

Data Analysis

The *Data Book* is a compendium of approximately 275 indicators that measure health status, determinants of health, health system performance, and population and health system characteristics. For each indicator, information on current status, trend data, and comparison data (by categories of person, place and time) is provided wherever possible. Data in this report can be mixed and matched to help determine population needs, create special reports that reflect targeted populations and establish comparisons to other provincial and national data.

A variety of methods were used to develop the indicators reported in this Data Book. Indicators were selected that met the following criteria: dependable data source, available data, and valid and reliable methods.

The following list identifies the types of analysis used in the development of the indicators:

- Counts
- Crude Rates
- Standardized Rates
- Relative Ratios
- Rate Differences
- Pre-Published Statistics
- Spatial Analysis
- Aggregating Data – Age Group, Diagnostic Categories, Procedure Categories, Geography, Sex
- Confidence Intervals for Survey Data

Counts & Rates

Many indicators are measured using counts, crude rates and age-adjusted rates. A crude rate is calculated by dividing the total number of events in a specified time period by the total number of individuals in the population who are at risk for these events and multiplying by a constant, such as 1,000 or 10,000. Crude rates are recommended when a summary measure is needed and it is not necessary or desirable to adjust for other factors such as age or gender. A crude rate is a real number and it provides an absolute measurement as well as a useful statistical tool for comparison and trend analysis.

An adjusted or standardized rate is the process by which differences in the age and/or gender composition of two or more populations are removed, to allow comparisons between these populations in the frequency with which a health event occurs. Frequently the adjustment is for age alone. Adjusted (Standardized) rates should be used only for the purpose of comparison. Because an adjusted rate is based on an external standard population, it does not reflect the absolute frequency of the event in a population. The absolute frequency of the event in a population is represented by the crude rate. An adjusted rate has meaning only when compared with a similarly adjusted rate, the magnitude of the adjusted rate means little in and of itself.

In this report the direct method of standardization was used to compute age-adjusted rates. The direct method of adjusting for differences among populations computes the overall rate that would result if, instead of having different distributions, all populations were to have the same standard distribution. The standardized rate is a weighted average of the stratum-specific rates (where the stratum might be age groups), with the weights taken from the standard population. For this report, age-adjusted rates were computed using the direct-standardized method with the 2000 WHR population as the standard population.

Relative Ratios and Rate Differences

Relative ratios and rate differences are useful techniques to answer the question “how different?”.

Relative Ratio

- Measures differences in relative terms
- Is independent of the absolute rates

Rate Difference

- Measures the actual amount by which an indicator has increased or decreased
- Has public health importance beyond the ratio of two rates (For example, the doubling or tripling of an indicator rate may not indicate an important public health problem if the baseline rate is very low)

Relative Ratio: The ratio of a rate in one group to that in another group is referred to as the relative ratio

