

**Monitoring the Winnipeg Hospital System:
The First Report**

1990 - 1992

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Health Policy and Evaluation**
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Monitoring the Winnipeg Hospital System: The First Report 1990-1992

Executive Summary

Introduction

In 1991, 29 (0.8%) of the hospital beds in Winnipeg closed. The following year 306 (8.4%) of the city's acute hospital beds were closed. Expenditures per capita on hospitals (after adjusting for inflation) declined 1% a year starting in 1991.

When Manitoba Health began downsizing the hospital sector, the MCHPE agreed to monitor and report annually on the effects of these changes. Before beginning these efforts to monitor the effects of downsizing the acute sector, interviews were held with physicians, nurses and others to determine what individuals' major concerns were about negative impacts on the health care system, patients and quality of care. In developing this report we have attempted to monitor those things about which individuals expressed most concern. The results of the analyses using 1990 through 1992 data from the administrative data files of Manitoba Health are the basis of this report.

The study addressed three major questions: Do these actions reduce access to hospital care? Do they reduce the quality of care provided in these institutions? Do they negatively affect the health status of the city's population?

Results

Access

The changes appeared to have little effect on access to hospital services over this period despite the fact that Winnipeg residents spent 6.6% fewer days in acute hospital stays in 1992 than they did in 1991.

- The 1992 rate of hospital separations, including inpatient care and outpatient surgery, changed little over this period.
- The response to fewer beds was to favour the admission of sicker patients (persons with more co-morbid conditions), to perform more procedures on an outpatient basis, and to discharge short stay (< 60 days) inpatients faster.
- Access to Winnipeg hospitals by non-Winnipeg residents was unaffected by bed closures as was access to surgery even though much of rural residents' surgery is performed in Winnipeg. In fact, rural residents' rates of coronary artery bypass, cataracts, total hip replacement and knee replacement (often the focus of attention) either did not change or increased in 1992.
- Reductions in use of hospitals were not made at the expense of the poorest, most vulnerable population. Reflecting their health status, the number of days spent in hospital over the whole period was strongly linked to the relative affluence of the individual's place of residence. The poorer the neighbourhood, the more time the individual spent in hospital.

Quality of Care

Possible changes in the quality of care delivered by Winnipeg hospitals was investigated by examining the following: (1) the rate of death within three months of admission for heart attacks, hip fractures and cancer surgery (2) the rate of readmission to hospital within 30 days of discharge for fourteen common types of patients, and (3) the rate of contacting physicians within 30 days of discharge of medical patients.

To date there is no evidence that reduced use of hospitals and increased financial pressures has negatively influenced the quality of care delivered to patients.

- There was little change in mortality rates among those admitted for heart attacks, hip fractures and cancer surgery. The rate of death for patients with hip fractures actually decreased in 1992 compared to 1991.

- Hospital readmission rates (for 10 of the 14 groups of common types of patients) did not show a consistent pattern. Some increased one year and decreased the other and some remained the same. Five types of patients were at some increased risk of readmission to hospital in 1992 compared to 1990. Those at increased risk included persons with Caesarian sections, psychoses, cholecystectomy, prostatectomy and simple pneumonia. However, earlier discharge did not appear to be responsible. Patients with these conditions treated in hospitals with the shortest stays were no more likely to be readmitted than those with long stays.
- There was no increase in the rate at which individuals contacted physicians within 30 days of hospital discharge.

Thus there was no evidence that pressures on beds leading to early discharge had a negative impact on patients.

Health Status

The changes in Winnipeg's acute hospitals thus far have had no detectable adverse impact on the health of Winnipeg's population, although it is very early to draw conclusions.

- Rates of deaths from all causes, as well as from specific diseases including cancer, ischemic heart disease, and injuries were similar over the three year period.
- While it is early to detect changes in the health status of Winnipeg residents associated with bed closures and fiscal restraints, the measures we are using are demonstrably sensitive to variations in population health. These measures show marked differences in health status linked to neighborhood income levels. They highlight the disparity between the health status of middle-income persons as compared to those with higher incomes and the relative health advantages of those with middle incomes over those with poorer incomes.

Additional Insights From the Analyses

- Factors associated with differences in neighborhood income levels have a substantial impact on hospital use. Each rise in income level from the poorest to the wealthiest segment of the population results in better health and fewer days spent in hospital. This suggests that improving the health status of low and middle income persons could reduce the utilization of hospital beds. Finding the means to achieve this goal is a major challenge to public social policy.
- Although the number of hospital inpatient days per 1000 Winnipeg residents (stays under 60 days) fell over the three year period, it is difficult to assess patterns among long stay inpatient days (+60) at acute hospitals. Many of these patients were transferred as part of acute bed closures. However, our analyses suggest there was no increased waiting time for transfer to a personal care home (PCH). Despite a 3% increase in persons aged 75 or more (the predominant users of PCH care) in both 1991 and 1992 and a 2% reduction in the ratio of PCH beds per 1000 residents in each of those years, the average length of hospital stay for PCH transfers was unchanged. However, since more persons were admitted to PCH from hospital, total days used by those awaiting transfer was higher.
- Outpatient surgery expanded beyond replacing inpatient procedures. For many procedures, the rate of outpatient surgery grew so rapidly that the total rate of surgery showed an increase in each of the three years.
- Use patterns of long stay (60+ days) patients varied considerably from year to year with no discernible trend.

Limitations

Although hospital budgets were tighter in both 1991 and 1992, most bed closures occurred in 1992; some of them occurred during the year, rather than at the beginning. In addition, although 8.4% of the acute beds were closed in 1992, there was only a 6.6% drop in hospital days. The results of the analyses must, therefore, be interpreted with caution. One can speculate that the full impact of the 1992-93 changes will only be felt in subsequent years. Since additional bed

closures and budget reductions occurred in 1993-94, conclusions must be regarded as preliminary and tentative.

No assessment can be made as to whether persons requiring hospital admission gained access to care in line with the urgency of their need. However, the results of the analyses show that in 1992 the patients less likely to use Winnipeg hospitals were the least sick patients and there was no discernible deterioration in the health status of Winnipeg residents.

Conclusions

The changes affecting the Winnipeg acute hospital sector included the closure of 335 beds in Winnipeg hospitals by 1992. Most of these closures occurred in that same year and did not decrease access to hospital services either for Winnipeg or for non-Winnipeg residents. The bed closures have not reduced the quality of care and to date we detect no change in the health status of Winnipeg residents. The effects of past or future hospital bed closures should continue to be monitored. We plan our second report in early 1995.

This report also highlights the reduction in hospital use which could occur if the health status of low and middle income residents are improved. Well-targeted and thoroughly evaluated public health and social policy programs may prove to be more cost-effective in improving the health of Winnipeg residents than relying on hospital services.

Finally, the rapid expansion of outpatient surgery suggests a need by Manitoba Health to consider the basis on which such an expansion takes place. Increases beyond bed-replacement constitute an add-on cost to health care expenditures. The case for health benefits from such increases must be carefully made.

Monitoring the Winnipeg Hospital System: The First Report 1990-1992

Introduction

The health care system in Manitoba as elsewhere is undergoing major changes. In 1992, after a slight drop in the number of Winnipeg's hospital beds the previous year, 8.4% of the hospital beds in the city were closed. Winnipeg residents' acute stay use is down 6.6%. Hospital budgets were reduced by 1% in both 1991 and 1992. Additional bed closures and budget reductions were implemented in 1993. Manitoba Health has said that the downsizing of the system should take place without reducing access and without compromising either the quality of care delivered or the health of the population. The Manitoba Centre for Health Policy and Evaluation has been asked to monitor how the health care system affects these changes. Several reports are planned. This represents the first instalment.

This report addresses the following issues:

1. Is access to hospital care affected? Do bed closures result in fewer patients admitted to hospitals or is a stable rate of admission achieved through shortened length of stay, more outpatient activity, and shifts between acute and chronic users?
2. What types of patients are affected by bed closures? More specifically, does restricted access favour patients who are sicker or those who are less ill and therefore, potentially treatable in an ambulatory setting?
3. Are more rural patients being treated closer to home after beds close in Winnipeg? Does this shift mean they have reduced access to surgery, especially complex surgery, which is primarily available in Winnipeg?
4. How does a cutback in surgical beds combined with shifts to outpatient surgery affect the overall rate of surgery? Given the cutbacks and consolidations, do surgical rates decrease

- certain high profile procedures: cataract surgery, hip and knee replacement surgery, and the cardiac procedures of PTCA (percutaneous transluminal coronary angioplasty) and coronary artery bypass surgery?
5. Has the use of hospital resources by patients waiting for placement and the waiting time for personal care home admission changed?
 6. Have bed and budget reductions affected the quality of patient care? Are patients discharged too early, resulting in increased rates of readmission? Has mortality associated with common high risk conditions such as acute myocardial infarction (heart attack) and hip fracture increased?
 7. Finally, and possibly most important, does decreased use have a negative impact on the health of the population?

It must be recognized that bed closures do not necessarily translate to decreased use of hospitals. Hospitals can respond to bed closures by increasing occupancy rates, by shortening lengths of stay, or by increasing rates of outpatient surgery. The purpose of this analysis is to determine what has happened. Also, every patient treated in hospital does not necessarily have to be there. The classic study of the puzzling variations in hospital use rates comes from comparison of hospital use by residents of Boston, Massachusetts (most of whose residents are being served by the prestigious Harvard Medical School) with the use by residents of New Haven, Connecticut served by equally highly regarded Yale Medical School. Boston residents spent 44% more days in hospital and almost twice as much per capita on hospital use as did New Haven residents, with no detectable difference in health outcomes, and even more surprising, physicians in the two cities were unaware that they were practicing under extravagantly abundant or constrained circumstances respectively (Wennberg, et al., 1987; Wennberg et al., 1989).

Closer to home, the Saskatchewan Health Services Utilization and Research Commission reviewed the characteristics of patients admitted to hospital to determine if patients required the technology and high-intensity services characteristic of acute hospitals - whether at the time of admission, or at every point during their stay. Thirty nine percent of adult medical patients admitted to their

largest hospitals did not require acute hospital services, although they often required some form of service such as outpatient, long term care or home care. An even larger proportion of patients admitted to rural hospitals were judged to have not needed hospital based care. No such study has been done in Manitoba and we, therefore, cannot comment on the need which Winnipeg patients had for acute hospital care.

Before beginning these efforts to monitor the effects of downsizing the acute sector, interviews were held with physicians, nurses and others to determine what individuals' major concerns were about negative impacts on the health care system, patients and quality of care. In developing this report we have attempted to monitor those things about which individuals expressed most concern.

Results

Bed Closures and Hospital Expenditures

Table 1 describes the characteristics of bed closures in Winnipeg over the three year period. A small number of acute beds were closed in 1991 when one of the teaching hospitals closed 29 beds. A further 306 acute beds were closed in 1992 while 75 non-acute beds were added. Also added were 54 personal care home beds. Particularly affected were the two teaching hospitals: 279 of the 306 acute bed reductions were in these institutions. To adapt to these closures, many patients in acute care tertiary beds were transferred to long stay care beds such as personal care homes, interim beds at Riverview Health Centre, and rehabilitation beds at the Deer Lodge Centre. Overall, 0.8% of the acute beds in the Winnipeg hospital system closed in 1991 and 8.4% in 1992. Expenditures per capita on hospitals (after adjusting for inflation) declined 1% a year starting in 1991 (Figure 1).

Table 1

History of Acute Bed Closures at Winnipeg Hospitals

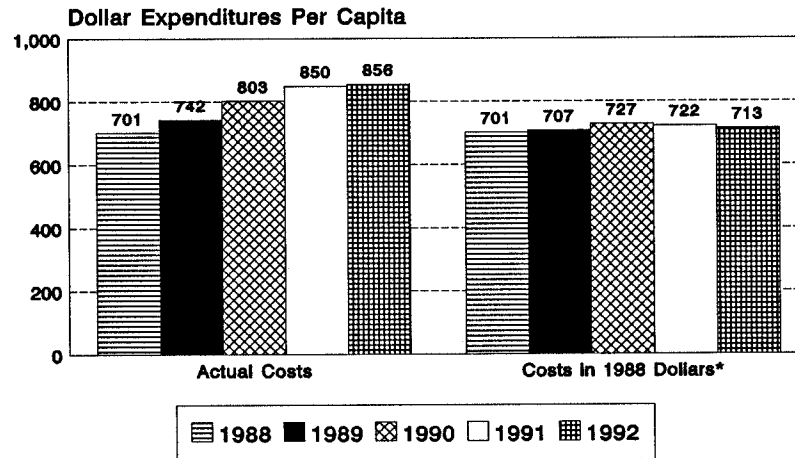
Acute Beds Change

1990-1992

Type of Hospital	1990	1991	1992
Teaching	0	(29)	(279)
Other	0	0	(27)
Total Change	0	(29)	(306)
Total Beds at Start of Year	3649	3649	3620
Change (% Decrease)	0	(0.8)	(8.4)

Source: Manitoba Health Bed Map

**Figure 1 - Changes in Insured Hospital Services:
Costs Per Capita in Winnipeg
1988 - 1992**



* Adjusted for Inflation

Source: Department of Health

Occupancy Rates

Table 2 presents the occupancy rates for Winnipeg hospitals over the three year period. These are unaudited data reported by the hospitals. The 1992 figures are likely inflated because of bed closures during the year. Despite the possible overstatement of occupancy rates, it is surprising that four of the hospitals reported a lower occupancy rate in 1992, the year of the bed closures, relative to the previous year, while three hospitals reported increased occupancy rates. Even in 1992, two hospitals were operating at less than 80% occupancy.

