Statistics Canada Statistique Canada

Health Analysis Division:

Presentation of current health research activities at Statistics Canada

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Telling Canada's story in numbers

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Canada

Health Research at Statistics Canada

Health research at Statistics Canada has six broad objectives:

- Innovative use of existing datasets and/or data integration
- Highlight new and ongoing surveys and administrative datasets and inform Canadians on new findings
- Serve the policy information needs of federal government departments and stakeholders
- Support other divisions within Statistics Canada to achieve their analytical goals, improve survey content and quality of new data sources (linked data)
- Develop programs and materials for training and strategies for continuous learning
- Disseminate health information

Health Research at Statistics Canada

Health Analysis Division (HAD) is one of four divisions within the Analytical Studies Branch of Statistics Canada focussed on in-depth statistical analysis to provide new insights on Canadian society and the economy.

- HAD provides high quality, relevant, and comprehensive research and data development on the health status and health determinants of the population and on the health-care system.
- The information is designed for a broad range of stakeholders including policy makers, researchers, educators, and the general public.
- Collaboration with health partners, including federal ministries, national health organizations, and the academic community.

Health Research at Statistics Canada

- **Research Themes**
  - Maternal, child and youth health
  - Aging
  - Immigrant Health
  - Health of Aboriginal Peoples
  - Behaviours, chronic diseases, mental health and cancer
  - Health and the environment
  - Healthcare use, costs and impacts
- **Data Integration**
  - Record Linkage
  - Big data
  - Microsimulation
- **Methods and Tools**
  - New measures, derived variables
  - PCCF+
- **Dissemination**
  - Health Reports
  - Analytical Studies Methods and References
  - Other Statistics Canada publications
  - Broad range of academic journals
  - Workshops

Research Themes

Maternal, child, and youth health

On-going surveillance of maternal health and perinatal outcomes are important to understand and contribute to the improvement of health for pregnant women, mothers and infants. Childhood is an important stage of life where early influences can have a large impact, one that lasts throughout the life course. Poor health at this stage in life can lead to substantial impacts on the health care system as well as educational, social, and employment opportunities over the life course.

Perinatal outcome research projects:

- Socioeconomic disparities in small-for-gestational age birth and preterm birth
- Birth outcomes among First Nations, Inuit and Métis populations
- Paternal socioeconomic position and its correlate to adverse birth outcomes

Maternal, child, and youth health

Children's health research projects:

- Children with neurodevelopmental conditions
  - Service use and impacts on caregiver health
  - Income trajectories of families
  - Relationship between child health and parental divorce

- Long-term economic outcomes of young children with poor mental health

Aging

The number of seniors is expected to double by 2031, and an understanding of the current and future care needs of seniors is critical. The aging population is an area of focus for several programs at Statistics Canada including demography, economic and social statistics program. Using new linked data, HAD continues to focus on new ways to understand seniors' health, outcomes and need for services such a long-term care and homecare.

Research Projects:

- Health-adjusted life expectancy in Canada
- Uncontrolled hypertension among older men and women
- Identifying factors that place seniors at risk for admission to long term care
- Nutritional risk, hospitalization and mortality among community-dwelling Canadians aged 65 or older
- Impact of social isolation among community dwelling seniors on use of hospital services and mortality

Immigrant health

Understanding immigrant health outcomes is key, particularly the differences in outcomes among immigrant by either country of birth and/or immigrant category (i.e. refugees, economic class). Working in partnership with Immigration, Refugee and Citizenship Canada (IRCC) and others, new linked data have been developed to further enhance our capacity to better understand immigrant health.

Research projects:

- Understanding differences in cardiovascular disease outcomes by ethnicity
- Tuberculosis related hospitalizations among new immigrants
- HPV and HCV related hospitalizations among new immigrants
- Mental health related hospital admissions among refugees

Health of Aboriginal Peoples

Through partnerships developed over several years, HAD has established a program of research focussed on Aboriginal child and adult health including outcomes such as education and mental health and the association with influential social determinants found in communities, schools, and the family environment.

