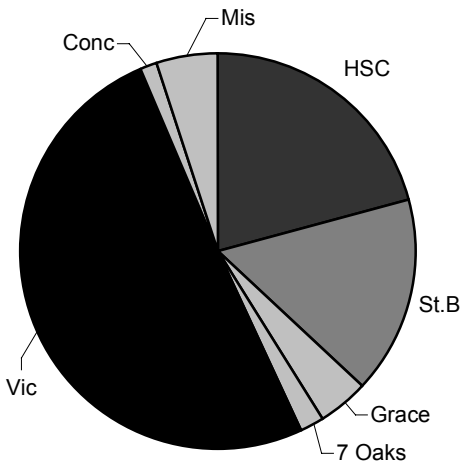


Figure 32: Hospitals Used by Patients From Assiniboine South

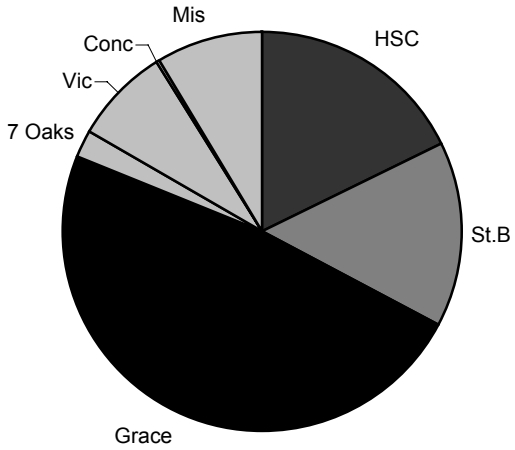


Figure 33: Hospitals Used by Patients From St. Vital

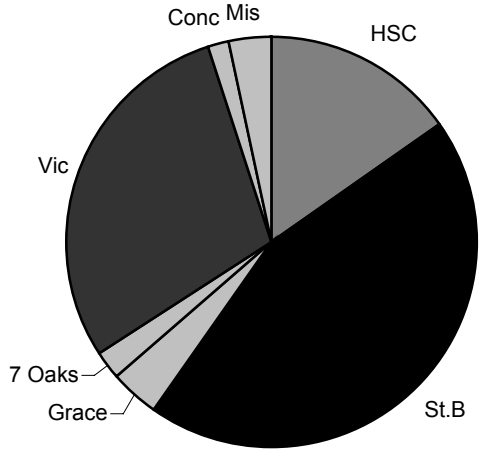


Figure 34: Hospitals Used by Patients From St. Boniface

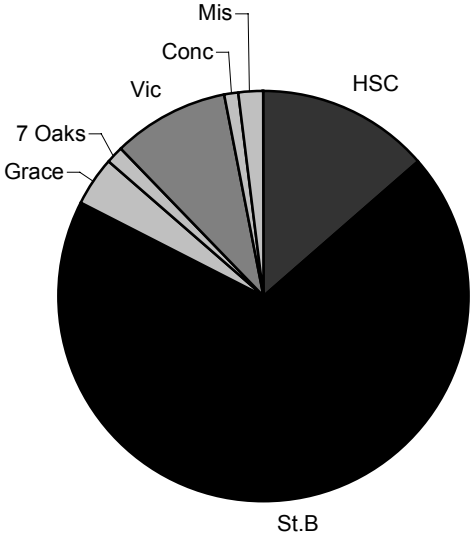


Figure 35: Hospitals Used by Patients From River Heights

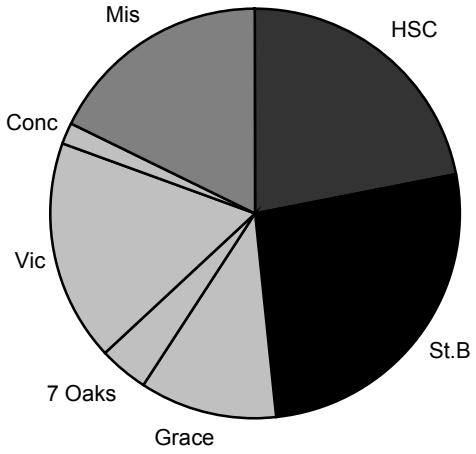


Figure 36: Hospitals Used by Patients From Seven Oaks

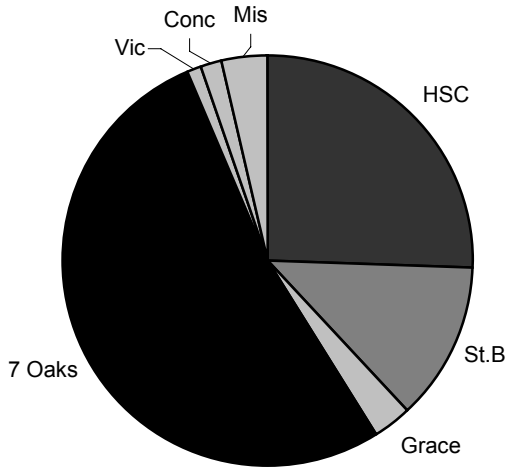


Figure 37: Hospitals Used by Patients From St.James - Assiniboia

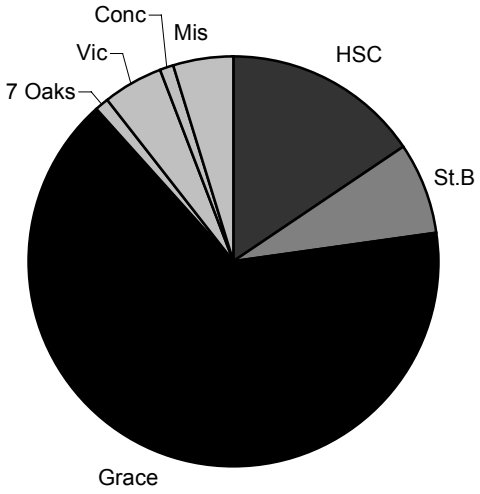


Figure 38: Hospitals Used by Patients From River East

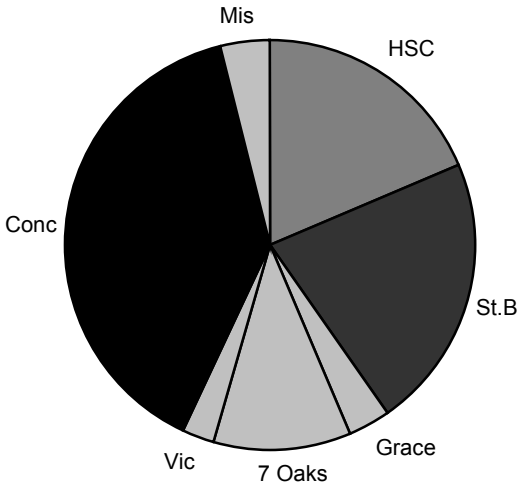


Figure 39: Hospitals Used by Patients From Transcona

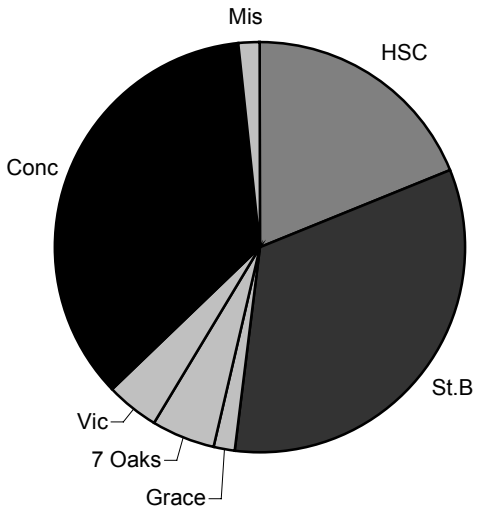


Figure 40: Hospitals Used by Patients From Inkster

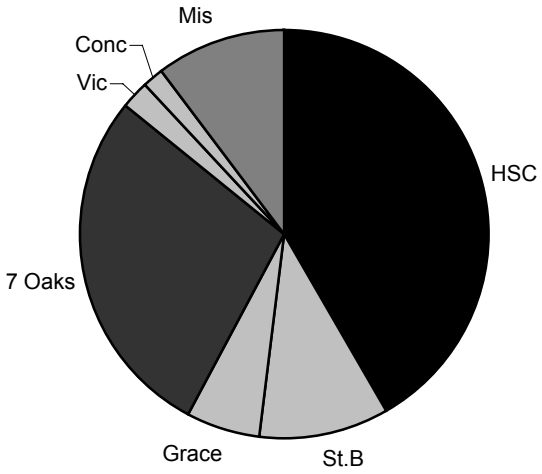


Figure 41: Hospitals Used by Patients From Downtown

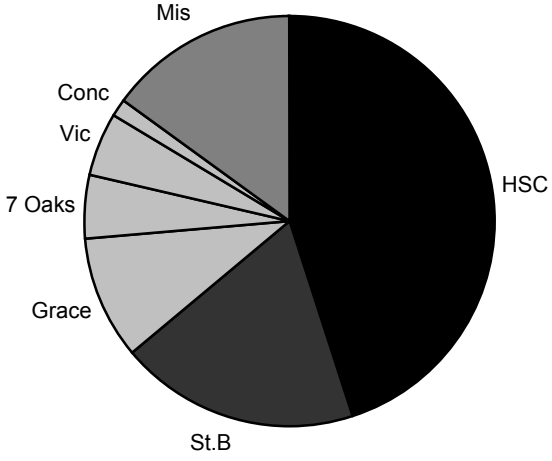
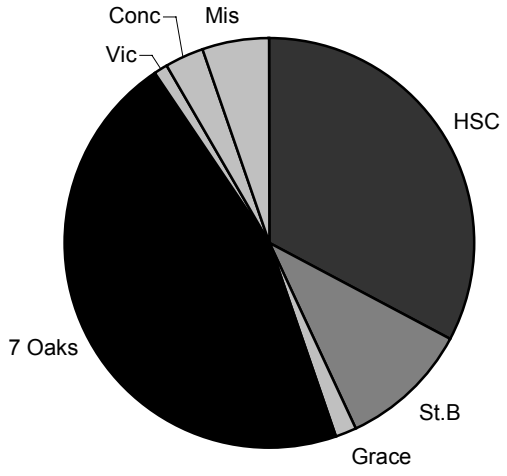


Figure 42: Hospitals Used by Patients From Point Douglas



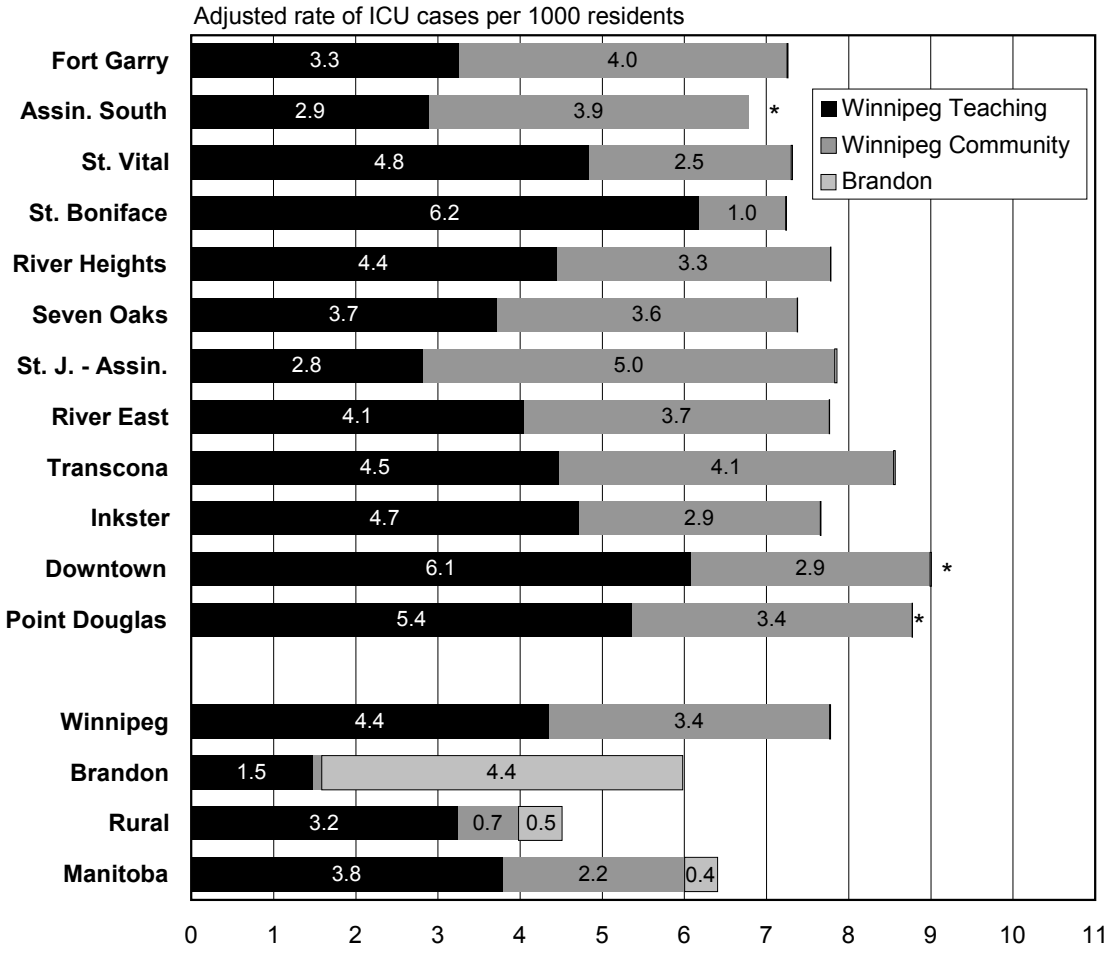
5.4 Intensive Care Units

Hospital care operates on a continuum of acuity and resource intensity. Intensive care units (ICUs) are at the top of the resource intensity scale with regard to both equipment and nursing hours. Patients are admitted to ICUs when that level of care is thought to offer a significant improvement in mortality, as compared with remaining on another ward. Does the population's use of Intensive Care Units (ICUs) match the pattern seen for total hospitalizations? This section separates hospitals into three categories: first, the two teaching hospitals, which care for the most severe cases; second, the Winnipeg community hospitals, which are frequently used for cardiac care; and third Brandon General Hospital, which is unique in functioning as a secondary regional centre. Since admission to ICU is relatively rare, we present results based on 5 years of data (1994/95 – 1998/99).

5.4.1 Frequency of ICU use

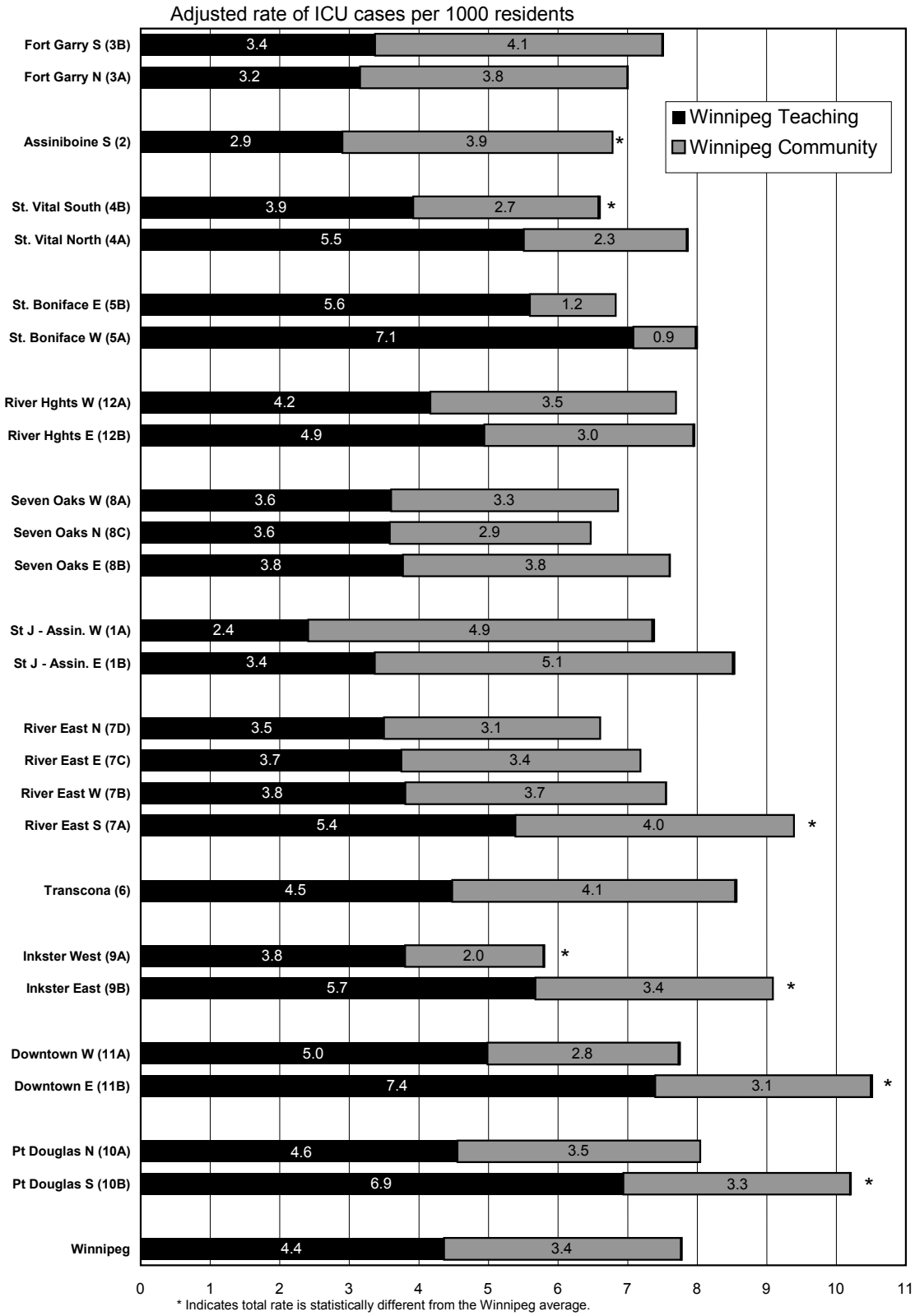
Figures 43 and 44 show the patterns of ICU separations by community and neighbourhood. There is a highly significant positive correlation between premature mortality rates and frequency of ICU use (over 5 years, r = 0.80 for communities, and 0.86 for neighbourhoods). Among the communities, Downtown has the highest five-year rate (9.0), while Assiniboine South has the lowest (6.8). Among the neighbourhoods, Downtown East is the highest (10.5), while Inkster West is the lowest (5.8). Winnipeg rates are higher than Brandon rates and much higher than Rural rates.

Figure 43: Cases Using Intensive Care, by CA, 1994/95 - 98/99



* Indicates total rate is statistically different from Winnipeg average.

Figure 44: Cases Using Intensive Care, by NC, 1994/95 - 1998/99

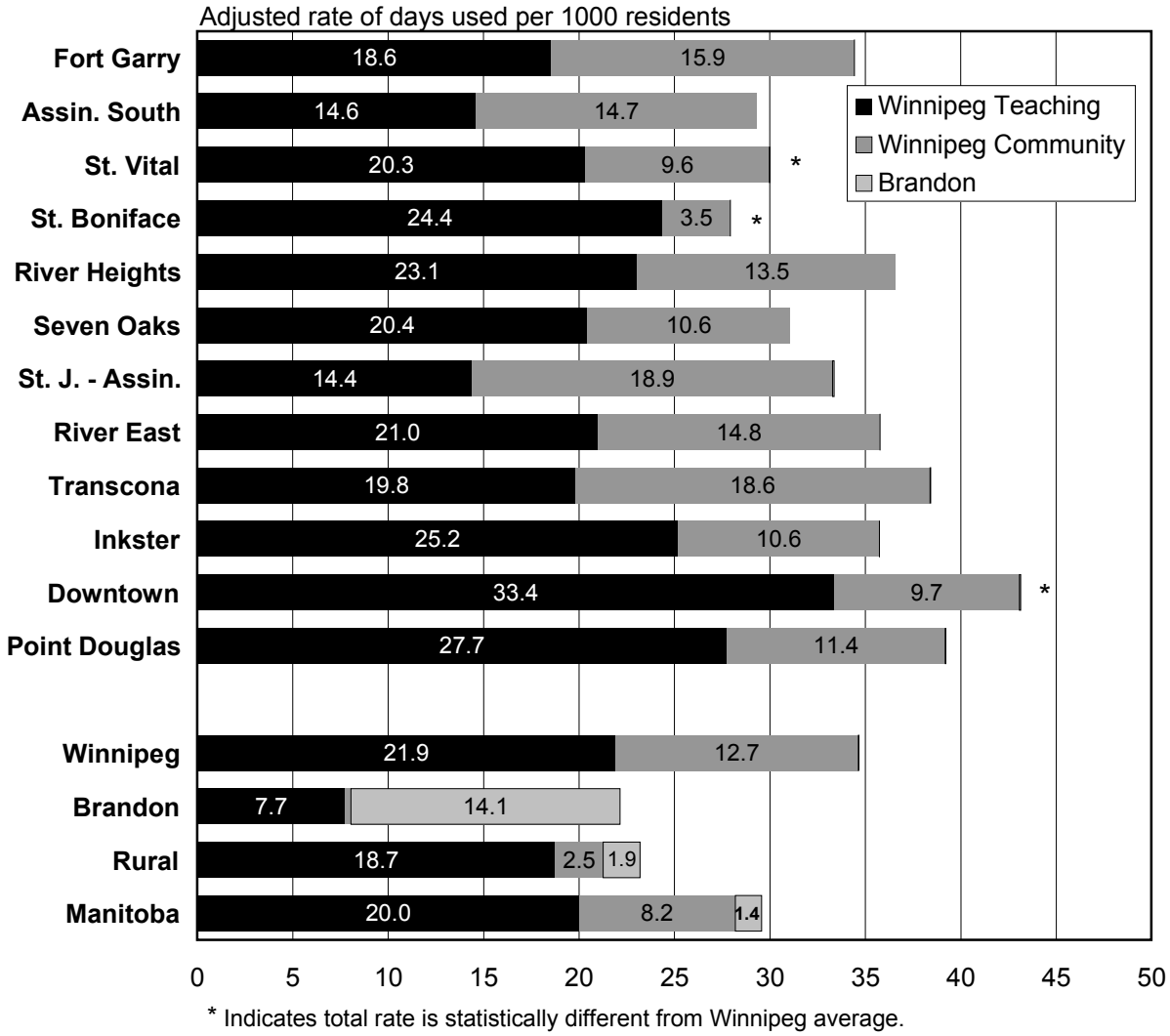


* Indicates total rate is statistically different from the Winnipeg average.

5.4.2 Days of ICU Use

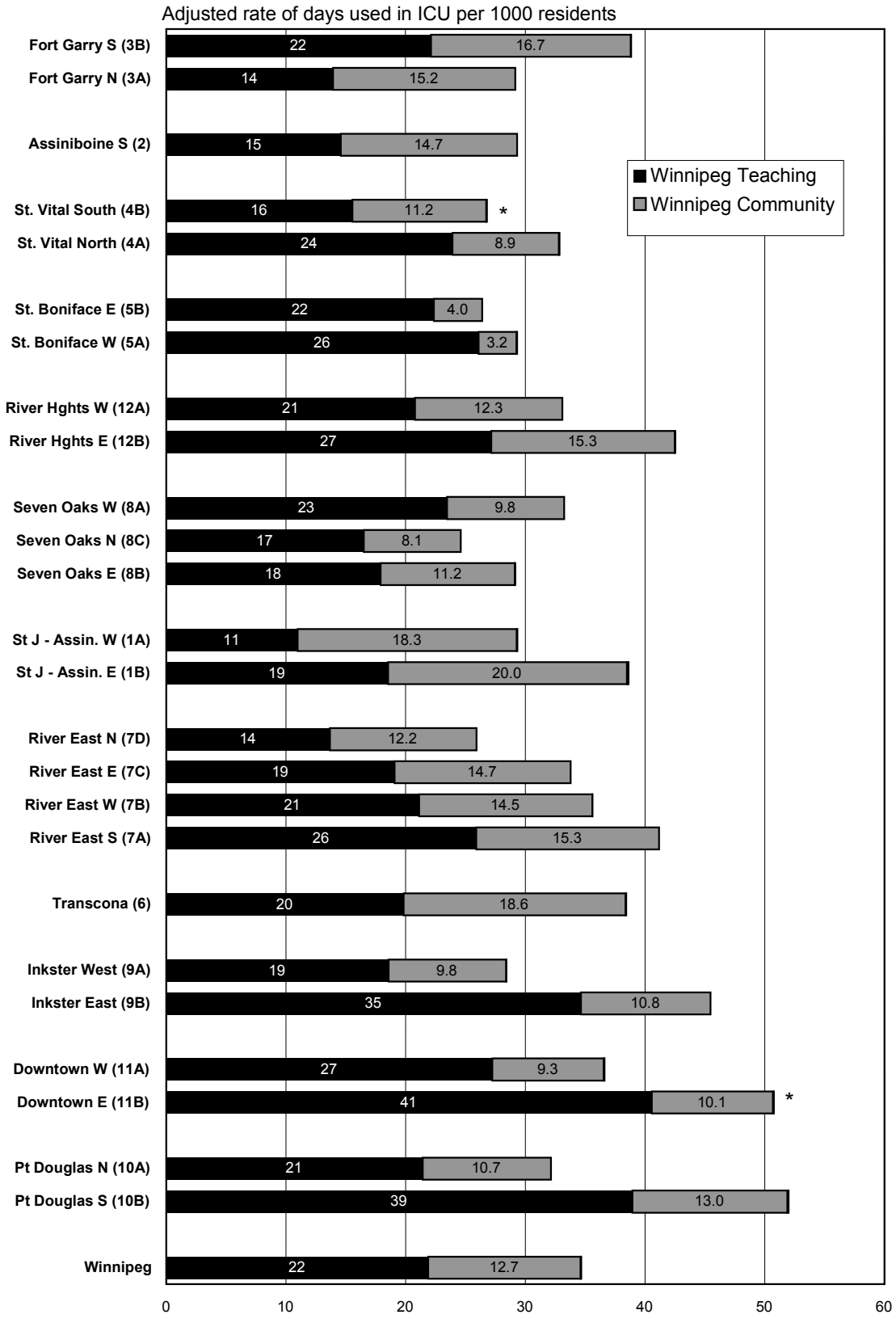
Figures 45 and 46 show the patterns of use of days in ICU, by community and neighbourhood. Again, 5-year rates are shown. The pattern of days used in ICU also track premature mortality rates at significant levels. Over 5 years, r = 0.70 for communities and 0.62 for neighbourhoods. The Downtown community is the highest user in this category (43.1), and St. Boniface is the lowest user (27.9). Among the neighbourhoods, Point Douglas South has the highest rate of use (50.8) and Seven Oaks North the lowest (24.6), with the difference being over a factor of two. Here again, Winnipeg rates are higher than Brandon and Rural rates.

Figure 45: Days in ICU, by CA, 1994/95 - 98/99



* Indicates total rate is statistically different from Winnipeg average.

Figure 46: Days in Intensive Care, by NC, 1994/95 - 1998/99



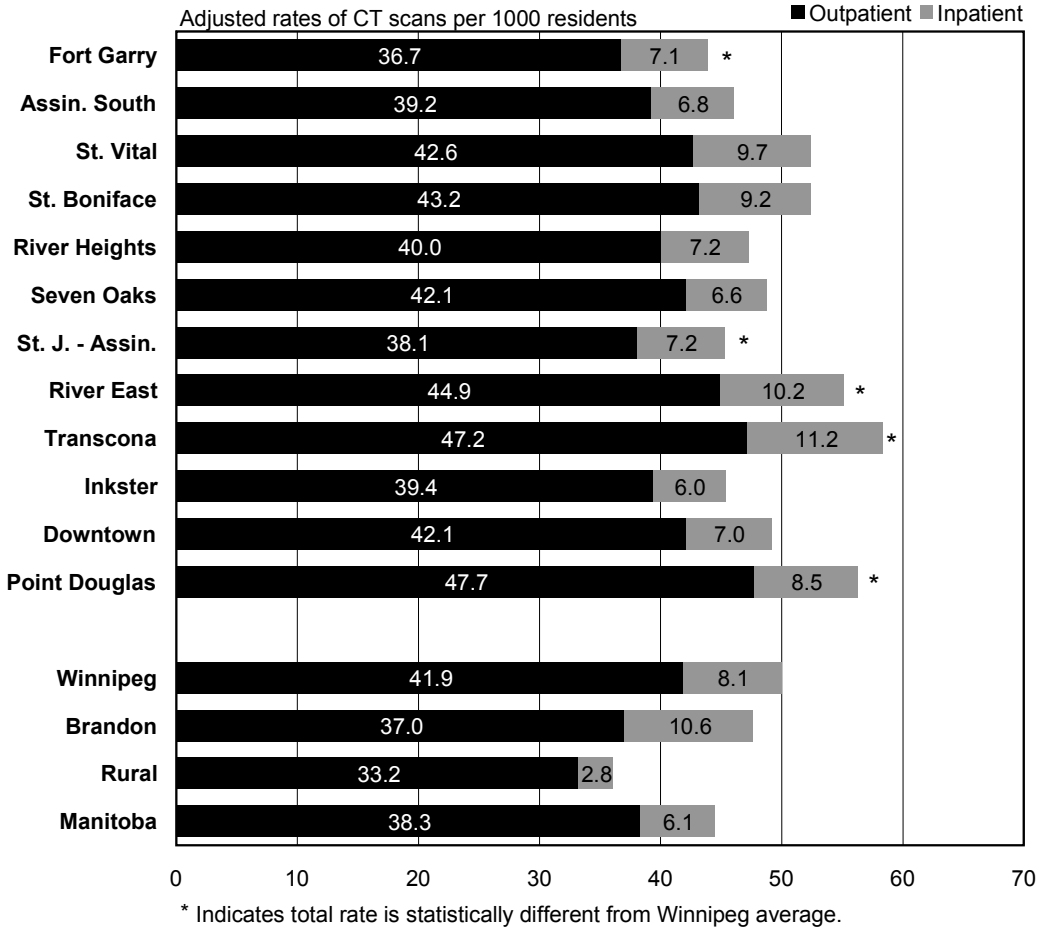
5.5 High Profile Services

This section examines a number of high profile diagnostic tests and surgical procedures. Use of these services is often cited in media reports as key indicators of the performance of the health care system. Most of them can only be provided upon recommendation of a specialist physician. Is the delivery of these services needs driven? Do residents of areas with less healthy populations areas have higher use of these tests and procedures?