Table 2
Occupancy Rates in Winnipeg Hospitals
1990-1992

Hospital	1990	1991	1992
Concordia	94.7	92.3	88.0
Grace**	87.2	86.5	88.1
Health Sciences Centre	79.4	83.9	87.5*
Misericordia	68.8	77.7	74.9*
St. Boniface**	78.3	81.5	77.6*
Seven Oaks	88.0	88.1	89.3*
Victoria	84.0	81.1	80.1

Source: Annual Return of Health Care Facilities - Hospitals - Part One. Based on Beds Set Up as of March 31 of fiscal year (i.e., March 31, 1993 for 1992).

* Occupancy rates at these hospitals were likely inflated in 1992 because of bed closures during the year.

** Excluding long term care beds.

Hospital Utilization

Hospital utilization in Manitoba over three fiscal years is analyzed in this report. Since a one-month long Winnipeg nursing strike took place during fiscal 1990, data from 1989 are also presented to place the "before" bed closure data in better perspective. Population-based data are used to track the use of hospital services by residents of an area (i.e., Winnipeg or non-Winnipeg) despite where such use takes place. Thus, use of Winnipeg hospitals by rural residents is not credited to Winnipeg residents' usage figures. At the end of the Report is a Methods Appendix and Glossary of Terms.

Changes in Winnipeg Residents' Hospital Use over Time

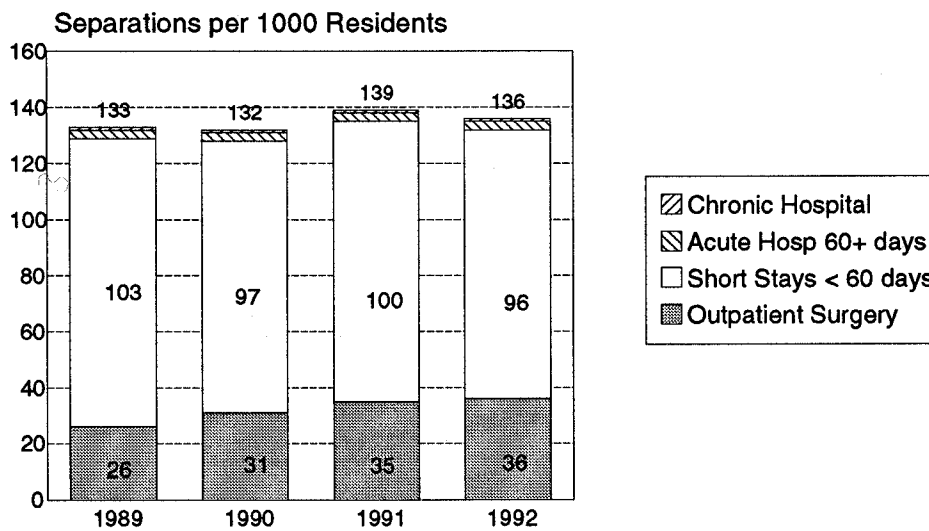
Moving long stay patients in acute beds to more appropriate settings has been a particular focus of the bed closure efforts. Figure 2 tracks separations per 1000 Winnipeg residents according to whether care occurred in an acute or chronic institution, was a short (under 60 days) or long stay, or if there was surgery in an outpatient setting. Separations per 1000 Winnipeg residents for short stay patients in hospital beds were significantly lower in 1992 compared to 1989 and 1991, but similar to the 1990 rate. Out-patient surgery expanded steadily even before major bed closures, reaching a high in 1992. Separations for long hospital stays remained stable.¹

Figure 3 tracks the changing use of hospital days per 1000 Winnipeg residents. The number of hospital days used by short stay patients in acute beds dropped significantly in 1992. Those used by long stay patients in acute hospitals peaked in 1990. The 1992 rate was not significantly different from the three previous years due to relatively large random fluctuations.² Days in chronic facilities rose steadily over the three year period from 1990 to 1992.

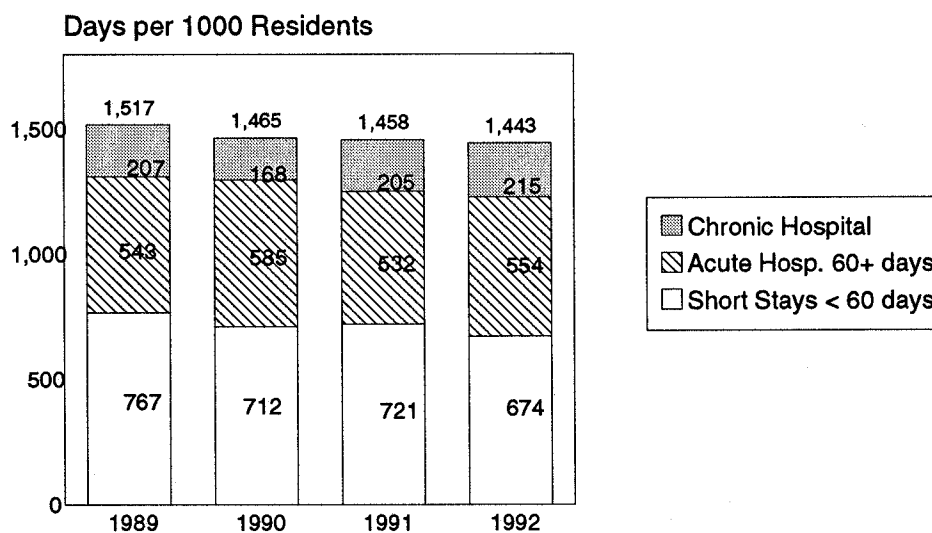
¹ The separation rates for stays of 60+ days in acute hospitals and long stay chronic hospital separations were so small they do not show well in Figure 2. For the 4 years beginning in 1989 the long stay chronic hospital separations per 1000 residents were 0.7, 0.6, 0.6 and 0.6. The separation rates for stays of 60 days or longer in acute hospitals over the same period were 3.3, 3.1, 3.1, 3.2.

² The long stay days in acute hospitals in 1992 may be artificially high because of the planned discharge of such patients from teaching hospital beds.

**Figure 2 - Changing Use of Hospitals:
Winnipeg Separations
1989-1992**



**Figure 3 - Changing Use of Hospitals:
Winnipeg Days
1989 - 1992**



Seven indicators of hospital use are presented in Table 3. Five of these significantly increased in 1991 relative to 1990, the year of the nursing strike, and all but outpatient surgery decreased in 1992 relative to 1991. The largest change was a 6.6% decrease in hospital days.

Table 3

Changing Use of Short Stay Inpatient Care:

Winnipeg Residents[†]

1990-1992

Rates per 1000 Winnipeg Residents	1990	1991	1992	Ratio 1991/1990	Ratio 1992/1991
Persons hospitalized	73	75*	72**	1.03	0.96
Episodes of hospital care	95	98*	94**	1.03	0.96
Average length of stay (days)	7.17	7.12 ^(ns)	6.96**	0.99	0.98
Hospital days	712	721	674**	1.01	0.93
Hospital separations	97	100*	96**	1.03	0.96
Outpatient surgery	31	35*	36**	1.13	1.04
Total separations	128	135*	132**	1.05	0.98

[†]Population-based rates (i.e., those measuring events per 1000 residents) have been age- and sex-adjusted using 1992 Manitoba population rates and a direct method of standardization.

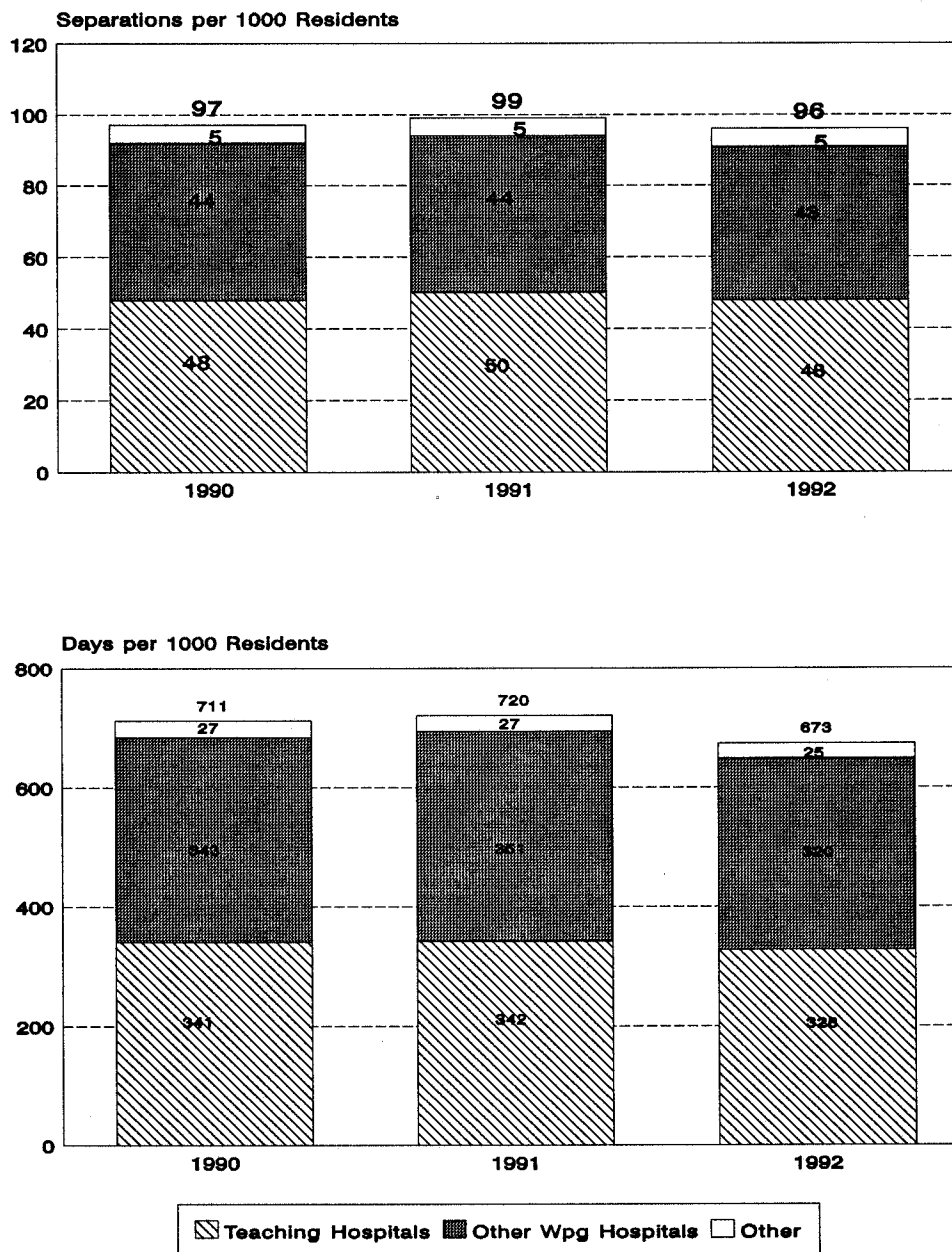
* statistically significant increase in 1991

** statistically significant decrease in 1992 (increase for outpatient surgery)

Changes in Place of Care

Over the three year period there was little change in Winnipeg residents' use of the teaching hospitals (Figure 4). A 1% increase in separations from 1990 to 1991 was noted. From 1991 to 1992 the rate of separations in teaching hospitals returned to 1990 levels. In addition there was a significant decrease of 4% in days spent in teaching hospitals in 1992 from 1990 and 1991.

**Figure 4 - Changes in Where Care Takes Place:
Winnipeg Residents
1990-1992**



Changes in Type of Patient Admitted to Hospital

Short stay inpatients who were very ill (i.e., with 3 or more co-morbid conditions) or who required complex care (those with a high level of co-morbidity and complications that affects resource utilization) were hospitalized at similar rates over this whole period (see Table 4). Between 1991 and 1992 patients with the lowest level of co-morbidity and complications showed a significant drop of 5% in separations (from 69.23 to 65.92 per 1000) and a 10% drop in days hospitalized (from 368.40 to 332.23 per 1000). Patients with no identified co-morbid conditions or 1 co-morbid condition also showed a 5% drop in separations in 1992. That is, the least sick patients were those less likely to be admitted to hospitals following bed closures.

Research at the MCHPE by Frohlich and Mustard (1994), confirming similar evidence for citizens of other Western countries, demonstrated that low income Manitobans are at high risk of poor health status and at high risk of being hospitalized. Figure 5 identifies the relative affluence of neighbourhoods in each area of Winnipeg. The figure shows that although the inner and outer core areas have the highest percentage of low income residents, almost a quarter of west and southeast Winnipeg residents also live in neighbourhoods classified in the two lowest income quintiles.

