Morbidity

Morbidity, also known as sickness or illness, can be defined as a departure from a state of physiological or psychological well-being.[1]

Many different factors can influence this departure from health, including environmental characteristics, health behaviours, and social and economic conditions. The impact of socioeconomic factors on chronic disease and injury are explored in more detail in the corresponding chapters.

Hospitalization data is typically used to provide a crude measure of the prevalence of illness in the population. In this report, hospitalizations are measured by in-patient hospital separations, which refer to a separation from a health care facility because of death, discharge or transfer. Day procedures are not included in the hospitalizations reported here. Causes of hospitalization are based on the most responsible diagnosis (MRD) during a given hospital stay, where the MRD is the diagnosis associated with the longest duration of treatment. It is possible that patients may be hospitalized for more than one disease or condition (co-morbidity), which contributes uncertainty to classifying the MRD. An additional limitation of hospitalization data, particularly in its use as a crude measure of the prevalence of an illness, is that individuals may not be hospitalized for a condition or they may be hospitalized several times for the same illness or injury. Hospitalization data can also be influenced by the availability and accessibility of services and hospital policies and procedures.

For the purposes of this report, healthy newborns (i.e. newborns born alive in hospital) have been excluded from all-cause hospitalization data to eliminate double-counting as the births have already been captured through the mothers under pregnancy and childbirth. It is important to note, however, that from a health-care utilization perspective newborns receive additional services and require additional resources, which is not reflected in these counts.
In this chapter, all-cause hospitalization rates will be presented, along with the leading causes of hospitalization. Comparisons of hospitalization data with Ontario will be made through standardized morbidity ratios.

All Cause Hospitalization

The crude hospitalization rate is the total number of hospital separations (discharges, transfers, and deaths) during a given year (fiscal or calendar) per total population. The total number of hospitalizations, along with the crude hospitalization rate for Huron County and Ontario, is shown for 2002-2006 in **Table 1**. Between 2002-2006, there was a range of 6,251 – 7,129 hospitalizations per year in Huron County, resulting in an average crude hospitalization rate of 110.0 hospital separations per 1,000 population. Females had a higher number and rate of hospitalizations than males, due in part to the high proportion of female hospitalizations resulting from pregnancy and childbirth. The crude hospitalization rate is higher for Huron County than Ontario, which could be the result of an older population.

Examining crude hospitalization rates by age groups demonstrates how morbidity varies by age. Age-specific hospitalizations for all causes are shown in **Figure 1** for Huron County. Hospitalization rates were highest for adults aged 65 years and older, followed by infants under the age of 1 year.

To compare Huron County hospitalization rates with the province, age-standardized hospitalization rates were calculated and are shown in Figure 2. Age-standardized hospitalization rates have declined 12.0% from 2002 to 2006 among Huron County residents. Ontario rates have also declined; however, Huron County continues to have higher age-standardized hospitalization rates than the province.

Year	Hospitalizations (Count)			Crude Hospitalization Rate (per 1,000)			
	Male	Female	Total	Male	Female	Overall	Ontario
2002	3,163	3,965	7,129	102.5	127.4	115.0	83.2
2003	2,993	3,862	6,855	96.9	124.5	110.7	79.8
2004	3,114	3,780	6,894	101.0	122.2	111.6	80.8
2005	3,087	3,739	6,828	100.2	121.4	110.8	79.9
2006*	2,800	3,450	6,251	91.0	112.5	101.7	75.5
Total/Average	15,157	18,796	33,957	98.3	121.6	110.0	79.8

Table 1. The number of hospital separations for both Huron County males and females, along with the crude hospitalization rates for both Huron County and Ontario, 2002-2006. * Note: The reporting system for hospitalizations in psychiatric beds in acute care hospitals changed at the beginning of the 2006 fiscal year. As a result, only approximately 5% of psychiatric hospitalizations for 2006 are captured, resulting in an underestimate of the number of hospitalizations for all causes in this year. *Source: Hospital In-Patient Data and Population Estimates [2002-2006], Provincial Health Planning Database (PHPDB). Extracted: 04/2008, Health Planning Branch, Ontario MOHLTC.*