5.5.1 Computerized Tomography (CT) Scans

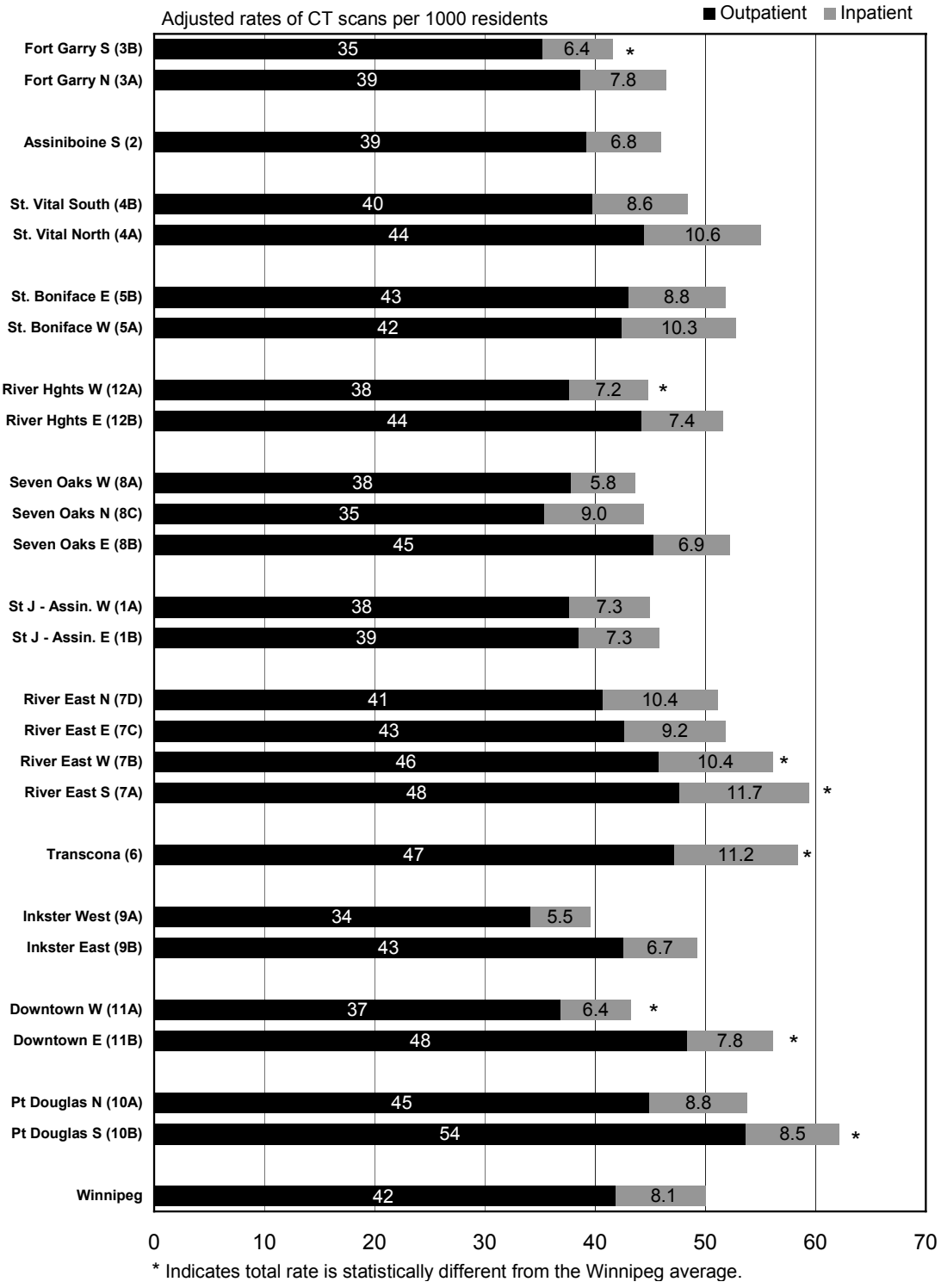
CT scans are a key diagnostic procedure for examination of internal body structures. All urban hospitals are equipped with CT scanners, with HSC and St. Boniface each having two units. Records for CT usage only became comprehensive in 1998/99, so past years cannot be analyzed (outpatients at community hospitals were not recorded before that time). Figures 47 and 48 show the utilization patterns for CT scans by community and neighbourhood in 1998/99. The relationships with premature mortality rates are mixed: there is a significant

Figure 47: CT Scan Rates, by CA, 1998/99



relationship at the neighbourhood level (r = 0.61), but a relationship that falls short of significance at the community level (r = 0.46). But because only one complete year of data

Figure 48: CT Scan Rates, by NC, 1998/99



was available for review, these associations should be interpreted with caution. More data will be required to confirm these preliminary findings that seem to indicate a link between our measure of health status and CT scan use.

A different look at the relationship between total CT scans and premature mortality adds a bit of texture to the tentative picture we have drawn. The plots in Figures 49 and 50 show the relationships directly. The slight upward slope of the lines reflects the positive relationship between CT scan rates and premature mortality rates. Residents from the less healthy areas have somewhat higher rates of scans. But it is also notable that many of the points (each representing the utilization rate and premature mortality rate for one area) fall far off the line, indicating that there is a good deal of variation in use across the areas, both at the community and neighbourhood levels. So, for example, a glance at Figure 50 shows that neighbourhoods with premature mortality rates around 3 per thousand vary in their CT Scan Rates by roughly 25%. One has the third highest rate while one the third lowest. The variation is even greater at the neighbourhood level than at the community level.

Figure 49: Total CT Scan Rates vs Premature Mortality by CA, 1998/99

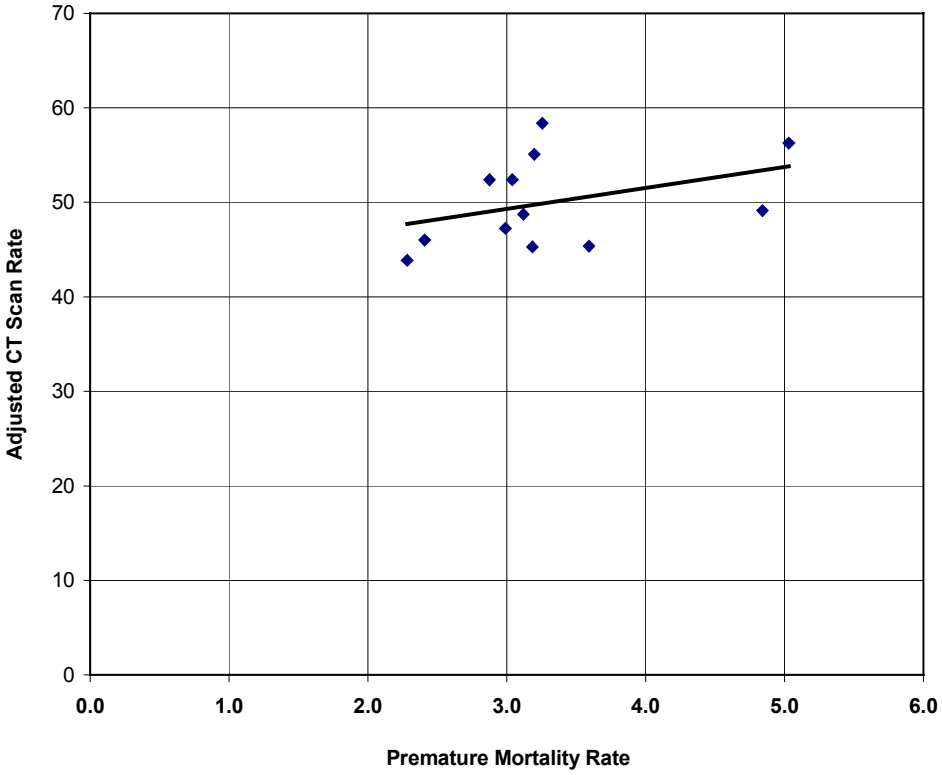
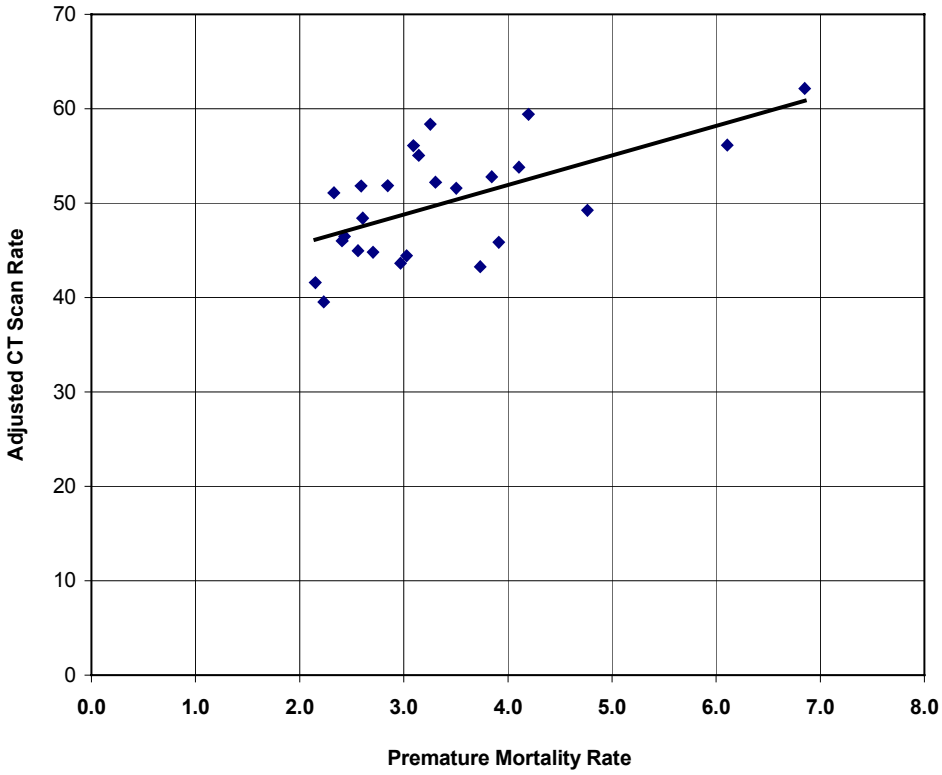


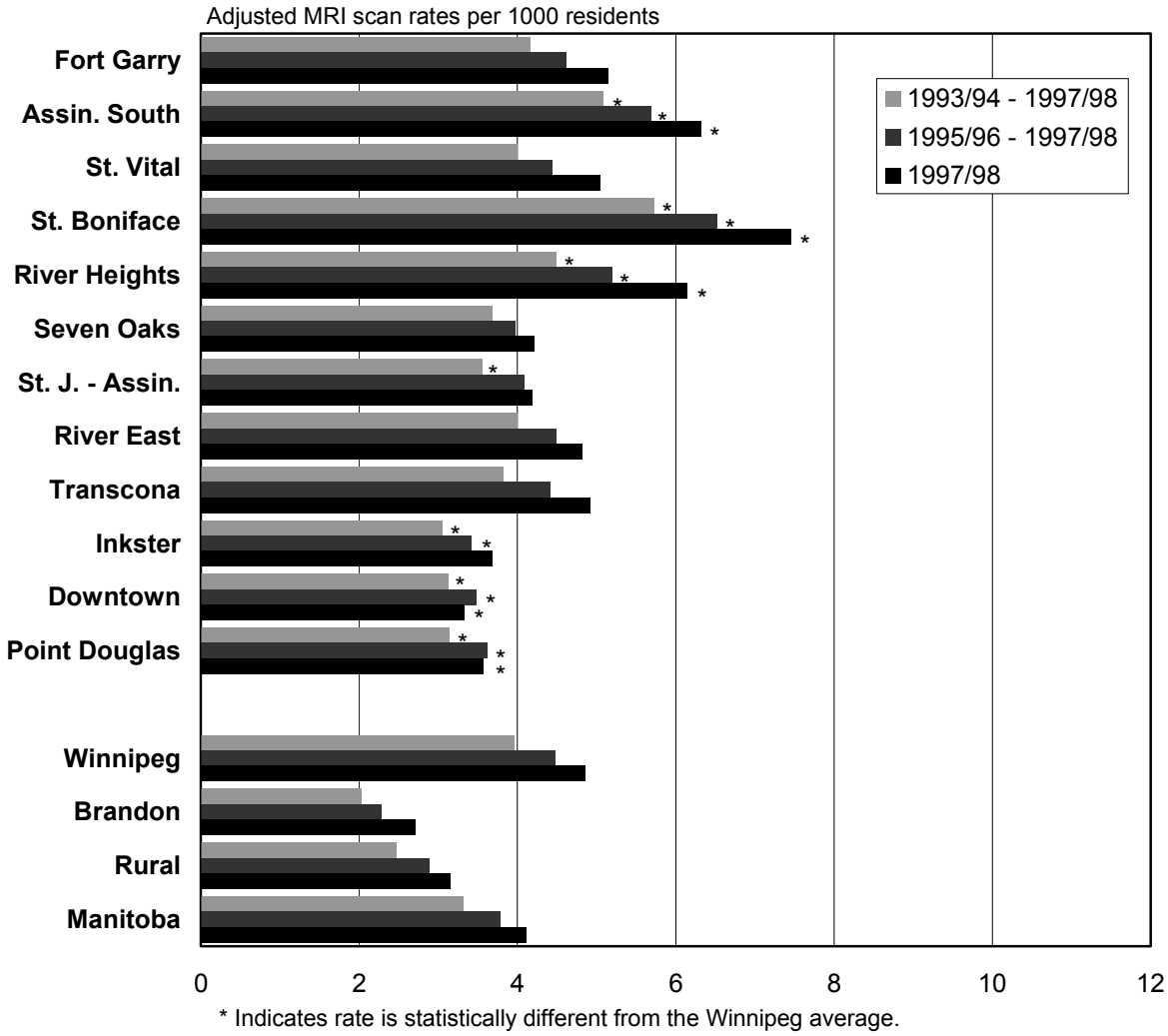
Figure 50: Total CT Scan Rates vs Premature Mortality by NC, 1998/99



5.5.2 Magnetic Resonance Imaging (MRI) Scans

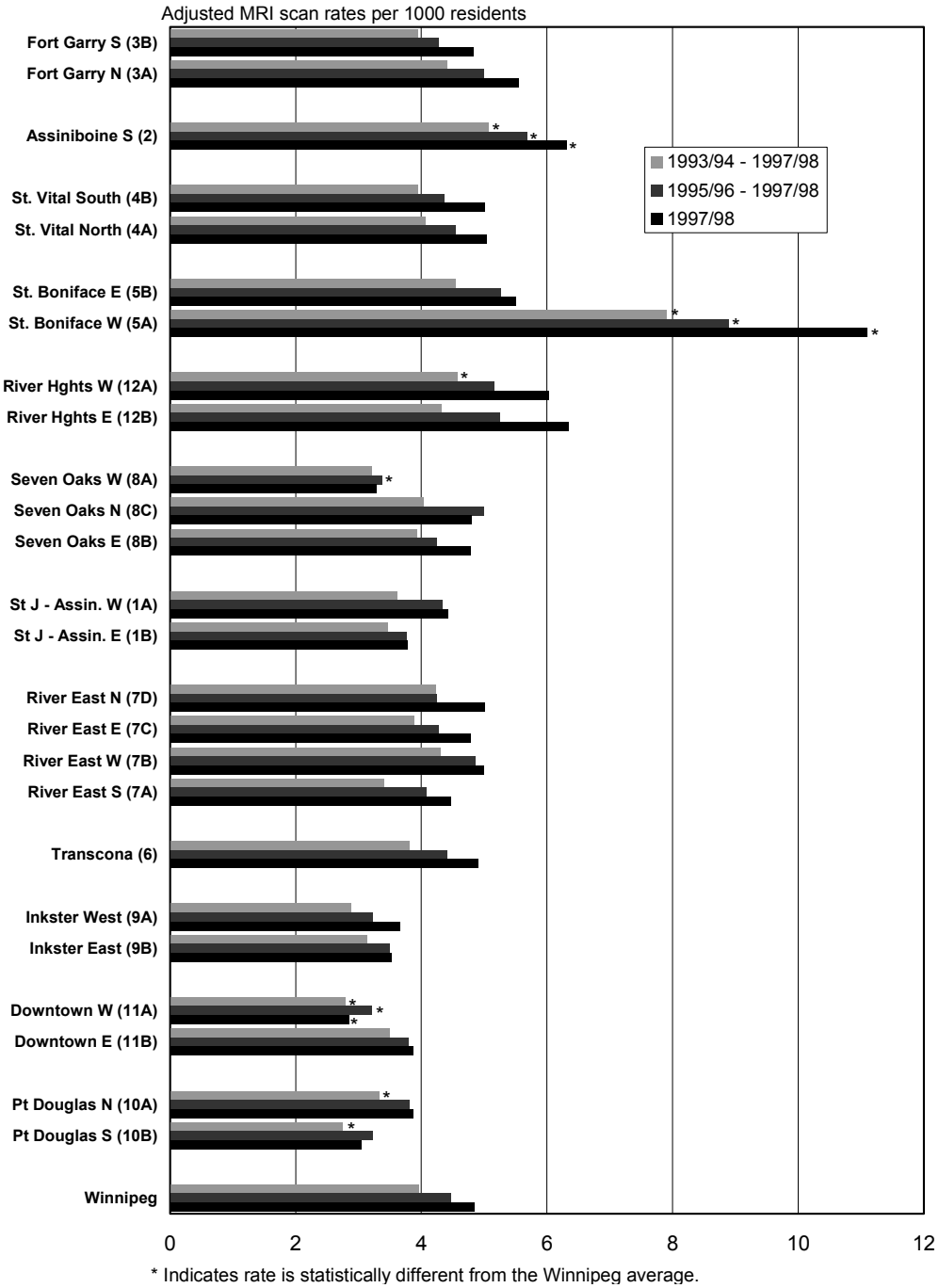
MRI scans, like CT scans, are an imaging technique used for examination of internal body structures. There was only one MRI facility in the province (at St. Boniface Hospital) until October 1998, when a second facility was established at HSC. Data from the HSC facility are not yet available in electronic form, so Figures 51 and 52 show results from fiscal year 1997/98 and earlier. The frequency of MRI scans increased substantially in the 5-year period. The figures reveal a negative relationship with premature mortality rates: the healthier areas have higher MRI scan rates (r = -0.42 for neighbourhoods, -0.78 for communities).

Figure 51: MRI Scan Rates by CA



One confounding factor in analyzing the relationship between premature mortality rates and some of these high profile services (including MRI), is use of specialist physicians. MRI scans, like many of these services, cannot be ordered or performed by GP/FPs. Only specialists can order them. Since, as observed above, residents of less healthy areas do not

Figure 52: MRI Scan Rates by NC



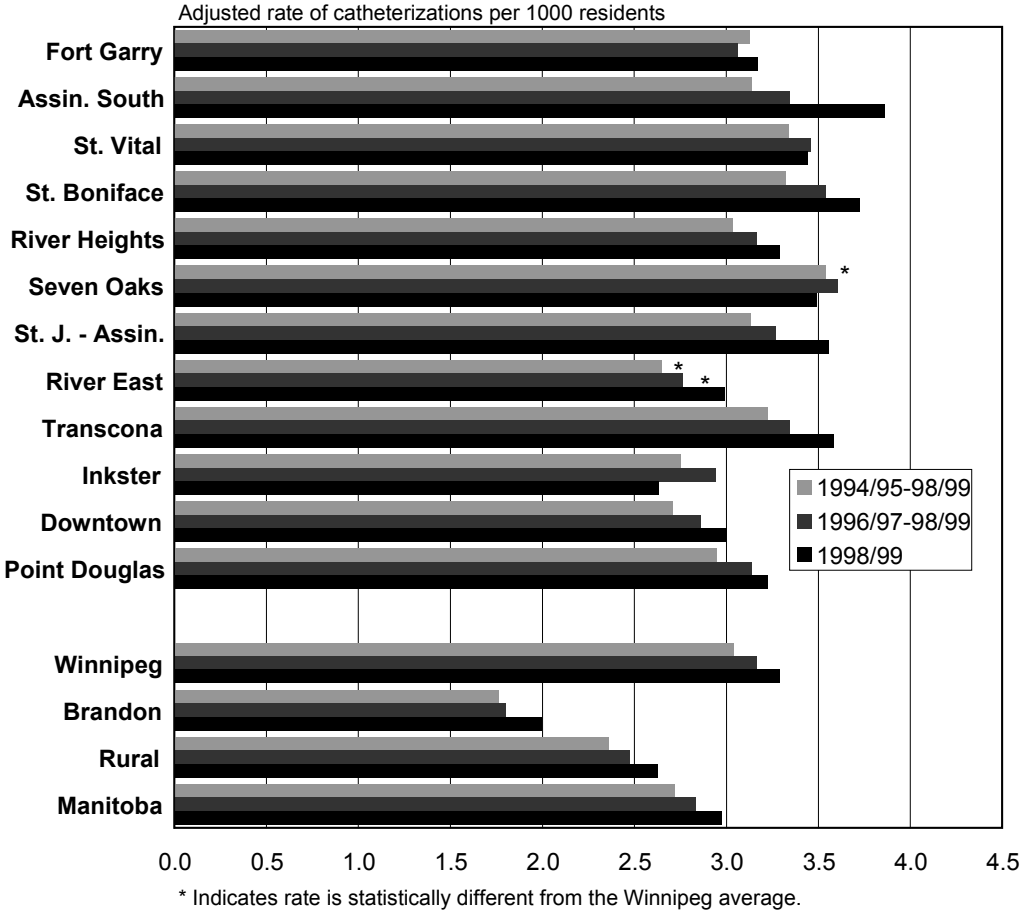
have the higher visit rates to specialists one might expect, it is perhaps not surprising that the relationship between MRI scan rates and premature mortality rates is not positive. However, that observation does not explain why the relationship is strong in the opposite direction: with the residents from healthier areas getting greater use of MRIs.

The obvious outlier in use of MRIs in Figure 52 is the neighbourhood of St. Boniface West (which contains St. Boniface hospital). It has an MRI scan rate which was persistently almost double the Winnipeg average. It's impossible to know exactly why this anomaly exists, but potential explanations include geographical proximity, which increases the chances of nearby residents being called to use a cancelled appointment, as well as local physician practise patterns.

5.5.3 Cardiac Catheterization

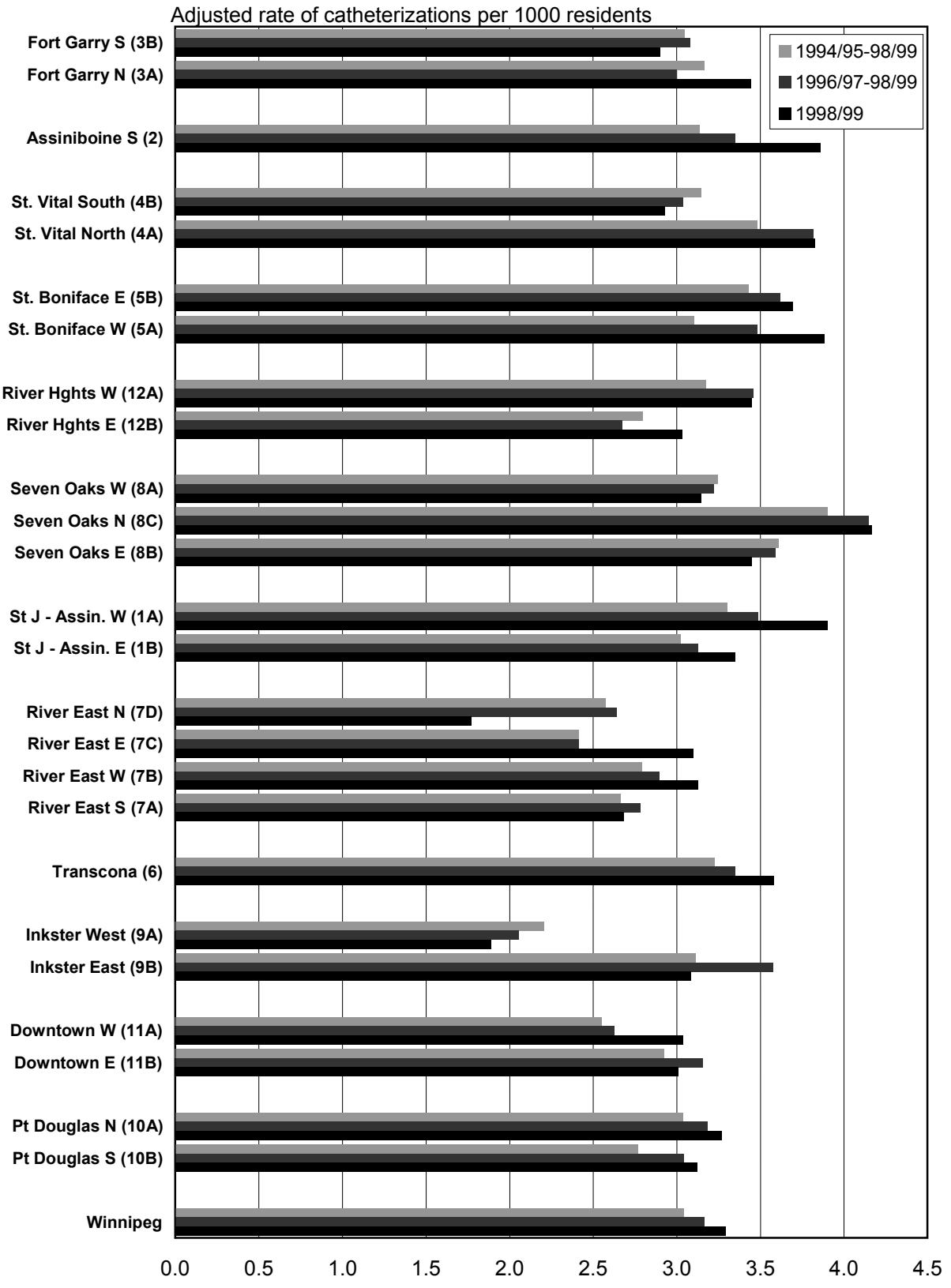
Cardiac catheterization is a diagnostic procedure used to examine coronary arteries to determine whether medical or surgical interventions are required. Figures 53 and 54 reveal significant variations in these rates across both communities and neighbourhoods. At the community level, in 1998/99, they range from a low of 2.63 in Inkster to a high of 3.86 in Assiniboine South, a difference of 47%. Moreover, the relationship appears to be inversely related to premature mortality, though it does not reach statistical significance (r = -0.41). At the neighbourhood level the range is even greater, going from 1.77 in River East North to 4.17 in Seven Oaks North, a more than two-fold difference. At this level, though, the rates seem to show no relationship with premature mortality rates (r = -0.01).

Figure 53: Cardiac Catheterization Rates, by CA



* Indicates rate is statistically different from the Winnipeg average.

Figure 54: Cardiac Catheterization Rates, by NC



Figures 55 through 58 show scatter plots of cardiac catheterization rates against premature mortality rates, at both the community and neighbourhood level, using five-year (1994/95 – 1998/99) and single year (1998/99) rates. These figures show that the weak negative relationships seen in the community level graphs (Figures 55 and 56) almost disappear at the neighbourhood level (Figures 57 and 58). This is not particularly encouraging as an indication of the matching of procedure to need inasmuch as one would expect consistently higher rates of cardiac catheterization in areas of poorer health status.

In addition, the spread of points around the line is a graphic representation of the variation in rates across both communities and neighbourhoods. A closer comparison of the 1998/99 rates to the five-year rates seems to indicate that the increased volume of the procedures has not resulted in the usage pattern more closely reflecting need of area residents. There is more dispersion in the most recent year, although some of that may be attributable to smaller sample size.