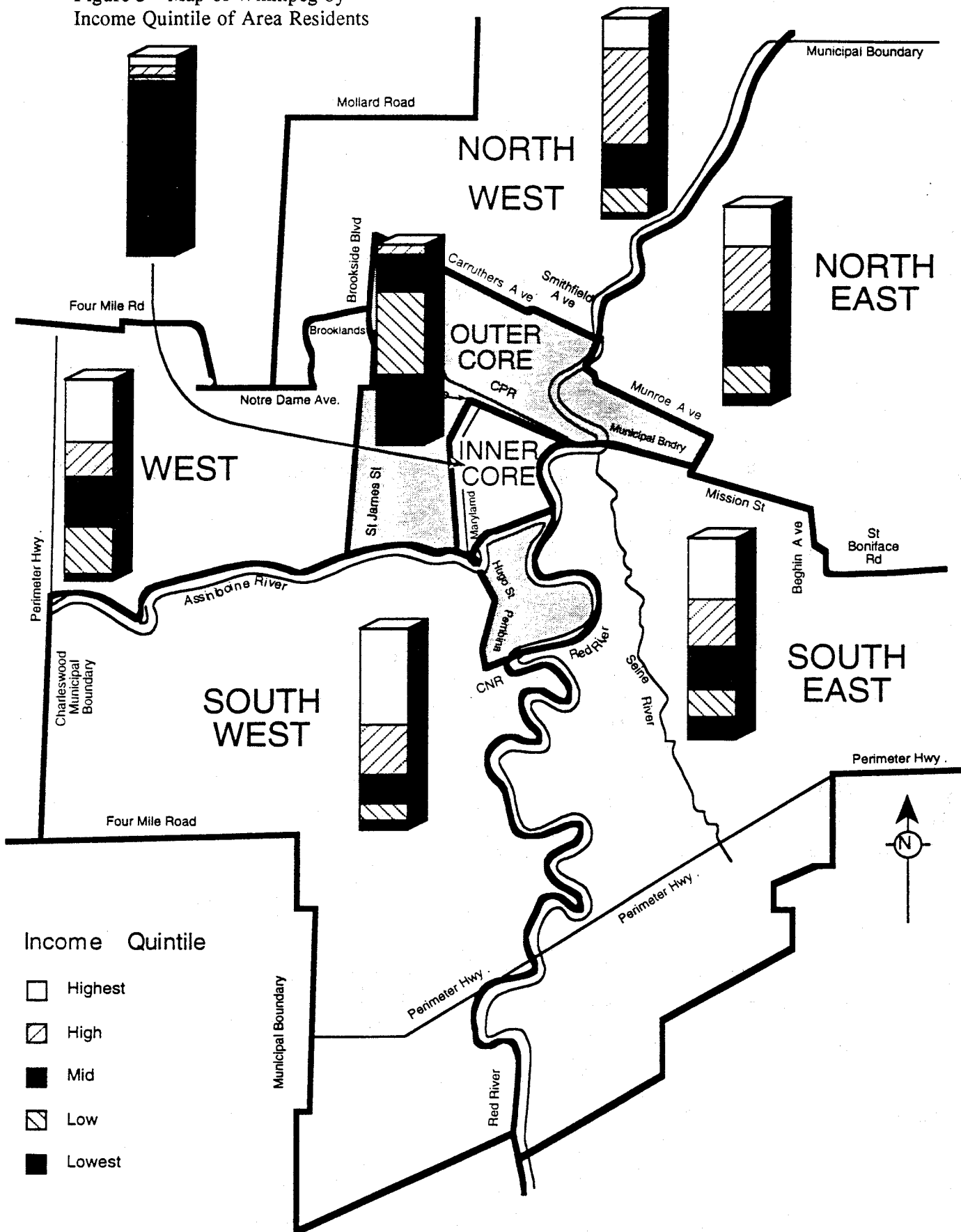
Figure 6 illustrates that a strong relationship exists between the number of days spent in hospital during the year and the relative affluence of one's place of residence. Winnipeg residents living in middle income neighbourhoods spent 22.9% more days in hospital in 1992 than did those living in the wealthiest neighbourhoods (637 days versus 518 days per 1000), while those living in the poorest neighbourhoods spent 57% more days in hospital than did those in middle income neighbourhoods (997 versus 637 days per 1000). All income groups except the lowest (poorest) income group showed significant decrease in use in 1992. The greatest decrease in use (13%) was among the wealthiest (and healthiest) group. This pattern is also consistent with the system working well. Less use by those groups least likely to need hospitalization was shown to prevail consistently through this period. Indeed it was this group that decreased their hospital use the most in 1992.³

³ If there was an increase in residents of the poorer neighborhoods over the three years they and their use would be included in the analyses.

Table 4
 Changes in Types of Short Stay Patients Admitted to Hospital
 Winnipeg Residents
 1990-1992

	1990	1991	1992	Ratio 1991/1990	Ratio 1992/1991
<u>Separations per 1000 Residents</u>					
Level of Co-morbidity and Complications					
Low	67.56	69.23	65.92	1.02	0.95
Moderate	19.81	20.55	20.15	1.04	0.98
High	9.48	9.87	9.96	1.04	1.01
Number of Co-morbid Conditions					
None	73.60	74.84	71.45	1.02	0.95
1	10.15	11.31	10.78	1.11	0.95
2	6.78	7.08	7.33	1.04	1.04
3+	6.32	6.42	6.47	1.02	1.01
<u>Days per 1000 Residents</u>					
Level of Co-morbidity and Complications					
Low	362.65	368.40	332.23	1.02	0.90
Moderate	193.85	195.09	186.31	1.01	0.95
High	155.22	157.42	154.97	1.01	0.98
Number of Co-morbid Conditions					
None	451.90	453.25	417.50	1.00	0.92
1	99.71	109.22	102.61	1.10	0.94
2	75.53	76.10	72.37	1.01	0.95
3+	84.58	82.35	81.02	0.97	0.98

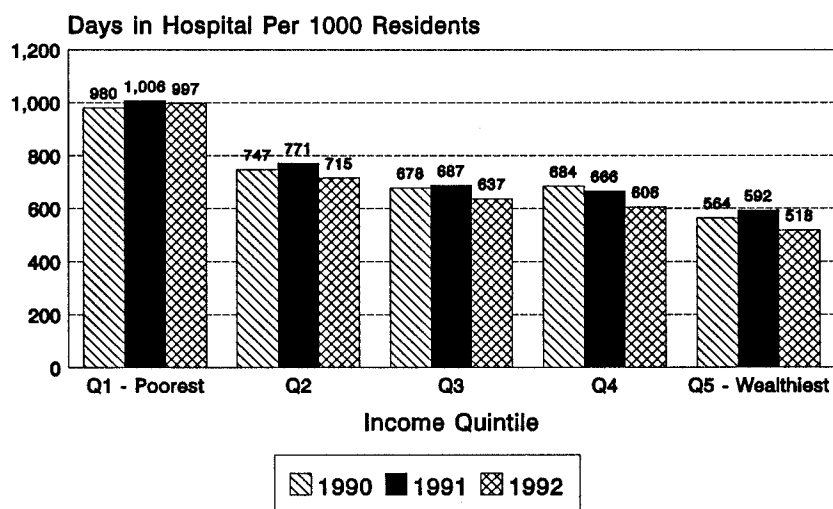
Figure 5 - Map of Winnipeg by Income Quintile of Area Residents



Income Quintile

- Highest
- ▨ High
- Mid
- ▩ Low
- Lowest

**Figure 6 - Days in Hospital by Income Quintile:
Winnipeg Residents (Short Stay < 60 Days)
1990 - 1992**



Q1 = 20% of Population Resident in Winnipeg neighborhoods with lowest household incomes

Changes in Type of Care

Changes in patterns of care are important because physicians expressed concern that downsizing the Winnipeg hospitals would produce an increase in surgical waiting lists due to decreased availability of surgical beds. Although the rate of surgical separations remained essentially unchanged (Table 5), there was a significant decrease (10%) in adult surgical inpatient days per 1000 in 1992 compared to 1990 and 1991. Surgical rates were unaffected because there was a 4% growth in outpatient procedures (from 28.22 to 29.46) and a 4% decrease in inpatient procedures (from 29.69 to 28.38). There was also a decrease in length of stay for surgical inpatients (from 8.05 days to 7.64 days). Table 5 also identifies a 5% decrease in medical separations between 1991 and 1992. There was no significant change in obstetrics or psychiatric separations during this time.⁴

⁴ Although not presented here, an examination of 1989 data confirmed these patterns.

Table 5

Changing Utilization by Type of Care

Winnipeg Residents

1990-1992

Type of Care	1990	1991	1992	Ratio 1991/1990	Ratio 1992/1991
<u>Separations per 1000 Residents</u>					
Surgery					
Inpatient	28.68	29.69	28.38	1.04	0.96
Outpatient	25.11	28.22	29.46	1.12	1.04
Total	53.79	57.91	57.84	1.08	1.00
Medical (adult)	37.93	38.91	37.15	1.03	0.95
Obstetrics	19.38	19.13	19.12	0.99	1.00
Psychiatry	3.28	3.47	3.61	1.06	1.04
<u>Mean Length of Stay</u>					
Surgical (adult)	8.35	8.05	7.64	0.96	0.95
Medical (adult)	8.15	8.16	8.08	1.00	0.99
Obstetrics	3.13	3.11	3.04	0.99	0.98
Psychiatry	18.89	18.55	17.93	0.98	0.97
<u>Days per 1000 Residents</u>					
Surgical (adult)	244.34	242.40	218.82	0.99	0.90
Medical (adult)	315.11	321.38	302.43	1.02	0.94
Obstetrics	60.66	59.34	58.03	0.98	0.98
Psychiatry	63.30	65.83	65.93	1.04	1.00

Pediatric care showed a 7% decrease in separations (3.68 to 3.80), a 3% decrease in length of stay (3.80 to 3.68) and a 9% drop in total days per 1000 residents (31.95 to 28.31) (Appendix, Table 6). Since the closure of pediatric beds occurred late in the year, changes in this area will be best assessed with the 1993-94 data.

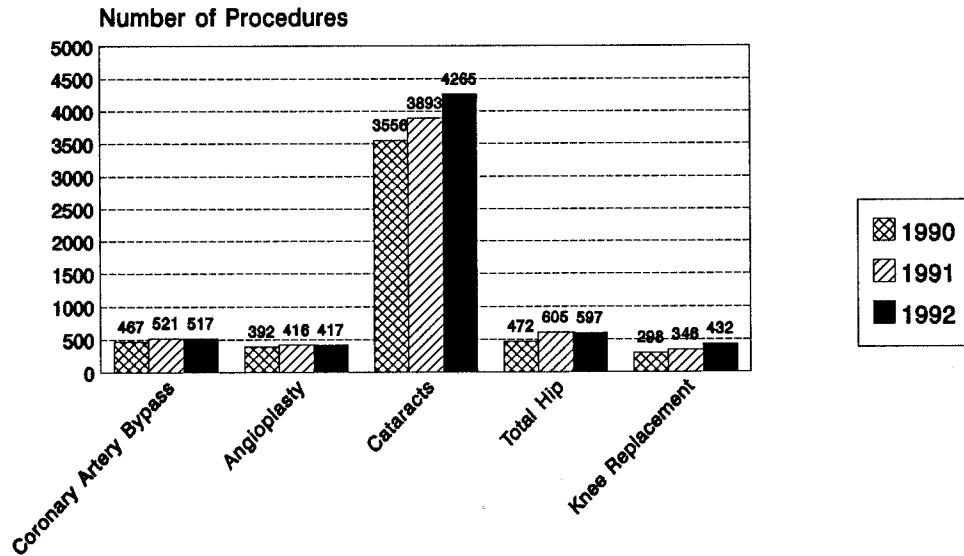
Specific Procedures: An Overview

Access to certain types of procedures, either because they may offer considerable benefits in terms of quality of life or because they have been noted as potentially rationed in Canada, are of particular interest. Figure 7 (Appendix, Table 7) present data for several of these procedures. (All rates here and elsewhere are adjusted to the 1992 population age distribution so we can assess whether growth in surgical rates has kept pace with the aging of the population.)

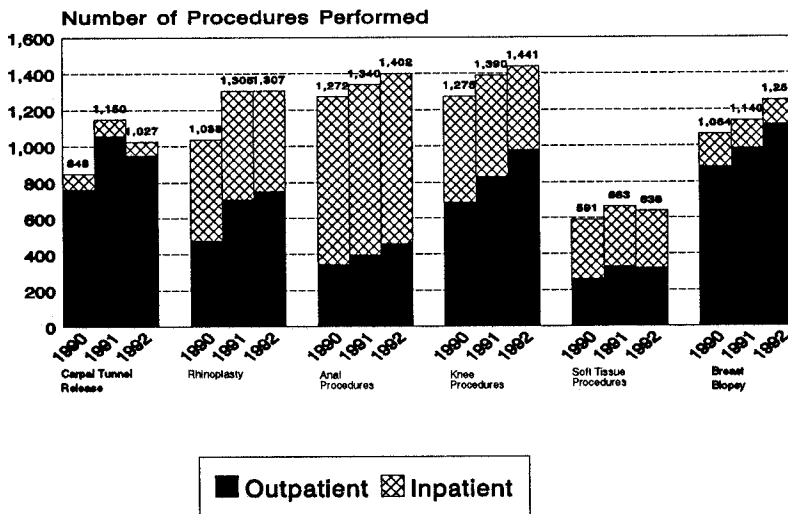
Since Winnipeg surgeons and hospitals serve the entire province for most of the procedures identified, the provincial numbers as well as rates for Winnipeg and non-Winnipeg residents are important. Between 1990 and 1992 there was a striking increase in the number of knee replacements performed (16% between 1990 and 1991 and 25% between 1991 and 1992) and consistent growth in cataract surgery (9-10% a year). For hip replacement there was a substantial increase of 28% between 1990 and 1991 possibly due to catch-up after the nurses' strike. This was followed by a levelling off from 1991 to 1992. Winnipeg and non-Winnipeg residents' use of these procedures differed somewhat, with higher rates of growth observed for non-Winnipeg residents' use of bypass and angioplasty (but lower overall rates).