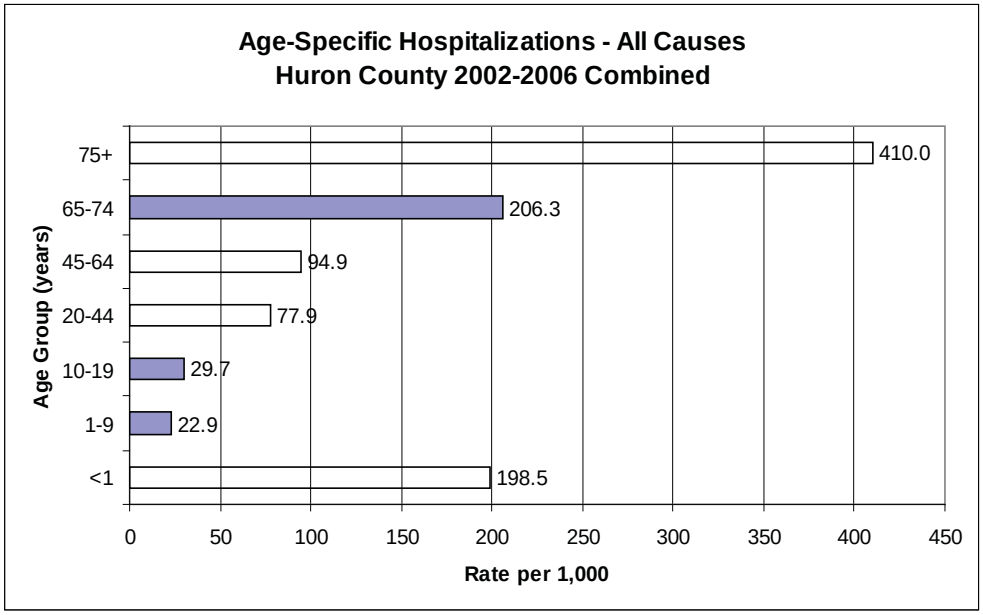
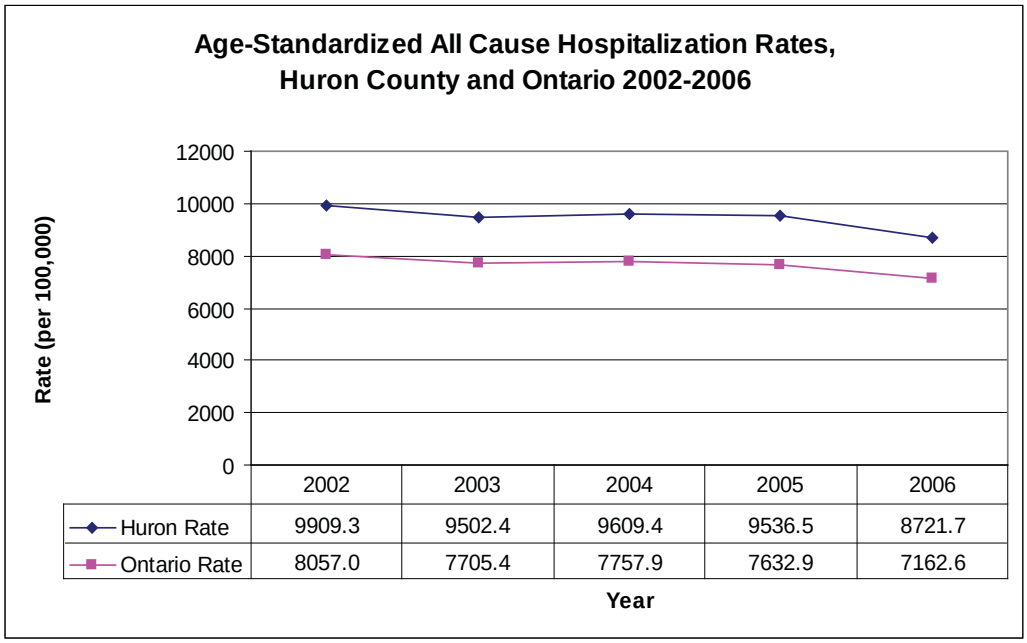


Figure 1. Age-specific hospitalization rates for all causes in Huron County (2002-2006 combined). Source: Hospital In-Patient Data and Population Estimates [2002-2006], Provincial Health Planning Database (PHPDB). Extracted: 04/2008, Health Planning Branch, Ontario MOHLTC.

