Statistics Canada Statistique Canada

Health Indicators
December 2000

Catalogue no. 82-221-XIE

Canadian Institute for Health Information
Institut canadien d' information sur la santé

Technical Notes

These notes provide general comments to assist with accurate interpretation of the health indicators. Please see the descriptions for specific information on indicator definitions, sources, calculation methods, and other details. Additional information on interpretation, comparability, relevant standards/benchmarks, and other material is available upon request.

Health indicators

The methodology used for these indicators was designed to maximize inter-regional and inter-provincial comparability given the characteristics of available national datasets. For this reason, there may be differences between definitions, data sources, and extraction procedures used in some local, regional, or provincial/territorial reports when compared to those described here. In addition, discrepancies may exist due to on-going updates to databases.

Rates are standardized wherever possible to facilitate comparability across provinces/regions and over time.

Health region level rates and population estimates presented in this publication are based on the boundaries in effect as of January 2000.

Indicators based on hospitalization records are limited to health regions with population greater than 100,000.

Health region level population estimates:

- Population estimates for health regions were produced by Statistics Canada (Demography Division) for all provinces, except Quebec and British Columbia. Quebec health region population estimates were provided by l'Institut de la statistique du Québec and British Columbia population estimates were provided by BC Stats.

  See **Appendix 1** for methodology.

- The population estimates for health regions in Alberta prepared by Statistics Canada differ from those of Alberta Health and Wellness, which are based principally on Alberta's health care file. The differences in these estimates are shown in Appendix 2. Work is underway to reconcile these population differences. Therefore, rates presented in this publication may differ from those produced by Alberta Health and Wellness.

Health status indicators based on vital statistics (Statistics Canada - STC)

- Rates are based on place of residence for indicators derived from birth and death events.

- Vital statistics data in this product are based on three years of birth and death data (1995-1997) averaged over three years of births (1995-1997) and the 1996 population estimate, respectively. Table titles associated with these data reflect the mid-point of the three-year period being averaged (1996).

- All data presented have an associated 95% confidence interval (CI). The confidence interval illustrates the degree of variability associated with a rate. Wide confidence intervals indicate high variability, thus, these rates should be interpreted and compared with due caution. Some age-standardized rates were suppressed due to both a very small underlying count plus extremely high variability. Confidence intervals can also be used to determine whether a rate in one health region is statistically below, above or no different than the rate for the same indicator in another health region.

- The confidence intervals for the age-standardized rates were produced via the Spiegelman method. Reference: Spiegelman M. Introduction to Demography, Revised Edition. Cambridge MA, Harvard U Press, 1968. Formula 4.29, p 113

- The confidence intervals for the birth-related data were produced via the Fleiss method. Reference: Fleiss JL, Statistical Methods for Rates and Proportions, 2nd Ed, Wiley and Sons, NY, 1981

- Due to the small population of Churchill health region (4690), Manitoba (pop. 1,110 in 1996) and the number of deaths, virtually all vital statistics data for this health region would, in the absence of any adjustment, need to be suppressed. As such, in this product all vital statistics data presented for region 4680 (Burntwood) are an aggregate of Burntwood and Churchill regions. For census-related data, however Burntwood and Churchill are presented separately.

- Mortality rates, with the exception of infant and perinatal mortality, are age-standardized using the direct method, and the 1991 Canadian Census population structure. The use of a standard population results in more meaningful mortality rate comparisons, because it adjusts for variations in population age distributions over time and across different geographic areas.

- Birth and death data for 1996 and 1997 (and 1995 death data from Alberta) have been linked to health regions using postal codes reported with place of residence and converted to enumeration area (EA) using the automated geo-coding system developed in Health Statistics Division. These data were then aggregated to health region based on the EA level correspondence developed in Health Statistics Division with the cooperation of provincial Ministries of Health, Alberta Treasury and BC Stats.