Figure 55: Cardiac Catheterization Rates vs Premature Mortality by CA, 1994/95 - 1998/99

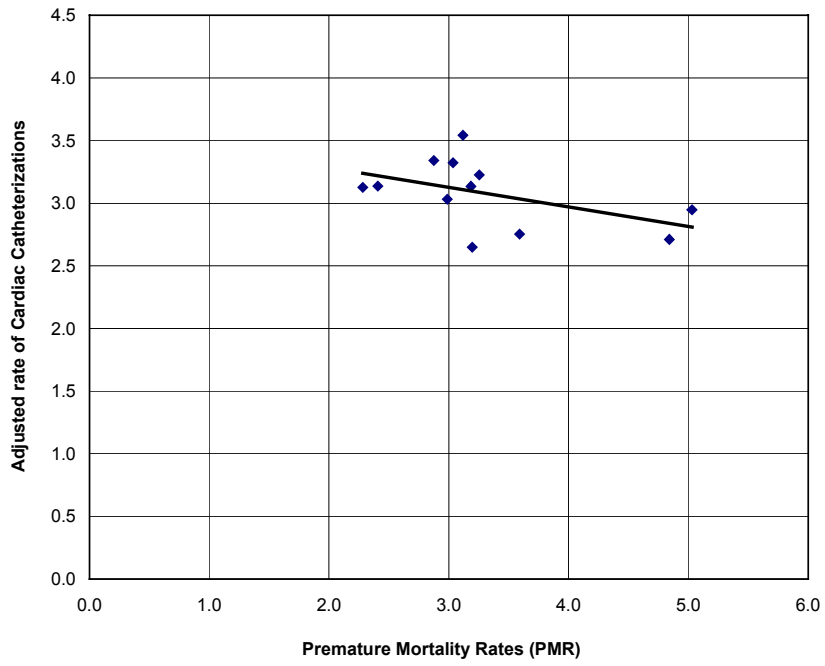


Figure 56: Cardiac Catheterization Rates vs Premature Mortality by CA, 1998/99

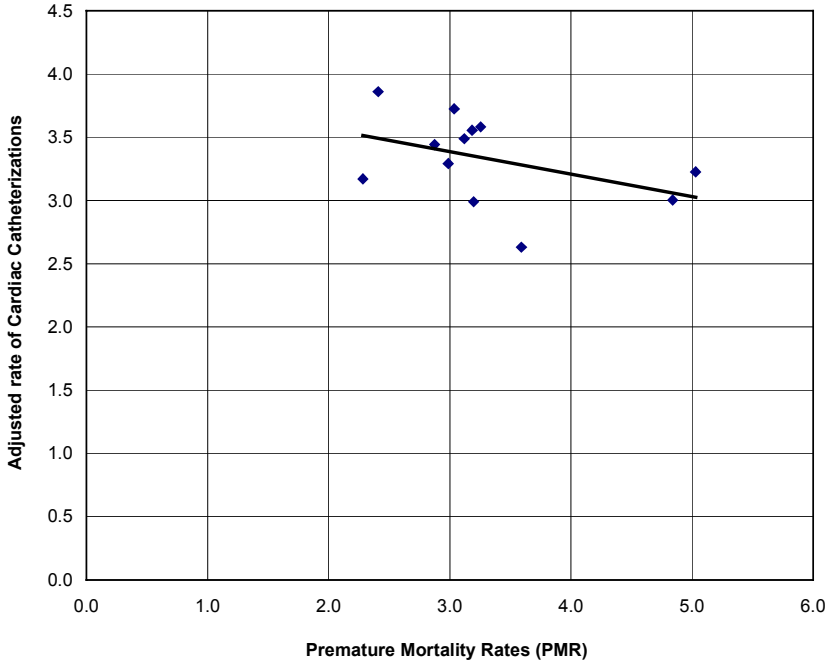


Figure 57: Cardiac Catheterization Rates vs Premature Mortality, by NC, 1994/95 - 1998/99

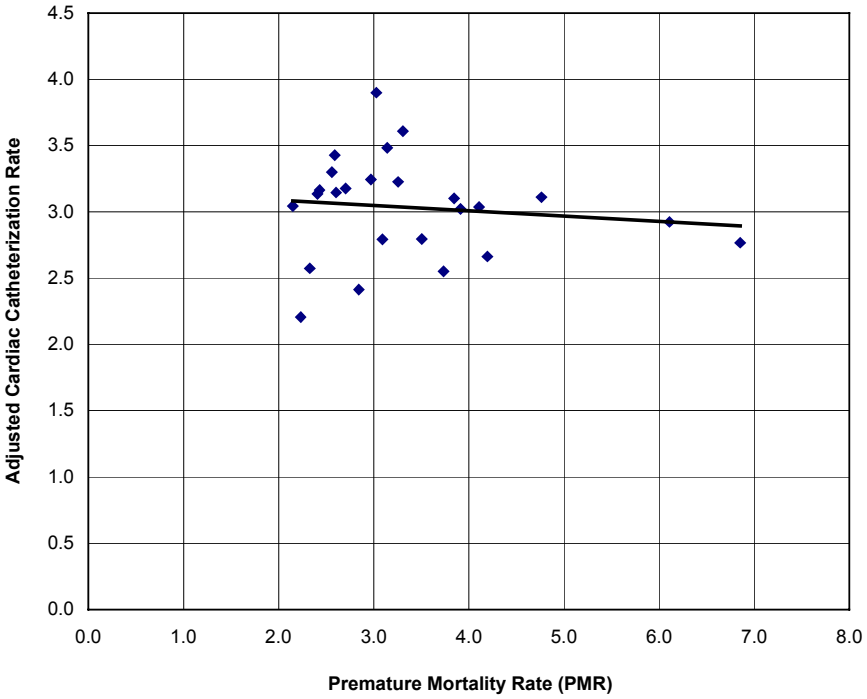
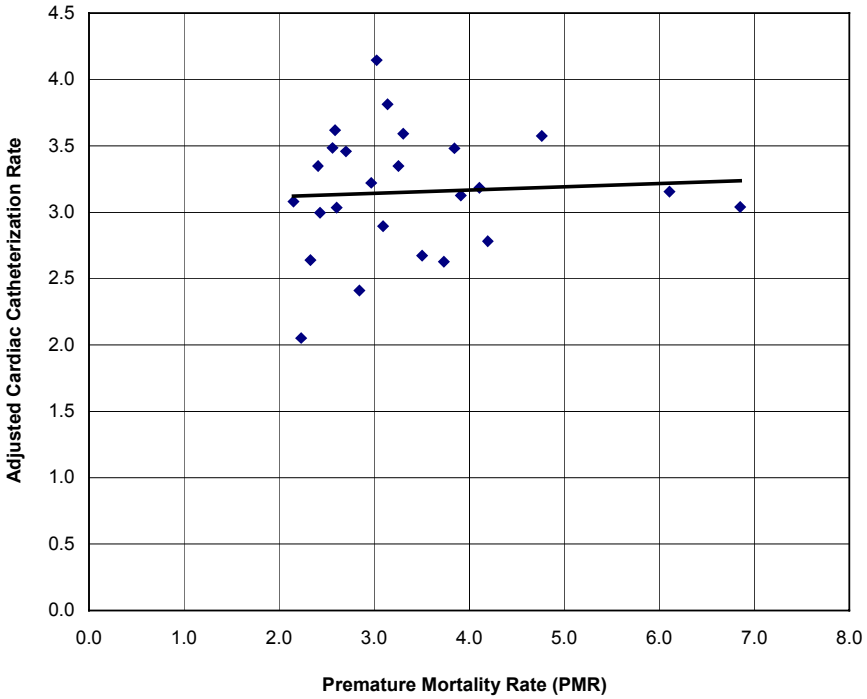


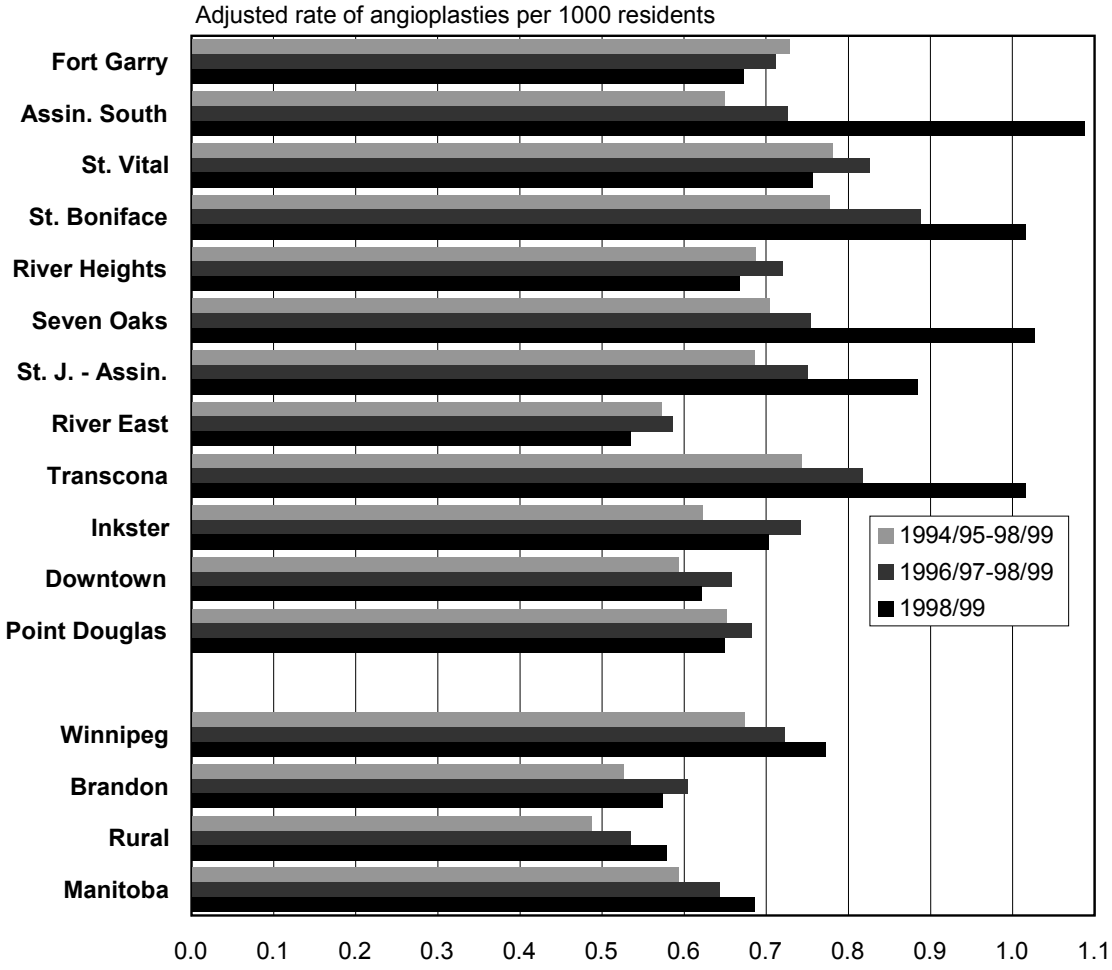
Figure 58: Cardiac Catheterization Rates vs Premature Mortality, by NC, 1998/99



5.5.4 Angioplasty

Angioplasty is an invasive procedure used to widen and clear blocked arteries; it is frequently performed at the time of cardiac catheterization. Figures 59 and 60 show the rates of angioplasty by community and neighbourhood. Again, there is great variation among areas, and the variation seems to be growing over time. At the community level, in 1998/99, Assiniboine South had 1.09 procedures per thousand residents, which was roughly twice the rate as that of residents of River East, who had 0.54. At the neighbourhood level the differences were larger, but low numbers in a single year make interpretation risky. For angioplasty, as with cardiac catheterization, there is no significant relationship of the rates

Figure 59: Angioplasty Rates, by CA



with premature mortality rates, the surrogate measure of need. At the neighbourhood level, there is a non-significant negative relationship with premature mortality rates (r = -0.26).

At the community level, the relationship is stronger, but still not statistically significant ($r = -0.50$). Overall, and for most individual areas of Winnipeg, angioplasty rates are increasing over time (recall that these are age-adjusted rates, so population aging does not explain this increase). The increase in rates appears to be exacerbating the negative relationship with premature mortality, but again small numbers for a single year make it impossible to draw firm conclusions. These findings suggest that the increasing number of angioplasties being done is not solving the problem: the rates did not increase for residents in the least healthy areas.

Compounding this observation is the previously reported significant positive relationship between the prevalence of hypertension and premature mortality rates. The fact that treatment of a precursor condition to more serious heart disease and stroke is correlated with premature mortality, while angioplasty and coronary bypass procedures are not (see below) raises the question of possible impediments to treatment for those more serious conditions. It may be that some population characteristics associated with high premature mortality rates, such as lower socioeconomic status, pose barriers to use of some high profile procedures. It may also be that specialists act as gatekeepers to these procedures, and we have previously shown that residents of areas with poorer health have lower than expected use of specialists. Our data, (which are limited by the low numbers of the procedure in some neighbourhoods) do not allow us to make definitive statements on this account, but they do raise the question. Figures 61 and 62 illustrate the relationships at the community level.

Figure 60: Angioplasty Rates, by NC

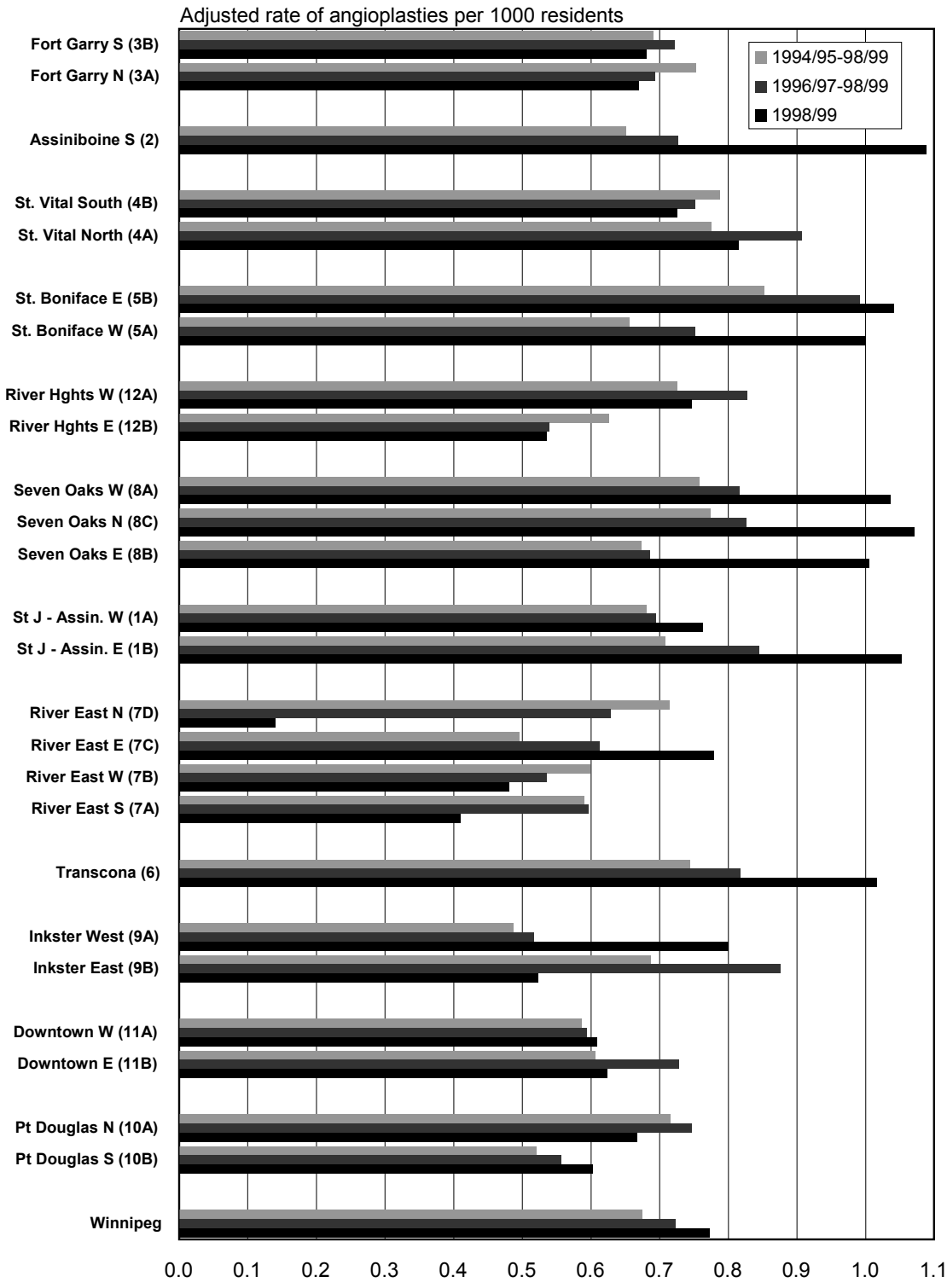


Figure 61: Angioplasty Rates vs Premature Mortality by CA, 1994/95 - 1998/99

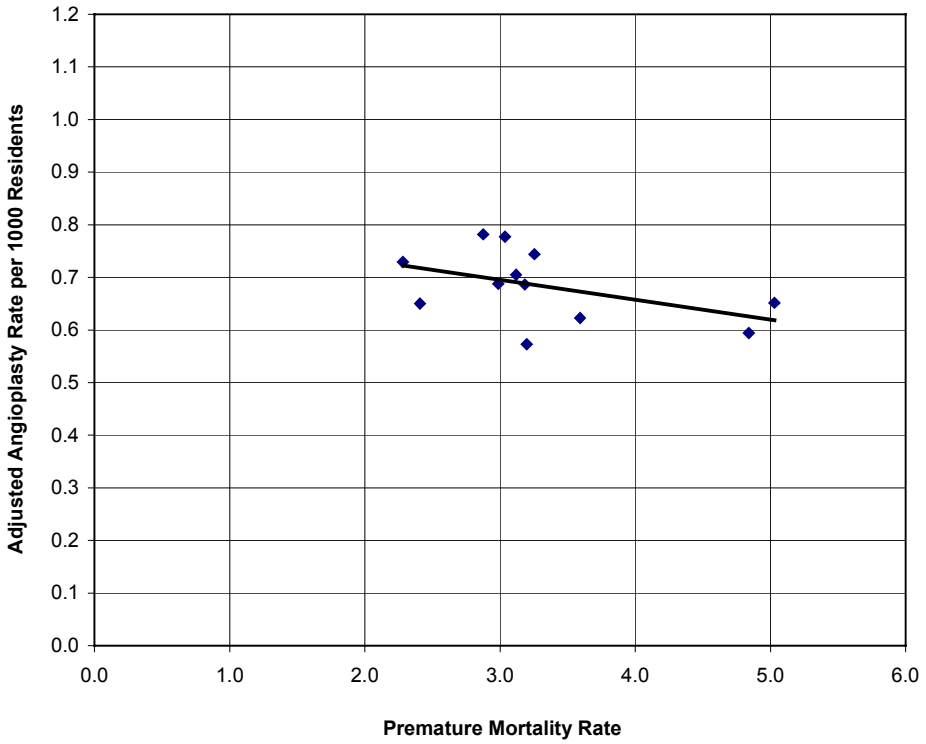
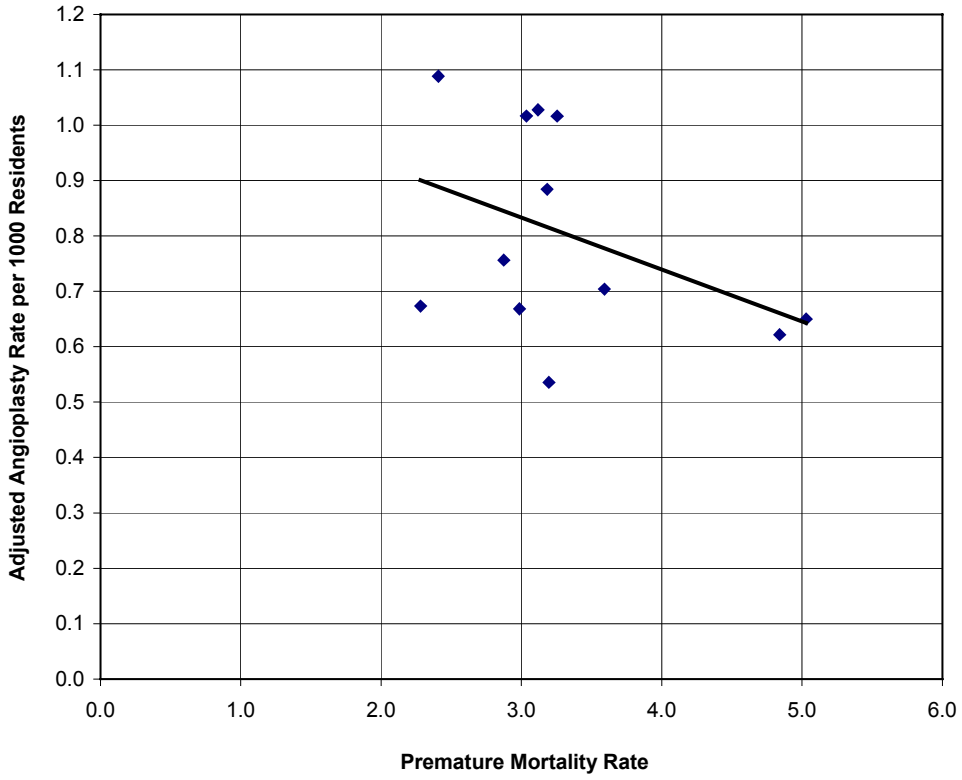


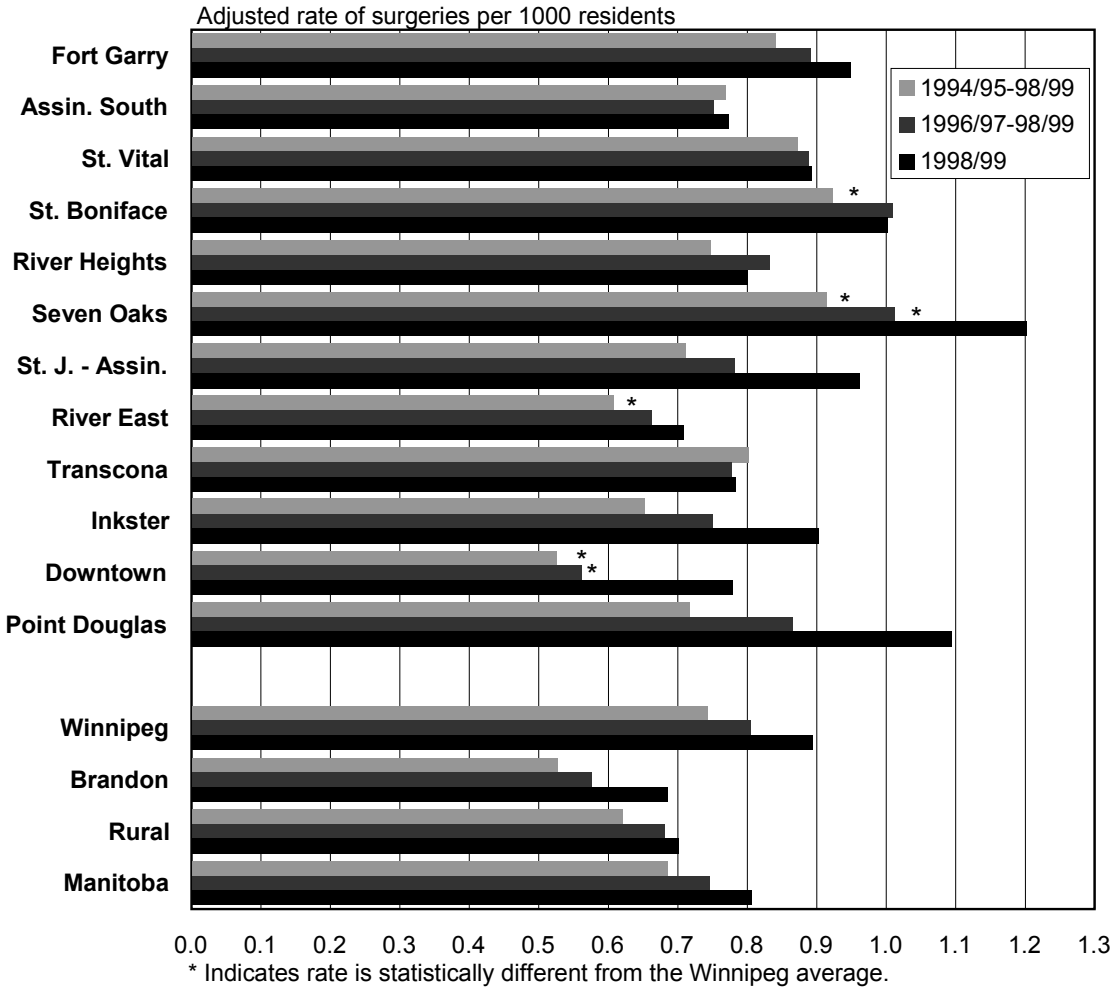
Figure 62: Angioplasty Rates vs Premature Mortality by CA, 1998/99



5.5.5 Coronary Artery Bypass Surgery

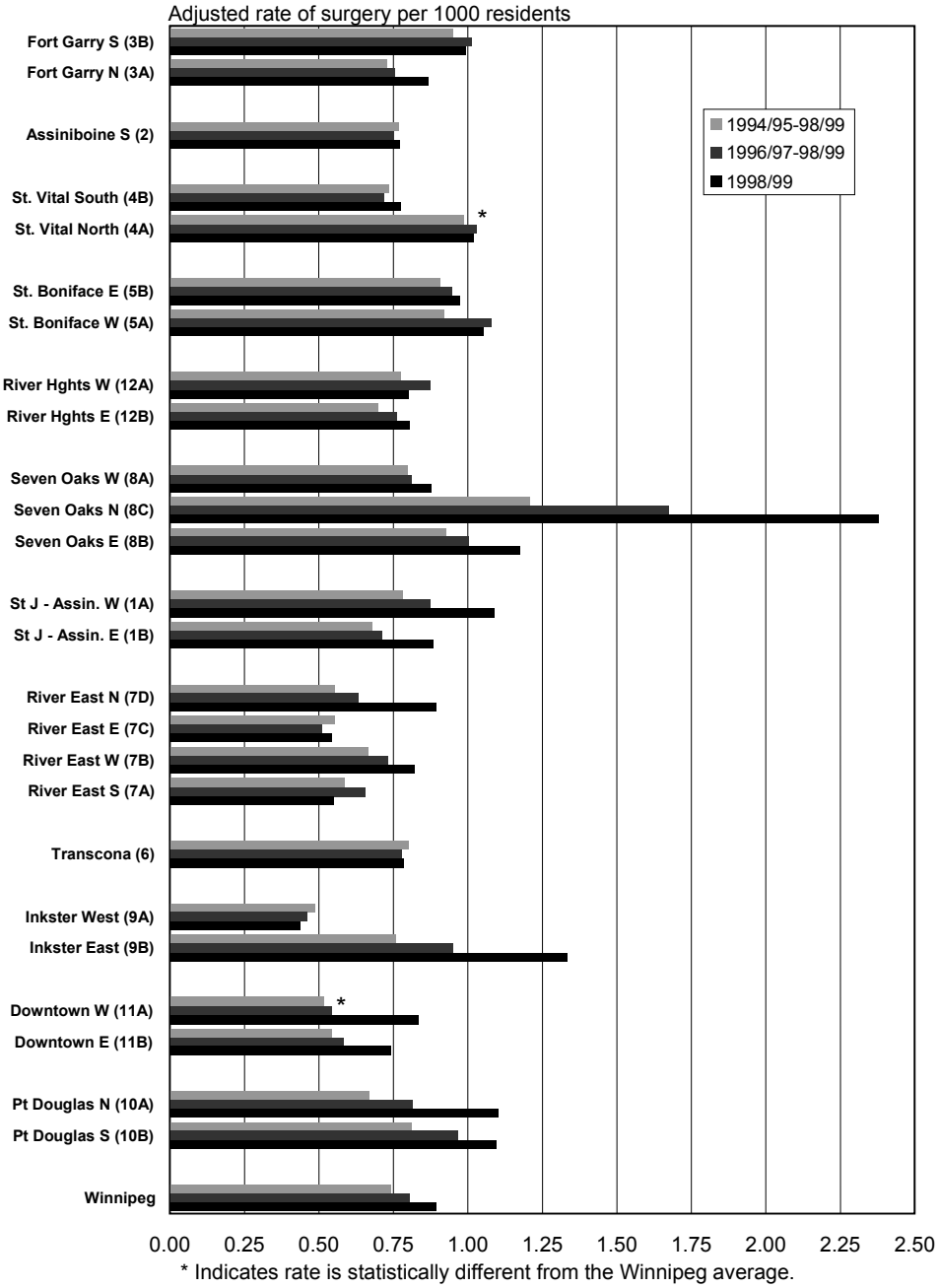
Bypass surgery is a procedure performed when coronary arteries are irreversibly blocked. Figures 63 and 64 show the bypass surgery rates for the communities and neighbourhoods. As with the previous two coronary procedures examined, there is considerable variation in bypass surgery rates. The range in 1998/99 is from a rate of 0.71 in the River East community to 1.20 in Seven Oaks, two areas of very similar premature mortality rates. At the neighbourhood level the variation is even more striking. Seven Oaks North has a rate of 2.38 while Inkster West's rate is only 0.44, though the relative infrequency of the procedure in a single year makes over-interpretation of this 5-fold difference risky. But even using the five-year average, the difference between the two areas is quite large: 1.21 vs. 0.49.

Figure 63: Coronary Artery Bypass Surgery Rates, by CA



The relationships with premature mortality rates are mostly non-significant, however, there seems to be an encouraging trend at both the community and neighbourhood levels. While the relationships with premature mortality rates appear to be negative during the 5 year period, their direction becomes positive in 1998/99. If recent trends hold, there would appear to be a growing match between the administration of this procedure and premature mortality rates, as more procedures are performed. This contrasts with the opposite trend, noted above, regarding angioplasty. The relationships are shown in the plots in Figures 65 and 66. In them, again, the more recent one-year rate shows more dispersion than the five-year rates.

Figure 64: Coronary Artery Bypass Surgery Rates, by NC



* Indicates rate is statistically different from the Winnipeg average.

