Canadian Health Measures Survey (CHMS): an introduction and overview

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Health Statistics Division
Statistics Canada
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Overview

- Collection of data
- Content
- Microdata files
- Documentation available
- Online access and analytical products
- Biobank
CHMS OBJECTIVES

- **Explore** emerging public health issues and new measurement technologies
- **Establish** national baseline data on major health concerns
- **Determine** relationships among risk factors, protection practices and health status
- **Assess** the validity of self reported information
- **Assemble** a nationally representative sample for storage in a biobank
CHMS: FOUR COMPONENTS

- Household component – about 1¼ hours
- Mobile Examination Centre (MEC) component – about 2 ¼ to 3 hours
- Laboratory component – several external reference labs, one lab in the MEC
- Biobank component - storage for future health research of: whole blood, plasma, serum, urine and DNA.
OVERALL RESPONSE RATES: CYCLE 4

- **92%** of selected respondents completed the household questionnaire.
- **77%** of respondents who completed the household questionnaire attended the mobile clinic.
- Well over **90%** participation for all the tests performed at mobile examination centre.
SAMPLING STRATEGY: CYCLES 3 - 5

National sampling frame
(360 eligible collection sites)

- Collection sites stratified in 5 regions
- Covers about 96% of population
- 11 age/sex groups from age 3 to 79
- Sample size (n = 5,700) to yield national estimates by sex/age group at 10% prevalence with coefficient of variation of 16.5%

Collection sites selected

Households selected

Respondents selected
The questionnaire content is to be used in context with physical measures data and covers the following topics:

- Health status
- Nutrition and food
- Medication use
- Health behaviours
- Environmental factors
- Socio-economic information
THE MOBILE CLINIC
THE MOBILE CLINIC
PHYSICAL MEASURES: CYCLE 5

- Anthropometry
- Cardiorespiratory fitness
- Musculoskeletal fitness
- Physical activity
- Bone Health
- Vision
BLOOD AND URINE MEASURES: CYCLE 05

Over 200 laboratory tests

Cardiovascular health

Thyroid status

Nutritional status

General health

Diabetes

Infectious disease

Bone health
BLOOD AND URINE MEASURES: CYCLE 05 (cont’d)

Environmental exposure

- Plasticizers
- Metals
- Insecticides
- Volatile organic compounds
- Parabens
- Phthalates
- Bisphenol A
- Tobacco
- Hair samples – metals/trace elements
### MICRODATA FILES - CYCLE 1

<table>
<thead>
<tr>
<th>Full sample file</th>
<th>Subsample files</th>
<th>Medication file</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household questionnaire, clinic and laboratory measures done on all respondents</td>
<td>Content</td>
<td># obs.</td>
</tr>
<tr>
<td>5604 obs.</td>
<td>Fasting measures</td>
<td>2,634</td>
</tr>
<tr>
<td>Ages 6 to 79</td>
<td>Inorganic mercury</td>
<td>1,123</td>
</tr>
<tr>
<td></td>
<td>PBDE / PCB</td>
<td>1,696</td>
</tr>
<tr>
<td></td>
<td>PFCs</td>
<td>2,880</td>
</tr>
<tr>
<td></td>
<td>Activity monitor</td>
<td>4,441</td>
</tr>
<tr>
<td></td>
<td>Phthalates</td>
<td>3,237</td>
</tr>
<tr>
<td></td>
<td>Nicotine</td>
<td>2,483</td>
</tr>
</tbody>
</table>

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### MICRODATA FILES - CYCLE 2

<table>
<thead>
<tr>
<th>Content</th>
<th># obs.</th>
<th>Age covered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household questionnaire, clinic and laboratory measures done on all respondents</td>
<td>6,395 obs.</td>
<td>Ages 3 to 79</td>
</tr>
<tr>
<td>Fasting measures</td>
<td>2,793</td>
<td>6 to 79</td>
</tr>
<tr>
<td>Indoor air - hhld</td>
<td>3,857</td>
<td>N/A</td>
</tr>
<tr>
<td>Indoor air - person</td>
<td>5,191</td>
<td>3 to 79</td>
</tr>
<tr>
<td>Activity monitor</td>
<td>4,948</td>
<td>3 to 79</td>
</tr>
<tr>
<td>Environmental blood</td>
<td>1,524</td>
<td>12 to 79</td>
</tr>
<tr>
<td>Environmental urine</td>
<td>2,563</td>
<td>3 to 79</td>
</tr>
</tbody>
</table>