- Birth and death data (except Alberta) from 1995 were linked to health regions using two methods:
  1) For most records (where health regions are comprised of complete census subdivisions) the standard geographical classification codes recorded on the vital statistics database were used to link records to health region.
  2) Selected records (those linked to census subdivisions which are associated with more than one health region) were extracted from the data base. Using the registration numbers of these events, birth registration records and death certificates were accessed and the postal codes for place of residence were captured. These records were then geo-coded to enumeration areas (same as for data years 1996 and 1997), linked to health regions using the EA-to-HR correspondence, then merged with the remaining data for that year to get the most accurate health region link.

- Life expectancy: This variable was calculated using the Chiang methodology for abridged life tables. The estimates are based on three years (1995-1997) of mortality data and 1996 population estimates, as described above. Abridged life tables use five-year age groupings of both population and mortality rate inputs (as opposed to single year age breakdown). Since there is more variability in the number of events by age in smaller geographic areas, abridged life tables are more suitable for the adaptation to a sub-provincial level (health region). Chiang's method in particular was chosen because it was relatively easy to adapt to the health region level data and included the calculation of standard error (in this case, addressing the variability of deaths from one year to the next).
- Birth statistics: Birth data on our Vital Statistics Database for Ontario are underestimated for data years 1996 and 1997 due to incomplete files. At least 1,500 Ontario births from 1997 were not available for geocoding. Birth data for those same years for some other provinces may also be incomplete. Thus, birth-related data (low birth weight, infant mortality, perinatal mortality), particularly for Ontario, should be interpreted with caution.
- Low birth weight: Due to a high number of missing birth weight values from the original 1996 and 1997 birth files from Quebec, we received supplementary data files that matched birth records with hospital records. These files allowed us to analyze a larger group of Quebec births for low birth weight data. Thus, our present analysis may differ from previous Statistics Canada publications for low birth weight that present data for those same data years.

Indicators based on 1996 Census data (STC)

- Regional data on non-medical determinants of health indicators and certain community characteristics were extracted from the 1996 Census, based on enumeration areas (EA). A correspondence file, linking EAs to current health regions has been developed in the Health Statistics Division of Statistics Canada with the cooperation of provincial Ministries of Health, Alberta Treasury and BC Stats.

- Income related indicators from 1996 Census are based on income in 1995.

- Low income rate, children in low income families: Low income data were not derived for economic families or unattached individuals in the Territories or on Indian reserves. For health regions containing Indian reserves, analysis of low income data should only be done with this caveat explicitly noted.

- Housing affordability: Band housing on Indian reserves was not included in the calculation of housing affordability. For health regions containing Indian reserves, analysis of housing affordability should only be done with this caveat explicitly noted.

- Proportion Aboriginal population: This variable is derived from three questions asked in the 1996 Census (20% sample). Aboriginal population refers to those persons who reported identifying with at least one Aboriginal group, i.e. North American Indian, Métis or Inuit and/or those who reported being a treaty Indian or a Registered Indian as defined by the Indian Act of Canada and/or who were members of an Indian Band or First Nation. Census coverage studies were used to adjust these data with the population estimates for incompletely enumerated Indian Bands or reserves. The 1996 demographic population estimates (which adjusts for census undercoverage and refusal reserves) were used as the denominator for these percentages.

For more information on census concepts, please refer to the *1996 Census Dictionary*, Statistics Canada, Catalogue no. 92-351-XPE.

Indicators based on 1996 to 1999 labour force data (STC)

- Regional unemployment rates and youth unemployment rates where calculated as annual averages from the Canadian Labour Force Survey (LFS). The estimates were derived by linking, at the enumeration area (EA) level, the LFS geography to health regions.

- Some health regions could not be published as the estimated rate did not meet the minimum requirements for quality and confidentiality.

- The LFS is a monthly sample of approximately 52,000 households. The survey is designed to represent the Canadian population aged 15 years and older. The survey excludes Indian reserves, full time members of the Canadian Forces, and persons living in institutions. The survey also excludes the Territories.