Example and Interpretation

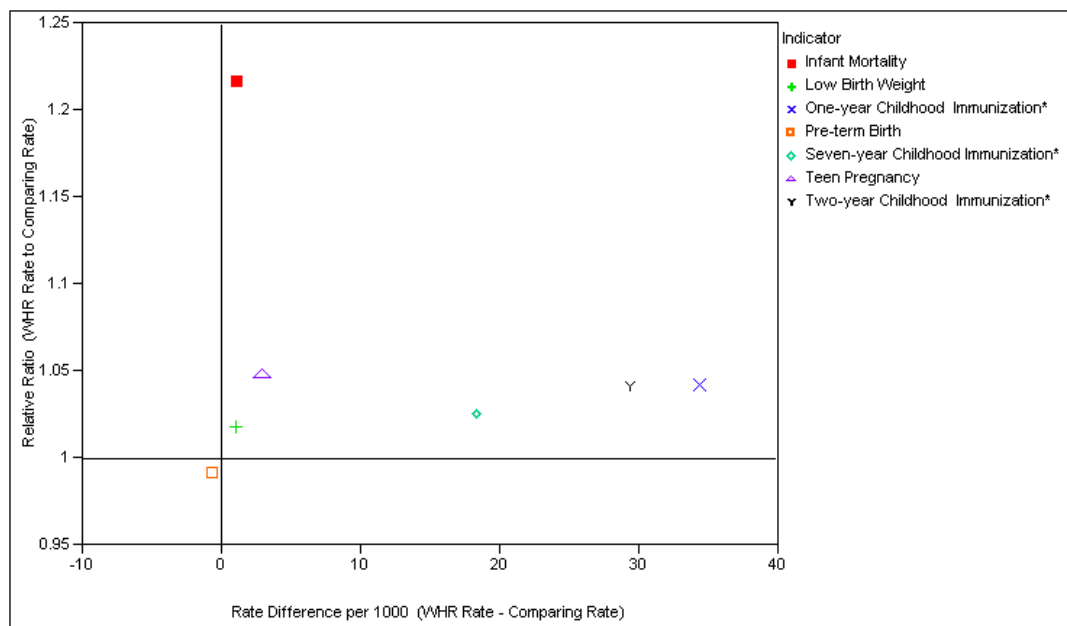
Suppose the Asthma rate in the year 2003 for Area A was 50 cases per 1000 population and the comparable rate in Area B was 25 cases per 1000 population. The two groups can be compared by the ratio of their rates. We can calculate the ratio in Area A compared with Area B as $50/25 = 2.0$. Thus, we can say that the Asthma rate in Area A is two times that of Area B. Similarly, one can calculate the ratio in Area B compared with Area A as $25/50 = 0.5$, therefore, we can say that the Asthma rate in Area B is half that of Area A.

Rate Difference: The rate difference is calculated by subtracting the rate in one group from that in another group.

Example and Interpretation

Suppose the Asthma rate in the year 2003 for Area A was 50 cases per 1000 population and the comparable rate in Area B was 25 cases per 1000 population. The two groups can be compared by a rate difference. We can calculate the rate difference between Area A with Area B as $50 - 25 = 25$ cases per 1000. This difference indicates how much, in absolute rather than relative terms, the rates differ in these two populations. Thus, we can say there are 25 per 1000 more persons in Area A potentially with asthma compared to Area B. Similarly, if the Asthma rate in Area A was 10 cases per 1000 and the comparable asthma rate in Area B was 25 cases per 1000 population, the difference would be $10 - 25 = -15$ cases per 1000. Therefore, there are 15 per 1000 population fewer individuals potentially with asthma in Area A compared to Area B.

Plotting Relative Ratios and Rate Differences



For all seven category groups (i.e. Chronic Disease (Cancer), Communicable Diseases, Health Conditions, Infant & Maternal Health, Injury, Mental Health, Quality of Life) the relative ratio of the Winnipeg Health Region compared to Canada (or Manitoba if Canada was not available) was calculated along with the rate difference.

For all indicators within the seven categories with the exception of childhood immunizations, a relative ratio greater than one indicates the Winnipeg Health Region is worse than Canada (or Manitoba). That is, the Winnipeg Health Region rate was larger than the Canadian or Manitoba rate. For childhood immunizations a value greater than one would indicate the Winnipeg Health Region is better than Canada (or Manitoba) – a larger immunization rate is associated with a positive health outcome, while for all other indicators a larger rate is associated with a negative health outcome.

Indicators with relative ratios less than one (with the exception of childhood immunizations) indicate that the Winnipeg Health Region is better than Canada (or Manitoba). That is, the Winnipeg Health Region rate was smaller than the Canadian or Manitoba rate.

Relative ratios greater than one will have a rate difference greater than zero (i.e. Winnipeg Health Region rate was larger than the Canadian rate (or Manitoba rate)), while relative ratios less than one will have a rate difference less than zero.

Example (using graph above):

From the graph above, teen pregnancy has a relative ratio of approximately 1.05. Therefore, we can say that the teen pregnancy rate in the Winnipeg Health Region is approximately 1.05 times or 5% higher than the Canadian rate. This equates to approximately 3 teenage pregnancies more per 1000 females aged 15-19 in the Winnipeg Health Region compared to Canada (i.e. rate difference is approximately 3 per 1000).

Similarly, the relative ratio of the Winnipeg Health Region compared to Canada for pre-term births is approximately 0.99. Therefore, pre-term births in the Winnipeg Health Region are approximately 1% lower than the Canadian rate, which equates to approximately 7 fewer pre-term births per 1000 live births (i.e. rate difference is approximately 0.7 per 1000).