**Medication file**
- **Medication File**
  - 6,395 obs.
  - Ages 3 to 79

**Statistics Canada • Statistique Canada**

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### MICRODATA FILES - CYCLE 3

<table>
<thead>
<tr>
<th>Full sample file</th>
<th>Subsample files</th>
<th>Medication file</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household questionnaire, clinic and laboratory measures done on all respondents</td>
<td>Content</td>
<td># obs.</td>
</tr>
<tr>
<td><strong>Fasting measures</strong></td>
<td>2,571</td>
<td>6 to 79</td>
</tr>
<tr>
<td><strong>Activity monitor</strong></td>
<td>4,271</td>
<td>3 to 79</td>
</tr>
<tr>
<td><strong>RBC fatty acids</strong></td>
<td>1,984</td>
<td>20 to 79</td>
</tr>
<tr>
<td><strong>Fluoride - hhld</strong></td>
<td>2,188</td>
<td>12 to 79</td>
</tr>
<tr>
<td><strong>Fluoride - person</strong></td>
<td>2,671</td>
<td>12 to 79</td>
</tr>
<tr>
<td><strong>VOCs - hhld</strong></td>
<td>2,650</td>
<td>12 to 79</td>
</tr>
<tr>
<td><strong>VOCs - person</strong></td>
<td>2,527</td>
<td>12 to 79</td>
</tr>
<tr>
<td><strong>5,785 obs.</strong></td>
<td>Medication File</td>
<td>5,785 obs.</td>
</tr>
<tr>
<td>Ages 3 to 79</td>
<td>Ages 3 to 79</td>
<td></td>
</tr>
</tbody>
</table>

Statistics Canada • Statistique Canada
<table>
<thead>
<tr>
<th>Content</th>
<th># obs.</th>
<th>Age covered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acrylamide (environ. blood)</td>
<td>2,492</td>
<td>3 to 79</td>
</tr>
<tr>
<td>Methyl mercury (environ. blood)</td>
<td>1,032</td>
<td>20 to 79</td>
</tr>
<tr>
<td>NNK metabolites (environ. urine)</td>
<td>2,220</td>
<td>12 to 79</td>
</tr>
<tr>
<td>Environmental urine (main)</td>
<td>2,538</td>
<td>3 to 79</td>
</tr>
<tr>
<td>Indoor air - household</td>
<td>3,524</td>
<td>N/A</td>
</tr>
<tr>
<td>Indoor air - person</td>
<td>4,752</td>
<td>3 to 79</td>
</tr>
</tbody>
</table>

Pooled serum data file (50 environ. variables) – Fall 2016
## RELEASE DATES FOR MICRODATA FILES - CYCLE 4

<table>
<thead>
<tr>
<th>Release date</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oct. 13, 2016</td>
<td>Household, Clinic, hearing data</td>
</tr>
<tr>
<td>Dec. 8, 2016</td>
<td>Activity monitor data</td>
</tr>
<tr>
<td>Jan. 12, 2017</td>
<td>Non-environmental lab data</td>
</tr>
<tr>
<td>Feb. 23, 2017</td>
<td>Medication data</td>
</tr>
<tr>
<td>Apr. 6, 2017</td>
<td>Fluoride and VOC data (tap water and blood and urine subsamples)</td>
</tr>
<tr>
<td>May 25, 2017</td>
<td>Spirometry data</td>
</tr>
<tr>
<td>July 6, 2017</td>
<td>Environmental lab data (except fluoride, VOCs and indoor air)</td>
</tr>
<tr>
<td>Oct. 5, 2017</td>
<td>Indoor air data</td>
</tr>
</tbody>
</table>
CHMS DOCUMENTATION

- User guide
- Data dictionaries
  - Information for all variables on the full sample and subsample files
- Derived variables documentation
- Sampling documentation
- Instructions for combining multiple cycles of CHMS data
- CHMS Bibliography
- Content summary document
COMBINING MULTIPLE CYCLES OF CHMS DATA

- Use combined weights
- Use instructions document
  - Steps to follow
  - Limitations
  - Data files and variables that can be combined
  - Response rates for the combined cycles
  - SAS code
  - Analysis below national level – must consider
    - Reduced number of degrees of freedom
    - CHMS is designed to produce national estimates
  - Recommendations for analyzing CHMS data
RESEARCH DATA CENTRES (RDCs)