Research projects:

- Hospitalization for ambulatory care sensitive conditions among urban Métis adults
- Strong family networks and health among Métis aged 45 or older
- Smoking correlates among Inuit men and women in Inuit Nunangat

Health of Aboriginal Peoples

- Acute care hospitalizations for mental health disorders among First Nations people
- Hospitalizations for intentional injuries among Aboriginal men and women: Results from linked data
- Smoking among First Nations, Inuit, and Métis high school students
- Updating the Community Well Being Index
- Educational attainment and Aboriginal language knowledge among First Nations: Trends over time
- School bullying and health outcomes in First Nations youth
- Income assistance among Aboriginal people in Canada
- Overqualification among Aboriginal workers in Canada

Behaviours, chronic diseases, mental health and cancer - Behaviours

Health behaviours are often characteristics that can be modified in the population. Many chronic conditions are associated with a set of key factors including physical activity, nutrition, obesity, smoking, sleep. New this year will be a greater focus on cannabis use.

Research projects:

- Moderate-to-vigorous physical activity of Canadian children and youth
- Energy intake, underreporting an obesity status of Canadians: focus on fats, sugar intake and meeting food guide recommendations
- Historical trends in cannabis use among Canadians
- A profile of cannabis use for medicinal purposes

Behaviours, chronic diseases, mental health and cancer - Chronic disease

Chronic diseases are the leading cause of morbidity in developed countries and drive most of the healthcare use. HAD research focusses on a range of chronic conditions to provide information on disease prevalence, incidence and better understand the role of the social determinants of health outcomes.

Research projects:

- Multiple sclerosis: Prevalence and impact
- Health differences in factors associated with hypertension control among older Canadians
- Development of national predictive algorithms to measure impact of factors on risk for chronic disease outcomes and mortality – Cardiovascular Predictive (CVDPoRT), Mortality Predictive …. (MPoRT)

Behaviours, chronic diseases, mental health and cancer - Mental Health

Mental health and illness are a priority focus for both population health and health services. Understanding the patterns of mental health and related health care use among the population are important.

- Significance of self-rated mental health for specific Canadian population groups
- Mental health hospitalizations for Aboriginal people

Behaviours, chronic diseases, mental health and cancer - Cancer

Cancer is a leading cause of death in Canada. Understanding the impact of cancer screening on future cancer incidence and treatment patterns is important. Working with partners such as the Canadian Partnership Against Cancer (CPAC), new linked data and microsimulation tools have been developed to better understand cancer patterns.

Research projects:

- Trends in thyroid cancer
- National profiles of surgical treatment for breast and lung cancer
- Cost-effectiveness of HPV vaccination/cervical screening, colorectal cancer screening, and lung cancer screening using OncoSim microsimulation model

Health and the Environment

The physical environment is a well-established determinant of health. Spatial data, also known as geospatial data or geographic information, is information that identifies the geographic location of features and boundaries on Earth and can be used to derive physical environmental variables. Working with partners including Health Canada and the Canadian Urban Environmental Health Research Consortium (CANUE), these measures can be combined with existing survey and administrative health data to assess impacts on health.

Research projects:

- Impact of long-term exposure of air pollution and other pollutants on health outcomes (i.e. death, cancer, adverse birth outcomes)
- Examining the role of non-chemical stressors and stress susceptibility in modifying the effects of air pollutants on health

Healthcare use, costs and impacts

While information on healthcare use such as hospitals is readily available, taking a social determinants of health approach to better understand the pattern of use and highlight potential inequities.

- High use of acute care hospital services at age 50 or older
- Equity indicators for selected hospital indicators (asthma, AMI, COPD) by education, income, Aboriginal status
- Economic (income) impact of being hospitalized for a cardiac related event
- Home care

Data Integration

Data Integration: Record Linkage

The linking of Statistics Canada health survey data with provincial administrative data creates a valuable and cost-effective dataset that can provide answers to important research questions that cannot be found in survey and administrative data alone, such as health conditions in subsectors of the Canadian population.