Figure 2. Age-standardized hospitalization rates for Huron County and Ontario from 2002 to 2006. Source: Hospital In-Patient Data and Population Estimates [2002-2006], Provincial Health Planning Database (PHPDB) Extracted: 30/01/2007, Health Planning Branch, Ontario MOHLTC.



Leading Causes of Hospitalization

Causes of hospitalization, as indicated by the most responsible diagnosis, were grouped by ICD-10 chapter* and ranked to determine the most common causes of hospitalization in Huron County. Figures are presented for the community as a whole, by sex and by age group. A description of the contents of each ICD-10 chapter, along with the resulting ICD-10 codes, is provided in Appendix 2.

Accounting for 13.8% of all hospitalizations between 2003 and 2006, the leading cause of hospitalization in Huron County was "diseases of the circulatory system" (**Table 2**). Following that, "diseases of the digestive system" and "factors influencing health status and contact with health services" were the second and third leading causes of hospitalization. Huron County has a higher proportion of hospital separations due to contact with the health services than Ontario, which could be due to the shortage of family physicians.

Rank	ICD-10 Chapter	Number of Hospital Separations	Per Cent (%)	Ontario Rank
1	Diseases of the Circulatory System	3,711	13.8	2
2	Diseases of the Digestive System	2,672	10.0	3
3	Factors Influencing Health Status and Contact with Health Services	2,642	9.8	11
4	Injury, Poisoning and Certain Other Consequences of External Causes	2,462	9.2	5
5	Pregnancy, Childbirth and the Puerperium	2,215	8.3	1
6	Diseases of the Respiratory System	2,044	7.6	4
7	Neoplasms (Cancers)	1,983	7.4	6
8	Mental and Behavioural Disorders*	1,947	7.3	9
9	Symptoms, Signs and Abnormal Clinical and Laboratory Findings (not classified elsewhere)	1,878	7.0	7
10	Diseases of the Musculoskeletal System	1,609	6.0	10
		n=26,828		

Table 2. Top ten leading causes of hospitalization in Huron County, 2003-2006. * Note: The reporting system for hospitalizations in psychiatric beds in acute care hospitals changed at the beginning of the 2006 fiscal year. As a result, only approximately 5% of psychiatric hospitalizations for 2006 are captured, resulting in an underestimate of the number of hospitalizations for mental and behavioural disorders. Source: Hospital In-Patient Data [2003-2006], Provincial Health Planning Database (PHPDB). Extracted: 18/04/2008, Health Planning Branch, Ontario MOHLTC.

* The International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10) is an international standard for reporting clinical diagnoses developed by the World Health Organization

Leading causes of hospitalization are shown for different age groups in **Table 4**. For infants under the age of one year, the leading cause of hospitalization for both sexes was "conditions originating in the perinatal period", accounting for almost a third of all hospitalizations in this age group. These conditions include infants affected by maternal factors and pregnancy complications; disorders related to gestation length and fetal growth; respiratory, cardiovascular and digestive system disorders, among others.

For children aged 1-9 years, "diseases of the respiratory system" were the leading cause of hospitalization for both males and females. Among youth aged 10-19 years, the top cause of hospitalization was "injuries, poisonings and certain other consequences of external causes" among males while "pregnancy, childbirth and the puerperium" was the leading cause among females. Pregnancy was also the leading cause of hospitalization in women aged 20-44 years, whereas "mental and behavioural disease" was the leading cause among men in that age group.

"Diseases of the circulatory system" were attributable for the highest number of hospitalizations among men aged 45 years and older and also among women aged 65 years and older. "Diseases of the digestive system" were the leading cause of hospitalization among women aged 45-64 years.