- The unemployment rate is the number of unemployed persons divided by the labour force population, expressed as a percentage. An unemployed person is someone who:
  - was without work and had looked for work
  - was on temporary layoff and available for work
  - had a new job to start in the future.

  The labour force population consists of the unemployed people plus the employed persons. To be employed, a person
  - worked at any job at all
  - had a job but was not at work during the reference week.

Health System Indicators (Canadian Institute for Health Information - CIHI)

CIHI's Privacy and Confidentiality policy does not permit the publication of data that might reasonably identify an individual whether a patient or care provider. As a result, data with small cell sizes have been suppressed. Additional measures have been taken to protect against residual disclosure from the dissemination of regional rates.

Hospitalization data and rates (CIHI)

- Data are reported based on the region of the patient's residence, not region of hospitalization. For most jurisdictions, this minimizes opportunities for identifying individual care providers. As a result of reporting data based on the region of residence, these figures reflect the hospitalization experience of residents of the region wherever they are treated, as opposed to the comprehensive activity of the region's hospitals (who will also treat people from outside of the region).

- Regional estimates for British Columbia are derived from reported postal codes using a translation file developed by BC STATS, BC Ministry of Finance and Corporate Relations. Health region level data for other provinces were produced through a geo-coding process using correspondence files developed with input from each provincial health ministry and Alberta Treasury. The link between enumeration areas and health regions was first created to provide the best resolution to census geography, and a census subdivision link to health regions was derived from this file. The boundaries are those that were in effect in January 1999. Records with invalid, missing, or partial postal codes are not included in regional counts. The absence of complete postal codes from Quebec for some indicators is likely to particularly affect rates for the Champlain District Health Council (Ottawa area) and other border regions.

- Where possible, Canadian and provincial indicator values are provided for comparison purposes. Where data are available, these totals include all provinces and territories.

- At the national level, rates for health data that are based on a fiscal year (April to March) use October 1st population estimates. Unless otherwise specified, Canadian and provincial hospitalization rates are standardized using the same methodology as regional rates. Other rates are based on appropriate population figures. Canadian rates for physicians are based on July 1st population estimates.

- Standardized rates are adjusted by age (collapsed to five-year groupings) using a direct method of standardization based on the July 1st, 1991 Canadian population.

- Unless otherwise specified, hospitalizations include discharges and deaths for inpatients in acute care hospitals for the reference period. Same day surgery (outpatient) cases and patients admitted to non-acute care hospitals (e.g. chronic care, psychiatric or rehabilitation facilities) are not included in the totals.

- Data from the Discharge Abstract Database include only jurisdictions that submit comprehensively to the database. Therefore, data from Quebec regions are not available.

- Where information is available, cancelled and previous procedures are excluded from the calculations. For Quebec data, cancelled procedures are not reported and therefore have not been excluded.

- 1997 figures for indicators derived from the Discharge Abstract Database may vary in some regions from previous figures due to recent updates to the database for hospitalizations in Saskatchewan, Alberta, New Brunswick and Ontario.

- Indicator values for Alberta, Newfoundland and Nova Scotia regions may vary from previously published figures as a result of revised population estimates, improved techniques to clarify boundaries or due to actual changes in health region boundaries.

Physician data (CIHI)

- In some regions, health facilities and personnel provide services to a larger community than the residents of the immediate region. In others, residents will frequently seek care from physicians outside the region where they live. The ratios of physicians to population reflect the number of doctors in a region and have not been adjusted to take these movements into account. The extent to which this affects individual regions is likely to vary.

- Figures include active civilian physicians (including those that are not providing clinical services, e.g. health research, administration and teaching) and exclude interns and residents. At a regional level, records with invalid, missing, or partial postal codes were excluded from the totals. Reporting is generally based on the region of the physician's office or hospital address (over 80% of cases), not region of residence. Reporting is based on total number of physicians on December 31 of the reference year (full or part time), not full time equivalent figures.