- Canadian Community Health Survey linked to the Canadian Vital Statistics Death Database (2000-2011)*
- Canadian Community Health Survey linked to the Discharge Abstract Database (2000-2011)*
- Canadian Census Health and Environment Cohort (CanCHEC) – 1991*, 1996, 2001*, 2006 Census (long-form) cohorts linked to:
  - Canadian Cancer Registry and Canadian Vital Statistics Database (Mortality)
  - Environmental pollutants and greenness

Data Integration: Record Linkage

- Canadian Birth-Census Cohort (CanBCC)*
  - CanBCC 1996 – 1996 Census (long form) linked to Live birth, Stillbirth, and Infant Mortality databases
  - CanBCC 2006 – 2006 Census (long form) linked to Live birth, Stillbirth, and Infant Mortality databases
- 2006 Census of Population linked to the Discharge Abstract Database (DAD) 2006/07-2008/09*
- 1980-2013 Immigrant Landing File (IMDB) linked to
  - Discharge Abstract Database
  - National Ambulatory Care Reporting System

* Available in the Research Data Centres

Data Integration: Big Data

Environmental data comes in many shapes and forms and covers a wide spectrum of exposures. This includes air quality (e.g. particulate matter, nitrogen dioxide, ozone), built environment (e.g. green space, neighbourhood factors, noise), social environment (e.g. neighbourhood deprivation), and drinking water quality. These data are integrated with health datasets in order to examining the impact of environment on human health and behaviours.

- Attachment of environmental data to CHMS respondents including historical exposures
- Environmental pollutants and greenness added to census cohorts and survey data
- Other Spatial data (e.g. ultraviolet radiation, built environment)

Data Integration: Microsimulation

HAD, in partnership with external collaborators, leads the development of several microsimulation models designed to project the health and disease states of the Canadian population and to evaluate policy responses.

- OncoSim (formerly known as Cancer Risk Management Model (CRMM))
  - Integration of demographic, health behaviour and cancer data to project cancer burden and evaluate cancer control strategies
  - Sophisticated models of lung, colorectal, breast and cervical cancers featuring natural history of tumour onset and progression, select risk factors (e.g. smoking, human papilloma virus), survival, treatment, direct and indirect health care costs
  - Used to inform Canadian Task Force on Preventive Health Care Guidelines' recommendations on screening for colorectal and lung cancer, as well as uptake by provincial health ministries
  - Simpler models of 25 cancer sites of incidence, treatment costs, survival, and attribution to risk factors

  (Partner: Canadian Partnership Against Cancer)

Data Integration: Microsimulation

- POpulation HEalth Model (POHEM 2.0)
  - Integration of demographic, health behaviour and health outcomes to project population health and disease
  - Predictive algorithms for assigning risk of cardiovascular disease, diabetes, osteoarthritis, health status, mortality
  - Ability to evaluate the impact of policy options (e.g. smoking reduction, diabetes control through increased physical activity / reduced obesity)

  (Partner: Public Health Agency of Canada)

- POHEM-Neurological
  - Incidence, prevalence & cost of select neurological conditions including Alzheimer's, cerebral palsy, epilepsy, multiple sclerosis, Parkinson's, traumatic brain injury, traumatic spinal cord injury

  (Partner: Public Health Agency of Canada)

- SPSD/M – Health (Beta version)
  - Merging health and health care use information with the Social Policy Simulation Database and Model (SPSD/M) to conduct scenarios and impact of financing options

Data Integration: Microsimulation

Development projects:

- Veterans' Health: In collaboration with Veterans Affairs Canada, POHEM 2.0 will be expanded to identify veterans in order to project future health states and need for health services

- Long-term care and home care: HAD is currently working on a planning document to summarize various on-going activities with view of integrating into POHEM 2.0

Methods and Tools

HAD is also involved in the development of methods and tools to assist researchers working with health data.

Projects:

- Methodological considerations in comparing energy intake in Canada, 2004 and 2015
- Positional accuracy of geocoding: Postal Code^{OM} versus street address
- PCCF+ Update to 2016 Census and neighbourhood income quintiles

Dissemination

- *Health Reports*
  - Statistics Canada monthly publication
  - Types of articles - Research Articles, Health Matters, and Methodological Insights (Author Guidelines)
  - Peer reviewed; Editorial Board; Indexed in PUBMED
- *Analytical Studies: Methods and References*
- *Analytical Studies Branch Research Paper Series*
- External peer reviewed journals: CMAJ, Pediatrics, JAMA Oncology, BMC Med, PLOS Med etc.
- Workshops: Using CHMS Data; OncoSim Microsimulation Model

Questions?
Comments?

Contact us at...

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