	Rank	ICD-10 Chapter	Number of Hospital Separations	Per Cent (%)
MALE	1	Diseases of the Circulatory System	2,141	17.9
	2	Diseases of the Digestive System	1,298	10.8
	3	Injury, Poisoning and Certain Other Consequences of External Causes	1,169	9.7
	4	Diseases of the Respiratory System	1,131	9.4
	5	Neoplasms (Cancers)	983	8.2
	6	Factors Influencing Health Status and Contact with Health Services	981	8.2
	7	Mental and Behavioural Disorders	960	8.0
	8	Symptoms, Signs and Abnormal Clinical and Laboratory Findings (not classified elsewhere)	914	7.6
	9	Diseases of the Musculoskeletal System	738	6.2
	10	Diseases of the Genitourinary System	494	4.1
			n=11,994	
FEMALE	1	Pregnancy, Childbirth and the Puerperium	2,215	14.9
	2	Factors Influencing Health Status and Contact with Health Services	1,661	11.2
	3	Diseases of the Circulatory System	1,570	10.6
	4	Diseases of the Digestive System	1,374	9.3
	5	Injury, Poisoning and Certain Other Consequences of External Causes	1,293	8.7
	6	Neoplasms (Cancers)	1,000	6.7
	7	Mental and Behavioural Disorders	987	6.7
	8	Symptoms, Signs and Abnormal Clinical and Laboratory Findings (not classified elsewhere)	964	6.5
	9	Diseases of the Respiratory System	913	6.2
	10	Diseases of the Musculoskeletal System	871	5.9
			n=14,831	

Table 3. Top ten leading causes of hospitalization in Huron County, by sex, 2003-2006. *Source: Hospital In-Patient Data [2003-2006], Provincial Health Planning Database (PHPDB). Extracted: 18/04/2008, Health Planning Branch, Ontario MOHLTC.*

Table 4. Top five leading causes of hospitalization for various age groups in Huron County, by sex, 2003-2006. Source: Hospital In-Patient Data [2003-2006], Provincial Health Planning Database (PHPDB). Extracted: 18/04/2008, Health Planning Branch, Ontario MOHLTC.

Under 1 year

	Rank	ICD-10 Chapter	Number of Hospital Separations	Per Cent (%)
MALE (n=277)	1	Certain Conditions Originating in the Perinatal Period	78	28.2
	2	Diseases of the Respiratory System	69	24.9
	3	Factors Influencing Health Status and Contact with Health Services	39	14.1
	4	Congenital Malformations, Deformations and Chromosomal Abnormalities	36	13.0
	5	Diseases of the Digestive System	13	4.7

	Rank	ICD-10 Chapter	Number of Hospital Separations	Per Cent (%)
FEMALE (n=159)	1	Certain Conditions Originating in the Perinatal Period	49	30.8
	2	Diseases of the Respiratory System	45	28.3
	3	Factors Influencing Health Status and Contact with Health Services	29	18.2
	4	Congenital Malformations, Deformations and Chromosomal Abnormalities	14	8.8
	5	Symptoms, Signs and Abnormal Clinical and Laboratory Findings (not classified elsewhere)	6	3.8

1 to 9 years

	Rank	ICD-10 Chapter	Number of Hospital Separations	Per Cent (%)
MALE (n=355)	1	Diseases of the Respiratory System	120	33.8
	2	Diseases of the Digestive System	41	11.5
	3	Injury, Poisoning and Certain Other Consequences of External Causes	40	11.3
	4	Symptoms, Signs and Abnormal Clinical and Laboratory Findings (not classified elsewhere)	37	10.4
	5	Factors Influencing Health Status and Contact with Health Services	23	6.5

	Rank	ICD-10 Chapter	Number of Hospital Separations	Per Cent (%)
FEMALE (n=224)	1	Diseases of the Respiratory System	74	33.0
	2	Injury, Poisoning and Certain Other Consequences of External Causes	37	16.5
	3	Diseases of the Digestive System	31	13.8
	4	Symptoms, Signs and Abnormal Clinical and Laboratory Findings (not classified elsewhere)	21	9.4
	5	Endocrine, Nutritional and Metabolic Diseases	11	4.9

10 to 19 years				
	Rank	**ICD-10 Chapter**	**Number of Hospital Separations**	**Per Cent (%)**
MALE (n=549)	1	Injury, Poisoning and Certain Other Consequences of External Causes	169	30.8
	2	Mental and Behavioural Disorders	82	14.9
	3	Diseases of the Digestive System	80	14.6
	4	Factors Influencing Health Status and Contact with Health Services	54	9.8
	5	Symptoms, Signs and Abnormal Clinical and Laboratory Findings (not classified elsewhere)	36	6.6