Figure 65: Coronary Artery Bypass Surgery Rates vs Premature Mortality, by CA, 1994/95 - 1998/99

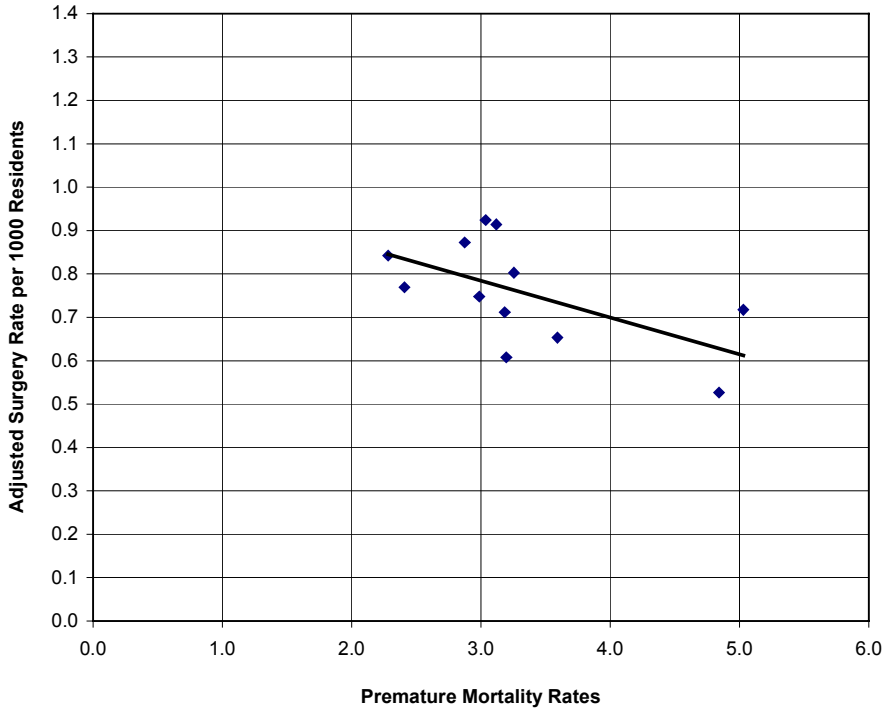
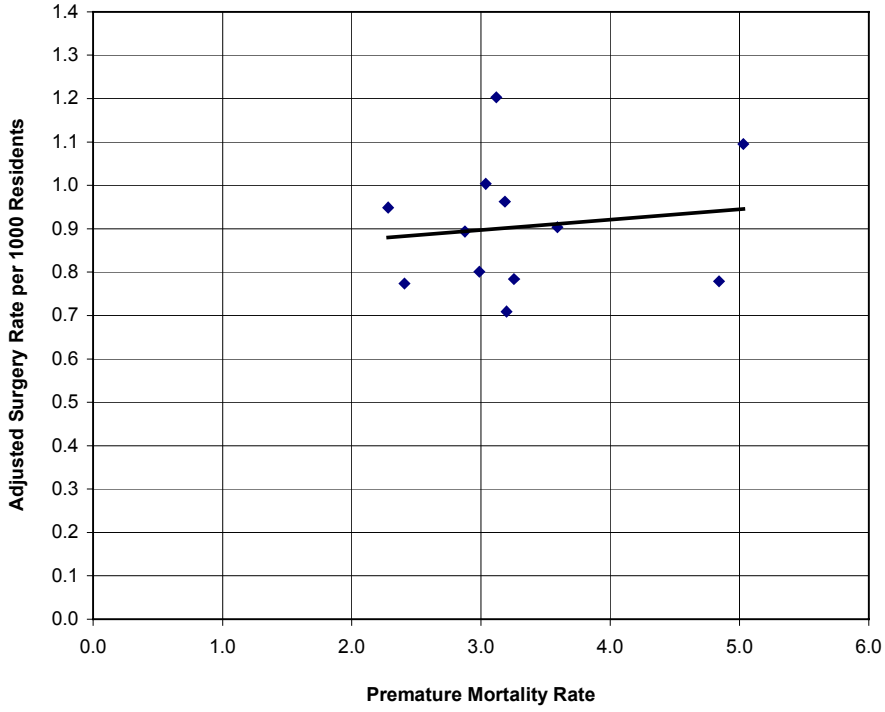


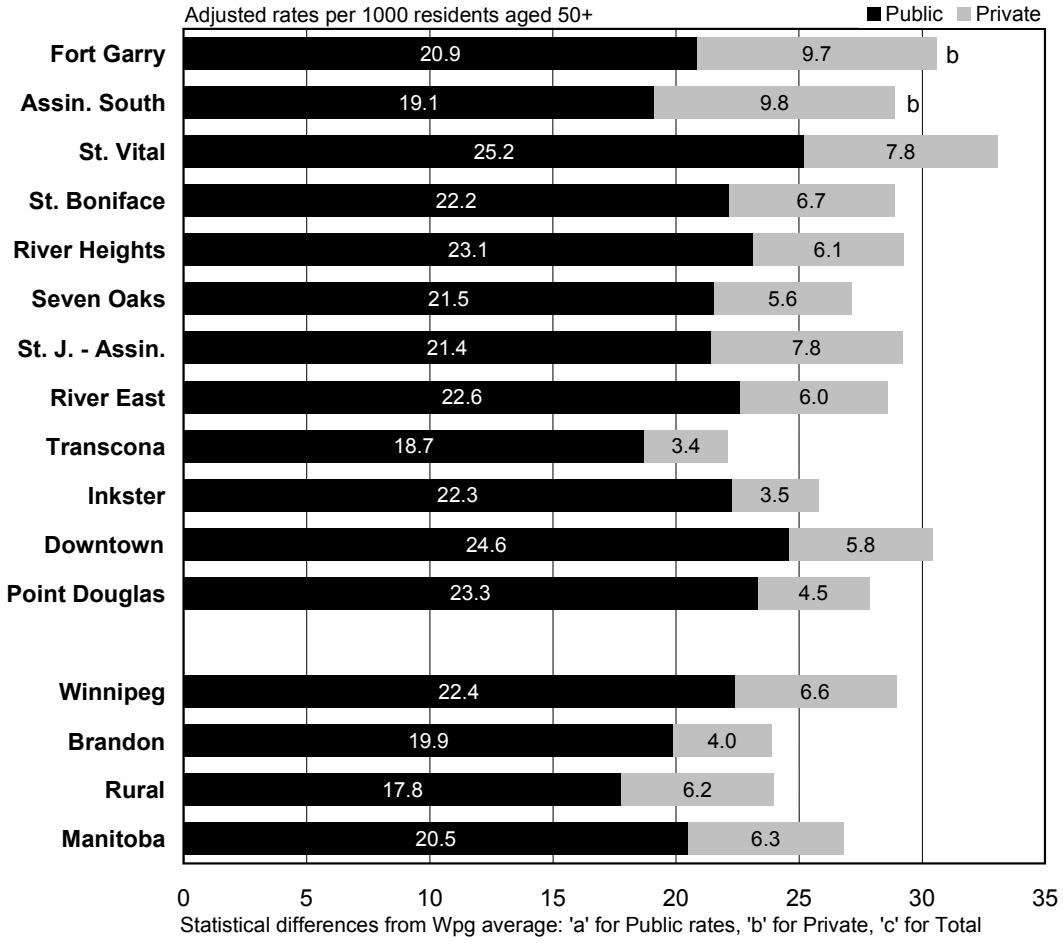
Figure 66: Coronary Artery Bypass Surgery Rates vs Premature Mortality, by CA, 1998/99



5.5.6 Cataract Surgery

A cataract affects the lens of the eye by causing it to become opaque, thus obscuring vision. Over the past decade, cataract surgery has become much less invasive, and consequently more common: over 8,000 procedures were done on Manitobans in 1998/99. Figures 67 and 68 show the cataract surgery rates for communities and neighbourhoods in Winnipeg, for those aged 50 years or more. Cataract surgeries were available from both public and private sector providers, and these are separated in the graph. Extra payment for procedures performed in private clinics was allowed through December 1998. Total surgery rates varied from a low of 22.1 in the Transcona community to a high of 33.2 in St. Vital. Procedure

Figure 67: Cataract Surgery Rates, by CA, 1998/99



rates performed in the public system (hospital) varied from 18.7 in Transcona to 25.2 in St. Vital. Privately provided services fluctuated much more widely, depending, as they did, on ability to pay. They ranged from 3.4 in Transcona to 9.8 in Assiniboine South. Similar patterns with magnified differences were found at the neighbourhood level. Total rates

varied from 15.2 in River East North to 36.3 in St. Vital North. Public rates varied from 9.9 to 26.7 in those same areas. The private rates ranged from 1.9 in Inkster West to 11.5 in Fort Garry South.

Figure 68: Cataract Surgery Rates by, NC, 1998/99

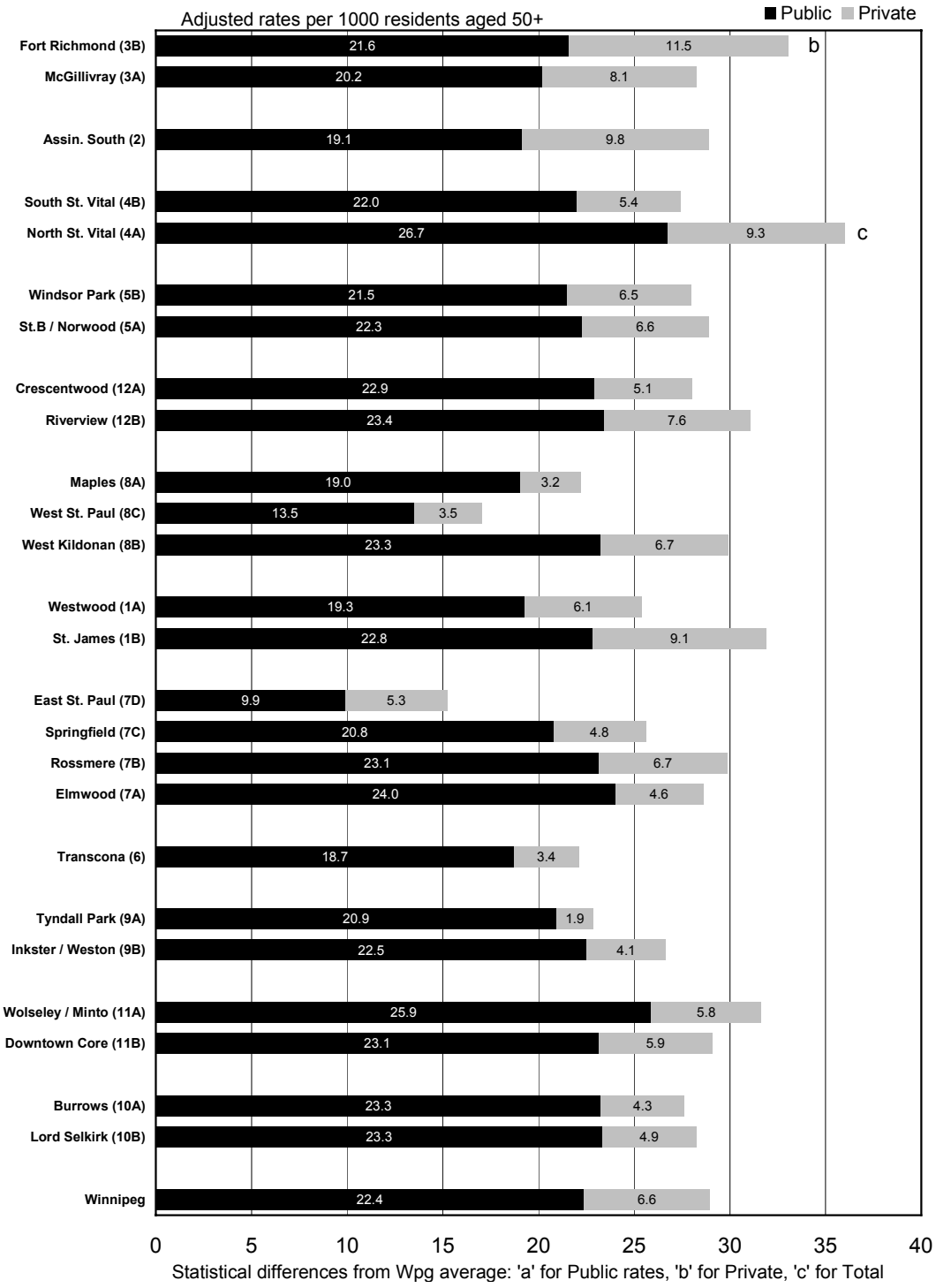
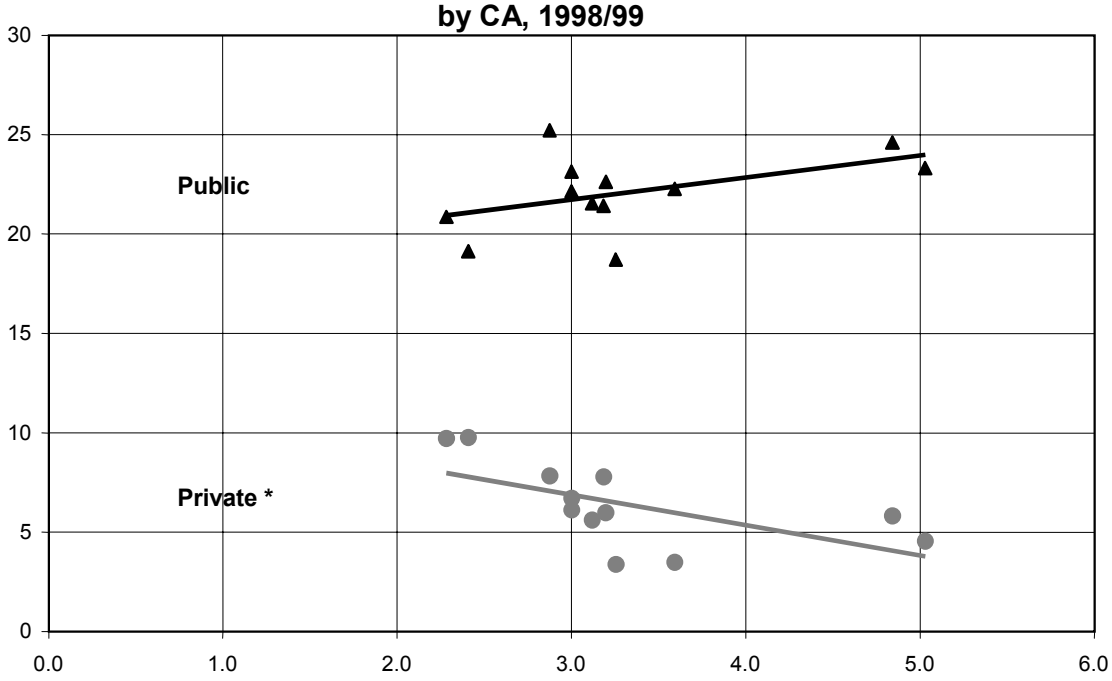
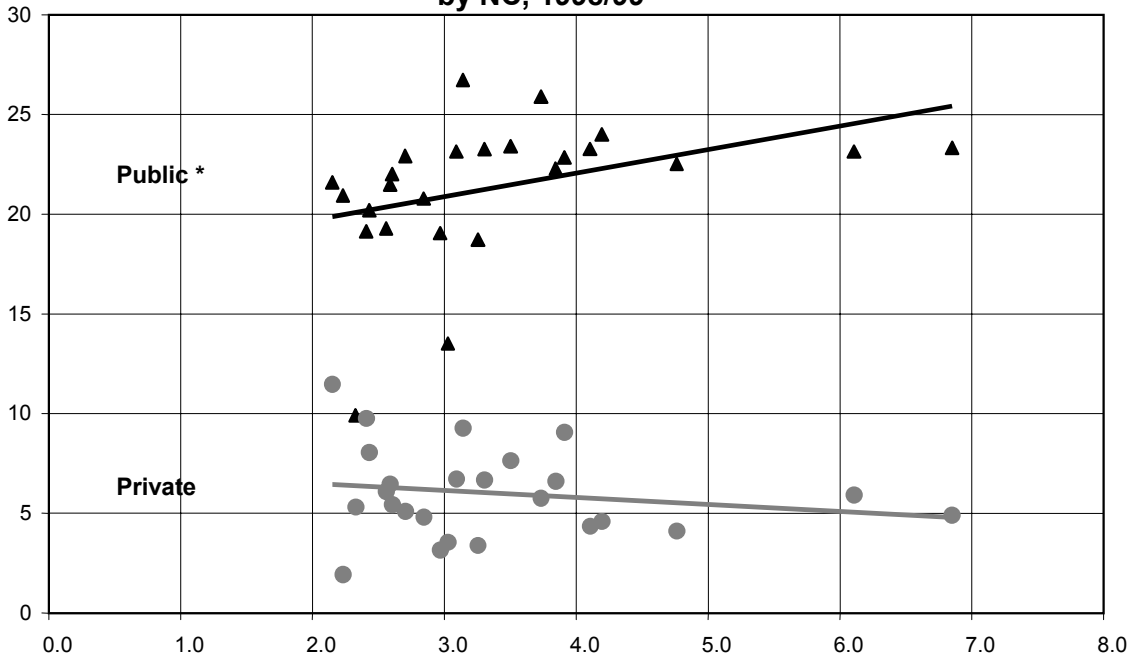


Figure 69: Cataract Surgery Rates vs Premature Mortality by CA, 1998/99



* Indicates relationship is statistically significant.

Figure 70: Cataract Surgery Rates vs Premature Mortality by NC, 1998/99



* Indicates relationship is statistically significant.

5.5.7 Total Hip Replacement

Hip replacement surgery has also become an increasingly utilized procedure over the past decade. Patients receiving this surgery experience substantial improvements in quality of life. Figures 71 and 72 show the hip replacement rates by community and neighbourhood, for 1, 3, and 5-year periods. Again, there are considerable variations in the rates across areas. The variations are particularly great in the 1998/99 data. At the community level, procedure rates range from a low of 0.57 in Inkster to a high of 0.94 in Fort Garry, while at the neighbourhood level the rates range from 0.13 in River East North to 1.24 in River Heights East. The relationship between need, as reflected in premature mortality rates, and the frequency of the procedure (over 5 years) is not positive. In fact, the correlation with premature mortality rates is negative at the community level (r = -0.78), and zero at the neighbourhood level (r = 0.05). Hip replacement rates are increasing over time, but this has not led to a better match with premature mortality rates at either the community or neighbourhood levels.

Figure 71: Hip Replacement Rates, by CA

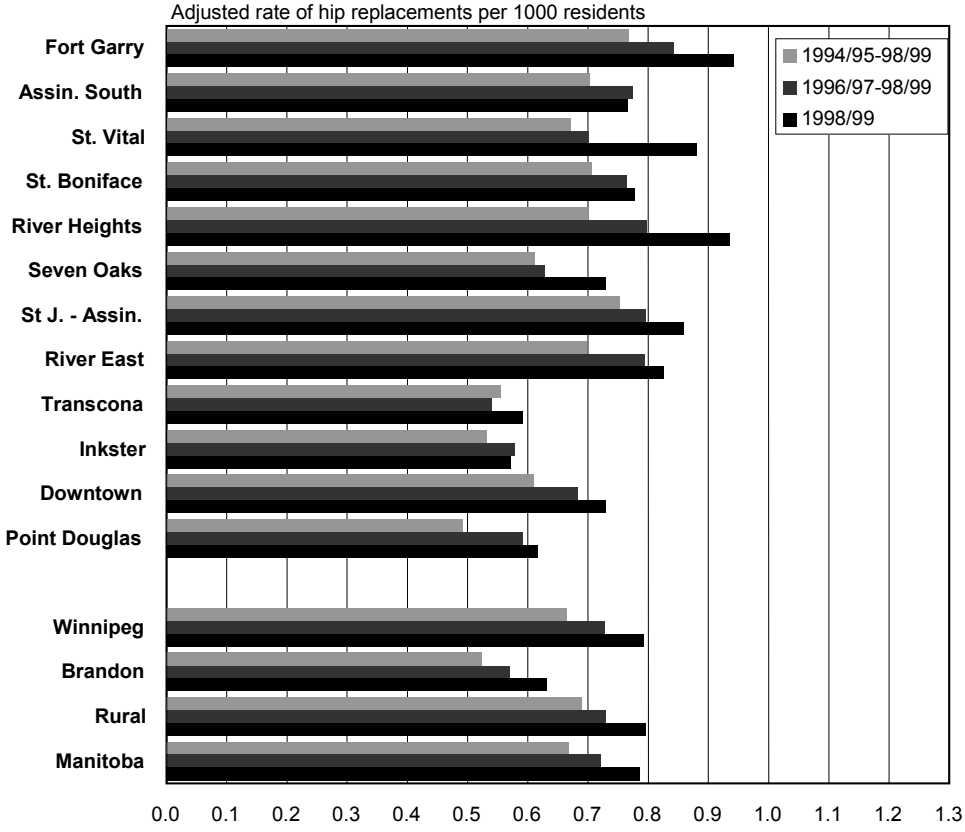
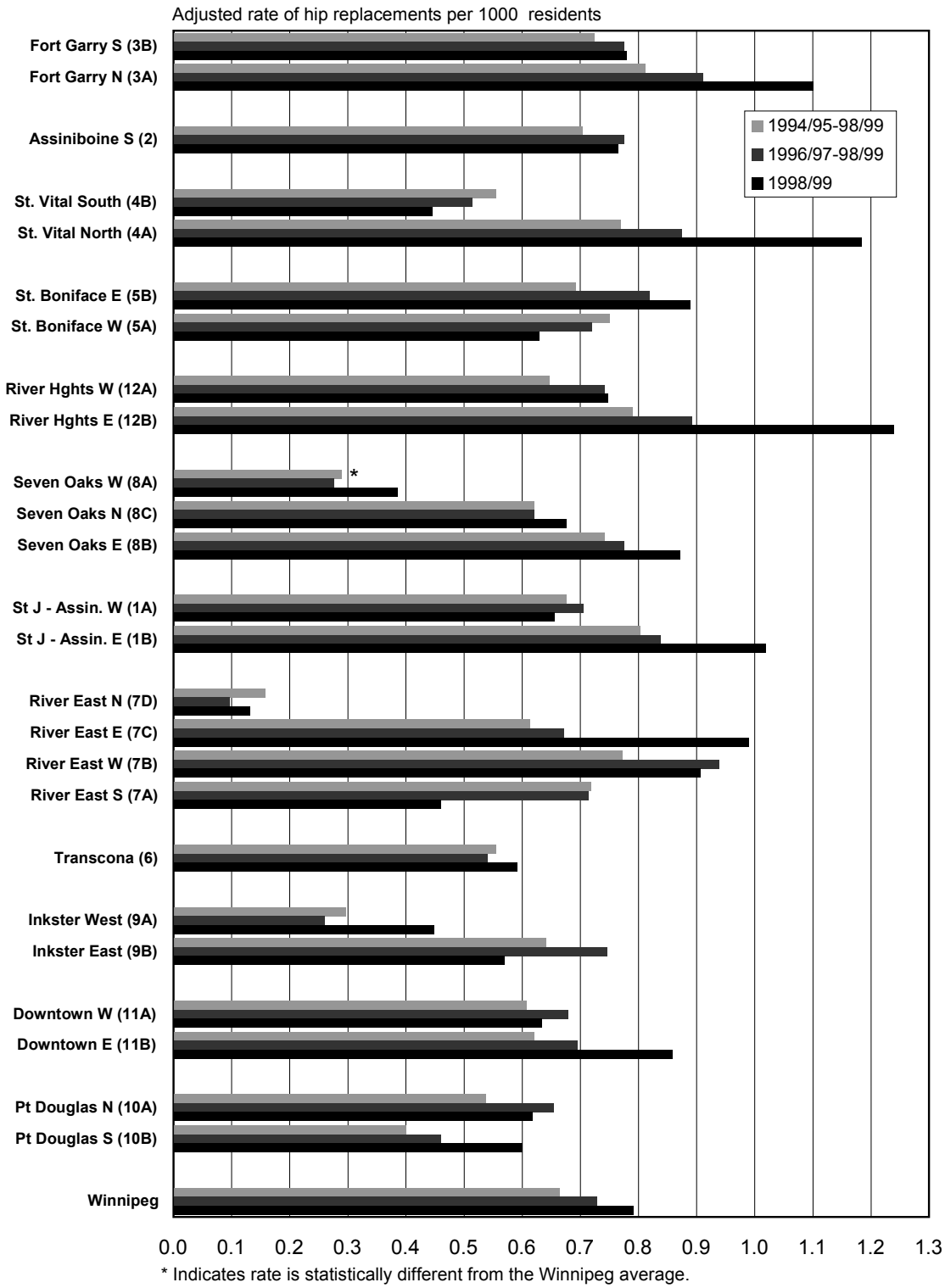


Figure 72: Hip Replacement Rates, by NC

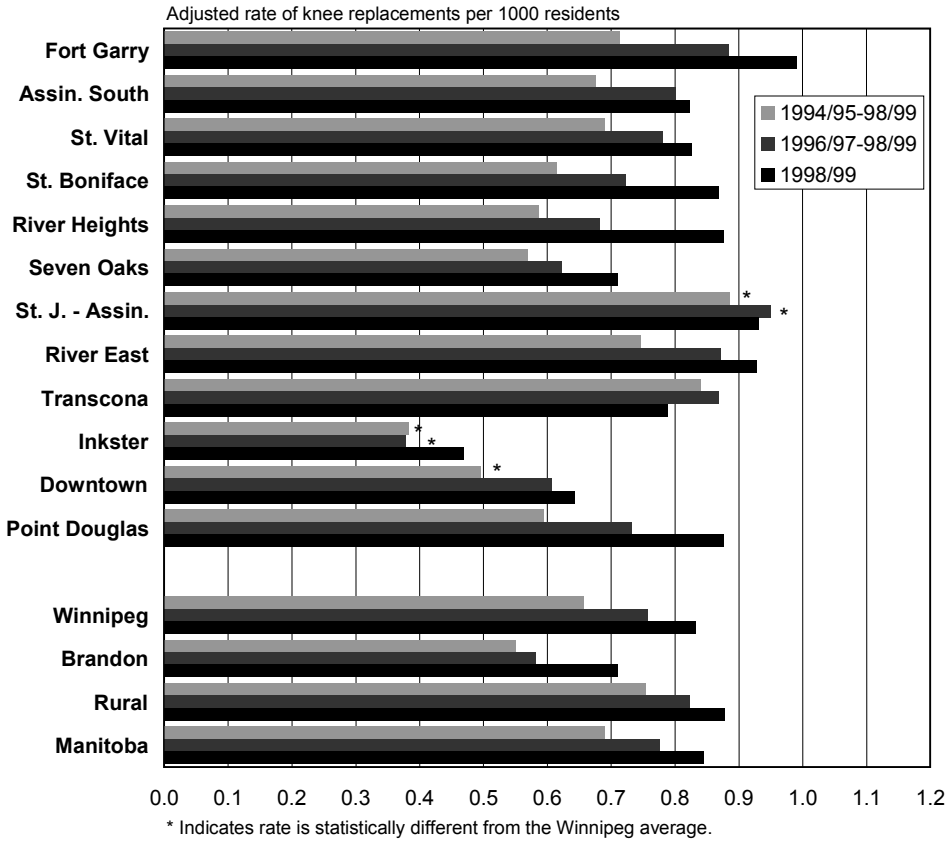


* Indicates rate is statistically different from the Winnipeg average.

5.5.8 Total Knee Replacement

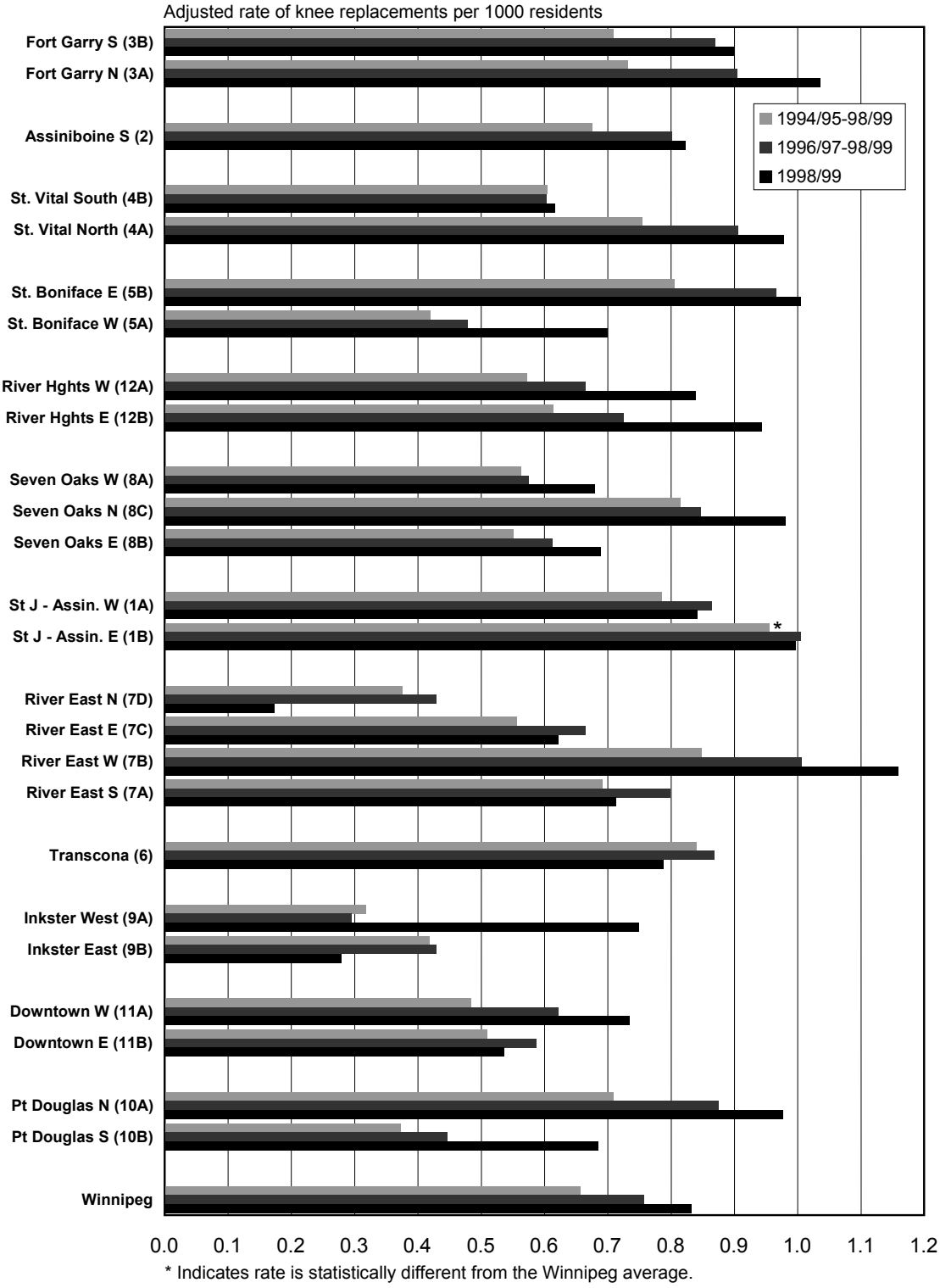
Knee replacement is another procedure which has become increasingly common, and is also associated with significant improvements in quality of life. Figures 73 and 74 show the rates by communities and neighbourhoods. Again, the greatest variations appear in 1998/99, the year in which the largest number of procedures were performed. At the community level the lowest rate was 0.47 in Inkster, while the highest was 0.99 in Fort Garry. At the neighbourhood level rates ranged from 0.17 in River East North to 1.16 in River East West, (remarkably, two neighbourhoods in the same community). Again, the relationships between premature mortality rates and procedure rates appears to be negative, although neither reached statistical significance (over 5 years, r = -0.13 for neighbourhoods, and –0.29 for communities). Knee replacement rates are increasing with time, and are now slightly more frequent than hip replacements (975 knee replacements were done in 1998/99). Like hip replacements, the increased number of procedures has not reversed the negative relationship with premature mortality rates; if anything, the relationship is worse (for 1998/99, r = –0.19 for neighbourhoods and –0.34 for communities).