For one-year childhood immunizations, the relative ratio is approximately 1.04, therefore, one-year childhood immunizations are approximately 1.04 times or 4% higher in the Winnipeg Health Region than the comparing rate. This equates to approximately 35 more one-year old immunizations per 1000 one-year old population being immunized in the Winnipeg Health Region versus the comparing area.

The major limitation to this type of analysis is that relies on the presence of comparable rates based on the same time periods and algorithms.

Spatial Analysis

Geographic data exploration and spatial data analysis provided a visual representation of selected indicators. To demonstrate patterns and variability for various indicators at the Community Area and Neighbourhood Cluster level we used the geographic information system (GIS) by ESRI ARCVIEW 8.3.

Pre-published Statistics

Where applicable, statistics from reports published by reputable research organizations are used in this report. For example, information published by Canadian Institute for Health Information, Statistics Canada, Manitoba Centre for Health Policy and Manitoba Health was used in some of the indicators. Where an external source is quoted, refer to the respective organization for details on the methodologies used.

Aggregate Data

Some data sources used in this report are received as pre-aggregate data. Where possible, these are aligned with other reports. In certain instances it may not be possible to align or create specific groups. For example, diabetes data was provided aggregated in 10 year age groups (0-9, 10-19, ..., 70+), therefore, given the data provided it is not possible to create a 0-12 year old age category.

ICD-9-CM

ICD-9-CM refers to International Classification of Diseases 9th Revision Clinical Modification, the clinical modification of ICD-9 developed and used for morbidity coding in the United States. This is the standard used in Manitoba for coding of hospitalization data. Refer to the Mortality Report, WRHA 2004 for more detail about this coding system.

Information in this report related to diagnosis, procedures, inpatients, day visits, length of stay, vital statistics and injury are based on ICD-9-CM and its grouping methodology.

Confidence Intervals

Indicators based on sample data from the Canadian Community Health Survey (CCHS) include an estimate of the true population percentage and a 95% confidence interval. Confidence intervals are based on the observed sample data and express the statistical variation associated with the data. The given 95% confidence interval may or may not include the true percentage for the indicator, however, there is a 95% probability that the interval will contain the true population percentage for the indicator.

Example, A CCHS indicator is estimated to be 32% and the corresponding 95% confidence interval is given by the lower confidence bound of 26% and the upper confidence bound of 38%. Therefore, there is a 95% probability that the interval from 26% to 38% will contain the true population percentage of the indicator.

Geography Assignment

For this report, Winnipeg residents are assigned to the smaller geographies within the WHR using the Postal Code Conversion file (PCCF) 2002. The PCCF is used to aggregate information from our data sources to Neighbourhood Clusters or Community Areas as appropriate. Data based on hospital abstracts have sub-geographies pre-assigned by Manitoba Health and may be based on a hybrid of postal code and municipal assignment.

Postal Code Conversion file (PCCF)

The Postal Code Conversion file is a tool that can be used to geocode event records, which contain 6-digit postal code, to the administrative geographies used for the planning and delivery of health services in Manitoba.

These geographic areas are:

1. Regional Health Authorities (RHA): In Manitoba there are 12 RHA's, covering the entire land mass of the province.
2. Community Areas (CA): The RHA Winnipeg can be sub-divided into 12 sub-regional areas known as CA's.
3. Neighborhood Clusters (NC): The RHA of Winnipeg can be further sub-divided into 25 sub-regional areas known as NC's.

The files included in the MB - PCCF were produced as a collaborative effort involving Manitoba Health, the Manitoba Center for Health Policy, Cancer Care Manitoba, First Nation and Inuit Health Branch of Health Canada and the Winnipeg Regional Health Authority.

Age Groups

Where possible, age groups have been formed to match other indicators commonly reported to allow direct comparison. One exception would be the Bed Map indicator where the custom groups were assigned to program areas to analyze 'typical' utilization.