	Rank	**ICD-10 Chapter**	**Number of Hospital Separations**	**Per Cent (%)**
FEMALE (n=510)	1	Pregnancy, Childbirth and the Puerperium	102	20.0
	2	Mental and Behavioural Disorders	83	16.3
	3	Injury, Poisoning and Certain Other Consequences of External Causes	80	15.7
	4	Diseases of the Digestive System	56	11.0
	5	Factors Influencing Health Status and Contact with Health Services	41	8.0

20 to 44 years				
	Rank	**ICD-10 Chapter**	**Number of Hospital Separations**	**Per Cent (%)**
MALE (n=1500)	1	Mental and Behavioural Disorders	426	28.4
	2	Injury, Poisoning and Certain Other Consequences of External Causes	277	18.5
	3	Diseases of the Digestive System	196	13.1
	4	Symptoms, Signs and Abnormal Clinical and Laboratory Findings (not classified elsewhere)	117	7.8
	5	Factors Influencing Health Status and Contact with Health Services	89	5.9

	Rank	**ICD-10 Chapter**	**Number of Hospital Separations**	**Per Cent (%)**
FEMALE (n=4329)	1	Pregnancy, Childbirth and the Puerperium	2,106	48.6
	2	Factors Influencing Health Status and Contact with Health Services	516	11.9
	3	Mental and Behavioural Disorders	362	8.4
	4	Diseases of the Genitourinary System	278	6.4
	5	Diseases of the Digestive System	243	5.6

45 to 64 years				
	Rank	**ICD-10 Chapter**	**Number of Hospital Separations**	**Per Cent (%)**
MALE (n=3211)	1	Diseases of the Circulatory System	649	20.2
	2	Diseases of the Digestive System	399	12.4
	3	Neoplasms (Cancers)	303	9.4
	4	Mental and Behavioural Disorders	300	9.3
	5	Diseases of the Musculoskeletal System	281	8.8

	Rank	**ICD-10 Chapter**	**Number of Hospital Separations**	**Per Cent (%)**
FEMALE (n=2797)	1	Diseases of the Digestive System	366	13.1
	2	Neoplasms (Cancers)	352	12.6
	3	Mental and Behavioural Disorders	287	10.3
	4	Diseases of the Circulatory System	265	9.5
	5	Diseases of the Genitourinary System	255	9.1

65 years and older				
	Rank	**ICD-10 Chapter**	**Number of Hospital Separations**	**Per Cent (%)**
MALE (n=6102)	1	Diseases of the Circulatory System	1,407	23.1
	2	Diseases of the Respiratory System	731	12.0
	3	Neoplasms (Cancers)	639	10.5
	4	Diseases of the Digestive System	569	9.3
	5	Factors Influencing Health Status and Contact with Health Services	538	8.8

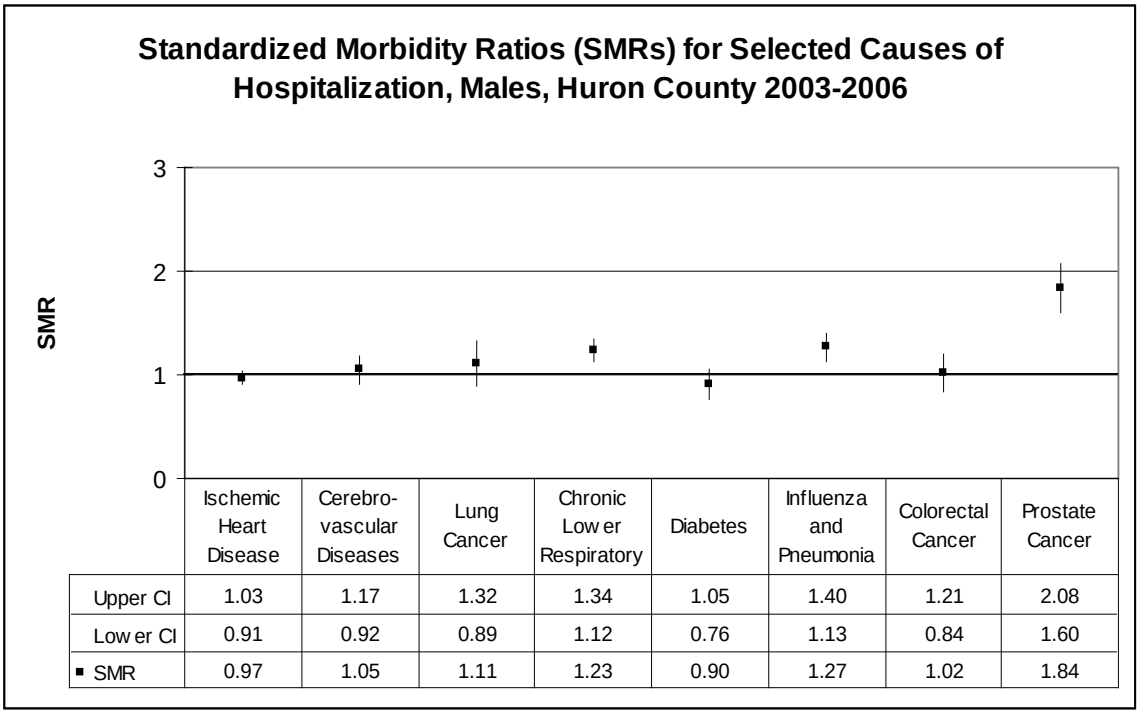
	Rank	**ICD-10 Chapter**	**Number of Hospital Separations**	**Per Cent (%)**
FEMALE (n=6812)	1	Diseases of the Circulatory System	1,250	18.3
	2	Factors Influencing Health Status and Contact with Health Services	849	12.5
	3	Injury, Poisoning and Certain Other Consequences of External Causes	772	11.3
	4	Diseases of the Digestive System	676	9.9
	5	Diseases of the Musculoskeletal System	571	8.4