Figure 73: Knee Replacement Rates, by CA



* Indicates rate is statistically different from the Winnipeg average.

Figure 74: Knee Replacement Rates, by NC



* Indicates rate is statistically different from the Winnipeg average.

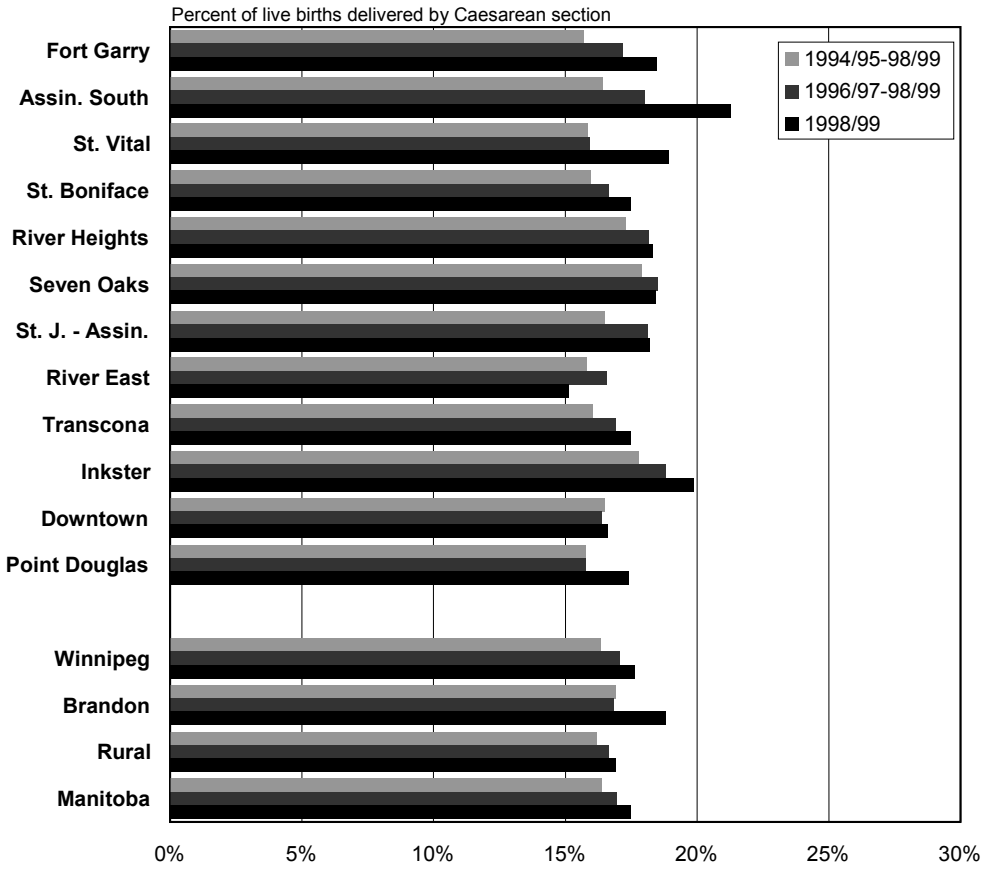
5.6 Discretionary Procedures

There are a number of medical procedures that are often referred to as 'discretionary' because their use can vary greatly among physicians. In some instances such procedures are indicated because of their life-saving potential. Caesarean sections and hysterectomies fall within that class in certain situations. But there are a variety of situations in which the medical community disagrees about their appropriateness. Indications for procedures such as tonsillectomy, adenoidectomy, and cholecystectomy have varied over time. The changing indications, risks, and potential benefits associated with these procedures mean that it is difficult to identify the levels of procedures that indicate best practice. Nevertheless, one might still expect a higher prevalence of conditions which might be treated via these procedures in areas with less healthy populations.

5.6.1 Caesarean Sections

The World Health Organization recommends that no more than 10-15% of births should be via Caesarean section (CIHI, 2000). Figures 75 and 76 show the rates for Winnipeg communities and neighbourhoods. A more thorough examination of Caesarean section rates

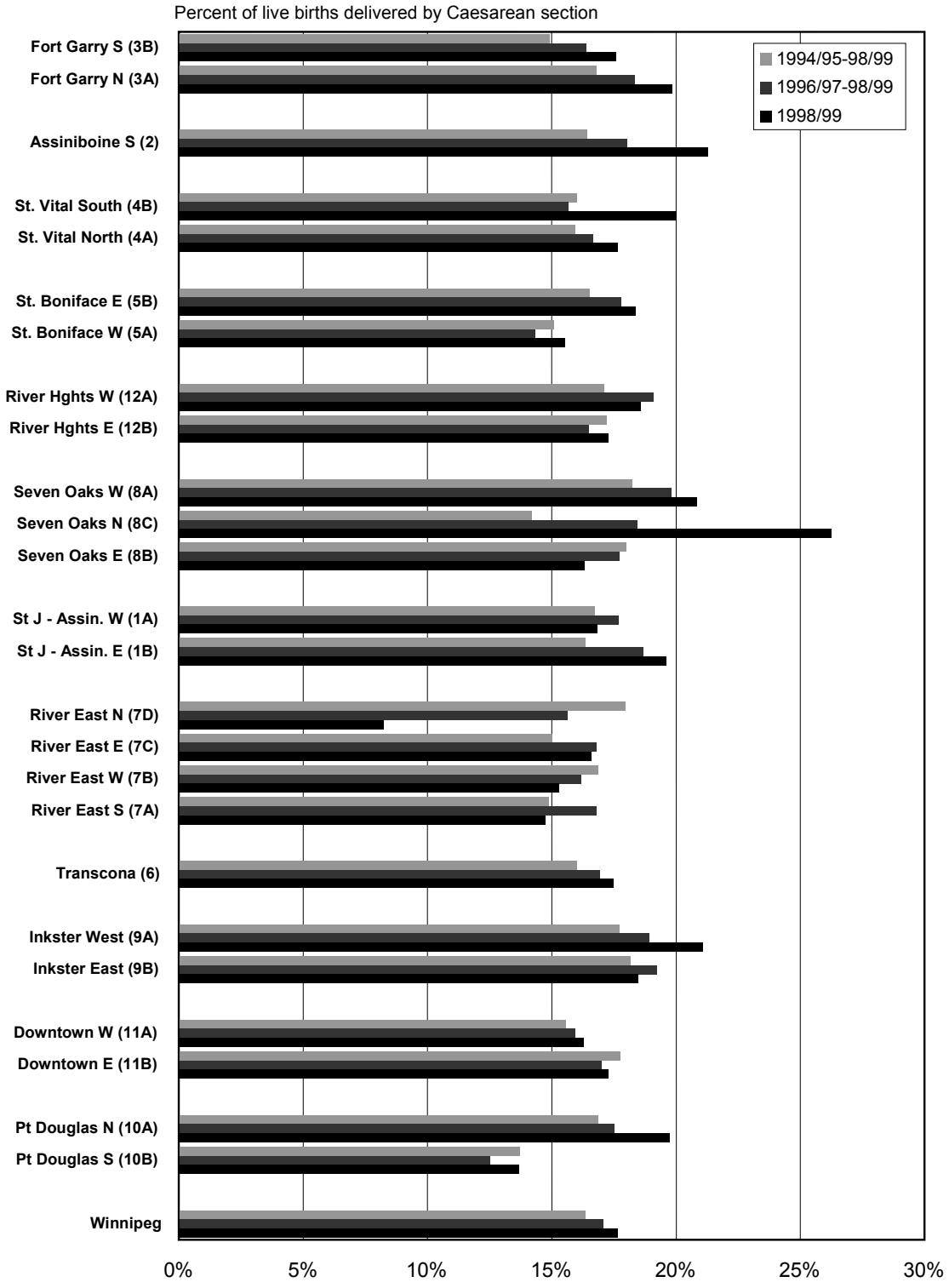
Figure 75: Rate of Caesarean Sections, by CA



can be found in MCHPE's report 'Assessing the Health of Children in Manitoba: A Population-Based Study'.

The data indicate that rates are increasing over time, with a notable rise in rates in the most recent year reported. Over the five-year period, the lowest rate, at the community level, was observed in Fort Garry (15.7%); the highest in Seven Oaks (17.9%). Neighbourhood variations were greater, ranging from a low of 13.7% in Point Douglas South to a high of 18.2% in Seven Oaks West. Over 5 years, there was no significant relationship between rates of the procedure and premature mortality rates ($r = -0.08$ for neighbourhoods and 0.14 for communities). But in 1998/99, there was a significant negative relationship at the community level ($r = -0.62$), though not at the neighbourhood level ($r = -0.35$).

Figure 76: Rate of Caesarean Sections, by NC



5.6.2 Hysterectomy

Hysterectomy is one of the more frequent surgical procedures performed each year, with over 1900 being performed on Manitoba women in 1998/99. Figures 77 and 78 indicate that the rates are generally stable over time, and that there is no relationship with premature mortality rates at either the community or the neighbourhood level. However, there is considerable variation across communities and neighbourhoods, illustrated by the two-fold difference between Point Douglas South (3.13) and St. James - Assiniboia West (6.34) neighbourhoods in 1998/99. This increased variation is occurring as rates in Winnipeg rise slightly, but the average rates in Winnipeg remain well below the rates in Brandon and in rural Manitoba.

Figure 77: Hysterectomy Rates, by CA

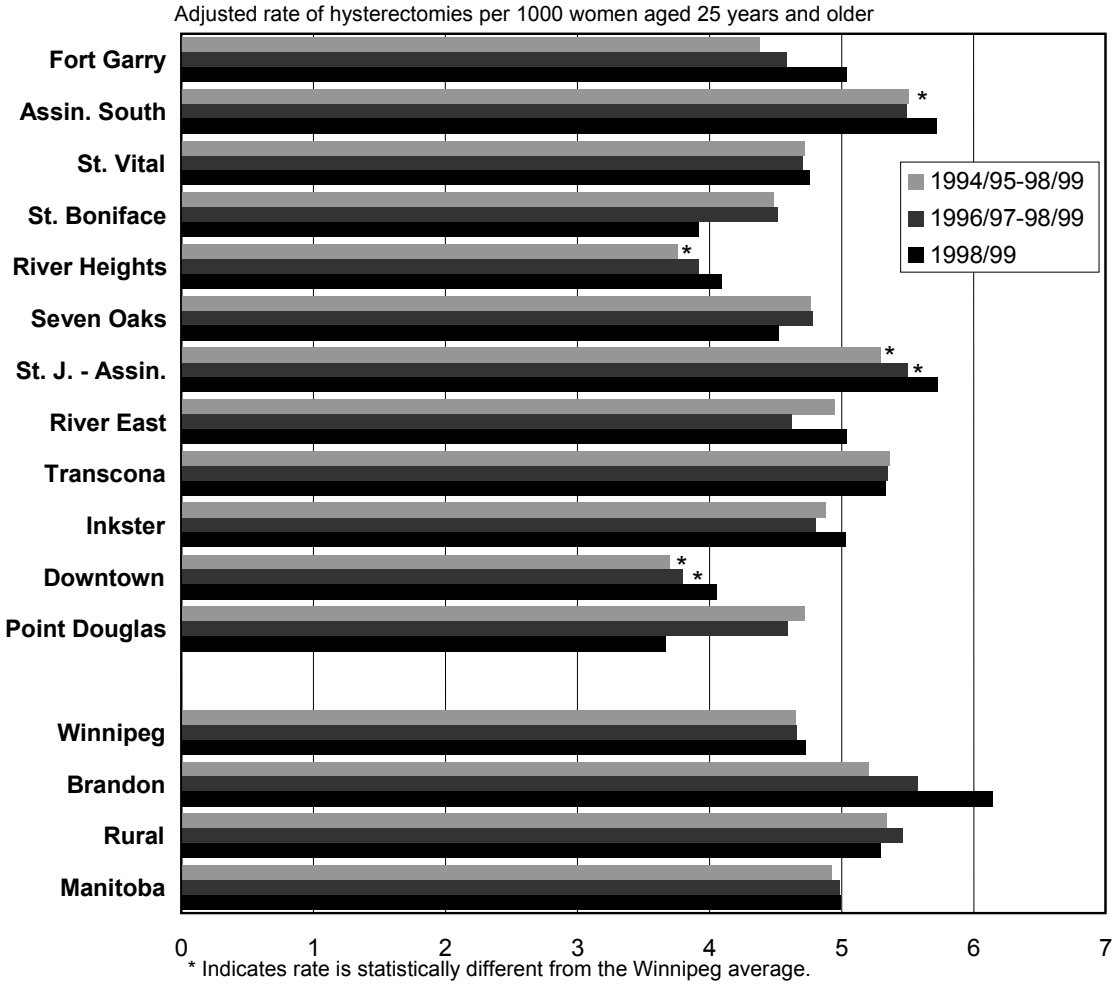
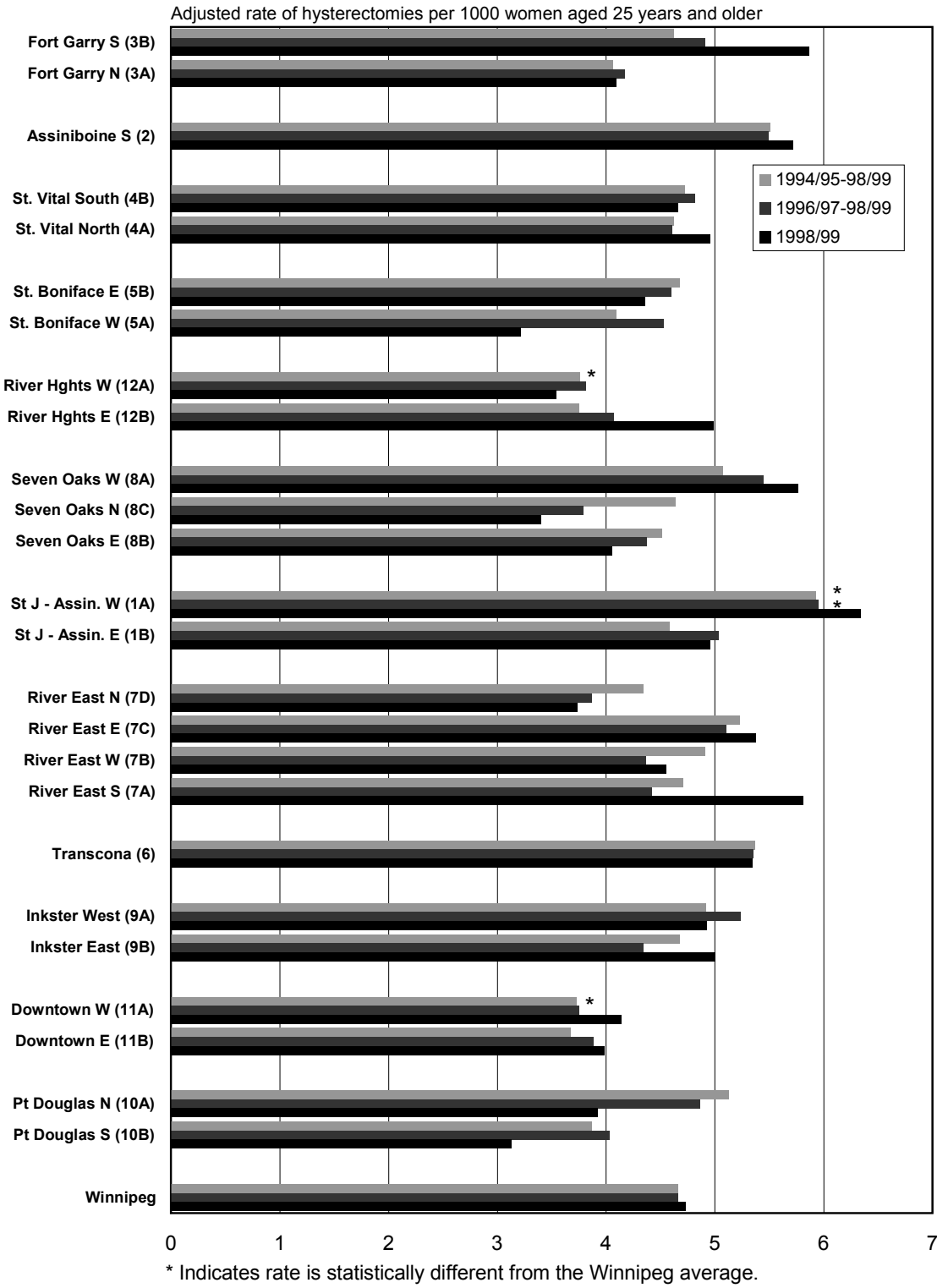


Figure 78: Hysterectomy Rates, by NC

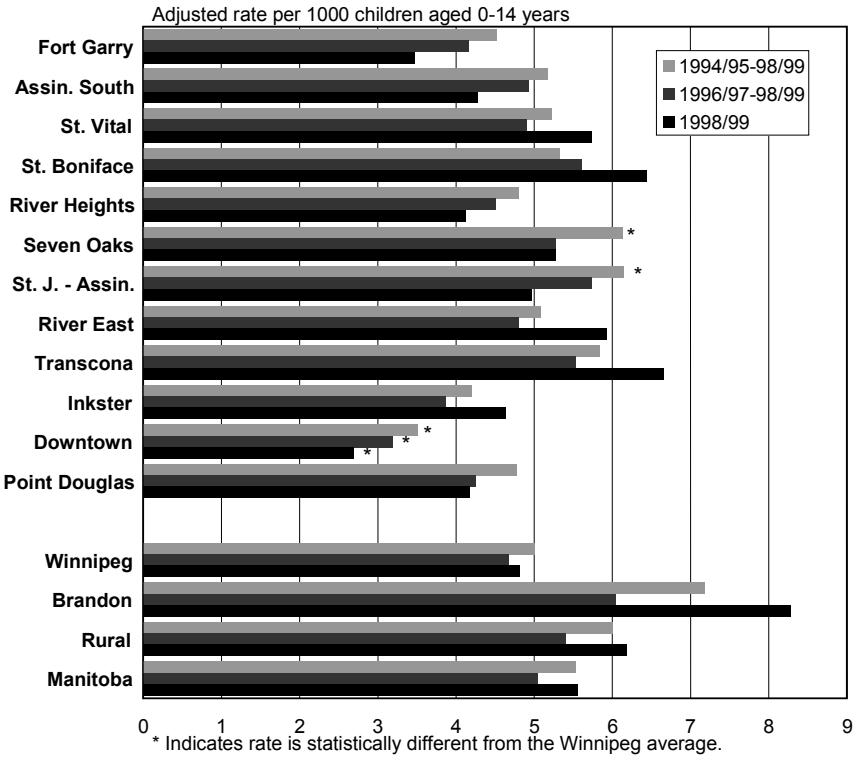


* Indicates rate is statistically different from the Winnipeg average.

5.6.3 Tonsillectomy and Adenoidectomy[9]

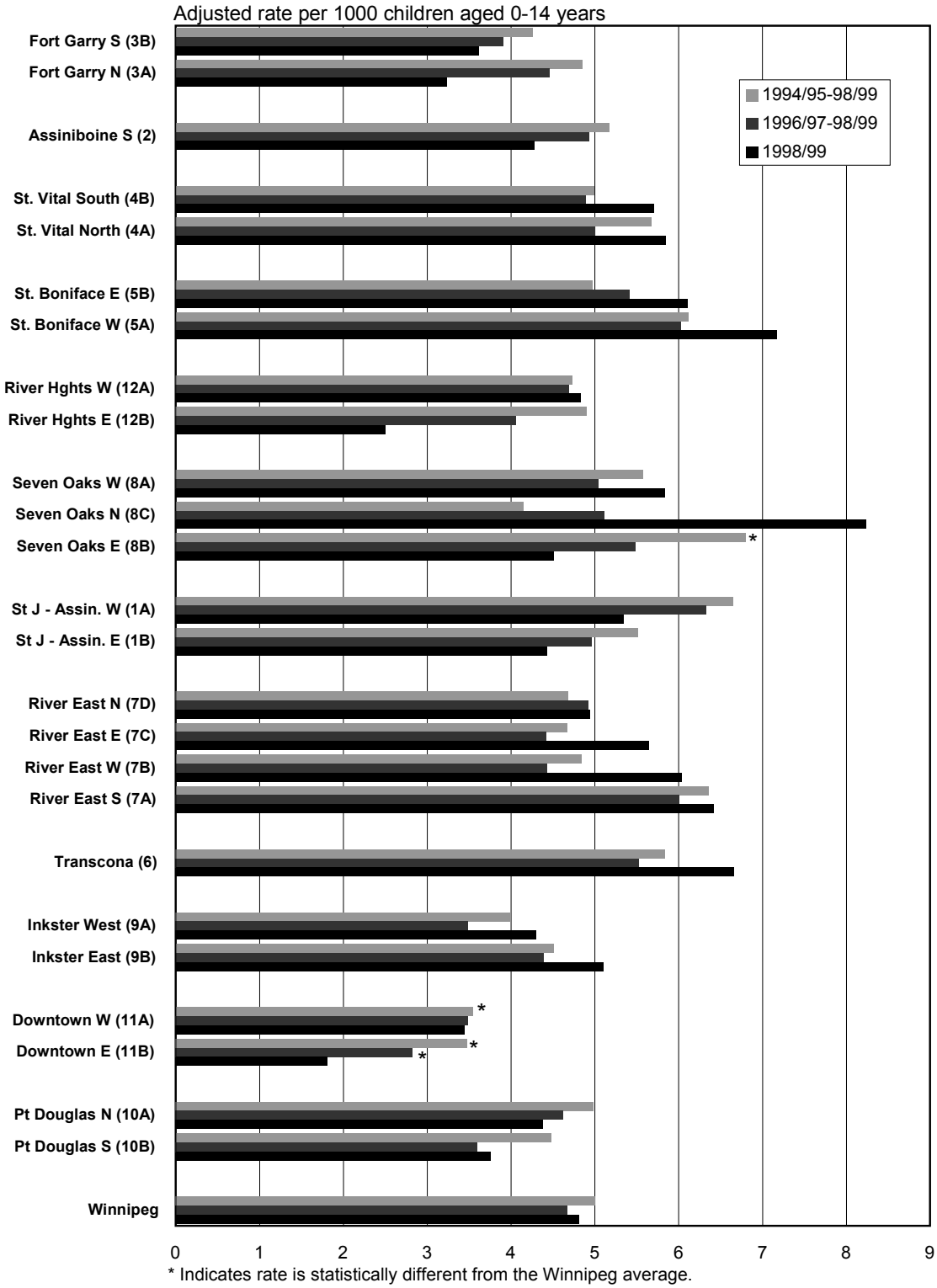
Tonsillectomy and adenoidectomy are frequent procedures, particularly among young children. Several years ago, MCHPE and the College of Physicians and Surgeons of Manitoba conducted an in-depth study and developed guidelines for the procedures (Black et al). As a result, tonsillectomy rates dropped significantly in subsequent years. However, there is some evidence that rates are starting to increase again. (A more thorough examination of tonsillectomy rates can be found in MCHPE's report 'Assessing the Health of Children in Manitoba: A Population-Based Study', Brownell et al). Figures 79 and 80 show that there are significant variations across areas; in 1998/99, the rate in the Downtown community is less than half the rate in Transcona; while at the neighbourhood level, the rate in Seven Oaks North is over four times the rate in the Downtown East. There is no relationship between tonsillectomy rates and premature mortality at either the community or neighbourhood level. Rates in the Downtown communities are notably low, and the Brandon rates are substantially above the Winnipeg rates.

Figure 79: Tonsillectomy and/or Adenoidectomy Rates, by CA



[9] For simplicity, we subsequently refer to tonsillectomy and/or without adenoidectomy as 'tonsillectomy'.

Figure 80: Tonsillectomy and/or Adenoidectomy Rates, by NC



* Indicates rate is statistically different from the Winnipeg average.

5.6.4 Cholecystectomy

Cholecystectomy (surgical removal of the gall bladder) is also a very common surgical procedure – over 3000 were done in 1998/99. Figures 81 and 82 show the rates by community and neighbourhood. The rates have been quite stable, though there appears to be a slight increase in 1998/99. There is significant variation in the rates of the procedure across the communities. The range goes from 1.63 in Assiniboine South to 2.69 in Point Douglas in 1998/99. At the neighbourhood level there is even greater range: from 1.45 in St. Boniface West to 3.26 in Inkster East, more than a twofold variation. The frequency of the procedure parallels our surrogate measure of poor health: the premature mortality rate. The relationship between cholecystectomy rates and premature mortality is not significant at the neighbourhood level and only reaches statistical significance over 5 years at the community level (r=0.88). Here again, Winnipeg rates are below both Brandon and rural rates.

Figure 81: Cholecystectomy Rates, by CA

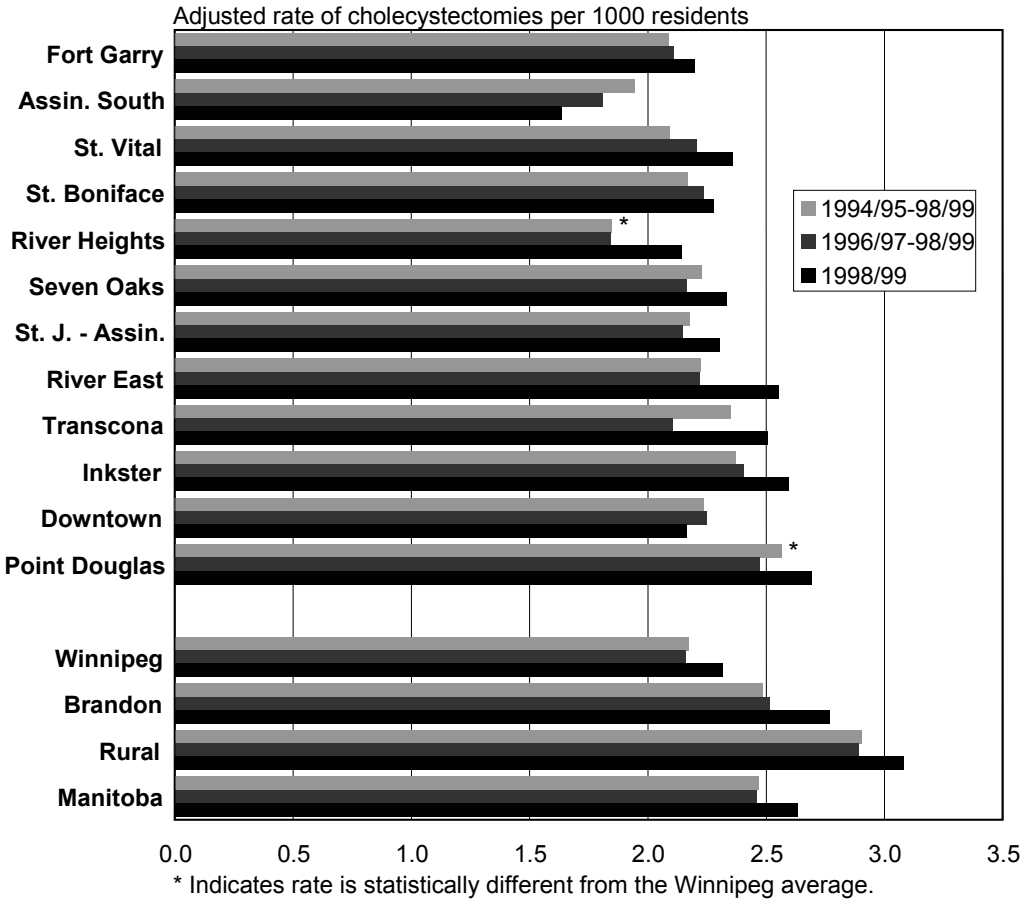
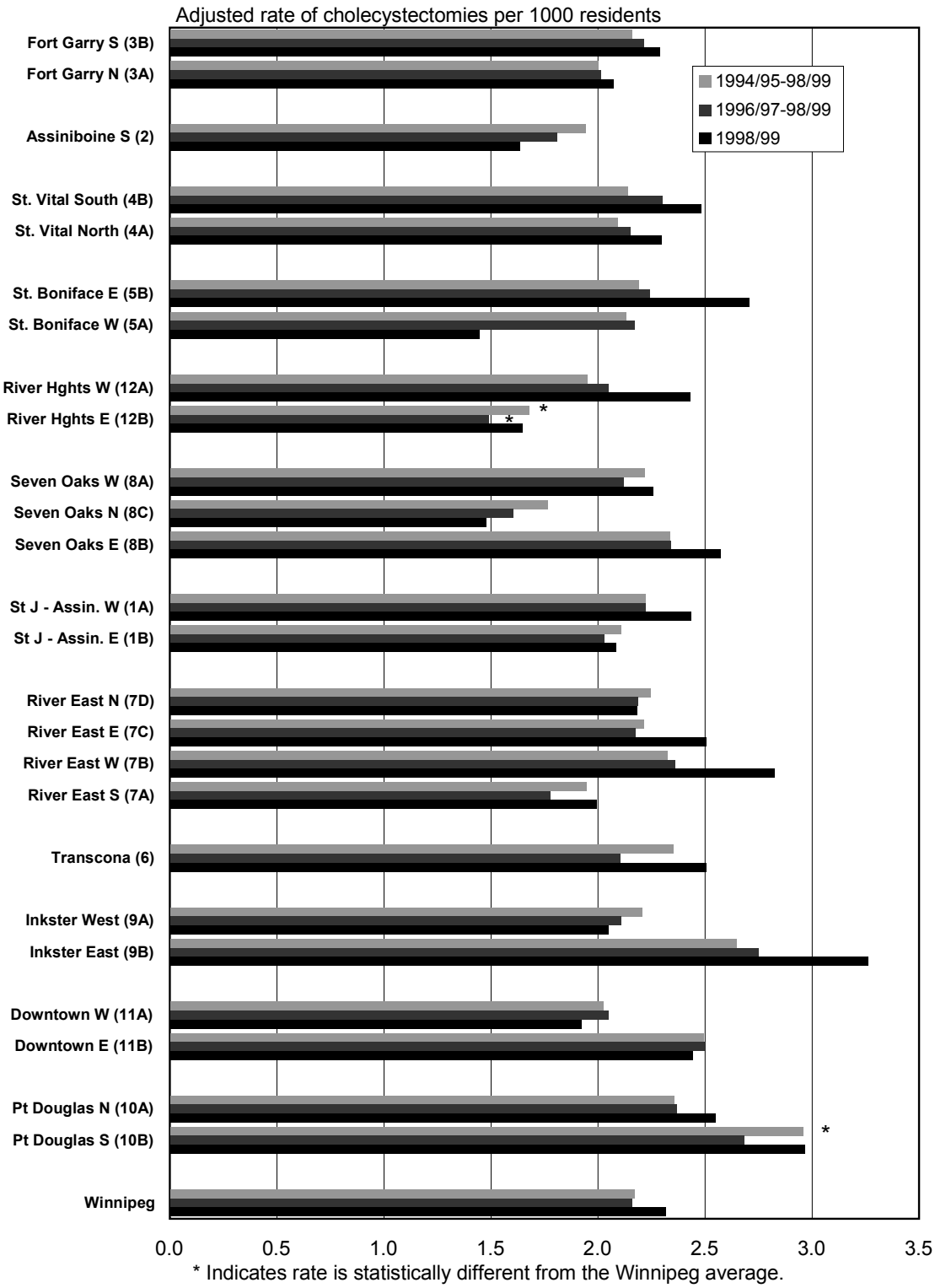


Figure 82: Cholecystectomy Rates, by NC



* Indicates rate is statistically different from the Winnipeg average.