Appendix 1

Population estimates

In summary, the population estimates for the health regions in this publication were prepared as follows. First, the 1996 population estimates were based on the 1996 Census, adjusted for net undercoverage. Secondly, for non-census years, the Census-based population estimates were adjusted for changes in the population, primarily using administrative data. Lastly, subprovincial/subterritorial population estimates were controlled to sum to the population estimates at the provincial/territorial level prepared by Statistics Canada.

Statistics Canada methodology

For health regions in all provinces/territories[1] except for Quebec and British Columbia, the method is that of Statistics Canada, described below. These estimates are based on census data and on population estimates by census division (CD) produced by Demography Division.

Population universe

The population included in these estimates is based on the 1991 and 1996 Census of Canada. The universe, therefore, corresponds to the census universe, which includes Canadian citizens and landed immigrants with a usual place of residence in Canada (or abroad on a Canadian Forces base, attached to a diplomatic mission or aboard merchant vessels) and non-permanent residents. For a complete description of the census universe, refer to the *1996 Census Dictionary*, Statistics Canada Catalogue no 92-351-XPE.

Census data are adjusted to take into account net census undercoverage and incompletely enumerated Indian reserves. Components of population change occurring between census day and July 1, 1991 or 1996 were also taken into account.

Method for deriving demographic estimates by health regions

Population estimates at the census division (CD) level are produced annually by Demography Division, using the component method, which accounts for changes in the number of births and deaths, as well as intraprovincial, interprovincial and international migration. The CD population estimates are prorated to the provincial population estimates.

Demographic estimates by health region are derived from these estimates using the following steps:

Calculation of conversion factors:
Health Statistics Division has created a file linking enumeration areas (EAs), census subdivisions (CSDs) and census divisions (CDs) for each health region.

[1] The population estimates for health regions in Alberta prepared by Statistics Canada differ from those of Alberta Health and Wellness which are based principally on Alberta's health care file. The differences in these estimates are shown in Appendix 2. Work is under way to try to reconcile these differences.

The 1996 Census population by CDs (EAs or CSDs in case of split CDs) was adjusted for late changes in geography and for partially enumerated Indian reserves to ensure EAs added up to the CD.

In cases where health regions split CDs, the proportion of population in each CD split is used to derive 'conversion factors' in order to allocate the CD level estimate to the appropriate health region.

Application of conversion factors to CD demographic estimates:
Conversion factors were applied to CD population estimates for 1995 to 1997 allowing conversion of CD population estimates into HR population estimates. The same approach used to obtain the total population estimates was used to establish age and sex estimates by HR.

For more information on health region level estimates, please refer to *Health Regions – 2000* CD-ROM, Statistics Canada, Catalogue no. 82F0082XCB.

Provincial methodologies

For health regions in Quebec and British Columbia, the administrative files used for adjusting the 1996-based population estimates for non-census years differ from those used by Statistics Canada in the description above. For these two provinces, the health region population estimates were supplied by the Institut de la statistique du Québec and BC Stats.

Quebec

For information on the methodology used to derive the health region population estimates in Quebec, for 1995 to 1997, contact the Institut de la statistique du Québec, Direction des statistiques sociodémographiques at (418) 691-2406 or e-mail demographie@stat.gouv.qc.ca .

British Columbia

The methodology used by British Columbia to derive small area populations by gender and age group is divided into two parts.

A Regression Approach, specifically the **Difference-Correlation Method (DCM)**, is the primary method underlying the sub-provincial population estimates. A secondary method, known as **Proportional Allocation (PA)**, is also used to estimate the population for certain classes of areas. Both these methods use information derived from a set of indicators obtained from administrative files that are symptomatic of regional population changes.