The strong move to outpatient surgery has served not simply to replace procedures performed on an inpatient basis in the province, but in some cases to expand the total number of procedures performed (Figure 8; Appendix, Table 8). Of the six sets of procedures reviewed in Figure 8, all increased substantially between 1990 and 1991, with increases ranging from 5% for anal procedures to 36% for carpal tunnel release. Three groups of procedures (anal procedures, such as excision of hemorrhoids, knee procedures such as excision of cartilage, and breast biopsies) continued to rise between 1991 and 1992. Much of this rise is accounted for by the growth of outpatient activity.

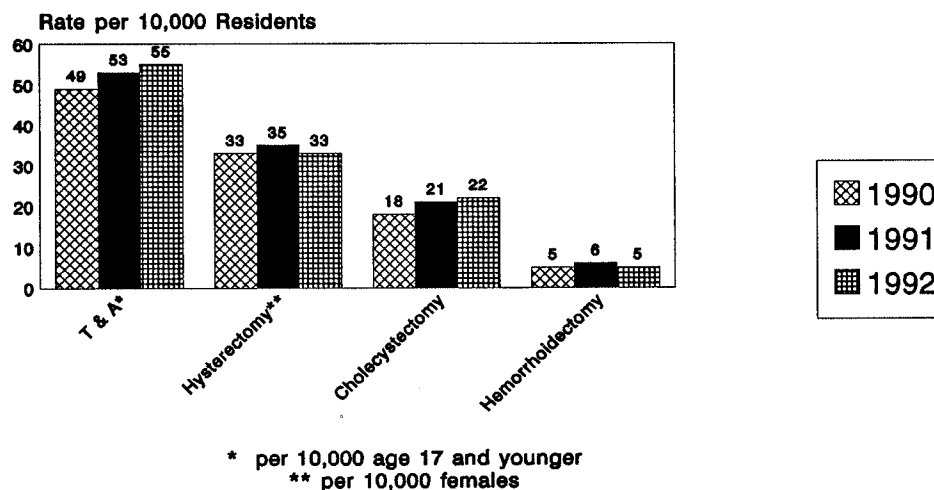
**Figure 7 - Access to High Profile Procedures: Number of Procedures Performed
All Manitoba
1990 - 1992**



**Figure 8 - Impact of Expansion of Outpatient Surgery on Numbers of Common Surgical Procedures:
All Manitoba
1990 - 1992**



**Figure 9 - Common Surgical Procedures Considered to be Sometimes Discretionary:
Winnipeg Residents
1990-1992**

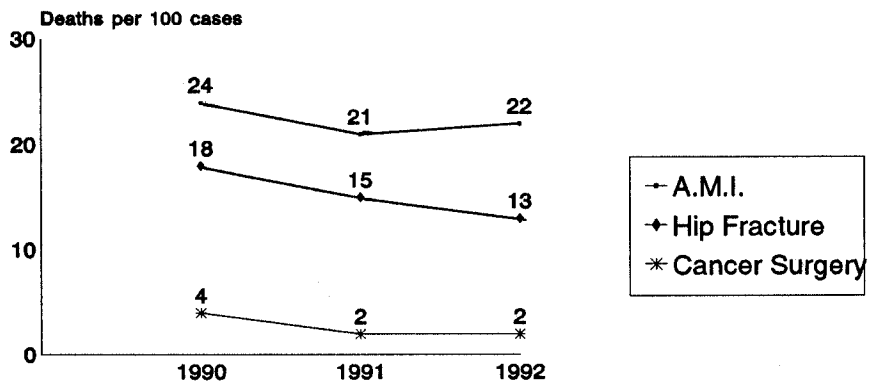


It is increasingly recognized that physicians do not necessarily agree about when a patient requires surgery and that patients, when they understand the risks and benefits of particular procedures, often opt for a conservative, non-surgical approach. Figure 9 plots the three year rates of Winnipeg residents who have undergone four common surgical procedures that have been the subject of critical reviews in the literature because of potential overuse (Bernstein et al., 1993; Scott & Black, 1991; Roos et al., 1977; The Lancet, 1975). The analyses suggest that despite the pressures on the system, there was little or no decrease in any of these procedures. In fact, the rate of cholecystectomy (gallbladder surgery) and tonsillectomy (T & A) climbed in 1992 by 17% and 12%, respectively, from 1990 rates.

Quality of Care

Physicians and hospital personnel expressed particular concern about the potential negative impact that downsizing has on quality of care. In discussion groups they specifically mentioned expected "decreased use of intensive care unit beds for monitoring post-op cases" and "increased use of floor beds for monitoring acute myocardial infarct patients (rather than in the coronary care units)". Figure 10 records the mortality rate within three months of admission for Winnipeg residents treated for three common conditions: acute myocardial infarction (AMI or heart attack), hip fracture, and cancer surgery. All deaths, whether they occurred in hospital or after discharge, were used in the analysis. There was a significant decrease in mortality from these conditions in 1991 compared with 1990. Mortality among patients with hip fracture continued to decrease in 1992. Although not included in Figure 10, changes in mortality rates for rural residents, many of whom are treated in Winnipeg, were not significant. These preliminary findings show that to date we have no evidence of negative impact from downsizing on the quality of care.

Figure 10 - Quality of Care - Rate of Death Within Three Months of Admission: Winnipeg Residents 1990-1992



Another expressed concern was that "more patients would be discharged from hospital in unstable condition and that there would be "increased complication rates (infection and bleeding)". We, therefore, examined the rate at which patients were readmitted for any reason to any hospital within 30 days of discharge from Winnipeg hospitals for 14 common conditions.⁵ If under pressure from downsizing and patients were discharged from hospital too soon, one might expect increased rates of readmission in 1992. Figure 11 displays the readmission rates for six medical conditions and for readmission following vaginal deliveries. Figure 12 tracks readmission for patients undergoing seven common surgical procedures. Other than random variation, we found no evidence of adverse effects from downsizing.

Five conditions (simple pneumonia, Caesarian section, psychoses, cholecystectomy, and prostatectomy) showed increased readmission rates at both points in time.⁶ To determine if a tendency towards increased readmissions might be due to some hospitals discharging their patients too soon, we compared the length of time a hospital kept its prostatectomy and Caesarean section patients with the proportion of their patients who were readmitted within 30 days of discharge.⁷ Figures 13 and 14 show there was no apparent relationship between a hospital's length of stay and the proportion of its patients readmitted within 30 days. For example, Figure 13 shows Hospital 7's prostatectomy patients stayed on average the longest in hospital and were just as likely to be readmitted within 30 days as Hospital 1's patients, those with the shortest stays. Statistical tests confirmed the lack of a consistent relationship between length of stay and readmission rates for these conditions.

⁵ In earlier work, close examination by a physician review panel showed that over half of the readmissions in the first month after surgery were judged to be complications of the original procedure. This ranged from 51% of the readmissions following cholecystectomy to 77% of those following hysterectomy (Roos et al., 1985).

⁶ Trend analyses found only the increases in readmission rates for Caesarian Section and pneumonia patients to be statistically significant.

⁷ These conditions were examined because there were significant differences in LOS among hospitals for these patients.

Figure 11 - Rate of Readmission to Hospital Within 30 Days of Discharge for Common Types of Medical/Obstetrical Patients: Winnipeg Hospitals 1990-1992

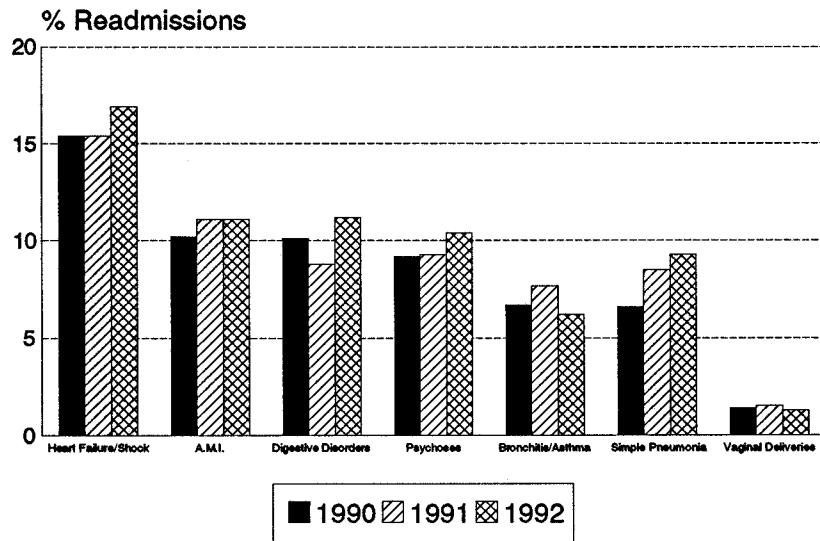


Figure 12 - Rate of Readmission to Hospital Within 30 Days of Discharge For Common Types of Surgical Patients: Winnipeg Hospitals 1990-1992

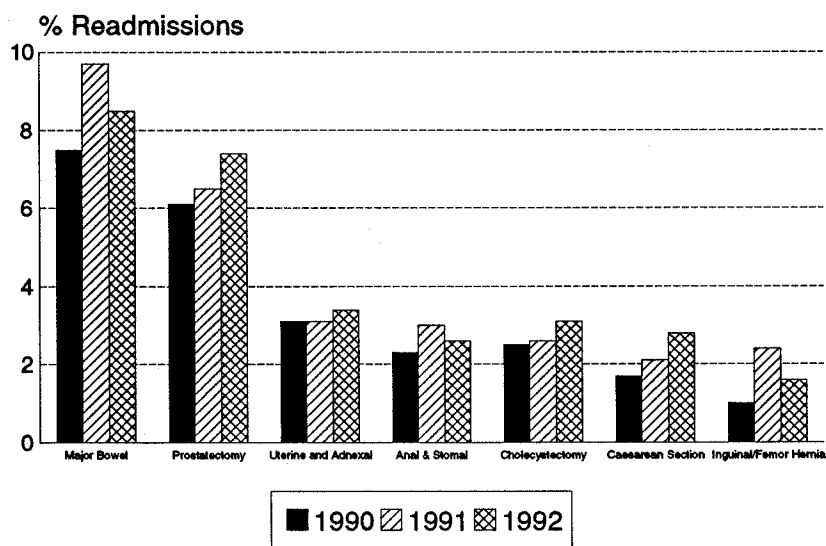
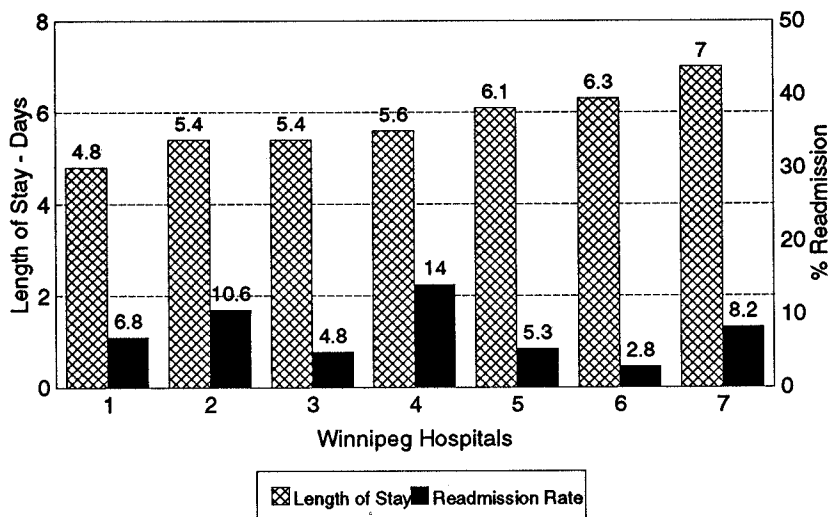
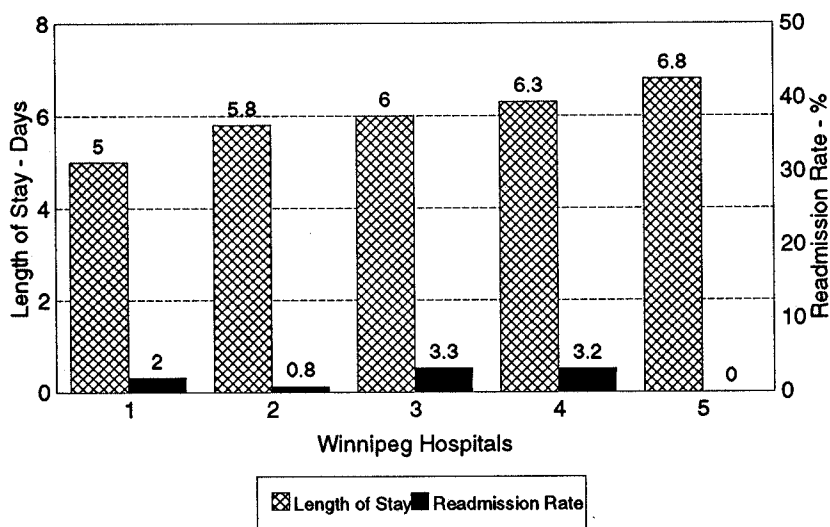