6. PERSONAL CARE HOMES

Personal Care Homes (PCH), or 'nursing homes,' are a growing part of our health care system, and an area of much current interest given our aging population. Admission to a personal care home can occur from hospital or from the community, following a standardized assessment. Manitoba's PCH facilities are almost all operating near 100% occupancy. The analyses performed here include only persons aged 75 years or older, since they are the main users of personal care homes (over 80% of PCH residents). These analyses were based on data from 1997/98, due to technical limitations in our data systems for determining area of residence prior to entering a PCH.

6.1 Location of Personal Care Homes

Table 1 shows how many PCH beds were located in each community in 1997/98 along with population statistics for the area. There is considerable variation across areas. Assiniboine South has by far the highest number of beds per population of individuals 75 years or older (244), but it has a relatively small percentage of older residents. Transcona has the fewest beds per population 75 and up, at 85. But it should be noted that there is a number of reasons (and considerable latitude) for seniors to choose specific personal care homes (or have them chosen for them) on bases other than geographic proximity to their former place of residence. The location of their children or close kin, and ethnic, religious or other affinity considerations may also play a role. So one might expect a significant proximity effect, but not an overwhelming one.

The uneven distribution of PCH beds is overcome by standardized admission criteria and seniors' considerable mobility, which is quantified in Table 2. The data in Table 2, which represent five years of admissions, show the relationship between the community of residence before PCH admission and the community of the PCH to which the person was admitted. A glance at the diagonal indicates that in almost all communities, a majority of seniors are placed in a PCH in their community of prior residence. The range is from a low of 35.9% in Assiniboine South to a high of 70.2% in Transcona.

Table 1: Personal Care Home Beds and Populations, by Community, 1997/98

Community Area	*# PCH Facilities*	*Total Beds*	*Population Age 75+*	*Total Pop*	*% Pop 75+*	*Beds per Pop 75+*	*Beds per Total Pop*
Fort Garry	3	233	2,705	61,192	4.4%	86.1	3.8
Assin. South	4	518	2,120	36,423	5.8%	244.3	14.2
St. Vital	4	391	3,507	60,787	5.8%	111.5	6.4
St. Boniface	1	314	2,910	46,153	6.3%	107.9	6.8
River Heights	4	552	5,481	56,890	9.6%	100.7	9.7
Seven Oaks	5	592	3,745	57,397	6.5%	158.1	10.3
St.J. - Assin.	6	693	4,873	60,340	8.1%	142.2	11.5
River East	5	569	5,788	90,917	6.4%	98.3	6.3
Transcona	1	100	1,182	33,744	3.5%	84.6	3.0
Inkster	1	137	1,244	31,157	4.0%	110.1	4.4
Downtown	4	514	4,884	71,259	6.9%	105.2	7.2
Point Douglas	2	505	3,245	40,430	8.0%	155.6	12.5
Winnipeg	40	5,118	41,684	646,689	6.4%	122.8	7.9

Sources:
Bed numbers from Manitoba Health Annual Statistics at end of fiscal year 1997/98.
Beds assigned to areas by MCHPE, based on postal code.
Population data from MCHPE population registry.

Table 2: Location of PCH's Chosen by Winnipeg Residents, Admitted 1993/94 - 1997/98

	Went to PCHs in:											
Residents from: (below)	Fort Garry	Assin. South	St. Vital	St. Boniface	River Heights	Seven Oaks	St. J. Assin.	River East	Trans-cona	Inkster	Down-town	Point Douglas
Fort Garry	*44.3%*	1.1%	15.0%	7.5%	14.6%	1.1%	1.1%	2.9%	1.1%	0.0%	8.9%	2.5%
Assin. South	2.1%	*35.9%*	4.7%	2.7%	16.2%	3.1%	10.5%	6.6%	1.4%	0.8%	14.0%	2.1%
St Vital	6.1%	1.0%	*58.1%*	12.6%	4.5%	0.5%	3.0%	2.5%	0.5%	1.0%	9.6%	0.5%
St. Boniface	0.4%	0.4%	9.5%	*63.4%*	6.0%	0.4%	1.7%	5.6%	0.0%	0.9%	9.9%	1.7%
River Heights	7.2%	3.1%	7.8%	5.9%	*48.8%*	1.0%	2.9%	5.3%	1.2%	0.4%	14.3%	2.0%
Seven Oaks	0.4%	0.6%	1.1%	1.1%	4.9%	*45.5%*	2.8%	10.4%	1.3%	6.2%	6.8%	18.9%
St J- Asin.	2.0%	8.0%	2.2%	2.1%	8.4%	3.8%	*49.7%*	3.2%	0.4%	2.2%	15.2%	2.8%
River East	1.2%	0.4%	5.4%	3.4%	2.1%	5.3%	2.2%	*59.9%*	5.7%	1.0%	7.2%	6.2%
Transcona	0.0%	0.0%	1.8%	7.0%	3.5%	0.0%	0.0%	8.8%	*70.2%*	1.8%	3.5%	3.5%
Inkster	2.4%	0.0%	1.2%	1.2%	2.4%	6.1%	0.0%	3.7%	0.0%	*47.6%*	11.0%	24.4%
Downtown	1.2%	2.1%	5.7%	3.6%	9.4%	2.8%	4.6%	10.5%	1.2%	3.0%	*49.5%*	6.2%
Point Douglas	0.3%	1.4%	0.3%	0.8%	12.3%	18.9%	0.8%	3.6%	0.3%	1.1%	4.7%	*55.4%*
Total Wpg	4.6%	5.9%	7.4%	6.7%	12.1%	8.3%	10.7%	14.9%	2.5%	2.6%	15.2%	9.1%

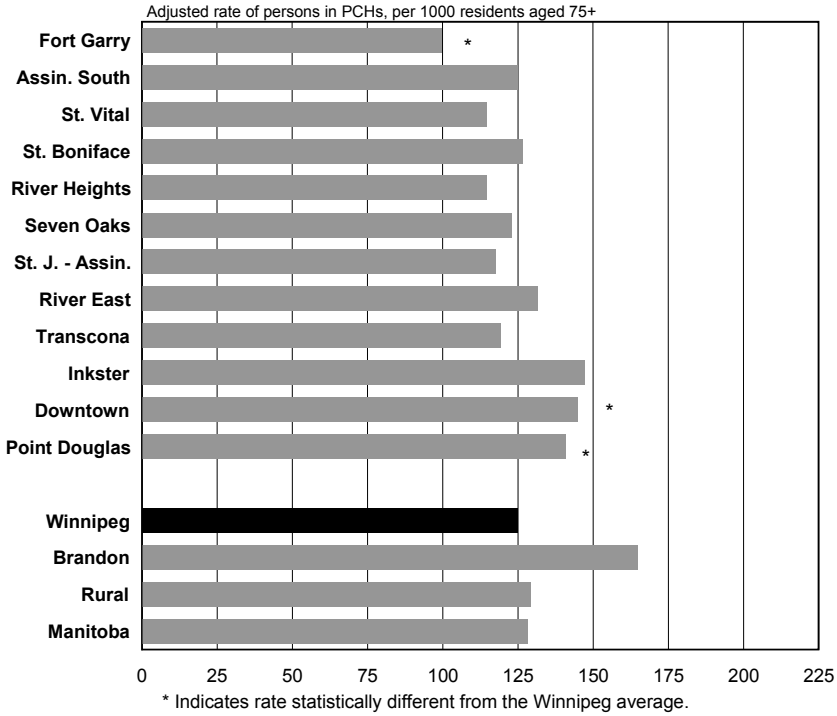
6.2 Use of Personal Care Home Beds

Utilization analyses based on where PCH residents are currently living would essentially replicate the distribution of beds (i.e. the residents are where the beds are). Therefore, the following analyses were calculated according to where PCH residents used to live, at 6 months prior to assessment. By focussing on the area of previous residence, we can examine patterns of PCH access and use by area, and compare the rates with each other and with premature mortality.

6.2.1 Residents in PCH

Figures 83 and 84 show the number of persons residing in Personal Care Homes in 1997/98 by communities and neighbourhoods of previous residence. There is substantial variation in the rates of institutionalization of the elderly from across the different communities. Fort Garry has the lowest rate (100) and Inkster the highest (147). At the neighbourhood level

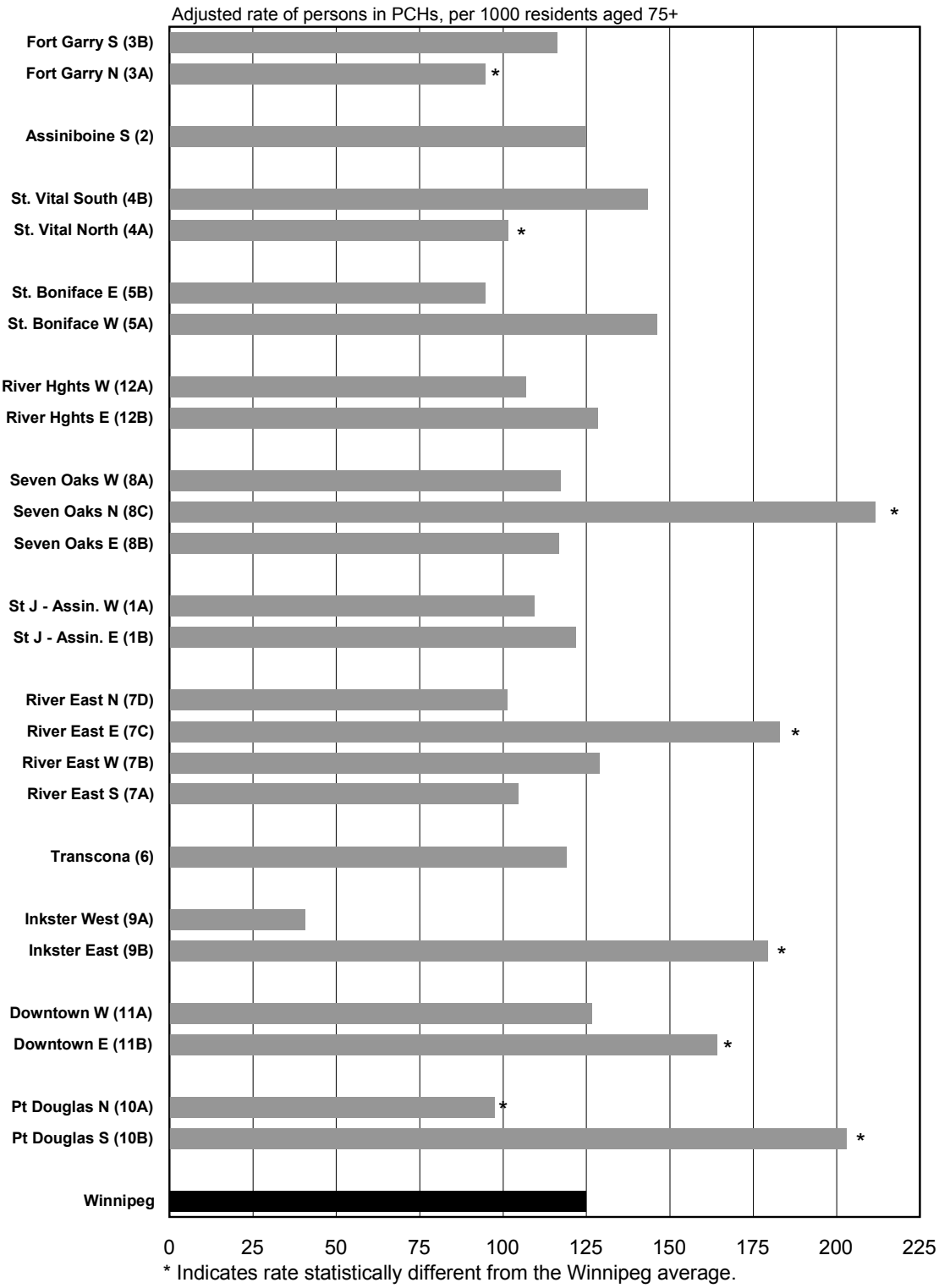
Figure 83: Residents in PCH, by CA, 1997/98



there are more significant differences in rates of institutionalization. The lowest rate is found for former residents of Inkster West: only 41 seniors per 1000 in Inkster West were in personal care homes. In Seven Oaks North, 212 of every 1000 seniors found themselves in personal care homes: a remarkable five-fold difference. Moreover, the rates are significantly

correlated with premature mortality (r = 0.47 for neighbourhoods and 0.75 for communities). Virtually identical results were seen for days of care (not shown; r = 0.44 and 0.71).

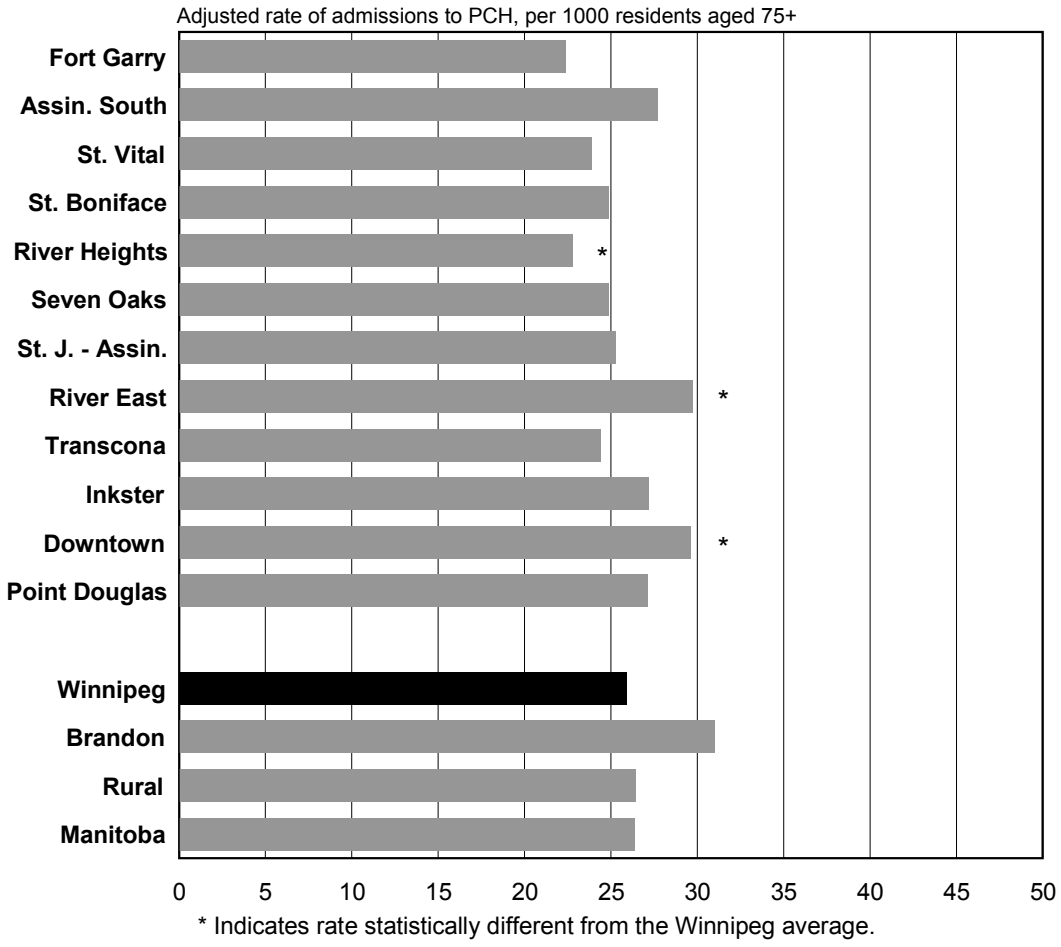
Figure 84: Residents in PCH, by NC, 1997/98



6.2.2 Admissions to PCH

Figures 85 and 86 show rates of admission to PCH. These represent how many people from each area entered PCHs (anywhere in Manitoba) each year, again according to where they lived prior to being admitted to a PCH. Since admission is relatively infrequent, we combined 5 years of data to provide reliable rates[10]. There is a moderate amount of variation in these rates at the community level: Fort Garry has the lowest rate of 22.4, while River East is the highest at 29.8. The relationship with premature mortality rates is positive, but just below statistical significance (r = 0.56).

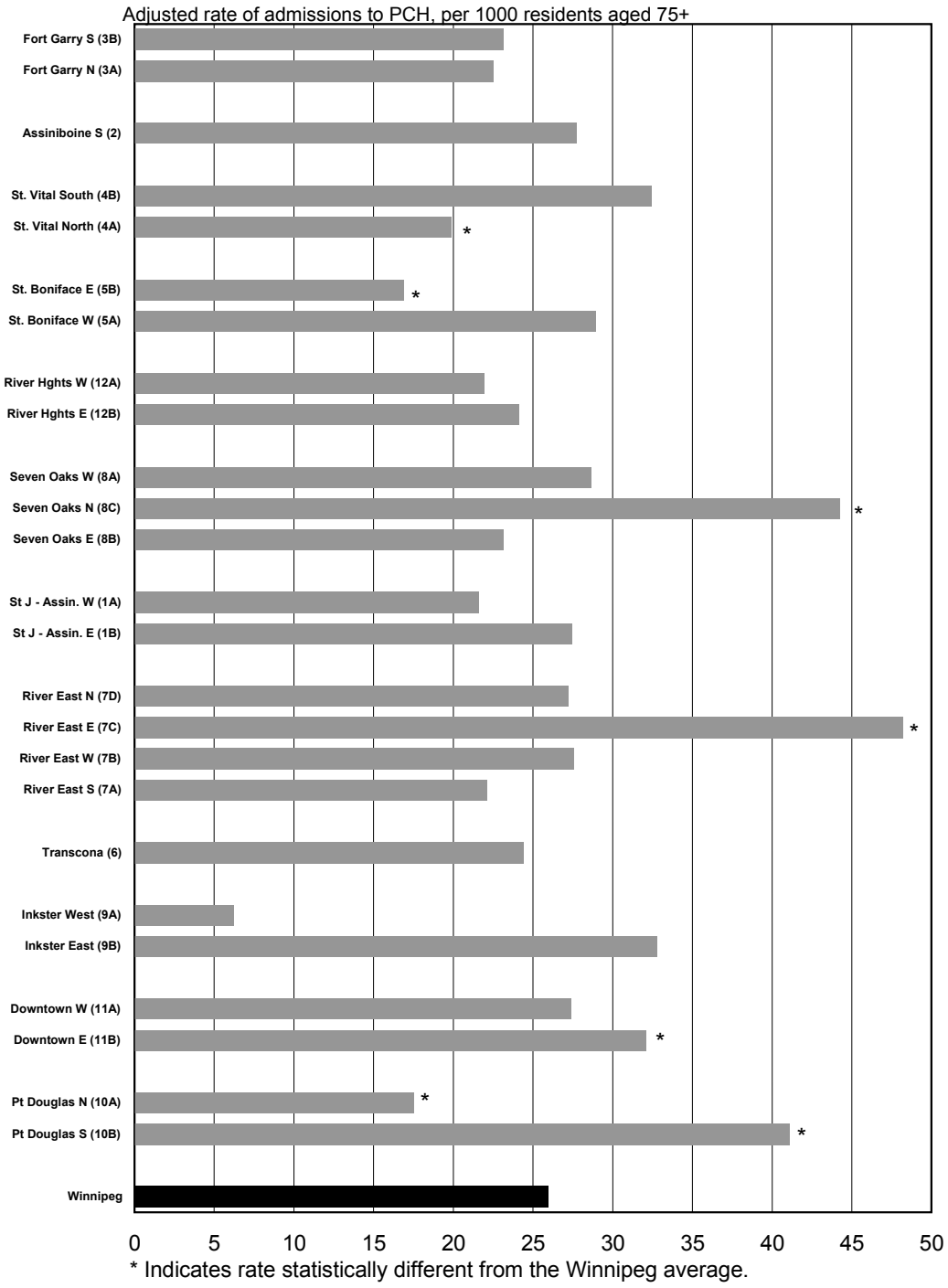
Figure 85: Admissions to PCH, by CA, 1993/94 - 1997/98



[10] The admission rates shown in this report are slightly lower than those found in previous MCHPE reports because an error in our computer programming has been found. These new 'corrected' rates are approximately 5-6% lower than previous results.

At the neighbourhood level, the variation is much greater. Inkster West has a low admission rate of 6.3 while the rate in River East is 48.2. This is almost an 8-fold difference and stands out strikingly in the figure. The neighbourhood-level relationship with premature mortality rates is not statistically significant (r = 0.32).

Figure 86: Admissions to PCH, by NC, 1993/94 - 1997/98



6.2.3 Waiting Times for PCH Admission

Figures 87 and 88 show the median waiting times for PCH admission. 'Median' means that half of the people had shorter waiting times, and half had longer. (We used the median rather than the mean because the mean is skewed by long-wait outliers.) There is great variation in these rates: median waits vary from a low of 72 days in the Downtown community to 168 days in Inkster. The Downtown West neighbourhood has the shortest wait at 69 days, and Inkster East the longest at 173 (a more than 2-fold difference). Notably, within the Inkster community Inkster West has one of the shortest waiting periods in the city (74 days) in contrast to its neighbouring area, Inkster East. There is no significant relationship between waiting times and premature mortality rates at either level; the correlations are r = 0.27 for neighbourhoods and 0.14 for communities. Waiting times can be substantially affected by personal decisions of the resident, most obviously about location of placement geographically, and ethnic/dietary requirements. Since these analyses were based on 1997/98 data, they reflect circumstances just prior to a number of recent policy changes for PCH placement, and significant increases in the number of PCH beds.

Figure 87: Waiting times for PCH Admission, by CA, 1997/98

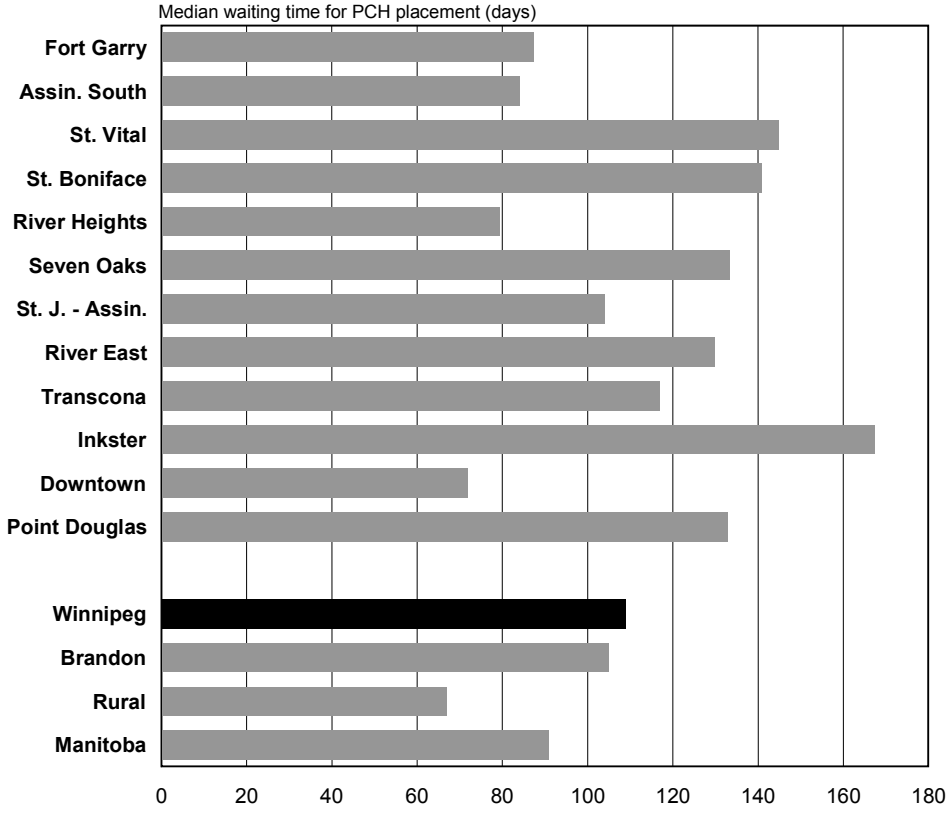
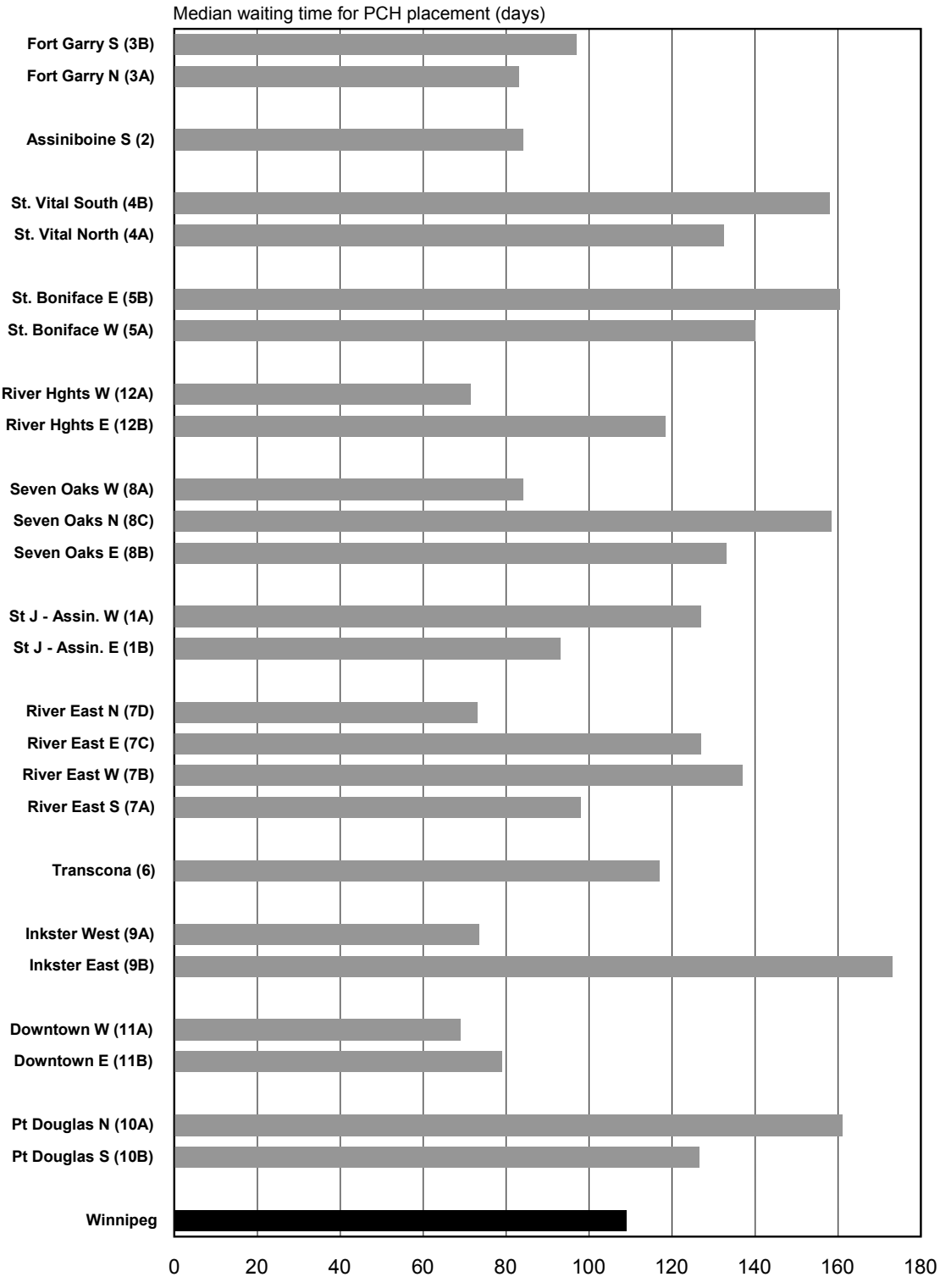


Figure 88: Waiting times for PCH admission, by NC, 1997/98



7. PREVENTIVE SERVICES

While most of our health care system (and therefore most of this report) focuses on treatments for illnesses already contracted, there is growing effort focussing on prevention. This section presents data for some common preventive services whose benefits are substantial.