Standardized Morbidity Ratio (SMR)

Like the Standardized Mortality Ratio, the Standardized Morbidity Ratio is a useful method to compare morbidity in two different populations. The Standardized Morbidity Ratio is a ratio of the observed number of hospital separations in a specific population to the number of hospital separations that would be expected if the population had the same age-specific hospitalization rates as a reference population. Calculating Standardized Mortality Ratios for Huron County, using Ontario as the reference population, gives the expected number of hospitalizations in Huron County if Huron had the same age-specific hospitalization rates as Ontario. An SMR greater than 1.0 indicates that the hospitalization rate in Huron is higher than Ontario, while an SMR lower than 1.0 indicates that Huron has a lower hospitalization rate than Ontario.

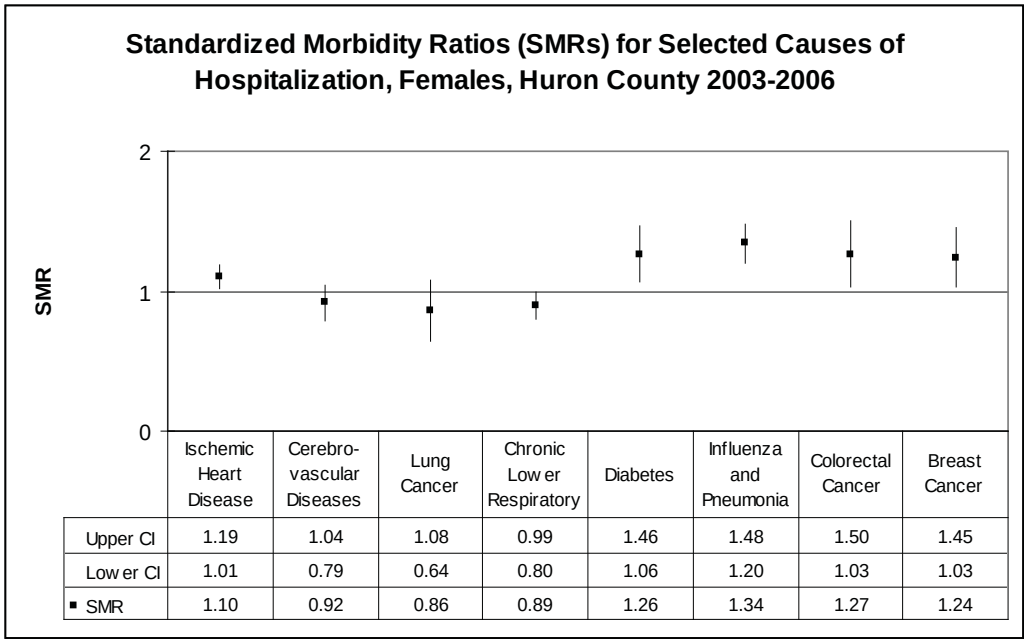
SMRs for selected causes of hospitalization between 2003 and 2006 are shown in **Figure 3** for males and **Figure 4** for females. Huron County males had a significantly higher hospitalization rate for chronic lower respiratory illness, influenza and pneumonia and prostate cancer than Ontario. Among females, by contrast, hospitalization rates were significantly higher for most causes of hospitalization when compared to Ontario, with the exception of chronic lower respiratory illness, cerebrovascular disease and lung cancer.