Figure 13 - Comparison of Length of Stay and 30 Day Readmission for Prostatectomy on First Admission: Winnipeg Hospitals 1992-1993



Note: The number of patients discharged ranged from 47 to 200 across the hospitals

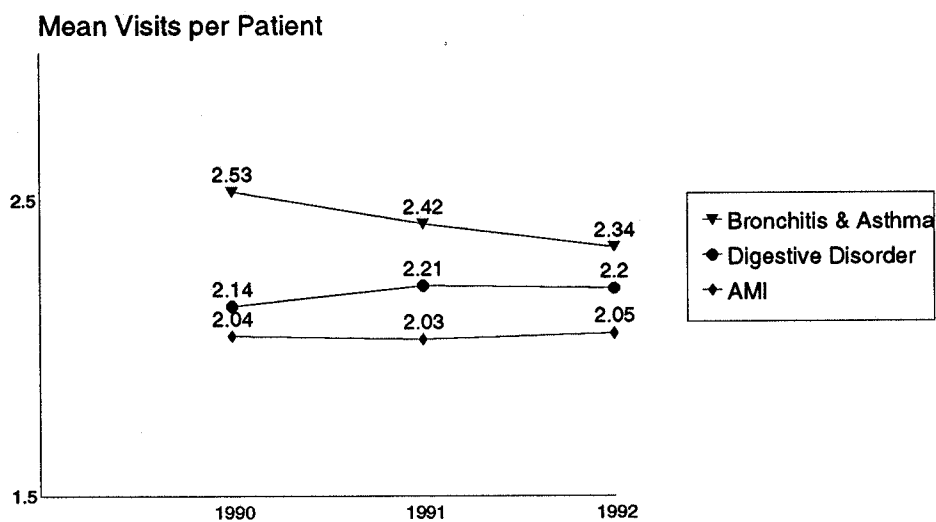
Figure 14 - Comparison of Length of Stay and 30 Day Readmission for Caesarian Section on First Admission: Winnipeg Hospitals 1992-1993



Note: The number of patients discharged ranged from 40 to 578 across the hospitals

In response to physician concerns about "much higher emergency room visit rates due to early discharge" and as a final check on whether pressures for early discharge have had an adverse impact on quality of care, we tracked the rates at which patients went to emergency rooms⁸ or contacted physicians within 30 days of discharge from hospital. Almost all patients had at least one contact with a physician (in the office or in an emergency room) after discharge and there were no discernible patterns over time. As Figure 15 shows, there was also no sign of an increase in the average number of physician contacts per patient in the 30 days after discharge for three common medical conditions.

**Figure 15 - Contacts with Physician Within 30 Days of Discharge
Office, Emergency Room, and Outpatient Clinic Visits:
Winnipeg Hospitals
1990-1992**



⁸ Emergency room visits at Health Sciences Centre and St. Boniface were tracked. Emergency room physicians at other smaller emergency departments in the city do not file evaluation claims and therefore such activity was not included in this analysis.

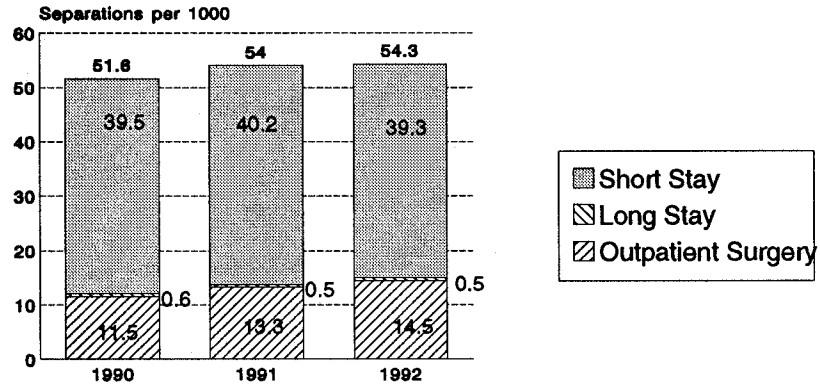
Impact of Winnipeg Hospital Changes on Non-Winnipeg Residents

As beds close in Winnipeg, it is important to monitor the system to ensure that rural Manitobans, who traditionally use a significant proportion of Winnipeg hospitals days, are not unduly affected. Rural residents rely upon Winnipeg teaching hospitals for tertiary care, and come to Winnipeg for much of their surgery.

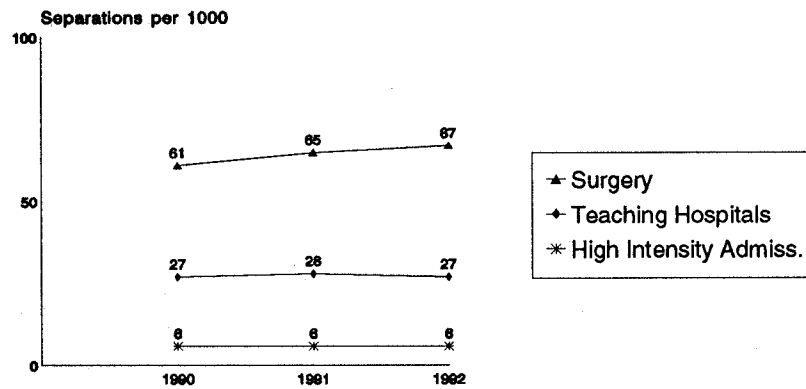
The data in Figure 16 (Appendix, Table 9) show that the changes to date have had little impact on rural residents' use of Winnipeg hospitals (Figure 16; Appendix, Table 9). In fact, rural residents have significantly increased their overall rate of use of Winnipeg hospitals by 5% from 51.6 separations per 1000 residents in 1990 to 54.3 in 1992. This increase is accounted for by the increase of rural Manitoba's use of outpatient surgery.

Over the three year period there has been a 10% increase in the overall rate of surgery available to rural residents (Figure 17; Appendix, Table 10). The use of teaching hospitals and rural residents' access to very high intensity hospital admissions (these represent the most costly admissions and include such procedures as coronary artery bypass procedures and craniotomy) remained unchanged over this period, keeping up with the aging of the population.

**Figure 16 - Patterns of Use of Winnipeg Hospitals:
Non-Winnipeg Residents
1990-1992**



**Figure 17 - Access to Surgery and Tertiary Care:
Non-Winnipeg Residents in Winnipeg Hospitals
1990-1992**

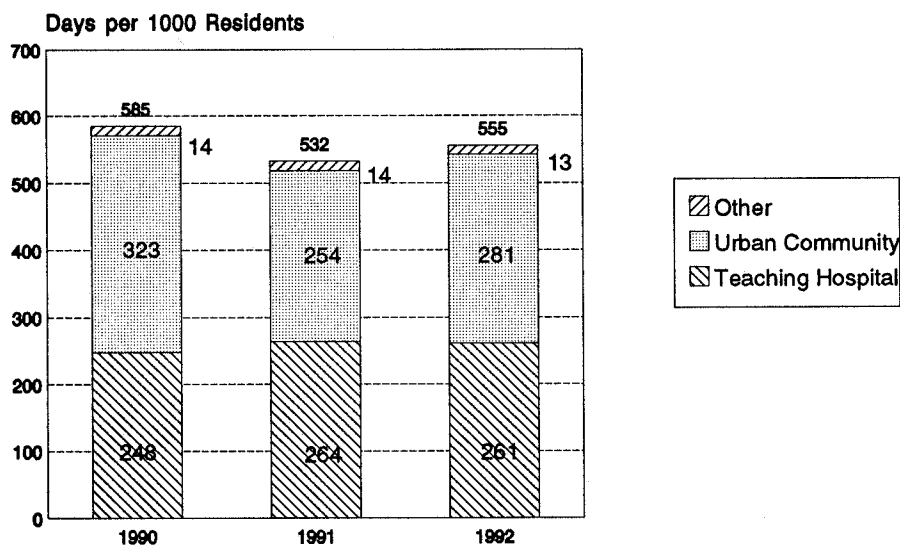


Long Stay Inpatient Care in Acute Hospitals

Such a high proportion of Winnipeg hospitals' days are used by patients with very long stays (60 days or more) that tracking patterns of long stay care as the system changes is important. There was a small but non significant increase in both the number of long stay hospital separations from acute hospitals per 1000 Winnipeg residents and their average length of stay between 1991 and 1992 (Appendix, Table 11). This increase may have happened because of the planned discharge of long stay patients from acute care beds.

Between 1990 and 1991 there was a 6% increase in long stay days at the teaching hospitals (Figure 18). Between 1991 and 1992 there was virtually no change at the teaching hospitals, but at the non-teaching hospitals, which had a substantial 21% decrease in long stay days in 1991 compared to 1990, there was an 11% increase in days used in 1992 compared to 1991.

**Figure 18 - Where Long Stay Inpatient Care in Acute Hospitals Took Place
Winnipeg Residents
1990-1992**



Given the substantial use of acute Winnipeg hospitals for long stay inpatient care, understanding the characteristics of these patients and assessing changes over time is important. Almost half (264/554; 48%) of the long stay days in 1992 were incurred by patients awaiting their first placement in a nursing home, and an additional 16% (88/555) by patients who died prior to discharge (Figure 19; Appendix, Table 12). However, 29% of the long stay days (158/555) were incurred by other patients, most of whom were eventually discharged home. Between 1991 and 1992 the proportion of long stay days used by patients discharged to nursing homes increased 17%, although the average length of stay of such patients was unchanged (Figure 20).

Figure 19 - Hospital Use of Long Stay Patients by Final Placement Upon Discharge from Acute Winnipeg Hospitals: Winnipeg Residents 1990-1992

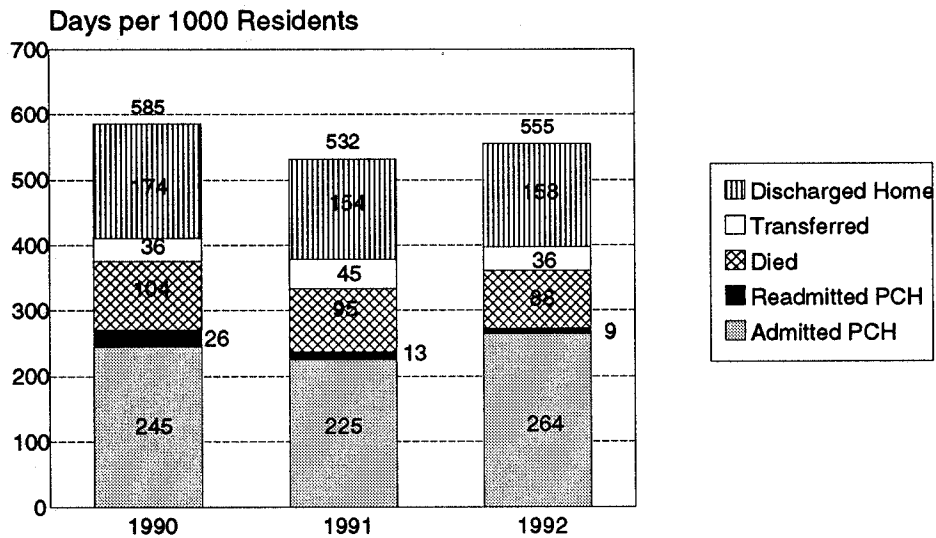
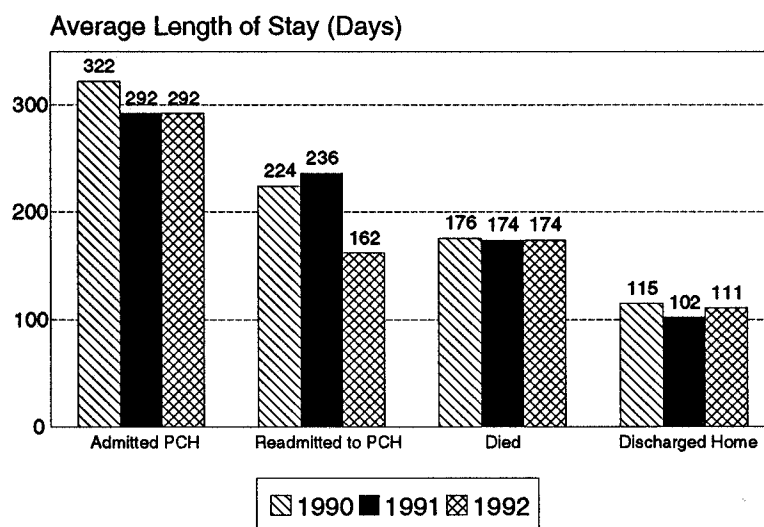


Figure 20 - Average Length of Stay of Long Stay Patients by Final Placement Upon Discharge from Acute Winnipeg Hospitals: Winnipeg Residents 1990-1992



Personal Care Home Utilization

Personal care homes provide an important source of long term care for the elderly. The population aged 75 or over increased at a rate of about 3% per year in Winnipeg from 1990 to 1992 (Table 13). Despite a 2% drop in PCH beds per 1000 residents each year over this period, Winnipeggers' access to nursing homes was not restricted.

The actual number of admissions increased in each of the three years, yet the number of residents per 1000 Manitobans aged 75 years or older in nursing homes remained steady due to the aging of the population. The types of patients admitted to nursing homes, as reflected in their expected length of stay also did not vary over this period (Table 14).⁹

⁹ A patient's ELOS score at admission varies according to age, sex and level of care; that is younger patients admitted at a lower level of care have a longer expected length of stay. (See Methods Appendix for explanation.)