7.1 Childhood Immunizations

In conjunction with other provinces, Manitoba has developed immunization guidelines for children. Figures 89 and 90 show the percentage of children with complete immunization schedules at 1 and 2 years of age[11]. The variation in these rates is somewhat less than observed in many of the other conditions and treatments reviewed above. Nevertheless, the differences are still substantive. At the community level, for example, only 62% of the two year olds are fully immunized in Point Douglas in contrast with 82% in St. Vital. At the neighbourhood level the rates vary from 56% in Point Douglas South to 85% in River East North. Moreover, there are highly significant negative relationships with premature mortality rates at the neighbourhood level, for both 1 and 2 year olds (r = -0.67 for 1 year olds and -0.60 for 2 year olds). The relationships at the community level are also negative, but not statistically significant (r = -0.47 and –0.39 for 1 and 2 year olds respectively). Since populations in areas of high premature mortality rates generally have poorer health status, these negative relationships raise policy issues of what might account for the lower rates, and how they might be raised.

[11] Immunization rates were derived from the Manitoba Immunization Monitoring System, which includes vaccinations delivered by physicians and public health nurses. These data are known to be highly reliable for Winnipeg residents.

Figure 89: Childhood Immunization Rates, by CA

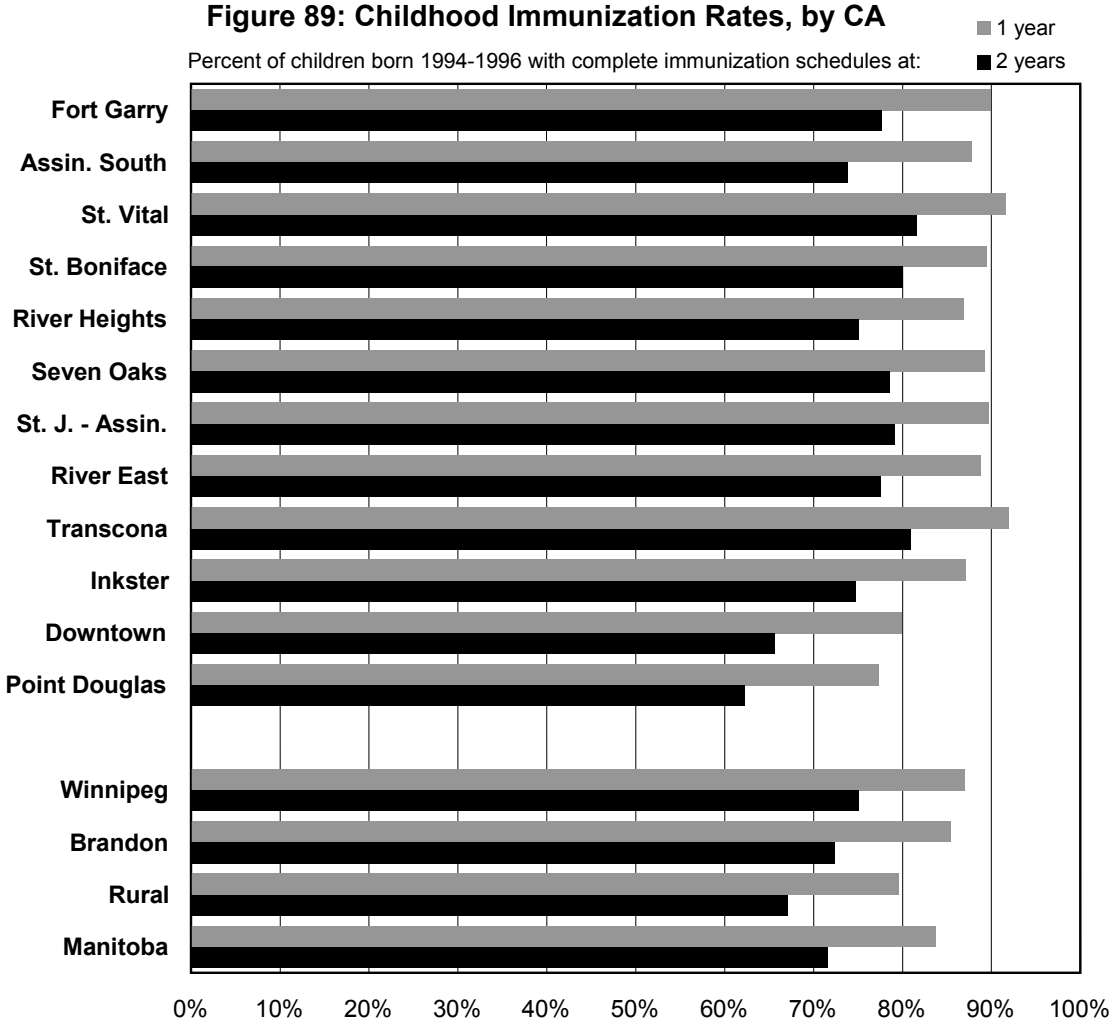
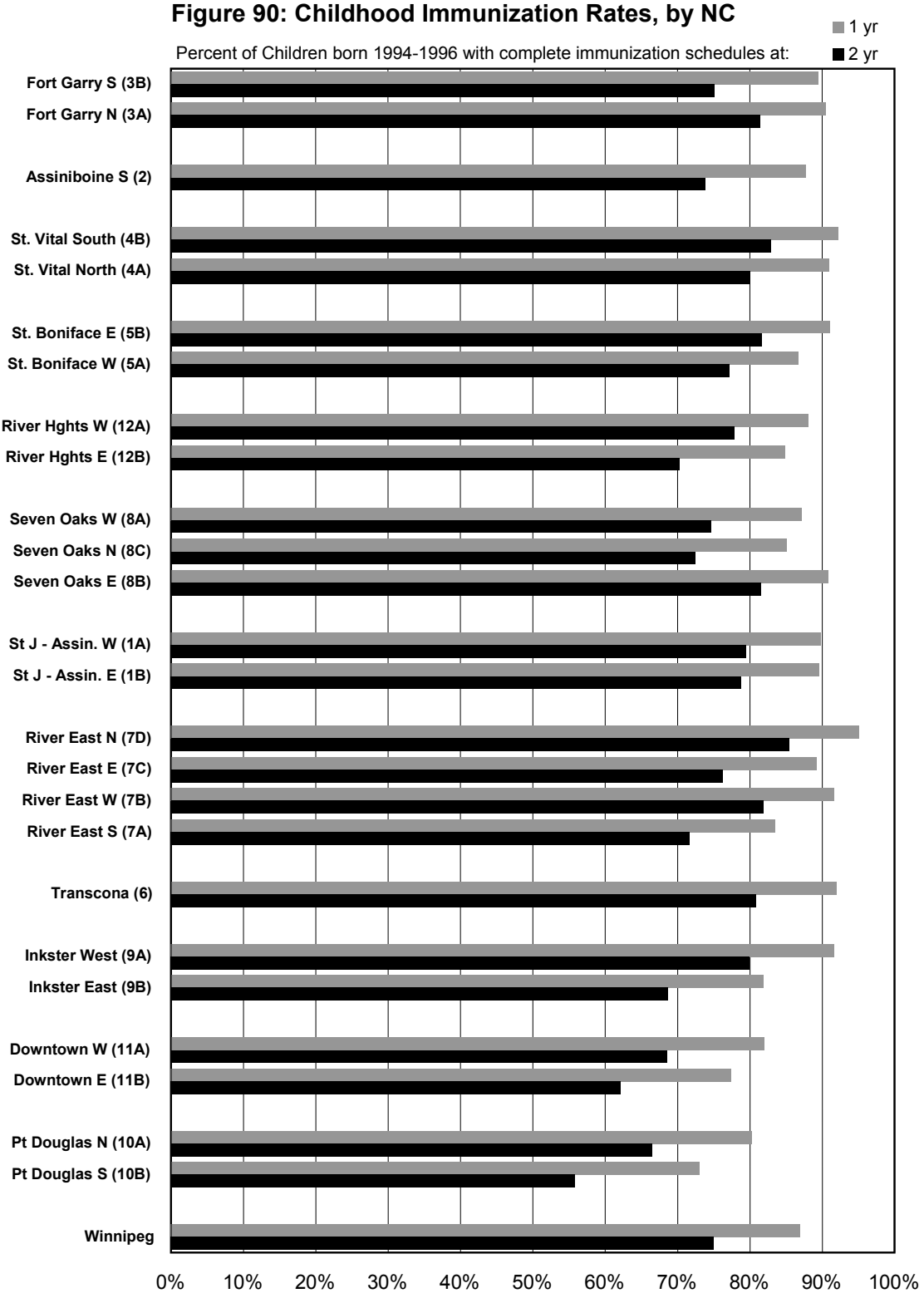


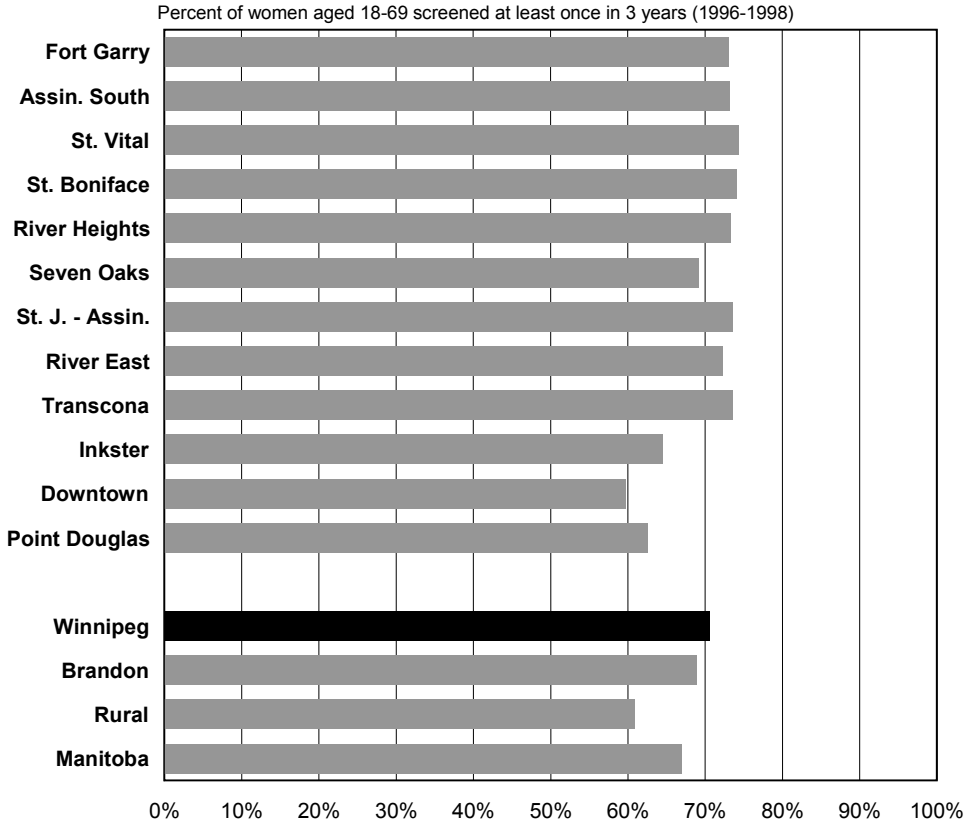
Figure 90: Childhood Immunization Rates, by NC



7.2 Cervical Cancer Screening

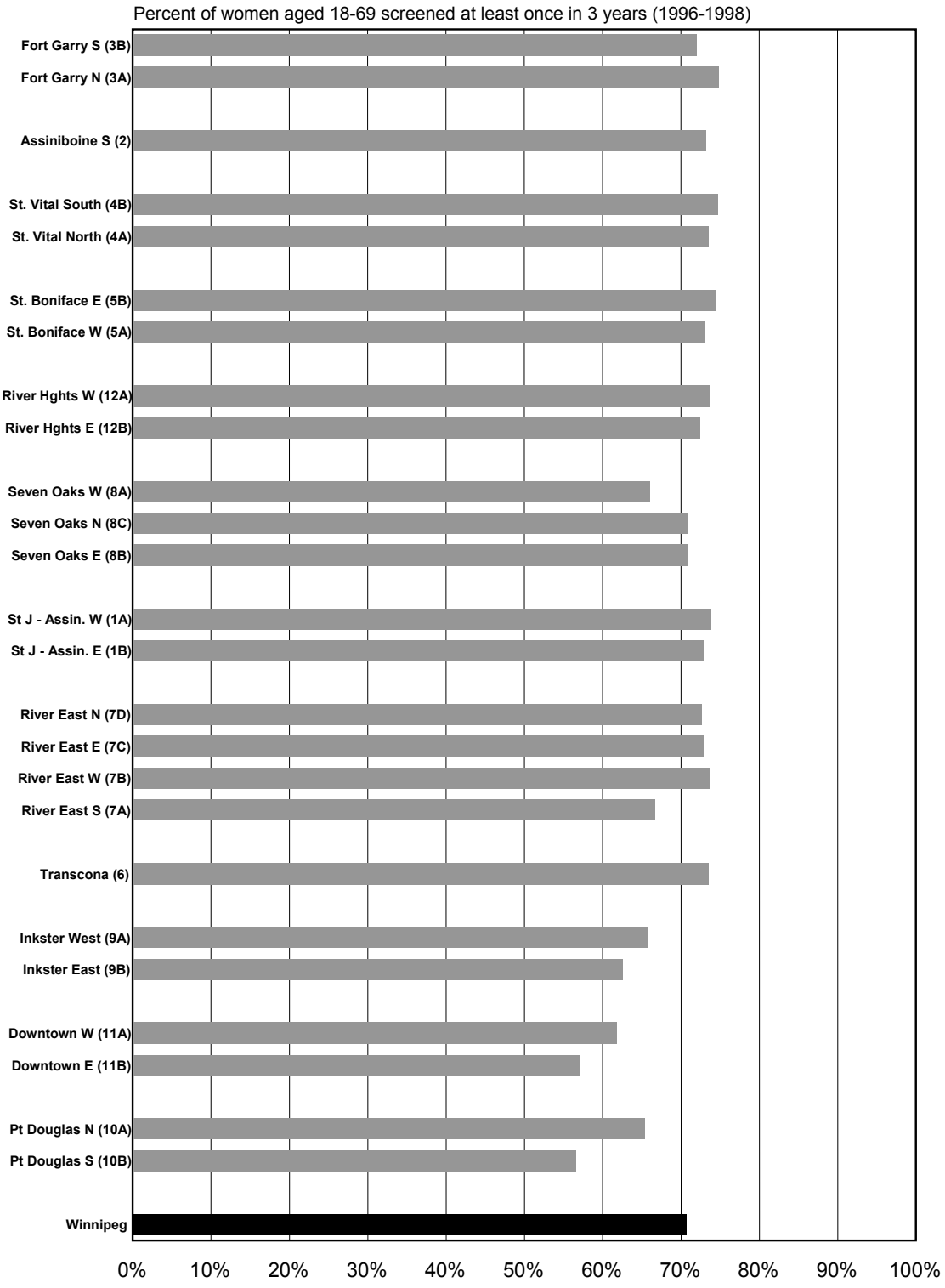
Cervical cancer is considered largely preventable with systematic testing by pap smears. Guidelines recommend that healthy women be screened at least once every three years (more often at first, and after any positive findings). Figures 91 and 92 show the rates by community and neighbourhood. The Winnipeg average is just over 70%, and some areas fall well below that[12]. Here again there is a negative relationship with premature mortality rates. That is, women in less healthy areas (high premature mortality rates) are less likely to be screened. The relationship is highly significant at the neighbourhood level (r = -0.55), but marginally non-significant at the community level (r = 0.57). CancerCare Manitoba is developing a cervical cancer screening program for Manitoba designed to increase the screening rates.

Figure 91: Cervical Cancer Screening Rates, by CA



[12] These rates are based on physician payment claims, but are not significantly under-counted because of salaried physicians in community clinics who do not file such claims. This is because each pap test has two claims associated with it – one for taking the sample, the other for the laboratory test. Therefore, one or the other of these claims is almost always present for tests done on Winnipeg residents. See Roos et al (1999).

Figure 92: Cervical Cancer Screening Rates, by NC



7.3 Breast Cancer Screening

Breast cancer rates have increased substantially in the past 20 years. Breast cancer screening (using mammograms) is recommended every two years for women between 50 and 69 years of age, although there are reports that question the added benefit of mammograms over well-conducted self-examinations. However, given the uncertainty of the frequency and carefulness of self-examinations, mammography is a major contributor to the detection of breast tumours. Figures 93 and 94 show the rates of mammography for women between 50 and 69 years of age. Again the overall level of coverage is quite low: the Winnipeg average is just 53%. A few areas fall under 50%, and the highest level is only a bit over 60%. As with other preventative services, there is a significant negative relationship with premature mortality rates (r = -0.65 for neighbourhoods and –0.79 for communities), so the areas with populations in poorer health seem to make less use of this service. However, Manitoba has a systematic breast cancer screening program which should increase rates in all areas.

Figure 93: Breast Cancer Screening Rates, by CA

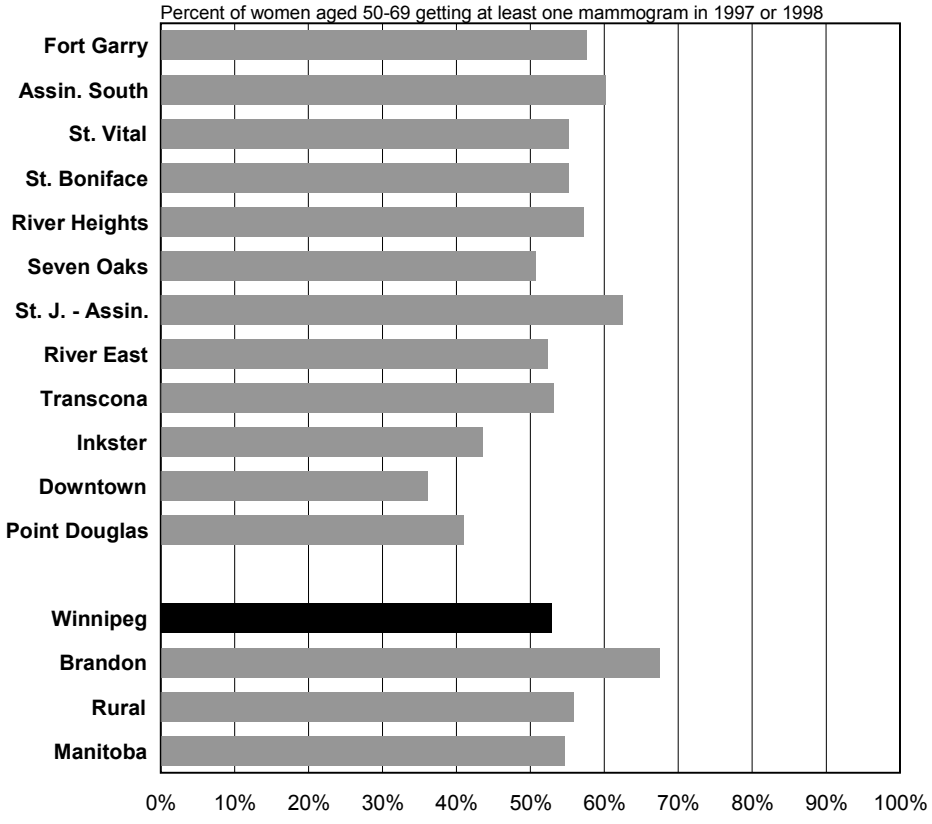
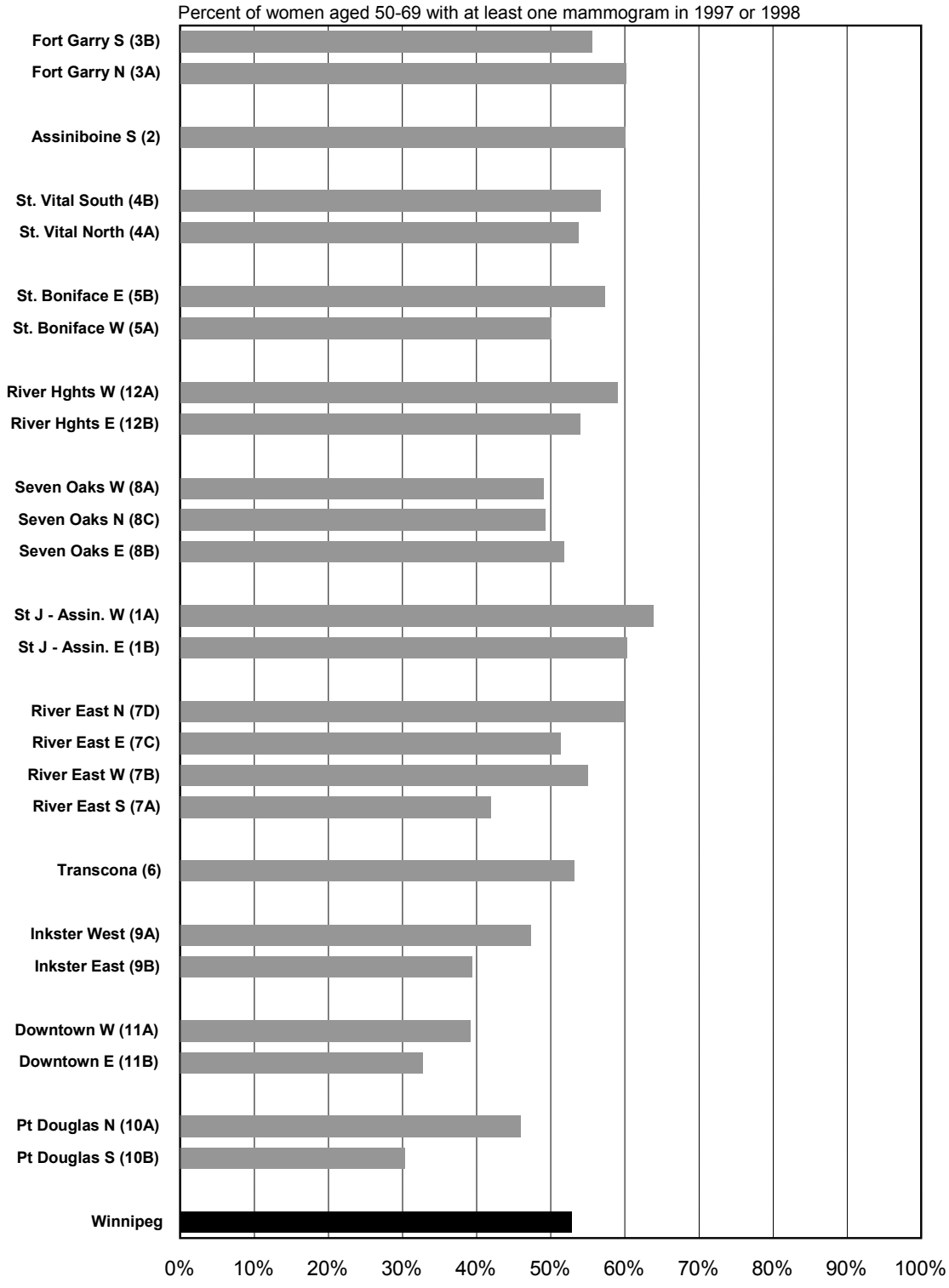


Figure 94: Breast Cancer Screening Rates, by NC



8. CONCLUSIONS

There is a remarkable range of health status in the Winnipeg area. The premature mortality rates for residents of the 12 areas varies by more than a factor of two from the healthiest (Fort Garry) to the least healthy (Point Douglas). But even within the 12 areas there are major differences in premature mortality rates. Division of Winnipeg into the 25 neighbourhoods allows one to identify distinct areas with very different rates of premature mortality, and different rates of use of various health care services. The most dramatic example of the insight gained by the subdivision of communities can be found by looking at Inkster. That community, having the third highest premature mortality rate, decomposes into Inkster East and Inkster West. The former had the third *highest* premature mortality rate among the 25 neighbourhoods, while the latter had the second *lowest* rate! They are obviously populated by individuals with very different characteristics. Planning for the delivery of services could benefit from taking those differences into account.

It is a presumption of this study that the need for health care services can be represented, approximately, by the premature mortality rate of a population. The higher the premature mortality rate of the residents of an area, the higher one would expect them to utilize various health care services. By that standard, the use of basic services, such as visit rates to generalist physicians, and most measures of hospital use (separations and days) is closely related to need. On the other hand, the use of specialist physicians is not positively related to this measure of need. Indeed, there seems to be no relationship between specialist visit rates and premature mortality rates.

A set of disconcerting findings is a set of *negative* relationships between the premature mortality rates of residents in the areas and their use of a variety of high profile procedures. MRI scans, Angioplasty, Coronary Artery Bypass Surgery Rates, Hip Replacement Rates, and Knee Replacements all show utilization rates that are in the direction opposite to need as measured by premature mortality. In general, residents from areas with less healthy populations receive fewer of these procedures than residents from areas with healthier populations. Moreover, recent increases in the volume of these procedures have not

alleviated the problem. There are, apparently, impediments in the system which result in residents from poorer health areas having lower rates of these procedures. No relationships were found between premature mortality rates and rates of Coronary Catheterization or Cataract Surgery.

Access to Personal Care Homes, on the other hand, appears to be positively related to poor health status, as indicated by premature mortality rates, and the waiting times are independent of premature mortality rates.

Preventative services provide the most uniform and discouraging picture. In all three service areas examined (Childhood Immunization Rates, Cervical Cancer Screening Rates, and Breast Cancer Screening Rates), there was a strong negative relationship between premature mortality rates and the rate at which they availed themselves of these services.

In summary, it appears that basic services are being provided in accordance with need as measured by premature mortality rates, but that a variety of high profile and preventative services do not conform to that pattern. An examination of the causes of these anomalies with an eye to how they might be addressed might serve to bring the full range of services closer in alignment with need.

REFERENCES

Birch S, Eyles J, Hurley J, Hutchinson B, Chamber S. A needs-based approach to resource allocation in health care. *Can Pub Pol*. 1993; 19(1): 68-85.

Black C, Peterson S, Mansfield J, Thliveris M. *Patterns of Tonsillectomy in Manitoba 1989-1993; Analyses to support the Tonsillectomy Review Panel of the Clinical Guidelines and Analysis Program.* Winnipeg, MB: Manitoba Centre for Health Policy and Evaluation and The College of Physicians and Surgeons of Manitoba; 1996.

Black C, Roos NP, Fransoo R, Martens P. *Comparative Indicators of Population Health and Health Care Use for Manitoba's Regional Health Authorities, A POPULIS Project.* Winnipeg, MB: Manitoba Centre for Health Policy and Evaluation; 1999.

Brownell M, Martens P, Kozyrskyj A, Fergusson P, Lerfald J, Mayer T, Derksen S, Friesen D. *Assessing the Health of Children in Manitoba: A Population-Based Study*. Winnipeg, MB: Manitoba Centre for Health Policy and Evaluation; 2001.

Carstairs V, Morris R. *Deprivation and Health in Scotland*. Aberdeen, Scotland; Aberdeen University Press; 1991.

Eyles J, Birch S, Chambers J, Hurley J, Hutchinson B. A needs-based methodology for allocating health care resources in Ontario, Canada: Development and an application. *Soc Sci Med.* 1991; 33(4): 489-500.

Eyles J, Birch S, Chambers S. Fair shares for the zone: allocating health-care resources for the native populations of the Sioux Lookout zone, Northern Ontario. *Can Geo.* 1994; 38(2): 134-150.

Mays N, Chinn S, Ho KM. Interregional variations in measures of health from the Health and Lifestyle Survey and their relation with indicators of health care need in England. *Epidemiol Comm Health*. 1992:46 (1): 38-47.

Roos LL, Traverse D, Turner D. Delivering prevention: The role of public programs in delivering care to high-risk populations. *Med Care.* 1999;37(Suppl)(6):JS264-JS278.

Tataryn DJ, Roos NP, Black C. *Utilization of Physician Resources. Volume 1: Key Findings; Volume II: Methods and Tables.* Winnipeg, MB: Manitoba Centre for Health Policy and Evaluation; 1994.

Winnipeg Health Region, Demographic Profiles. Winnipeg, MB: Winnipeg Regional Health Authority; Volume 1: 2000.

APPENDIX 1: METHODS

Confidentiality, Security, and Anonymity

The Faculty of Medicine, Health Research Ethics Board reviews all MCHPE projects. The Health Information Privacy Committee of Manitoba Health is kept informed of all MCHPE deliverables for Manitoba Health. Strict policies and procedures to protect the privacy and security of data have been followed in producing this report.

Population Studied

The focus of this report is the population of the Winnipeg Health Region and its component areas (see below). First Nations residents are included, but not separately identified in any of these analyses. Non-Winnipeg residents are included in the appropriate comparison groups (Rural, Brandon and Manitoba) shown in the community-level graphs.

Areas and Neighbourhoods

The Winnipeg Health Region has been divided into 12 Community Areas (CAs), which further sub-divide into 25 Neighbourhood Clusters. Figures 1 & 2 show the areas graphically, and their boundaries are described in Appendix 2.

Assignment to area of residence

Each resident of Winnipeg was assigned to one of the 25 Neighbourhood Clusters based on their postal code of residence. Since the 25 Neighbourhood Clusters fit into the 12 Community Areas, this neighbourhood assignment also determines the community of residence.

Statistical Adjustment

Health service utilization rates were age and sex adjusted using the direct method. Our program uses 11 age groups for each sex (0-14 yrs, 15-24, 25-34, 35-44, 45-54, 55-64, 65-74, 75-79, 80-84, 85-89, and 90+ years). The standard population was that for all of Manitoba as of December 1996.

Statistical Differences

Confidence intervals were used to determine whether any area's adjusted rate was statistically different from the Winnipeg average. These were based on 95% confidence

intervals, adjusted for multiple comparisons (i.e. for communities, 99.58%, and for neighbourhoods, 99.98%). This analysis was done only for Winnipeg's sub-areas; Rural, Brandon and Manitoba rates were not statistically compared to other values.

Time frame

Virtually all analyses in this report use data from fiscal year 1998/99. For many analyses, additional years were added to provide more stable estimates and allow examination of trends over time. These were three-year (1996/97 – 1998/99) and five-year (1994/95 – 1998/99) periods.

Calculation of rates

The analyses in this report were all performed using the 'population-based' approach. This means that service use is tracked for all residents and allocated to the patient's area of residence, regardless of where the service actually took place. For example, if a resident of Transcona received surgery at the Health Sciences Centre, the service is added to the total for the residents of Transcona. As a result of this allocation method, as well as the age/sex adjustment noted above, the rates for different areas can be fairly and validly compared to each other.