SMRs were also calculated for external causes of hospitalization, including land transport occurrences, attempted suicide and accidental falls (**Figure 5** for males and **Figure 6** for females). Hospitalization rates were significantly higher in Huron County males and females for all three external causes when compared to Ontario.



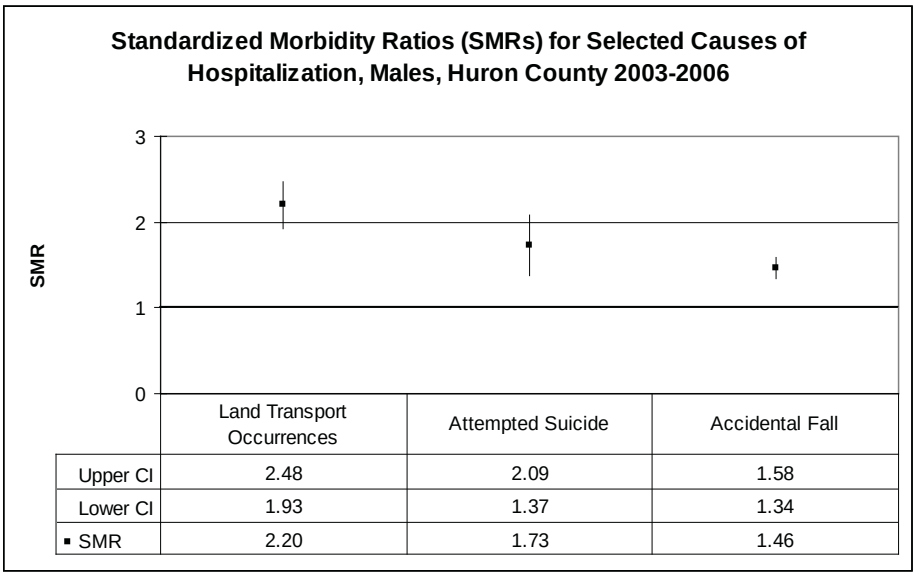
	Ischemic Heart Disease	Cerebro-vascular Diseases	Lung Cancer	Chronic Lower Respiratory	Diabetes	Influenza and Pneumonia	Colorectal Cancer	Prostate Cancer
Upper CI	1.03	1.17	1.32	1.34	1.05	1.40	1.21	2.08
Lower CI	0.91	0.92	0.89	1.12	0.76	1.13	0.84	1.60
SMR	0.97	1.05	1.11	1.23	0.90	1.27	1.02	1.84

Figure 3. Standardized Morbidity Ratios (SMRs) for selected causes of hospitalization among males in Huron County, 2003-2006. The error bars represent the 95% Confidence Interval for the SMR. Intervals that do not include one indicate the SMR for Huron is significantly higher or lower than that of Ontario. *Source: Hospital In-Patient Data and Population Estimates [2003-2006], Provincial Health Planning Database (PHPDB) Extracted: 04/2008, Health Planning Branch, Ontario MOHLTC.*



	Ischemic Heart Disease	Cerebro-vascular Diseases	Lung Cancer	Chronic Lower Respiratory	Diabetes	Influenza and Pneumonia	Colorectal Cancer	Breast Cancer
Upper CI	1.19	1.04	1.08	0.99	1.46	1.48	1.50	1.45
Lower CI	1.01	0.79	0.64	0.80	1.06	1.20	1.03	1.03
▪ SMR	1.10	0.92	0.86	0.89	1.26	1.34	1.27	1.24

Figure 4. Standardized Morbidity Ratios (SMRs) for selected causes of hospitalization among females in Huron County, 2003-2006. The error bars represent the 95% Confidence Interval for the SMR. Intervals that do not include one indicate the SMR for Huron is significantly higher or lower than that of Ontario. Source: Hospital In-Patient Data and Population Estimates [2003-2006], Provincial Health Planning Database (PHPDB) Extracted: 04/2008, Health Planning Branch, Ontario MOHLTC.