Table 13

Changing Utilization of PCH Resources:
Winnipeg Residents Age 75+
1990-1992

	1990	1991	1992	Ratio 1991/1990	Ratio 1992/1991
Population	35,398	36,488	37,493	1.03	1.03
PCH Beds per 1000*	130	128	126	0.98	0.98
Residents per 1000	134	132	132	0.99	1.00
Admissions per 1000	25	27	27	1.08	1.00
Number of Admissions	873	983	1,000	1.13	1.02
Days of care per capita	39	39	38	1.00	0.97

Table 14

Changing Characteristics of Patients Admitted to Nursing Home:
Winnipeg Residents Age 75+
1990-1992

	1990	1991	1992	Ratio 1991/1990	Ratio 1992/1991
Expected Length of stay (years)*	4.12	4.17	4.06	1.01	0.97
Median Length of Waiting Time (days)	179	175	184	0.98	1.05
Median Length of stay in Hospital**	247	200	210	0.81	1.05
Admit from hospital (%)	55	53	58	0.96	1.09
Total number admissions	873	983	1000	1.13	1.02

* All rates are based on the population aged 75 years and older.

** The median is the midpoint, or the value below which half of the values fall. For example, in 1990 half of the people admitted to PCH waited 179 days or less between panelling and admission.

The median length of waiting time for admission to PCH after panelling also varied little from 1990 to 1992. The median length of stay in hospital before discharge to a nursing home (for those patients admitted to nursing home directly from hospital) varied inconsistently. There was a 19% drop between 1990 and 1991 and a 5% increase between 1991 and 1992. Every year, more than half the individuals admitted to a nursing home were discharged directly from hospitals (58% in 1992).

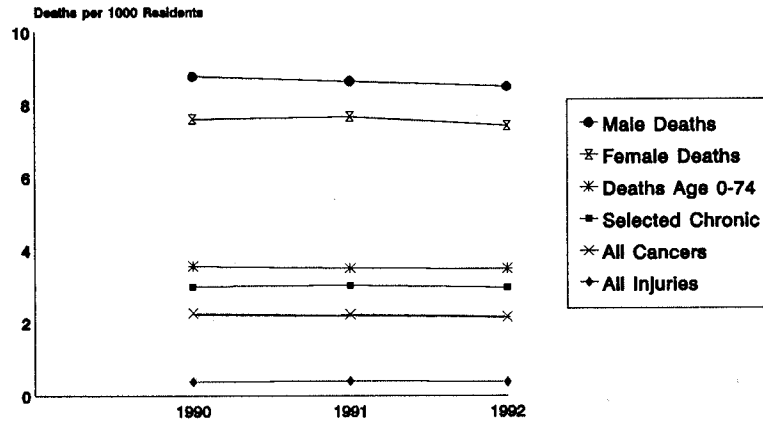
Health of Winnipeg Residents

Did the closure of hospital beds have a negative impact on the health of Winnipeg residents? Although it is early to assess such changes, it is important to monitor key health status indicators so we will have a baseline for assessing longer term impacts. Physicians expressed particular concern about "increased morbidity and mortality" as a result of bed closures. Health status measures, selected from those developed as part of the Population Health Information System (Cohen and MacWilliam, 1994), were chosen because they are among some of the most commonly used to assess population health.

The first set of measures is based on mortality rates and cause of death information derived from Manitoba Health's registration file and from Vital Statistics records. Death among residents aged 0-74 is recognized as the indicator of health status best capturing the need for health care (Eyles et al., 1991). This measure as well as the all-age mortality indicators (presented separately for males and females) and the cause-specific mortality measures (deaths from chronic disease, cancer and injuries) showed essentially no change from 1990 to 1992 (Figure 21; Appendix Table 15).

Physicians were particularly concerned about the impact bed closures would have on the "frail elderly". Because the elderly are at greatest health risk and are the heaviest users of hospitals, we tracked the age specific mortality rates for those aged 75 and older over the three year period. The data show that for each of the age groups (75-79, 80-84 and 85-89) there was little or no change to date in mortality rates between 1991 and 1992, the year of the bed closures (Figure 22).

**Figure 21 - Changes in Ill-Health of Population
Mortality Rate Indicators:
Winnipeg Residents
1990-1992**



**Figure 22 - Changes in Ill-Health of the Very Elderly Population:
Winnipeg Residents
1990-1992**

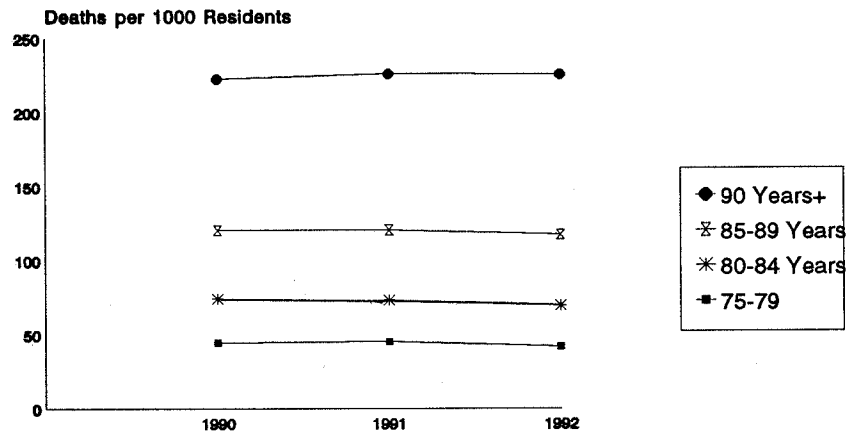
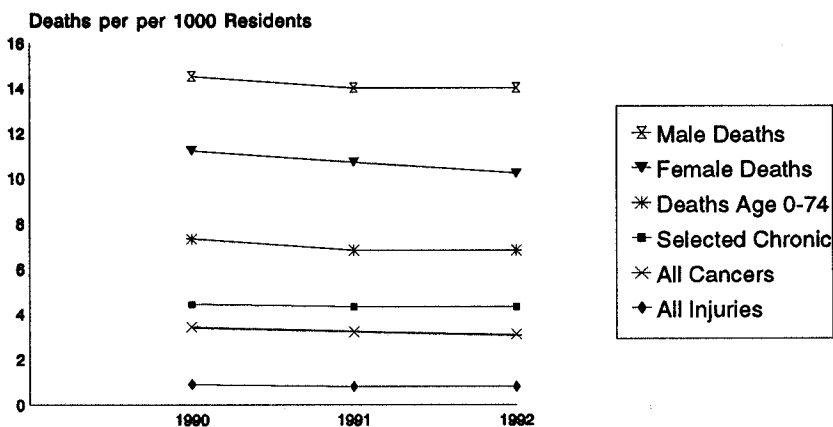


Figure 23 - Changes in Ill-Health of Most Vulnerable Population Residents of Neighborhoods In the Lowest Income Quintile: Winnipeg Residents 1990-1992



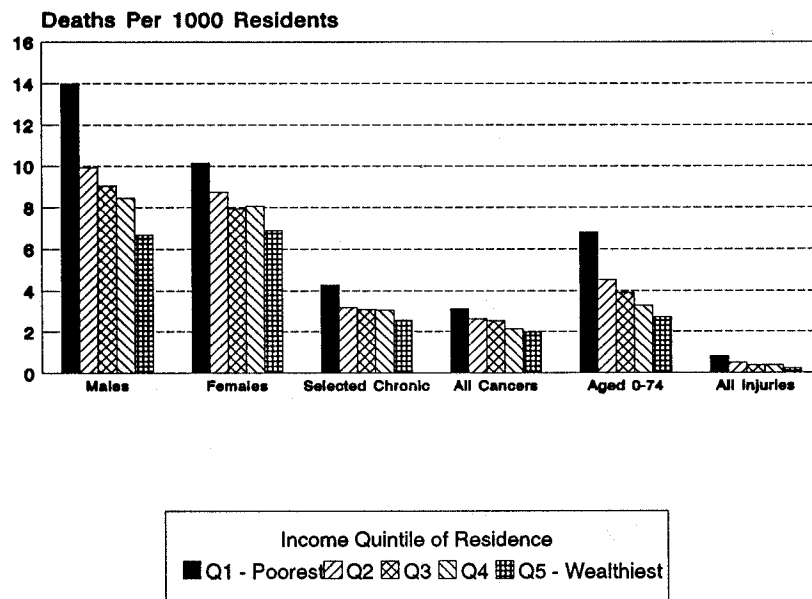
These same indicators (mortality rates) were used to track whether there was a negative impact on health status among the poorest, most vulnerable population group associated with the bed closures (i.e., those living in neighbourhoods with the lowest mean household incomes (Q1). Since these are groups which rely heavily on the teaching hospitals, health impacts on this group are important to monitor. Figure 23 suggests that even in this group, bed closures had no detectable impact on our indicators of health status (also see Appendix, Table 16)

Sensitivity of the Indicators

Our inability to detect changes in health status associated with fiscal constraints and closures of hospital beds might simply reflect the insensitivity of these measures to important health status differences. However, as Figure 24 documents, these indicators of health status are very sensitive to important differences in the health of the Winnipeg population. The indicators varied markedly in 1992 according to the relative affluence of a Winnipeg resident's neighborhood of residence. In general, individuals in middle income neighbourhoods had poorer health status (as measured by these indicators) than did individuals residing in the highest income neighbourhoods; those

residing in the poorest neighbourhoods demonstrated the worst health status (see Appendix, Table 17 for details).

Figure 24 - Health Characteristics of the Winnipeg Population According to Relative Affluence of 1992 Neighborhood of Residence



Conclusions and Recommendations

It is too early in the downsizing process to draw firm conclusions concerning the impact of the closures of hospital beds in Winnipeg. Nevertheless, indications are that, thus far:

- Access by Winnipeg residents and non-Winnipeg residents to hospital services has not been adversely affected. The reduction in beds has been made up by persons receiving outpatient surgery and the earlier discharge of short stay hospital patients. Furthermore, where changes have occurred access has favoured the admission of Winnipeggers with higher health care needs, giving preference to persons with poorer socio-economic status and with more co-morbidity. Care givers should be commended for managing so well with reduced resources.
- Quality of care has not been adversely affected. Mortality within three months of hospital admission has not increased for three common types of patients. Rates of readmission to hospital within 30 days of discharge varied by condition but hospitals which discharged their patients more efficiently did not increase the risk of patient readmission. No pattern of increased contact with physicians (whether in emergency rooms or office) in the 30 days following discharge was observed.
- To date the health status of Winnipeggers has not been adversely affected. However, health status continues here, as elsewhere, to be strongly related to socio-economic status.

The analyses used in this study to monitor the effects of bed closures suggest that Manitoba Health needs to address the following issues:

- The expansion of outpatient surgery beyond its potential for replacing inpatient care is an add-on cost. Therefore, careful consideration should be given to setting limits to expansion consistent with bed closures, unless on a procedure by procedure bases, the case for health benefits from such increases is carefully made.
- The continuing higher use of hospitals by individuals from low income neighborhoods suggests that careful consideration be given to using some of the savings from hospital bed

closures to improve the health status of middle and lower income Winnipeggers. Well-designed and evaluated experiments which focus not on providing more health care services but on other determinants of health could help identify ways of reducing hospital use. The planning, implementation and evaluation of such experiments might well benefit by a process which includes the participation of key representatives from such departments as Family Services and Housing.

- A study to determine whether patients admitted to Manitoba acute care hospitals require such resources or could be cared for in alternative settings should be undertaken.
- Acute care hospitals do not consistently identify patients in extended treatment or long term assessment/rehabilitation beds. Appropriate service codes for such patients have been identified; they should be consistently used. The coding system should be consistent with Manitoba Health's bed counting system so it is possible to relate bed changes to changes in use.
- Acute care hospitals do not consistently identify patients panelled and awaiting placement for PCH or chronic care beds. Service codes identifying such patients should be used as well as the date of approval for placement.
- Outpatient contacts which occur for purposes other than major day surgery procedures are not reliably recorded. With pressures on inpatient care such activity is likely to increase. Reliable reporting should be put in place.

Methods Appendix

Study Period

This report analyzes data from the Manitoba Health Data base for the fiscal years 1990-1991, 1991-1992, 1992-1993. Unless otherwise specified, all analyses are based on Winnipeg residents use of hospitals, since over this period, the Winnipeg hospitals were the primary site of bed closures. Information on region of residence was obtained from the Manitoba Health registry file as of December of the target year, except in the case of Treaty Status Indians.¹⁰ For these individuals, residence information on the registry file may not be reliable because Manitoba Health assigns the region of residence as the First Nation of origin, usually a municipality denoted as an Indian reservation, instead of using actual residence information. Postal code information from hospital discharge abstracts was therefore used to assign region of residence.

Statistical Analysis

We have applied the standard normal theory for studying any significant changes in rates of events over the three year period. Because the longitudinal data are from one Manitoban population, we used the normal test for a single population. For example, when comparing the 1992-93 rates to the 1991-92 rates, we assumed that the 1991-92 rates are the population parameters and the 1992-93 rates are their estimators. With large datasets, there is practically no chance of making type II error (the probability of wrongly pronouncing equality of rates when in fact they are not), while type I error rate (the probability of wrongly concluding inequality of rates when in fact they are) is controlled at a preset level, traditionally at 5%, in any test. However, the type I error is considered to be the more serious kind of error. To maintain balance between these two types of error, we set the significance level (type I error rate) at 1% rather than the conventional 5%. Since multiple comparisons are made, we have adjusted the significance level using the Bonferroni method.

