Data Analysis

A multi-method approach was used to identify the major health issues and factors that influence these health issues. All methods used indicators that were developed in the Data Book, CHA Report 2004. This approach was used to increase the validity of the findings and minimize the biases of any one method.

The following methods were used:

1. Comparison of Health Indicators: Comparison of **Relative Ratios and Rate Differences** to identify health outcomes where the WHR was better or worse than the Canadian rate.
2. Underlying Population Health Issues: **Factor Analysis** to identify patterns in the data, identify clusters of indicators and communities, and link indicators to the communities in which they are observed.
3. **Spatial Analysis** of leading health issues to demonstrate variability and patterns among smaller communities in the WHR.
4. **Expert review** of identified health issues in the WHR to identify gaps and validate findings.
5. **Literature Review**: Review of existing reports and research to identify associations between health issues and determinants of health.

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)

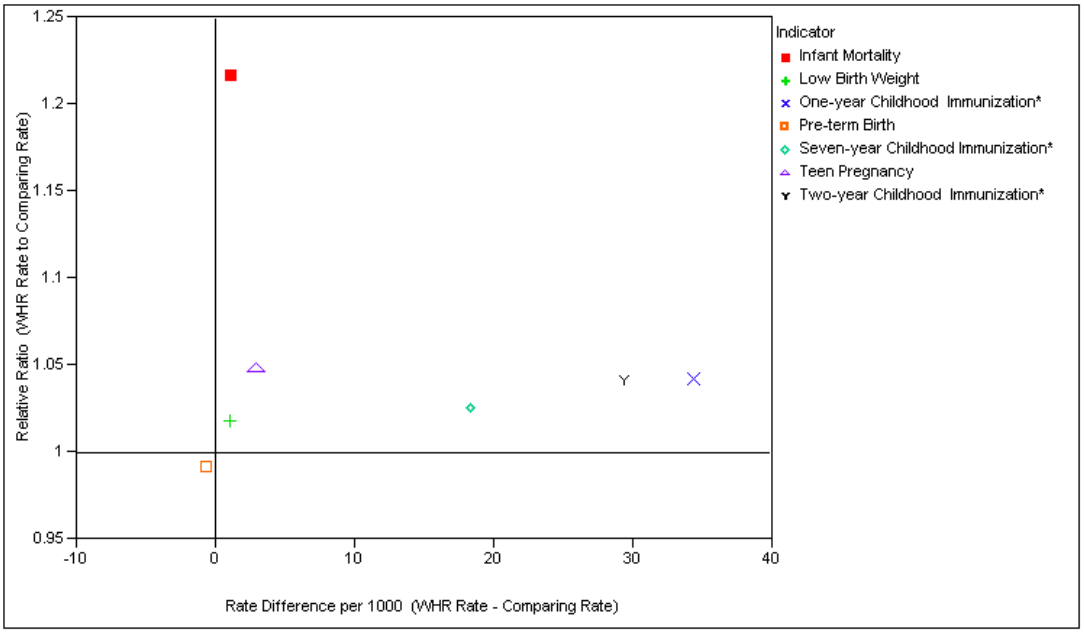
Relative Ratio: The ratio of a rate in one group to that in another group is referred to as the relative ratio

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.

Factor Analysis

The term "factor analysis" is generally understood to refer to a set of closely related models intended for exploring or accounting for the correlational structure among observed variables. Given the high inter-correlations amongst some health indicator variables, we use a factor analysis model to study the relationships between health status indicators, determinants of health, and demographic variables in the Winnipeg Health Region. The factor analysis model was used to provide simplified health profiles of twenty-five neighbourhood clusters, on the basis of the 91 selected random variables. Since no sampling is involved, the analysis is that for a fixed population (the analysis can be extended to that of random populations using the concept of a super-population). In the final analysis the estimated factors are primarily mathematical constructs, and as such do not rely on any process of identification or interpretation for their validity. That is, if patterns are detected in the data, there is no guarantee that a clear interpretation of the physical health setting of the region will be "meaningful". The principal motivation for using factor analysis however lies in the possibility of a meaningful interpretation of the factors, and hence a meaningful insight into the data.

A solution for the 91 selected variables was carried out using a factor analysis model. The initial factor solution revealed 10 common or explanatory factors or dimensions accounting for approximately 93% of the total observed variance of the 91 variables, were required to represent the data adequately, with the remaining factors representing unique variance (such as measurement error) associated with the individual variables. In order to obtain better resolution of the variable/factor relationships the 10 retained factor reference axes were rotated using standard factor rotation methods. Output of the factor analysis model consisted of factor coefficients referred to as "loadings", which link the variables in terms of correlation coefficients and which indicate the importance of a factor or dimension for these variables. We also output the computed observations for the factors referred to as "scores", which measure the prevalence or importance of a factor in a given neighbourhood cluster. What is achieved is a link between the factors underlying the variables and the spatial areas where the variables are observed. Neighbourhood clusters with factor "scores" above the 3rd quartile were classified as "above average", that is, it identifies the importance or prevalence of that factor in a given neighbourhood cluster. Similarly, neighbourhood clusters with factor "scores" below the 1st quartile were classified as "below average", that is, it identifies the lack of importance or prevalence (i.e. absence) of that factor in a given neighbourhood cluster. Those neighbourhood clusters with "scores" between the 1st and 3rd quartiles are being viewed as being more-or-less average, with respect to a factor.

The results of the factor analysis can be found in the Appendix.

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.

Expert Review

Field experts reviewed the profiles for content and face validity. Experts were identified as Medical Officers of Health, Community Area Directors and members of the Population and Public Health Team in the Winnipeg Regional Health Authority. The following questions were asked of each reviewer:

1. In your opinion, are the health issues identified valid for this population?
2. Are there any other health issues that in your opinion, are of concern, but have not been identified?
3. Are there any other linkages you would add to the Table*: Associations between Health Issues and Determinants of Health* between the determinants of health and leading health issues specific to this population?
4. Are there other populations that should be of priority or concern to the WHR?

Literature Review

Library Services at the University of Manitoba and the Population Health and Health System Analysis Department, WRHA conducted literature searches to supplement the information in the profiles.