	Land Transport Occurrences	Attempted Suicide	Accidental Fall
Upper CI	2.48	2.09	1.58
Lower CI	1.93	1.37	1.34
▪ SMR	2.20	1.73	1.46

Figure 5. Standardized Morbidity Ratios (SMRs) for selected external causes of hospitalization among males in Huron County, 2003-2006. The error bars represent the 95% Confidence Interval for the SMR. Intervals that do not include one indicate the SMR for Huron is significantly higher or lower than that of Ontario. Source: Hospital In-Patient Data and Population Estimates [2003-2006], Provincial Health Planning Database (PHPDB) Extracted: 04/2008, Health Planning Branch, Ontario MOHLTC.

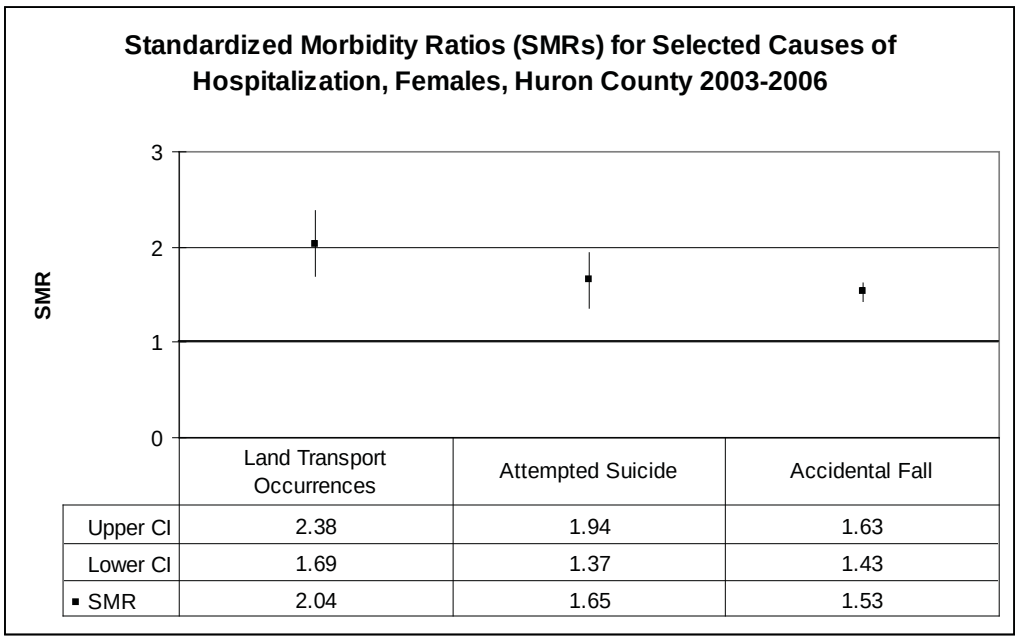


Figure 6. Standardized Morbidity Ratios (SMRs) for selected external causes of hospitalization among females in Huron County, 2003-2006. The error bars represent the 95% Confidence Interval for the SMR. Intervals that do not include one indicate the SMR for Huron is significantly higher or lower than that of Ontario. Source: Hospital In-Patient Data and Population Estimates [2003-2006], Provincial Health Planning Database (PHPDB) Extracted: 04/2008, Health Planning Branch, Ontario MOHLTC.

Conclusions

Between 2002 and 2006, there was a range of 6,251 to 7,129 hospitalizations per year in Huron County. Females experienced higher hospitalization rates compared to males, likely a result of the high proportion of hospitalizations due to pregnancy and childbirth. Leading causes of hospitalization for both sexes were "diseases of the circulatory system", followed by "diseases of the digestive system" and "factors influencing health status and contact with health services". The higher number of hospitalizations due to this latter category could be a result of the physician shortage in Huron County. When compared to the province, Huron County males had higher hospitalization rates for chronic lower respiratory illness, influenza and pneumonia and prostate cancer. Huron County women had significantly higher hospitalization rates than Ontario for most causes of hospitalization.

1 Last J. A dictionary of epidemiology, Fourth Edition. New York, NY: Oxford University Press, Inc., 2001.