¹⁰ The designation 'Treaty Status Indians' refers to a specific group of the aboriginal population who have certain rights and privileges under the Indian Act of Canada.

Glossary of Terms

Population Based Rates

The numerator for rates was calculated by counting or summarizing events (i.e., hospitalizations) over each fiscal year for individuals identified as residents of Winnipeg regardless of where the hospitalization took place. Denominators were based on counts of individuals resident in Winnipeg as of December that year. Rates of the numbers of separations and total number of hospital days were developed by dividing numerator information by population denominators, measured in thousands.

Age- and sex-standardized rates of indicators were developed to permit comparisons across time periods. The elderly population aged 75 and over of Winnipeg grew at the rate of 3% a year over this period. The age and sex structure of the population is recognized as contributing to different requirements for hospital resources, and hence as factors that ultimately influence patterns of care delivered. Unless otherwise indicated, rates presented in this report have been age- and sex-adjusted using the December 1992 Manitoba population and a direct method of standardization. This procedure mathematically removes the effects of different population structure that influence overall rates of use of health care. These 'adjusted' rates provide an indication of the use of care in one year relative to use in another, after the effects of changes in population structure have been removed.

Number of separations counts the number of hospital discharges (separations) during the year for Winnipeg residents. It is a function of both the rate of persons hospitalized and the average number of times they are hospitalized; it is the most commonly used measure of hospital utilization.

Number of days of hospital care counts the total number of days spent in hospital by residents. This measure is a function of the number of separations and the average length of stay. It provides a useful estimate of the total resources used to provide inpatient hospital care to residents during one year versus another.

Length of stay measures the average number of days of care for inpatient hospitalizations. Zero day stays for surgical outpatient care are therefore not included in the calculation. This measure has been used to assess the efficiency of hospital use of days, after controlling for such factors as severity of cases (Brownell and Roos, 1992). It is not a population-based measure because the denominator is the number of hospitalizations; consequently it has not been age- and sex-adjusted in the analyses.

Inpatient hospital care refers to all admissions in which patients had hospital stays of one or more days. It has been further classified into: short stay inpatient care, comprising all admissions with 1 to 59 days length of stay; and long stay inpatient care, comprising admissions lasting 60 days or longer.¹¹ The term acute care is used interchangeably with the term short stay inpatient care. Long stay inpatient care which occurred in acute Winnipeg hospitals is distinguished from care at chronic and rehabilitation institutions¹² - contrary to how this was reported in our first Utilization of Hospital Resources (Black et al., 1994) report. The current analyses therefore focus mainly on long stay patients in acute care institutions.

Outpatient surgical care refers to day surgery contacts. These were defined as outpatient cases (day care with zero day length of stay) for surgical care recognized as falling into a surgical DRG category (Averill, 1991).¹³ The analyses excluded outpatient contacts which occurred for purposes other than major day surgery procedures. Hospitals are not required to report on these activities and therefore, there is variation in the way they are recorded across hospitals, making them unreliable for analysis.

¹¹ The first 59 days of a long stay admission are included in the long stay rather than the short stay analyses.

¹² These institutions include Deer Lodge, Riverview Health Centre, Rehabilitation Centre for Children and Adolescent Treatment Centre.

¹³ The DRG program classifies hospital care into homogenous groups with respect to clinical and resource consumption and is used as a tool to pay hospitals for care provided in the United States. Since having a surgical procedure is one of the major factors contributing to higher resource use (costs) during a hospital stay, the program partitions care nonsurgical care. It therefore permits identification of hospitalizations involving surgery, for either inpatient or outpatient care.

Number of Comorbid Conditions

Comorbidity refers to medical conditions that exist in addition to the main reason for hospitalization (usually recorded as the "most responsible diagnosis" on hospital discharge abstracts). The type and number of comorbid conditions provide an indication of the health status (and risk of death) of patients (Charlson, et al. 1987). We used counts of comorbid conditions. Cases (patients) were classified as having none, one, two, or three or more, of the comorbid conditions known to increase risk of death.

Level of Comorbidity and Complications

Comorbidity, together with complications of care affect the complexity of hospital care required to treat given patients. The RDRG (Refined DRG) program (Fetter and Freeman, 1989) classifies cases into levels of severity and complexity based on the impact that they are likely to have on use of hospital resources. We used the RDRG program to classify patients into three groups of complexity: those where comorbidity and complications were likely to have no or only minor impact on hospital resource use (low); those in which comorbidity and complications were likely to have a moderate impact; and those where comorbidity and complications were likely to have a major impact (high). The final category also included a catastrophic category for surgical cases, where, for instance, a patient had an acute myocardial infarction while undergoing surgery.

Intensity of Resource Use

Resources used to provide hospital care vary across cases.¹⁴ We used DRG weights¹⁵ to classify hospital care into three levels of intensity of resource use. First, each hospital contact was assigned a DRG weight and all cases were ranked from lowest to highest intensity of resource use. Three levels were defined to classify rates of hospital care received by regional residents: the lowest ten percent of cases - including admissions for false labour, paediatric tonsillectomy and/or adenoidectomy, and other admissions requiring few resources - were classified as very low intensity; the highest 5% of cases, which used 11.5% of hospital days and included admissions for coronary artery bypass procedures, craniotomy and other major cases requiring intense

¹⁴ Resources used by hospitals include labour and non-labour inputs such as drugs, equipment, food and fuel. Resource inputs vary in terms of price, volume and mix (Black and Frohlich, 1991).

¹⁵ DRG weights describe resource use for different types of care in relation to an arbitrarily defined standard case. While they were developed exclusively with United States cost data, they correlate well with similar intensity weights (CMG) developed from U.S. data for Canadian applications.

hospital treatment, were called "very high" intensity admissions. Because this high intensity care is typically obtained by rural residents in Winnipeg hospitals their access to such care was tracked over the period.

Measuring Health of the Population

For this report, we have developed health status indicators from administrative data using Vital Statistics death information. We select a subset of the 102 indicators reported for the entire Manitoba population as part of the Population Health Information System 1991 (Cohen and MacWilliam, 1994). Using administrative data to assess health status has the major advantage over surveys in that the measures can be readily repeated over time (i.e., annually).

Since the number of deaths is small for some conditions, in order to have a stable assessment of mortality rates, two years of vital statistics data were used (calendar years 1989 and 1990 for 1990; 1990 and 1991 for 1991; 1991 and 1992 for 1992). The numerator and denominators for all rates were determined by counting individuals identified as residents of Winnipeg.

Description of Health Status Indicators

Death Rates for Males and Females. Mortality rates for all causes of death for Winnipeggers were calculated separately for males and females of all ages.

Deaths Among Those Aged 0-74. In this ratio, only deaths for persons aged 0-74 years are counted and only the population who are 0-74 years of age are included in the denominator. British researchers (Carstairs & Morris, 1989) as well as a group at McMaster (Birch & Eyles, 1991) have suggested that the standardized mortality ratio for this younger population is the best single indicator of health status capturing a population's need for health care. The Scottish Health Authorities have used a similar ratio for allocating funds for health care.

Cancer Deaths. In Canada, cancer accounts for about one-quarter of all deaths (Bisch et al., 1989) with lung cancer, breast cancer and cancer of the colon accounting for the most cases and deaths. Other cancers such as bladder and kidney are associated with occupational exposures (Andersen et al., 1987). We report rates of death for which cancer was reported as the primary cause, over this period (the following ICD-CM codes were used to define this group - 140-239).

Selected Chronic Disease. For adults in the mid years, chronic diseases are the main causes of death and disability, particularly heart disease, stroke, and diabetes. For the elderly, heart disease, stroke, chronic obstructive lung disease (emphysema), and diabetes are among the leading causes of death (McGinnis et al., 1992). If an individual's cause of death was any of the following chronic diseases, they were counted in this group; asthma (493) ischemic heart disease (410-414), diabetes (250), hypertension (401-405), emphysema (492-496) and vascular complications (430-437).

Ischemic Heart Disease. Ischemic Heart Disease is the biggest single contributor to deaths in the chronic disease category. Given the importance of this disease, separate indicators are presented (ICD 410-414).

All Injuries. Injuries including suicides are the highest cause of death for adolescents and young adults. Most unintentional injuries are attributable to motor vehicles. Deaths associated with seven different types of injuries are included; motor vehicle (E810-E819), vehicular non-traffic (E820-E829) fire (E890-E899), falls (E880-E888), suicide (E950-E959), drowning (E910-E915), homicide, poisoning (E850-E869) as well as the other injuries category.

INCOME QUINTILES

Public-Use Census Files. Data from the 1986 Canadian census are available for public use, aggregated to the geographic unit of the enumeration area. In Winnipeg, there are approximately 800 enumeration areas containing residential households, with an average population of 700 people. These residential areas can be characterized by several demographic and economic indicators, including mean household income, mean educational level of women and labour force participation. A measure of the mean household income for a given enumeration area was used in this study.

These enumeration areas were ranked from poorest to wealthiest and they were grouped into five population quintiles, each quintile containing 20% of the city's population. Each Winnipeg resident was linked to an enumeration area by postal code, and a quintile income rank (with Quintile 1 being the poorest) was assigned.

Quality of Care

90 Day Mortality Rate. Adverse outcomes of care have long been recognized as important in evaluating health care delivery. Since 1986, the U.S. Health Care Financing Administration has encouraged comparison of rates of adverse events across hospitals by publishing death rates for institutions. We identified all deaths which occurred within 90 days of admission for patients treated with three common conditions. There were no exclusions for these analyses.

Readmission Rates. Readmissions (to any hospital across Manitoba, not just Winnipeg hospitals) which occurred within 30 days of discharge from Winnipeg hospitals were also examined. Readmissions which occurred on the same day of discharge were not included since many of these, particularly for hip fracture, involve transfers from one institution to another. For the cross-hospital comparisons, we excluded the sickest patients (those having comorbidities or complications expected to have a major or catastrophic impact on length of stay as identified using the RDRG software, Fetter and Freeman, 1989) and the most vulnerable patients (those known to have higher readmission rates including aboriginal and core area residents). For the over time analysis, the sickest and most vulnerable patients were included to ensure all readmissions would be detected.

Contacts with Physicians

All contacts with physicians which occurred outside hospital within 30 days of discharge were examined. The sickest and most vulnerable patients were included in this set of analyses.

Personal Care Home Use

Region of Residence. For numerator data, (i.e., PCH use data) region of residence was assigned according to the Municipal Code in the PCH file, which refers to the last region of residence prior to admission to PCH and does not change regardless of the location of the PCH.¹⁶ For non-PCH residents, region of residence is identified from the Manitoba Health population registry. Many Status Indians do not actually reside on the reserve with which they are

¹⁶ The registry could not be used to assign region of residence because of the length of stay in PCH: municipal code in the registry changes to that of the PCH whereas the municipal code in the PCH file remains the same for as long as the person resides in a PCH.

registered. In this case, the postal code associated with each claim is used to determine region of residence.

All use is calculated for the region in which the person resided prior to admission to PCH, regardless of where the admission took place. In other words, if a person living in a non-Winnipeg region was admitted to a PCH in Winnipeg, that person's utilization would be attributed to the non-Winnipeg region.

Residents. Residents are all persons who lived in a personal care home at some time during the fiscal year.

Admissions. Admissions to nursing homes include all new admissions as well as those whose status changed from Respite Care (intermittent care for individuals who live outside of a PCH), to a long term PCH admission.

Expected Length of Stay (ELOS) for Admissions. Every admission was assigned an Expected Length of Stay (ELOS) based on the person's age, sex and level of care,¹⁷ (Shapiro and Tate, 1988) and these numbers were used to derive mean expected lengths of stay. If standards of admission varied markedly across regions or type of home, (i.e., if some facilities tended to admit younger, healthier individuals), this would be reflected in variations in ELOS for individuals admitted.

From Hospital. We classified an admission "from hospital" if that person was admitted to a PCH within 7 days of a separation from hospital. For people not admitted from hospital, we checked the "fromcode" in the PCH file. For those admitted from Mental Health Centres or unspecified in the PCH file, we created an "Other" category. Residents who did not fall into either of these two categories were considered to be admitted from the Community.

Length of Stay (LOS). For all residents admitted from hospital, the length of stay in hospital was calculated. We report median LOS because the mean is skewed by outliers. The median is the

¹⁷ All nursing home residents are assessed at one of four levels of care, depending on the number of nursing hours they require per day.

mid-point. For persons admitted to PCH from the hospital, if all of their lengths of stay in hospital were arranged from the briefest to the longest, the median is the mid-point of that range. In other words, half of the people admitted to PCH from hospital had hospital stays that are shorter than the median LOS, and half of them had hospital stays that are longer than the median LOS.

Length of Waiting Time (LWT) after assessment. For each admission, the date when the person was panelled for acceptance to PCH is recorded. The difference between the admission date and panelling date is the LWT. As for length of stay, because of outliers, the median rather than the mean LWT is reported.

The LWT reported here does not take into account the number of days that occur for administrative reasons after panelling, i.e., the number of days required to transmit the panel's decision to both the individual and the nursing home. We also do not adjust for people who may be temporarily removed from the Waiting List because of an acute illness requiring hospitalization. LWT is also sensitive to the availability of Continuing Care in the community, especially in remote areas of the province. For all these reasons, LWT should be viewed with some caution.