Premature Mortality Rates (PMR)

Premature mortality rates for all areas were derived from combining information from vital statistics data (death records) and the population registry file for 5 consecutive calendar years (1994 through 1998). Each area's PMR was calculated as the annual rate of persons dying before reaching age 75, divided by the number of persons aged 0-74 years in the area. The rate is then age-sex adjusted to allow valid comparisons across areas.

Life Expectancy

Life expectancy values derive from vital statistics data (death records). The analysis calculates age-specific death rates using 5-year age ranges, then assuming that these rates remain relatively stable, predicts expected longevity at birth for newborns of mothers from that area.

Socioeconomic Factor Index (SEFI)

This index is a composite measure developed at MCHPE, using a factor analysis of information taken from the 1996 Canadian Census. The variables included were:

Age Dependency Ratio –the population aged 65 or older, over the population aged 15-64

Unemployment Rates – the unemployed divided by the total labour force for that age group (4 age groups were used: 15-24, 25-24, 25-44, and 45-54).

Single Parent Households – percent of single parent households among households with children aged 0-14 years.

Single Parent Female Households – percent of single female parent households among households with children aged 0-14 years.

Labour Force Participation Female – women working or seeking work on census day (denominator is all women aged 15 and older).

Education – percent of residents who reported attaining at least high school diploma level education on census day. Three age groups were used: 25-34, 35-44, and 45-54.

The four unemployment values were combined into a single unemployment factor, and the three education values were similarly combined into a single education factor. The SEFI was then calculated by combining these two factors with the other variables, using factor analysis.

Within Winnipeg, the analysis was done at the Neighbourhood Cluster level, while outside Winnipeg, Rural Municipalities were the unit of analysis. The values were standardized so that the Manitoba average is zero and the standard deviation is one. Values for aggregate areas were calculated by using population-weighted averages of the scores of the component areas (e.g. for two neighbourhoods which make up one community).

Disease Prevalence

MCHPE data systems cannot definitively determine who has a given chronic condition; however, they can determine who received treatment for various conditions. Therefore, these

measures are called 'Treatment Prevalence' as they reflect the prevalence of persons receiving health services for the condition.

Hypertension prevalence

Our Hypertension Treatment Prevalence measure defined a hypertensive patient as someone who received at least one physician visit for 'Primary Hypertension' in the 3 years 1996/97 – 1998/99. This measure was validated using information from the Manitoba Heart Health Survey.

Diabetes prevalence

A person was defined as a diabetic if they received at least two physician visits or at least one hospitalization for Diabetes in the three-year period 1996/97 – 1998/99. This definition identifies approximately the same number of diabetics as contained in the provincial Diabetes Registry.

Cancer Incidence

We measured cancer incidence as the rate at which new cases of cancer are being reported. Data for this analysis came from CancerCare Manitoba in 1996, and included cases diagnosed through 1995. Cancer is a legally notifiable disease in Manitoba, so the registry is considered to be complete. Non-melanoma skin cancer cases were excluded, as were benign tumours.

Physician Visits and Consultations

Physician visits (and consultations) were counted from records of physician billing claims. All fee-for-service physicians submit billing claims, and most salaried physicians submit parallel 'evaluation' claims, so the database is reliable (Tataryn et al, 1994). Our definition of Ambulatory Visits excludes visits to hospital patients, but includes virtually all other physician encounters (in physicians' offices, hospital outpatient clinics, home visits, etc). Physician visits in hospital Emergency Rooms are counted as ambulatory visits, but only about 50% of ER visits are captured in the claims, since ER physicians at the community hospitals do not file claims (i.e. only ER contacts at HSC and St.B are recorded). Consultations included only those to specialist physicians, which make up 94% of all

consults. Specialists are physicians whose qualifications for practise in a specialty are recognized by Manitoba Health.

Hospitalizations

Data for use of acute care hospitals came from the hospital discharge abstracts database, a comprehensive dataset of all hospitalizations of Manitoba residents. For this report, hospitalizations in acute care facilities anywhere in Manitoba were included in the rate for the area of residence of the patient. For every community, and for every neighbourhood, the seven Winnipeg hospitals provided more than 94% of all hospitalizations. Therefore, for the 'location of hospitalization' analysis, only the 7 Winnipeg hospitals were included: Health Sciences Centre, St. Boniface, Grace, Seven Oaks, Victoria, Concordia, and Misericordia (which was still functioning as an acute care facility in 1998/99, but has since been converted). Facilities which provide chronic care only were excluded.

Intensive Care Units (ICU)

Data for analyses of ICU utilization were based on the hospital discharge abstracts database. Service codes in the abstracts indicated use of ICU resources. Only ICUs in Winnipeg and Brandon General Hospitals were included, as other facilities do not have comparable resources.

High Profile & Discretionary Services

Rates of these services were calculated from physician claims and hospital abstract files, using appropriate physician tariffs and ICD-9-CM codes. Exact details of codes used for each procedure are available by contacting MCHPE.

Magnetic Resonance Imaging (MRI)

Data for the analysis of MRI scan rates came from a specially-developed dataset which was the cooperative effort of MCHPE and the Department of Radiology. This dataset is comprehensive, including all scans done at the facility at St. Boniface General Hospital. As of October 1998, a second MRI facility was established at the Health Sciences Centre, but data from this facility are not yet being entered into the electronic file, so our analysis ends before that time.

Cataract Surgery

Cataract surgery rates were calculated from physician billing claims. Although some Manitoba residents opted for surgery in Alberta, this included only 74 of the 14,000 procedures (0.5%) performed on Winnipeg residents over the three-year period examined. Therefore, only procedures performed in Manitoba (public and private facilities) were included.

Personal Care Homes (PCH)

All care provided to Manitoba residents in personal care homes in the province were included and allocated back to the area where the resident lived before PCH admission (at 6 months prior to assessment). We used 1997/98 as the base year instead of 1998/99 because of an internal limitation of our ability to track the previous residence of PCH residents to 1998/99. Tracking previous residence is critical, as use rates calculated based on current area of residence would simply show that utilization takes place in the areas where the PCHs are located.

Childhood Immunizations

Data for immunization rates came from the Manitoba Immunization Monitoring System (MIMS). This data system is comprehensive and valid, and includes vaccinations provided by physicians and nurses. There is some concern that immunizations performed in remote First Nations communities are not fully counted, but this problem is believed not to affect Winnipeg residents.

Cervical Cancer Screening

These rates were calculated from physician claims for Papanicolau smears. Each exam could involve two physician tariffs: one to take the sample, another to interpret the results. Detecting either of these codes is sufficient to confirm the exam, so we are confident that the rates are accurate, at least for Winnipeg residents.

Breast Cancer Screening

These rates were calculated from physician claims data. Most exams are coordinated by the provincial mammography program (and use designated tariffs), though we also included mammography claims not related to this program, when present.

APPENDIX 2: AREA BOUNDARIES

The following descriptions, provided by the Winnipeg Regional Health Authority, help define and characterize the 12 Community Areas in Winnipeg. Similar descriptions for the Neighbourhood Clusters (NCs) were not available. Residence in neighbourhoods was determined by postal code (available from MCHPE on request).

St. James - Assiniboia

The St. James - Assiniboia area is 59.1 square kilometers in size. It is located on the west side of the city, and north of the Assiniboine River. Its eastern boundary is a jagged line that primarily follows Century Street, St. James Street, the CPR mainline and King Edward Street. The Winnipeg International Airport is one of the best known landmarks in this area along with the Assiniboine Park Foot Bridge, Canadian Forces Base, Winnipeg Stadium, Grace Hospital, Inkster Industrial Park and Red River Community College. Portage Avenue, Ness Avenue and Sturgeon Road are the major traffic routes in this area.

Assiniboine South

The Assiniboine South area is 61.1 square kilometers in size. It is located on the west side of the city and south of the Assiniboine River. Its eastern boundary is formed primarily by the CPR mainline and Kenaston Boulevard. The Assiniboine Zoo and the 17 Wing Canadian Forces Base are major landmarks in this area as is the Fort Whyte Centre. Charleswood and Tuxedo form two distinct communities within Assiniboine South. Grant Avenue, Corydon Avenue and Roblin Boulevard are a few of the major traffic routes in this area.

Fort Garry

The Fort Garry area is 76.9 square kilometers in size. It is located on the south side of the city and west of the Red River. Brady Road and the city limits are important borders on its west and south sides. The CNR mainline forms the north boundary. Pembina Highway, the Perimeter Highway and Bishop Grandin Boulevard are some of the well-known traffic routes in this area. The University of Manitoba and King's Park are prominent Fort Garry landmarks. St. Norbert is located in the Fort Garry area.

St. Vital

The St Vital area is 61.3 square kilometers in size. It is located on the south side of the city and east of the Red River. The city limits form its southern boundary, and Plessis Road, the Floodway and the Seine River form its eastern boundary. Carrière Avenue is the dividing line between and St. Boniface and St. Vital. The St. Vital Centre Shopping Mall and St. Vital Park are well-known landmarks in this area. Bishop Grandin Boulevard, St. Mary's Road, St. Anne's Road, Dakota Street, Fermor Avenue and Lagimodière Boulevard are some of this area's better known traffic routes.

St. Boniface

St. Boniface is 47.3 square kilometers in size. It is not the largest community area in the Winnipeg Region, but it is the only area that touches on both the inner city and on Winnipeg's outer boundaries. Its southern border is created by the Perimeter Highway, and its western boundaries are created by the Seine River, Carrière Avenue and the Red River. The CNR mainline creates its north boundary and Plessis Road forms its east boundary. Old St. Boniface with its many historical landmarks is a well-known area in Winnipeg. Main thoroughfares include Provencher Boulevard, Marion Street and Archibald Street.

Transcona

The Transcona area is 30.0 square kilometers. It is located on the east side of Winnipeg and west of Lagimodière Boulevard between the CPR and CNR mainlines. Gunn Road makes up its northern boundary and the Red River Floodway creates its eastern boundary. The south-eastern boundary for this area consists of St. Boniface Road, Murdock Road and Dugald Road. Transcona has long been known as a railway town, and the CNR Transcona Yards have maintained a large presence in this area. The Tall Grass Heritage site is located in Transcona. Regent Avenue, Pandora Avenue and Dugald Road are main thoroughfares.

River East

The River East area is 77.9 square kilometers, including the Rural Municipality of East St. Paul (43.3 square kilometers). This community area is located on the north-east side of Winnipeg. The Red River forms the north-western boundary for this area and it is also one of the major landmarks in River East, along with McIvor Park. The CNR mainline forms the southern-most boundary for this area, with Lagimodière Boulevard, the CPR mainline,

Plessis Road and East St. Paul Road forming the south-east boundaries. Major traffic routes are Lagimodière Boulevard and Henderson Highway.

Seven Oaks

The Seven Oaks area is 126.6 square kilometers in size, including the Rural Municipality of West St. Paul (88.4 square kilometers). The Red River forms the north-eastern boundary for this area. Jefferson Avenue and Carruthers Avenue form the southern boundary, with Brookside Boulevard, Mollard Road and Pipeline Road forming the western boundary. The municipal boundaries for West St. Paul form the northern boundary of this area. Middlechurch Home is a well-known landmark in West St. Paul, while Garden City Shopping Mall, Seven Oaks Hospital and Wellness Institute are important to the Seven Oaks area. Major traffic routes are McPhillips Street and Jefferson Avenue.

Inkster

The community area of Inkster is 18.0 square kilometers in size. It is located on the north-western side of the city with Brookside Boulevard forming its western boundary. Jefferson Avenue and Carruthers Avenue form its northern boundary. Notre Dame Avenue and the CNR mainline lie on Inkster's south side. McPhillips Street is the most important marker on the east side of this area. The CP railway yards and Red River Community College are well-known landmarks in this area. McPhillips Street, Keewatin Street and Notre Dame Avenue are major thoroughfares in Inkster.

Point Douglas

Point Douglas is one of Winnipeg's original settlements. It is also known as the North End. It is 10.8 square kilometers in size, and its eastern boundary is formed by the Red River. McPhillips Street is the predominant feature on its western boundary. Carruthers Avenue is located on the northern boundary of Point Douglas, and Logan Avenue creates its southern boundary. Point Douglas's most familiar landmarks are Selkirk Avenue, The Aboriginal Health & Wellness Centre of Winnipeg, and the Ukrainian-Orthodox Holy Trinity Cathedral on Main Street. Salter Street, Inkster Boulevard and Main Street are the major roads in this area.

Downtown

The Downtown area is 16.2 square kilometers in size. This area is formed by the Assiniboine River on its southern side and a combination of Notre Dame Avenue, McPhillips Street, and Logan Avenue on its northern side. The eastern side of this area is shaped by the Red River and the border for the western side is primarily composed of St. James Street and the CPR mainline. This area has numerous important landmarks including The Forks, the Exchange District, the Legislative Buildings, and the Portage and Main intersection, along with the University of Winnipeg. Portage Avenue and Main Street are major traffic arteries.

River Heights

The River Heights area is 18.1 square kilometers in size. It is composed primarily of areas that have more traditionally been known as Osborne Village, Fort Rouge, Crescentwood, and River Heights. The northern boundary for this area is the Assiniboine River and the southern boundary is formed by the CNR mainline. The Red River forms the eastern boundary and Kenaston Boulevard marks the western boundary. Osborne Street, Pembina Highway, Grant Avenue, and Corydon Avenue are important thoroughfares for this area. Wellington Crescent is a well-known landmark in Winnipeg as is the Pan Am Pool.

APPENDIX 3: CORRELATION TABLES.

Spearman's correlation coefficients (r) and their statistical significance levels (p)

	CA Level (12)		NC Level (25)	
	r	p	r	p
Health Status				
Life Expect - Males	-0.94	0.000	-0.97	0.000
Life Expect - Females	-0.81	0.001	-0.75	0.000
SEFI	0.80	0.002	0.90	0.000
Hypertension	0.64	0.024	0.43	0.034
Diabetes	0.94	0.000	0.77	0.000
Cancer	0.42	0.175	0.68	0.000
Physician Use				
Total MD Visits	0.45	0.141	0.76	0.000
Visits to GP/FPs	0.64	0.026	0.74	0.000
Visits to Specialists	-0.18	0.587	0.20	0.338
Non-Consults to Spec	-0.06	0.863	0.24	0.251
Consults to Spec	-0.75	0.005	-0.08	0.712
Hospital Use				
Total Separations	0.81	0.001	0.83	0.000
Short Stay Seps	0.80	0.002	0.84	0.000
Long Stay Seps	0.79	0.002	0.65	0.000
Total Days	0.85	0.000	0.78	0.000
Short Stay Days	0.90	0.000	0.89	0.000
Long Stay Days	0.73	0.007	0.64	0.001
ICU Cases	0.80	0.002	0.86	0.000
ICU Days	0.70	0.011	0.62	0.001
Imaging				
Total CT Scans	0.46	0.138	0.61	0.001
Outpatient CT	0.53	0.075	0.67	0.000
Inpatient CT	0.07	0.829	0.25	0.234
MRI 1997/98	-0.80	0.002	-0.40	0.049
MRI 3 yr	-0.72	0.008	-0.32	0.125
MRI 5 yr	-0.78	0.003	-0.42	0.036
High Profile				
Cardiac Cath 5 yr	-0.50	0.095	-0.15	0.472
Cardiac Cath 3 yr	-0.44	0.152	0.11	0.614
Cardiac Cath 98/99	-0.41	0.183	-0.01	0.951
Angioplasty 5 yr	-0.50	0.101	-0.26	0.205
Angioplasty 3 yr	-0.29	0.354	0.07	0.748
Angioplasty 98/99	-0.43	0.159	-0.27	0.196

	CA Level (12)		NC Level (25)	
	r	p	r	p
Bypass 5 yr	-0.61	0.036	-0.07	0.734
Bypass 3 yr	-0.47	0.124	0.10	0.645
Bypass 98/99	0.05	0.880	0.22	0.298
Total Cataracts	**-0.533**	**0.074**	**0.242**	**0.244**
Cataracts - Public	0.305	0.335	0.631	0.001
Cataracts - Private	-0.814	0.001	-0.177	0.398
Hip Replace 5 yr	-0.78	0.003	0.05	0.804
Hip Replace 3 yr	-0.67	0.017	0.03	0.893
Hip Replace 98/99	-0.76	0.004	0.01	0.980
Knee 5 yr	-0.29	0.366	-0.13	0.524
Knee 3 yr	-0.36	0.255	-0.12	0.555
Knee 98/99	-0.34	0.276	-0.20	0.342
Discretionary				
C-Section 5 yr	0.14	0.665	-0.08	0.690
C-Section 3 yr	-0.23	0.471	-0.15	0.467
C-Section 98/99	-0.62	0.031	-0.35	0.089
Hysterectomy 5 yr	0.06	0.846	-0.33	0.111
Hysterectomy 3 yr	-0.04	0.897	-0.33	0.107
Hysterectomy 98/99	-0.29	0.354	-0.26	0.208
Tonsillectomy 5 yr	-0.14	0.689	0.05	0.807
Tonsillectomy 3 yr	-0.16	0.631	-0.07	0.741
Tonsillectomy 98/99	0.15	0.670	0.00	0.985
Cholecystectomy 5 yr	0.88	0.000	0.30	0.152
Cholecystectomy 3 yr	0.60	0.051	0.23	0.272
Cholecystectomy 98/99	0.50	0.117	0.21	0.314
Personal Care Home				
PCH Residents	0.75	0.005	0.47	0.019
PCH Admissions	0.56	0.059	0.32	0.118
Waiting Time	0.14	0.665	0.27	0.198
Preventive				
Immunizations - 1 yr	-0.47	0.124	-0.67	0.000
Immunizations - 2 yr	-0.39	0.208	-0.60	0.002
Cervical Cancer Screen	-0.57	0.051	-0.55	0.005
Breast Cancer Screen	-0.79	0.002	-0.65	0.000

MCHPE REPORT LIST

The Impact of Influenza-Like Illness on the Winnipeg Health Care System: Is an Early Warning System Possible?, by Verena H Menec, PhD, Charlyn Black, MD, ScD, Leonard MacWilliam, MSc, MNRM, Fred Aoki, MD, Sandra Peterson, MSc, David Friesen, BSc (March 2001)

Assessing the Health of Children in Manitoba: A Population-Based Study, by Marni Brownell, PhD, Patricia Martens, PhD, Anita Kozyrskyj, PhD, Patricia Fergusson, PhD, Jennifer Lerfald, BSc, Teresa Mayer, Shelley Derksen, MSc, David Friesen, BSc (February 2001)

A Description of the Use of Insured Health Care Services by Income Assistance Recipients in the Province of Manitoba: A Pilot Study. Recipients of Income Assistance for Mental Health Disability, by Cam Mustard, ScD, Shelley Derksen, MSc, Anita Kozyrskyj, BSc (Pharm), PhD (December 2000)

Considering the Health Care Needs of Children Living in Households Receiving Income Assistance in Manitoba: Family Services and Manitoba Health Pilot Project, by Anita L Kozyrskyj, BSc (Pharm), PhD, Cam Mustard, ScD, Shelley Derksen, MSc (December 2000)

Using the Manitoba Hospital Management Information System: Comparing Average Cost Per Weighted Case and Financial Ratios of Manitoba Hospitals (1997/98), by Greg Finlayson, BA, CAE, Noralou Roos, PhD, Philip Jacobs, D Phil, CMA, Diane Watson, PhD, MBA (January 2001)

Waiting Times for Surgery: 1997/98 and 1998/99 Update, by Carolyn DeCoster, RN, MBA, Leonard MacWilliam, MSc, MNRM, Randy Walld, BSc, BComm (November 2000)

Long-Stay Patients in Winnipeg Acute Care Hospitals, by Carolyn DeCoster, RN, MBA, Anita Kozyrskyj, BScPhm, PhD (September 2000)

Assessing the Performance of Rural and Northern Hospitals in Manitoba: A First Look, by David Stewart, PhD, Charlyn Black, MD, ScD, Patricia Martens, PhD, Sandra Petersen, MSc, David Friesen, BSc (June 2000)

Defining Practice Populations for Primary Care: Methods and Issues, by Verena Menec, PhD, Charlyn Black, MD, ScD, Noralou Roos, PhD, Bogdan Bogdanovic, BComm, BA, Robert Reid, MD, PhD (February 2000).

Analysis of Patterns of Pharmaceutical Use in Manitoba, 1996: Key Findings A POPULIS Project, by Colleen Metge, BSc (Pharm), PhD, Charlyn Black, MD, ScD, Sandra Peterson, MSc, Anita Kozyrskyj, BSc (Pharm), MSc, Noralou Roos, PhD, Bogdan Bogdanovich, Bcomm, BA, (December 1999)

Seasonal Patterns in Winnipeg Hospital Use, by Verena Menec, PhD, Noralou Roos, PhD, Deborah Nowicki, MSc, Leonard MacWilliam, MSc, MNRM, Greg Finlayson, BA, CAE, Charlyn Black, MD, ScD (October 1999)

Hospital Case-Mix Costing Project: Using the Manitoba Management Information System, A first step, by Greg Finlayson, BA, CAE, Deborah Nowicki, MSc, Noralou Roos, PhD, Marian Shanahan, RN, MA, Charlyn Black, MD, ScD (July 1999)

Measuring Morbidity in Populations: Performance of the Johns Hopkins Adjusted Clinical Group (ACG) Case-Mix Adjustment System in Manitoba, by Robert Reid, MD, PhD, Leonard MacWilliam, MSc, MNRM, Noralou Roos, PhD, Bogdan Bogdanovich, BComm, BA, Charlyn Black, MD, ScD (June 1999)

Comparative Indicators of Population Health and Health Care Use for Manitoba's Regional Health Authorities: A POPULIS Project, by Charlyn Black, MD, ScD, Noralou Roos, PhD, Randy Fransoo, MSc, Patricia Martens, PhD (June 1999)

Cost List for Manitoba Health Services, by Philip Jacobs, DPhil, CMA, Marian Shanahan, RN, MA, Noralou Roos, Phd, Michael Farnworth, MA (January 1999)

Monitoring the Winnipeg Hospital System: 1990/91 through 1996/97, by Marni Brownell, PhD, Noralou Roos, PhD and Charles Burchill, BSc, MSc (February 1999)

Surgical Waiting Times in Manitoba, by Carolyn DeCoster, RN, MBA, K.C. Carriere, PhD, Sandra Peterson, MSc, Randy Walld, BSc, BComm. and Leonard MacWilliam, MSc, MNRM (June 1998)

A Needs-based Funding Methodology for Regional Health Authorities: A Proposed Framework, by Cam Mustard, ScD. and Shelley Derksen, MSc. (October 1997)

Interprovincial Comparisons of Health Care Expenditures, by Marian Shanahan, RN, MA and Cecile Gousseau, MBA (June 1997)

Issues in Developing Indicators for Needs-Based Funding, by Norman Frohlich, PhD and KC Carriere, PhD (June 1997)

Issues in the Management of Specialist Physician Resources for Manitoba, by Noralou Roos, PhD, Randy Fransoo, MSc, Bogdan Bogdanovic, BComm, BA, David Friesen, BSc, Leonard MacWilliam, MSc, MNRM (June 1997)

A Project to Investigate Provincial Expenditures on Health Care to Manitobans A POPULIS Project, by Marian Shanahan, RN, MA, Carmen Steinbach, Charles Burchill, BSc, MSc, David Friesen, BSc (June 1997)

Alternatives to Acute Care, by Carolyn DeCoster, RN, MBA, Sandra Peterson, BSc, MSc and Paul Kasian, MD (July 1996)

Needs-Based Planning for Manitoba's Generalist Physicians, by Noralou Roos, PhD, Randy Fransoo, MSc, Bogdan Bogdanovic, BComm, BA, David Friesen, BSc, Norm Frohlich, PhD, KC Carriere, PhD, David Patton, PhD and Ron Wall, BASc, MBA (June 1996)

Patterns of Tonsillectomy in Manitoba 1989-1993, by Charlyn Black, MD, ScD, Sandra Peterson, MSc, John Mansfield, MBChB., FRCPC, Mary Thliveris, RN, BA (February 1996)

Monitoring the Winnipeg Hospital System: The Update Report 1993/1994, by Marni D. Brownell, PhD and Noralou Roos, PhD (January 1996)

Socioeconomic Gradients in Mortality and the Use of Health Care Services at Different Stages in the Life Course, by Cam Mustard, ScD, Shelley Derksen, MSc, Jean-Marie Berthelot, Michael Wolfson, PhD, Leslie L. Roos, PhD and KC Carriere, PhD (December 1995)

A Report on the Health Status, Socio-Economic Risk and Health Care Use of the Manitoba Population 1992-93 and Overview of the 1990-91 to 1992-93 Findings, by Norman Frohlich, PhD, Trevor Markesteyn, PhD, Noralou Roos, PhD, KC Carriere, PhD, Charlyn Black, MD, ScD, Carolyn DeCoster, RN, MBA, Charles Burchill, BSc, MSc and Leonard MacWilliam, MSc, MNRM (December 1994)

Hospital Case Mix Costing Project 1991/92, Marian Shanahan, RN, MA, Michael Loyd, MA, Noralou Roos, PhD and Marni Brownell, PhD (December 1994)

Monitoring the Winnipeg Hospital System: The First Report 1990-1992, by Noralou Roos, PhD and Evelyn Shapiro, MA (July 1994)

The Utilization of Medical Services for Mental Health Disorders Manitoba: 1991-1992, Douglas Tataryn, PhD, Cam Mustard, ScD and Shelley Derksen, MSc (July 1994)

Redirecting Care from Winnipeg Hospitals to Ten Large Rural Facilities: Estimated Number of Cases, Feasibility and Implications, by Charlyn Black, MD, ScD and Charles A Burchill, BSc, MSc (June 1994)

Utilization of Physician Resources, Volume II: Methods & Tables, by Douglas Tataryn, PhD, Noralou Roos, PhD and Charlyn Black, MD ScD (March 1994)

Utilization of Physician Resources, Volume I: Key Findings, by Douglas Tataryn, PhD, Noralou Roos, PhD and Charlyn Black, MD, ScD (March 1994)

Estimating Per Diem costs for Manitoba Hospitals: A First Step, by Ronald Wall, MASc, MBA, PEng, Carolyn DeCoster, RN, MBA, and Noralou Roos, PhD (February 1994)

Socio-Economic Characteristics, by Norman Frohlich, PhD. and Cam Mustard, ScD (January 1994)

Population Health: Health Status Indicators, Volume II: Methods & Tables, by Marsha Cohen, MD, FRCPC and Leonard MacWilliam, MSc, MNRM (January 1994)

Population Health: Health Status Indicators, Volume I: Key Findings, by Marsha Cohen, MD, FRCPC and Leonard MacWilliam, MSc, MNRM (January 1994)

Utilization of Hospital Resources, Volume II: Methods & Tables, by Charlyn Black, MD, ScD, Noralou Roos, PhD and Charles Burchill, BSc, MSc (December 1993)

Utilization of Hospital Resources, Volume I: Key Findings, by Charlyn Black, MD, ScD, Noralou Roos, PhD and Charles Burchill, BSc, MSc (December 1993)

Assessing Quality of Care in Manitoba Personal Care Homes by Using Administrative Data to Monitor Outcomes, by Evelyn Shapiro, MA and Robert B. Tate, MSc (November 1993)

Utilization of Personal Care Home Resources, Volume II: Methods & Tables, by Carolyn DeCoster, RN, MBA, Noralou Roos, PhD and Bogdan Bogdanovic, BComm, BA (October 1993)

Utilization of Personal Care Home Resources, Volume I: Key Findings, by Carolyn DeCoster, RN, MBA, Noralou Roos, PhD. and Bogdan Bogdanovic, BComm, BA (October 1993)

The Utilization of Prenatal Care and Relationship to Birthweight Outcome in Winnipeg, 1987-88, by Cam Mustard, ScD (January 1993)

An Assessment of How Efficiently Manitoba's Major Hospitals Discharge Their Patients, by Marni Brownell, PhD and Noralou Roos, PhD (October 1992)

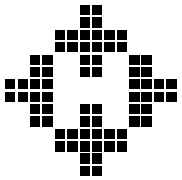
Maternal Demographic Risk Factors and the Incidence of Low Birthweight, Manitoba 1979-1989, by Cam Mustard, ScD (November 1991)

Hospital Funding within the Health Care System: Moving Towards Effectiveness, by Charlyn Black, MD, ScD and Norman Frohlich, PhD (May 1991)

Manitoba Health Care Studies and Their Policy Implications, by Evelyn Shapiro, MA (April 1991)

If you would like to receive a copy of any of our reports, the price (in Canadian funds) for each report is $10.00 in Canada and $12.00 outside of Canada (there is no charge for reports mailed in Manitoba). Please send an international money order or an institutional cheque payable to the **"University of Manitoba"** with your completed order form. We **cannot** accept personal cheques drawn on non-Canadian banks. Nor can we accept a purchase order; we must receive your payment prior to sending out any reports. Send your order form and payment to:

Manitoba Centre for Health Policy and Evaluation
University of Manitoba
S101 - 750 Bannatyne Avenue
Winnipeg, Manitoba Canada R3E 0W3
Tel: (204) 789-3805



Visit MCHPE's WWW site at: http://www.umanitoba.ca/centres/mchpe

There you'll find:

- ☆ A complete listing of all MCHPE reports. You can get one our summaries, a full report (for download in pdf), a power-point presentation, or ordering information
- ☆ A link to our Research Index. Click on the Concepts/Research icon and you'll be able to mine a motherlode of research resources, including our:
  - ☆ Concept Dictionary: answers to frequently asked questions, programming tips and descriptions of database analysis topics
  - ☆ Research Definitions: surgical procedures, medical diagnoses and diagnostic tests
  - ☆ Meta-Index to Concepts and Definitions: subject-based index
  - ☆ Glossary and Related Terms: glossary of terms used at MCHPE
  - ☆ Teaching:
    - ☆ Web-based graduate course in Epidemiology and Health Care
    - ☆ Introduction to SAS from MCHPE