- Access route for most researchers
- Allows microdata access in universities across Canada, under research agreement, in a secure setting
- CHMS microdata and supporting documentation, all Statistics Canada health survey microdata
- Similar files at Health Canada & PHAC

http://www.statcan.gc.ca/rdc-cdr
STATISTICS CANADA ANALYTICAL PRODUCTS

- Health Reports journal articles
- Health at a Glance articles
- CANSIM data tables
- Cycle 3 fact sheets
- Cycle 4 fact sheets
Health Reports
Physical activity and sedentary behaviour of Canadian children aged 3 to 5

by Didier Garriguet, Valerie Carson, Rachel C. Colley, Ian Janssen, Brian W. Timmons and Mark S. Tremblay

Release date: September 21, 2016

For preschool children, physical activity is associated with improved measures of adiposity, motor skill development, psychosocial health and cardiometabolic health indicators, while sedentary behaviour, notably screen time, is associated with increased adiposity and decreased psychosocial and cognitive development. In 2012, this evidence was used to develop physical activity and sedentary behaviour guidelines for Canadian children aged 0 to 4.

During the 2009-to-2011 period, the Canadian Health Measures Survey (CHMS) employed accelerometers to obtain objective measures of physical activity among 3- to 5-year-olds. According to the accelerometer results, 84% of 3- to 4-year-olds met the guideline of at least 180 minutes of total physical activity on all valid days, but based on parental reports, the percentage meeting the guideline of no more than 1 hour of daily screen time was 18%. For 5-year-olds, the guideline of at least 60 minutes of daily...
**Health at a Glance**

Understanding your health by using reference ranges

*by Janine Clarke, Victoria Higgins, and Khosrow Adeli*

**Release date:** June 27, 2016

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**Highlights**

- Reference ranges are one of the many ways that doctors assess and monitor the health of Canadians.

Data from the Canadian Health Measures Survey have been used to update Canada-specific reference ranges for some substances found in blood.
Table 117-0011

Distribution of the household population by chronic diseases, by sex and age group occasional (percent)

The data below is a part of CANSIM table 117-0011. Use the Add/Remove data tab to customize your table.

<table>
<thead>
<tr>
<th>Diseases</th>
<th>Age group</th>
<th>Categories</th>
<th>2011</th>
<th>2013</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>Ages 6 to 79</td>
<td>Presence of Chronic Disease</td>
<td>18.0</td>
<td>18.8</td>
<td>18.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Absence of Chronic Disease</td>
<td>82.0</td>
<td>81.2</td>
<td>81.3</td>
</tr>
<tr>
<td>Chronic obstructive pulmonary disease (COPD)</td>
<td>Ages 35 to 79</td>
<td>Presence of Chronic Disease</td>
<td>13.3</td>
<td>14.2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Absence of Chronic Disease</td>
<td>86.7</td>
<td>85.8</td>
<td></td>
</tr>
</tbody>
</table>

Symbol legend:
Cycle 3 fact sheets

- Blood pressure: * adults, * children and youth
- Body composition/BMI: * adults, * children and youth
- Chronic obstructive pulmonary disease
- Metabolic syndrome
- Cholesterol levels
- Vitamins: * C, *. D
- Physical activity: * adults, *. children and youth
- Hearing loss
- Bisphenol A
- Tobacco use
- Lead, mercury and cadmium
- Omega 3 fatty acid levels
Other Cycle 4 fact sheets to be released:

- Body composition of adults
- Body mass index of children and youth
- Directly measured physical activity: * adults, * children and youth
- Metabolic syndrome of adults
- Cholesterol levels of adults
- Omega-3 fatty acid levels of adults
- Vitamin D levels of Canadians
- Chronic obstructive pulmonary disease
- Bisphenol A concentration in Canadians
- Tobacco use of Canadians
- Lead, mercury and cadmium concentrations in Canadians.
Canadian Health Measures Survey

One of the main goals of the survey is to gather information to help improve health programs and services in Canada. Your information may also be used by Statistics Canada for other statistical and research purposes.

The survey will collect information on Canadians’ health and health habits. The first part of the survey is a household interview, which includes questions on many health-related topics. The second part of the survey involves a visit to a mobile clinic to collect direct physical measures such as blood pressure, height and weight, bone density and vision tests.

Collection periods: January 4, 2016 to December 20, 2017

Collection methods: the first step is a personal interview in the respondent’s home. The second step is a visit to a mobile clinic, where physical measures are taken.