It should be noted that, because Home Care data are not computerized, we were unable to determine how many people died or were admitted to hospital after panelling prior to admission.

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Table 6
 Characteristics of Pediatric Use of Hospitals
 For Short Stay and Outpatient Care
 Winnipeg Residents
 1990-1992

	1990	1991	1992	Ratio 1991/1990	Ratio 1992/1991
Separations per 1000 Residents					
Inpatient	7.52	8.40	7.68	1.12	0.91
Outpatient Surgery	2.71	3.43	3.40	1.27	0.99
Total	10.23	11.83	11.08	1.16	0.94
Mean Length of Stay	3.76	3.80	3.68	1.01	0.97
Days per 1000 Residents	28.31	31.95	28.31	1.13	0.89

Table 7
Access to High Profile Procedures in
Winnipeg and Non-Winnipeg
1990-1992

Rate Per 10,000 Residents	1990	1991	1992	Ratio 1991/1990	Ratio 1992/1991
Coronary Artery Bypass Surgery*					
Winnipeg	5.1	5.3	4.9	1.04	0.92
Non-Winnipeg	3.0	3.7	4.2	1.23	1.14
Province (number)	467	521	517	1.12	0.99
Angioplasty (PCTA)					
Winnipeg	4.4	4.2	4.4	0.95	1.05
Non-Winnipeg	2.4	3.0	2.7	1.25	0.90
Province (number)	392	416	417	1.06	1.00
Cataract Surgery					
Winnipeg	36.9	41.1	43.0	1.11	1.05
Non-Winnipeg	26.2	26.4	30.3	1.01	1.15
Province (number)	3556	3893	4265	1.09	1.10
Total Hip Replacement					
Winnipeg	4.0	5.1	5.1	1.28	1.00
Non-Winnipeg	4.6	5.8	5.5	1.26	0.95
Province (number)	472	605	597	1.28	0.99
Knee Replacement					
Winnipeg	2.6	2.9	3.4	1.12	1.17
Non-Winnipeg	2.8	3.3	4.4	1.18	1.33
Province (number)	298	346	432	1.16	1.25

The ICD9-CM codes used were as follows: coronary artery bypass surgery 36.1; angioplasty 36.01, 36.02, 36.05; cataract surgery 13.11, 13.19, 13.2, 13.3, 13.41, 13.43, 13.51, 13.59; total hip 81.51, 81.53; total knee 81.54, 81.55.

Table 8
 Numbers of Procedures Performed in
 Outpatient and Inpatient Settings
 All Manitoba
 1990-1992

	1990	1991	1992	Ratio 1991/1990	Ratio 1992/1991
Carpal Tunnel Release (6)*					
Outpatient	764	1,058	951	1.38	0.90
Inpatient	84	92	76	1.10	0.83
Total	848	1,150	1,027	1.36	0.89
Rhinoplasty (56)					
Outpatient	476	705	751	1.48	1.07
Inpatient	562	600	556	1.07	0.93
Total	1,038	1,305	1,307	1.26	1.00
Anal Procedures (157, 158)					
Outpatient	345	397	458	1.15	1.15
Inpatient	927	943	944	1.02	1.00
Total	1,272	1,340	1,402	1.05	1.05
Knee Procedures (221, 222)					
Outpatient	690	830	978	1.20	1.18
Inpatient	585	560	463	0.96	0.83
Total	1,275	1,390	1,441	1.09	1.04
Soft Tissue Procedures (226, 227)					
Outpatient	265	329	324	1.24	0.98
Inpatient	326	334	314	1.02	0.94
Total	591	663	638	1.12	0.96

... cont'd

	1990	1991	1992	Ratio 1991/1990	Ratio 1992/1991
Breast Biopsy and Excision for Non-malignancy (262)					
Outpatient	884	987	1,118	1.12	1.13
Inpatient	180	153	134	0.85	0.88
Total	1,064	1,140	1,252	1.07	1.10

*Identified Diagnostic Related Group Code. The most common ICD9-CM procedure codes in each group are as follows: carpal tunnel release 04.43; rhinoplasty 21.88; other septoplasty 21.84; revision rhinoplasty; anal procedures 49.46; excision of hemorrhoids 49.01; incision of perianal abscess 49.11; anal fistulotomy; knee procedures 80.6; excision of semilunar cartilage of knee 81.47; other repair of knee 81.45; other repair of cruciate ligaments; soft tissue procedures 83.31; excision lesion of tendon sheath; other suture of tendon; bursectomy; breast biopsy 85.12, 85.21.

Table 9

Where Hospital Use of Rural Manitobans Took Place

Non-Winnipeg Residents

1990-1992

	1990	1991	1992	Ratio 1991/1990	Ratio 1992/1991
<u>Separations per 1000 Residents*</u>					
Location of Care					
Short Stay					
In region of residence	112.07	116.18	115.93	1.04	1.00
Out of region Winnipeg	39.51	40.22	39.34	1.02	0.98
Out of region Non-Winnipeg	11.17	11.71	11.44	1.05	0.98
Long Stay					
In region of residence	1.73	1.87	1.66	1.08	0.89
Out of region Winnipeg	0.56	0.54	0.47	0.96	0.87
Out of region Non-Winnipeg	0.08	0.07	0.06	0.88	0.86
<u>Days per 1000 Residents</u>					
Location of Care					
Short Stay					
In region of residence	655.59	680.89	663.15	1.04	0.97
Out of region Winnipeg	269.64	275.59	253.41	1.02	0.92
Out of region Non-Winnipeg	59.98	62.92	62.65	1.05	1.00
Long Stay					
In region of residence	316	319	298	1.01	0.93
Out of region Winnipeg	84	78	79	0.93	1.01
Out of region Non-Winnipeg	11	8	9	0.73	1.13

* Does not include outpatient surgery.

Table 10

Assessing Rural Patients Access to Surgery and Tertiary Care in Winnipeg Hospitals

1990-1992

	1990	1991	1992	Ratio 1991/1990	Ratio 1992/1991
Separations per 1000 Residents					
Surgical Rate (adult)					
Inpatient	31.96	33.32	32.33	1.04	0.97
Outpatient	29.37	31.95	34.41	1.09	1.08
Total	61.33	65.27	66.54	1.06	1.03
Use of Teaching Hospitals	26.90	27.90	27.19	1.04	0.97
Very High Intensity Admissions (Resource Use)	5.85	6.21	6.36	1.06	1.02

Table 11

Changing Use of Long Stay Inpatient Care (60+ Days) In Acute Hospitals

Winnipeg Residents

1990-1992

	1990	1991	1992	Ratio 1991/1990	Ratio 1992/1991
Persons hospitalized per one thousand residents	3.17	3.02	3.05	0.95	1.01
Hospital separations per 1000 residents	3.27	3.11	3.16	0.95	1.02
Average length of stay	177.48	169.98	174.54	0.96	1.03
Hospital days per 1000 residents	585.39	531.69	554.27	0.91	1.04

Population-based rates (i.e., those measuring events per 1000 residents) have been age- and sex-adjusted using Manitoba population rates and a direct method of standardization. Use of chronic and rehabilitation institutions are not included in this table.

Table 12

Hospital Use of Long Stay Patients In Acute Hospitals by Final Placement

Winnipeg Residents

1990-1992

Final Placement of Long Stay*Patients	1990	1991	1992	Ratio 1991/1990	Ratio 1992/1991
<u>Days per 1000 Residents</u>					
Died	104.21	95.02	87.66	0.91	0.92
Admitted to PCH	244.89	225.00	263.62	0.92	1.17
Readmitted to PCH	26.30	12.99	8.70	0.49	0.67
Transfer to:					
Chronic Institution	26.01	33.90	28.38	1.30	0.84
Other Institution	10.38	11.12	7.96	1.07	0.72
None of above (includes discharge home)	173.59	153.67	157.95	0.89	1.03
Total	585	532	554	0.91	1.04
<u>Average Length of Stay</u>					
Died	176.19	173.89	173.89	0.99	1.00
Admitted to PCH First	322.19	291.85	291.69	0.91	1.00
Readmitted to PCH	224.41	236.12	161.55	1.05	0.68
Transfer to:					
Chronic Institution	128.25	215.62	131.78	1.68	0.61
Other	140.02	159.85	156.24	1.14	0.98
None of Above (includes discharge home)	114.66	102.17	110.81	0.89	1.08

* Use of chronic and rehabilitation institutions is not included in this table.

Table 15
 Indicators of Population Health Status
 Winnipeg Residents
 1990-1992

Rates per 1000 Winnipeg Residents*	1990	1991	1992	Ratio 1991/1990	Ratio 1992/1991
All Deaths	8.18	8.16	7.95	1.00	0.97
All Deaths - Females	7.60	7.67	7.42	1.01	0.97
All Deaths - Males	8.78	8.65	8.50	0.99	0.98
Deaths among those aged 0-74	3.56	3.50	3.49	0.98	1.00
Deaths due to:					
Selected Chronic Diseases	2.99	3.02	2.97	1.01	0.98
All Cancers	2.27	2.23	2.16	0.98	0.97
Ischemic Heart Disease	1.91	1.90	1.82	0.99	0.96
All Injuries	0.39	0.40	0.39	1.03	0.98

* All rates are adjusted for the age and sex characteristics of the population each year using the direct method.

Table 16
 Indicators of Population Health Status
 Winnipeg Residents by Income Quintile
 1990-1992

Rates per 1000 Winnipeg Residents*		Income Quintile	1990	1991	1992	Ratio 1991/1990	Ratio 1992/1991
All Deaths	Poorest**	1	12.8	12.3	12.0	0.96	0.98
		2	9.7	9.4	9.3	0.97	0.99
		3	8.6	8.8	8.5	1.02	0.97
		4	8.4	8.7	8.3	1.04	0.95
	Wealthiest	5	6.5	7.0	6.8	1.08	0.97
Deaths Among those aged 0-74		1	7.3	6.8	6.8	0.93	1.00
		2	4.7	4.5	4.5	0.96	1.00
		3	4.0	3.9	3.9	0.98	1.00
		4	3.5	3.5	3.3	1.00	0.94
		5	2.5	2.6	2.7	1.04	1.04
Deaths Among Males		1	14.5	14.0	14.0	0.97	1.00
		2	10.5	9.8	9.9	0.93	1.01
		3	9.2	9.3	9.0	1.01	0.97
		4	8.9	8.9	8.5	1.00	0.96
		5	6.9	7.3	6.7	1.06	0.92
Deaths Among Females		1	11.2	10.7	10.2	0.96	0.95
		2	8.9	9.1	8.7	1.02	0.96
		3	8.1	8.2	7.9	1.01	0.96
		4	8.0	8.6	8.1	1.08	0.94
		5	6.2	6.8	6.9	1.10	1.01

... cont'd

Table 16 (continued)

Rates per 1000 Winnipeg Residents*	Income Quintile	1990	1991	1992	Ratio 1991/1990	Ratio 1992/1991	
Deaths due to:							
Selected Chronic Disease	1	4.4	4.3	4.3	0.98	1.00	
	2	3.3	3.2	3.2	0.97	1.00	
	3	3.0	3.1	3.1	1.03	1.00	
	4	3.0	3.2	3.1	1.07	0.97	
	5	2.4	2.7	2.6	1.13	0.96	
All Cancers	1	3.4	3.2	3.1	0.94	0.97	
	2	2.8	2.7	2.6	0.96	0.96	
	3	2.7	2.8	2.5	1.04	0.89	
	4	2.3	2.2	2.1	0.96	0.95	
	5	2.0	2.0	2.0	1.00	1.00	
Ischemic Heart Disease	1	2.8	2.7	2.6	0.96	0.96	
	2	2.0	2.0	2.0	1.00	1.00	
	3	1.9	1.9	1.9	1.00	1.00	
	4	1.9	2.1	1.9	1.11	0.90	
	5	1.5	1.8	1.6	1.20	0.89	
All Injuries	Poorest	1	0.9	0.8	0.8	0.89	1.00
		2	0.6	0.6	0.5	1.00	0.83
		3	0.4	0.4	0.4	1.00	1.00
		4	0.3	0.4	0.4	1.33	1.00
	Wealthiest	5	0.3	0.3	0.2	1.00	0.67

* All rates are adjusted for the age and sex characteristics of the population each year using the direct method.

** 1 identifies 20% of Winnipeg residents who live in the poorest neighborhoods and 5 identifies the 20% living in the wealthiest neighborhoods with 2 - 4 representing neighborhoods in between these extremes.

Table 17
 Indicators of Population Health Status
 Winnipeg Residents by Income Quintile of Residence
 1992

Rates per 1000 Winnipeg Residents*	Lowest 1	2	3	4	Highest 5	Ratio Lowest/Highest
All deaths	12.01	9.31	8.47	8.25	6.77	1.77
Deaths among those aged 0-74	6.78	4.51	3.88	3.28	2.71	2.50
Deaths among males	13.97	9.93	9.03	8.45	6.67	2.09
Deaths among females	10.15	8.73	7.94	8.05	6.87	1.48
Deaths due to:						
Selected chronic disease	4.27	3.18	3.09	3.05	2.56	1.67
All cancers	3.11	2.63	2.53	2.14	2.00	1.56
Ischemic heart disease	2.60	1.98	1.90	0.00	1.57	1.66
All injuries	0.82	0.52	0.39	0.39	0.24	3.42

* All rates are adjusted for the age and sex characteristics of the population each year using the direct method.