In essence, the British Columbia small area population estimation model works as follows. Beginning with the most recent federal census (in this case the 1996 Census of Canada), each region's share of provincial population is adjusted up or down according to the current share of the provincial total of a weighted combination of residential hydro connections and/or Old Age Security recipients. Estimates of the population living in municipalities along with that portion of the population living outside the municipality but within the regional district (i.e., unorganized area), are controlled at the provincial level by a British Columbia population estimate prepared by Statistics Canada. Regional district population estimates are derived by summing the municipal and unorganized area population estimates. Local health areas are also controlled at the provincial level, and in

order to ensure consistency, the local health area population estimates within each regional district are then tied to the regional district population estimates.[2]

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[2] *BC Stats. Generalized Estimation System (GES), Small Area Population Estimation Methodology.* Ministry of Finance and Corporate Relations, December 1998.
Detailed information about the methodology used for estimating the age/gender distribution of small area population in British Columbia can be found in two documents on the BC Stats website *www.bcstats.gov.bc.ca* "Generalized Estimation System (GES)", December 1998, and "Estimating the Age/Gender Distribution of Small Area Populations in British Columbia", April 1994.

Appendix 2 Comparison of population estimates for health regions in Alberta by source, 1995-1997

		1995			1996			1997		
HR Code	**Health Region (HR) Name**	Demography Division, STC	*Alberta Health	% diff.	Demography Division, STC	*Alberta Health	% diff.	Demography Division, STC	*Alberta Health	% diff.
4801	Chinook RHA	143,439	143,778	-0.24	145,450	144,595	0.59	147,198	145,700	1.02
4802	Palliser RHA	85,761	84,312	1.69	86,900	85,546	1.56	88,126	86,718	1.60
4803	Headwaters RHA	69,274	65,315	5.71	71,179	67,055	5.79	72,873	69,193	5.05
4804	Calgary RHA	825,149	816,238	1.08	845,283	833,291	1.42	873,351	860,267	1.50
4805	RHA #5	51,862	50,607	2.42	52,824	51,297	2.89	53,530	51,644	3.52
4806	David Thompson RHA	178,263	175,534	1.53	181,469	177,433	2.22	185,201	180,184	2.71
4807	East Central RHA	103,744	102,017	1.66	103,872	102,040	1.76	104,426	102,674	1.68
4808	Westview RHA	88,505	84,024	5.06	89,437	85,831	4.03	90,827	87,783	3.35
4809	Crossroads RHA	38,736	38,534	0.52	39,004	38,492	1.31	39,539	38,862	1.71
4810	Capital Health Authority	777,895	785,319	-0.95	783,177	784,738	-0.20	794,051	791,614	0.31
4811	Aspen RHA	87,503	80,517	7.98	88,223	80,598	8.64	88,744	80,903	8.84
4812	Lakeland RHA	107,870	105,341	2.34	108,400	105,197	2.95	110,219	106,158	3.68
4813	Mistahia RHA	84,038	82,515	1.81	85,898	84,806	1.27	87,016	86,222	0.91
4814	Peace RHA	20,718	20,094	3.01	21,193	20,052	5.38	21,512	20,002	7.02
4815	Keeweetinok RHA	22,984	24,677	-7.37	23,565	25,001	-6.09	23,984	25,338	-5.65
4816	Northern Lights RHA	36,930	36,442	1.32	37,151	36,633	1.39	38,656	38,332	0.84
4817	Northwestern RHA	17,214	17,119	0.55	17,638	17,753	-0.65	17,951	18,784	-4.64
	Total	**2,739,885**	**2,712,383**	1.00	**2,780,663**	**2,740,358**	1.45	**2,837,204**	**2,790,378**	1.65

* Alberta Health and Wellness uses the Alberta Health Care Insurance Plan (AHCIP) Registry when determining health region population estimates. AHW population estimates are a count of the registrants active on June 30 of each fiscal year since 1994, as seen from December 31 of that year.