Injury Matrix

Injury Matrix
E-code Groupings

Mechanism/Cause	Unintentional	Self-inflicted	Assault	Undetermined	Other
Cut/pierce	E920.0-.9	E956	E966	E986	E974
Drowning/submersion	E830.0-.9, E832.0-.9, E910.0-.9	E954	E964	E984	
Fall	E880.0-E886.9, E888	E957.0-.9	E968.1	E987.0-.9	
Fire/burn	E890.0-E899, E924.0-.9	E958.1, .2, .7	E961, E968.0, .3	E988.1, .2, .7	
Fire/flame	E890.0-E899	E958.1	E968.0	E988.1	
Private home conflagration	E890(0-.9)				
Ignition of clothing	E893(0-.9)				
Hot object/substance	E924.0-.9	E958.2, .7	E961, E968.3	E988.2, .7	
Firearm	E922.0-.3, .8, .9	E955.0-.4	E965.0-.4	E985.0-.4	E970
Machinery	E919(0-.9)				
Agricultural machines	E919.0				
Motor vehicle traffic	E810-E819(0-.9)	E958.5	E968.5	E988.5	
Occupant	E810-E819(0.1)				
Motorcyclist	E810-E819(2,3)				
Pedal cyclist	E810-E819(.6)				
Pedestrian	E810-E819(.7)				
Unspecified	E810-E819(.9)				
Pedal cyclist, other	E800-E807(.3), E820-E825(.6), E826.1, .9, E827-E829(.1)				
Pedestrian, other	E800-807(.2), E820-E825(.7), E826-E829(.0)				
Transport, other	E800-E807(0.1, .8, .9), E820-E825(0.5, .8, .9), E826.2-.8, E827-E829(2-.9), E831.0-.9, E833.0-E845.9	E958.6		E988.6	
Snowmobile	E820(0.1, .9)				
Other off-road vehicle	E821(0.1, .9)				
Water transport, ex. Drowning	E831(0-9), E833-E838(0-9)				
Air & space transport	E840.0-E845.9				
Natural/environmental	E900.0-E909, E928.0-.2	E958.3		E988.3	
Excessive cold	E901(0-.9)	E958.3		E988.3	
Bites and stings	E905.0-.6, .9, E906.0-.4, .5, .9				
Overexertion	E927				
Poisoning	E850.0-E869.9	E950.0-E952.9	E962.0-.9	E980.0-E982.9	E972
Medication	E850.0-E858.9	E950.0-.5	E962.0	E980.0-.5	
Alcohol	E860(0-.9)				
Motor vehicle exhaust	E868.2	E952.0		E982.0	
Other carbon monoxide	E868(.3, .8, .9)	E952.1		E982.1	
Struck by, against	E916-E917.9		E960.0, E968.2		E973, E975
Suffocation	E911-E913.9	E953.0-.9	E963	E983.0-.9	
Choking on food	E911				
Choking, non-food	E912				
Suffocation, plastic bag	E913.1	E953.1			
Suffocation in bed or cradle	E913.0				
Hanging ex in bed or cradle	E913.8	E953.0	E963	E983.0	
Other specified, classifiable	E846-E848, E914-E915, E918, E921.0-.9, E922.4, E923.0-.9, E925.0-E926.9, E928.3, E929.0-.5	E955.5, .6, .9, E958.0, .4	E960.1, E965.5-.9, E967.0-.9, E968.4, .6, .7	E985.5, .6, E988.0, .4	E971, E978, E990-E994, E996, E997.0-.2
Child maltreatment			E967(0-.9)		
Other specified, NEC	E928.8, E929.8	E958.8, E959	E968.8, E969	E988.8, E989	E977, E995, E997.8, E998, E999
Unspecified	E887, E928.9, E929.9	E958.9	E968.9	E988.9	E976, E997.9
Fracture, cause unspecified	E887				
All injury	E800.0-E869.9, E880-E929.9	E950.0-E959	E960.0-E969	E980.0-E989	E970-E978, E990-E999
Adverse effects					E870.0-E879.9, E930.0-E949.9
Medical care					E870.0-E879.9
Drugs					E930.0-E949.9
All external causes					E800.0-E999.9

Reference: Child Injury Division, Bureau of Reproductive and Child Health, Laboratory Centre for Disease Control, Health Protection Branch, Health Canada. October, 1999.

Note: Adverse effects are excluded from All Injury totals.