Survey participation: voluntary

Confidentiality

Data sharing agreements and record linkage

Topics covered in the survey

Published data

Biobank

Questionnaires, definitions, data sources and methods: survey number 5071

www.statcan.gc.ca/chms

or

www.statcan.gc.ca/ecms
The Canadian Health Measures Survey (CHMS), launched in 2007, is collecting key information relevant to the health of Canadians by means of direct physical measurements such as blood pressure, height, weight and physical fitness. In addition, the survey is collecting blood and urine samples to test for chronic and infectious diseases, nutrition and environment markers.

Through household interviews, the CHMS is gathering information related to nutrition, smoking habits, alcohol use, medical history, current health status, sexual behaviour, lifestyle and physical activity, the environment and housing characteristics, as well as demographic and socioeconomic variables.
DATA HIGHLIGHTS FROM CYCLE 3

- 11% of adults aged 35 to 79 measured airflow obstruction consistent with chronic obstructive pulmonary disease (COPD); however, 90% of these individuals were unaware of their condition.

- 25% of Canadians aged 3 to 79 were at risk for inadequate vitamin D and 10% were at risk for having a vitamin D deficiency.

- 21% of Canadian adults aged 18 to 79 suffer from metabolic syndrome.

- 62% of Canadian adults aged 18 to 79 and 31% of children and youth 5 to 17 years were overweight or obese.
About 4 in 10 Canadian adults aged 20 to 79 have been measured as having at least slight hearing loss in one or both ears and 77% of these adults weren’t aware.

Almost 8 in 10 adults aged 60 to 79 had hearing loss.

A quarter of Canadian adults aged 20 and older suffer from high blood pressure.

7% of children and youth aged 19 and younger had blood pressure considered borderline or elevated.

Both adults and children who were classified as being overweight or obese had higher blood pressure than their normal weight counterparts.
FUTURE CONTENT CYCLES 5-8

- Cycles 5 and/or 6
  - Neighbourhood environment
  - Sleep apnea
  - Hair (metals)
  - Vision
  - pQCT and mechanography

- Cycles 7 & 8
  - Dual-energy x-ray absorptiometry (DXA)
  - More to come
CHMS BIOBANK

- Whole blood
- Serum
- Plasma
- Urine
- Buffy Coat DNA
- Saliva DNA

National Microbiology Laboratory, Winnipeg MB
To access CHMS respondent relations section of the website: www.statcan.gc.ca/chms or www.statcan.gc.ca/ecms

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- Topics covered in the survey
- Published data
- Biobank
To access information on the biobank studies in progress, how researchers can access the samples and how respondents can withdraw their samples, click Biobank.

- What kind of biospecimens are available?
- Who can use the biospecimens?
- How to access the CHMS biospecimens
- Analytical studies based on stored biospecimens
- Respondents wishing to withdraw their biospecimens from the Biobank
- Approved studies – in progress
- Approved studies – completed

What kind of biospecimens are available?

After several years of collection, the CHMS has collected hundreds of thousands of small test tubes of DNA, whole blood, blood fractions and urine from survey participants.

The CHMS plans to continue adding biospecimens to the biobank with each survey cycle.

More information can be found under Available stored biospecimens.
STEPs FOR ACCESS

• Proposal application submitted to CHMS Biobank
• Feasibility assessment by CHMS Staff
• Biobank Advisory Committee
• Statistics Canada’s senior management

• Key points
  ✓ Proof of Funding
  ✓ Research Ethics Board approval
  ✓ Security Clearance – facility and personnel
COSTS

- Samples available on cost recovery basis:
  - 2 ml serum, plasma, whole blood: $44,000 per series
  - DNA plates: $44,000 per series
  - 5 ml urine: $48,000 per series
- costs are estimates only
ADDITIONAL INFORMATION

Data User Workshops

- one-day hands-on workshops using synthetic data file; practice using recommended software SAS and SUDAAN
- offered once or twice a year, according to demand

For more information on the CHMS:

- toll-free number: 1-888-253-1087
- e-mail: statcan.infostats-infostats.statcan@canada.ca
- Web site: www.statcan.gc.ca/chms
QUESTIONS?

Joanne Boisjoli
Biobank Coordinator,

e-mail: statcan.chms-biobank-ecms-biobanque.statcan@canada.ca

Web site: www.statcan.gc.ca/chms