Overview of the Canadian Health Measures Survey
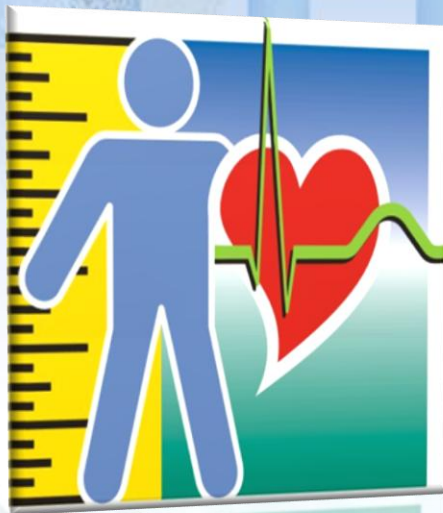
Josée Bégin, Director
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October 20, 2015

Outline

- Objectives

- Background

- Present and future content

- Collection processes

- CHMS Biobank

- Survey results

- Future health measures

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- and proxy-reported information.

- **Assemble** a nationally representative sample for storage in a biobank.

Background

- Nationally representative survey
  - 5,700 respondents per two-year cycle; 3- to 79- year-olds
  - Collection for first cycle began in 2007; collection completed for three cycles (cycle 4 near completion)
  - Planning up to cycle 8 (2022-2023) is well underway
  - Dissemination for a cycle begins 10 months after the end of the cycle collection
- Direct physical measurements
- Informed consent process
- Working in partnership with Health Canada and the Public Health Agency of Canada

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Direct physical measures

- Health information collected through self-report surveys or administrative records may be incomplete or inaccurate.

  - ➢ Many variables cannot be assessed in the absence of direct physical measurements.
  - ➢ Directly measured variables can be reported on continuous scales.
  - ➢ Directly measured variables are more robust and objective.

- Important health issues (metabolic syndrome, environmental toxins, physical inactivity) cannot be monitored without direct measures.

Consultations

CHMS: One project, 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.

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Consent process

1. **Physical measures** – to participate in the physical measures tests
2. **Lab report** – to receive a copy of the test results (such as the Report of Laboratory Tests and the lung function test results)
3. **Reportable disease/contaminants panel** – to allow Statistics Canada to test blood and urine for diseases and contaminants that are reportable in this province and to be contacted, along with the appropriate provincial authorities, if the results are positive
4. **Biostorage** – to allow the storage of blood and urine for use in future health studies
5. **DNA storage** – to allow the storage of DNA for use in future health studies
6. **Youth assent / written parental consent** – for children under 14 to take part in the survey and for storage
7. **Linking and sharing** – oral consent at the end of clinic collection to use the information for the purposes stated above
8. **Longitudinal participation** – permission to re-contact and tracing component for entire survey population

Benefits to respondents

- At end of the clinic visit, respondents receive the results of their physical tests.

- Lab test results are sent to respondents about 6 to 7 months after the clinic visit (with prior consent).

- Early reporting protocols are in place for lab results beyond threshold values.

- Respondents receive $100 to cover expenses for their participation.

Overall response rates: cycle 3

Statistical unit	All sites (%)
Households that provided a list of household members (as a percentage of all households randomly selected for the survey)	74
Respondents who completed the questionnaire (as a percentage of total respondents selected)	88
Respondents who attended a mobile clinic (as a percentage of respondents who completed the questionnaire)	79

Sampling strategy: cycles 3 and 4

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
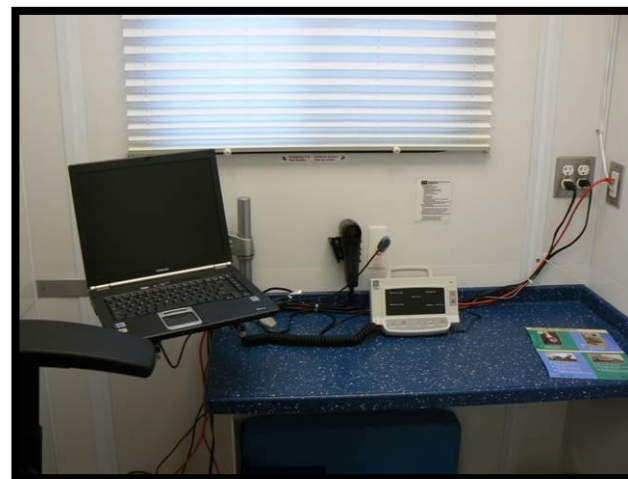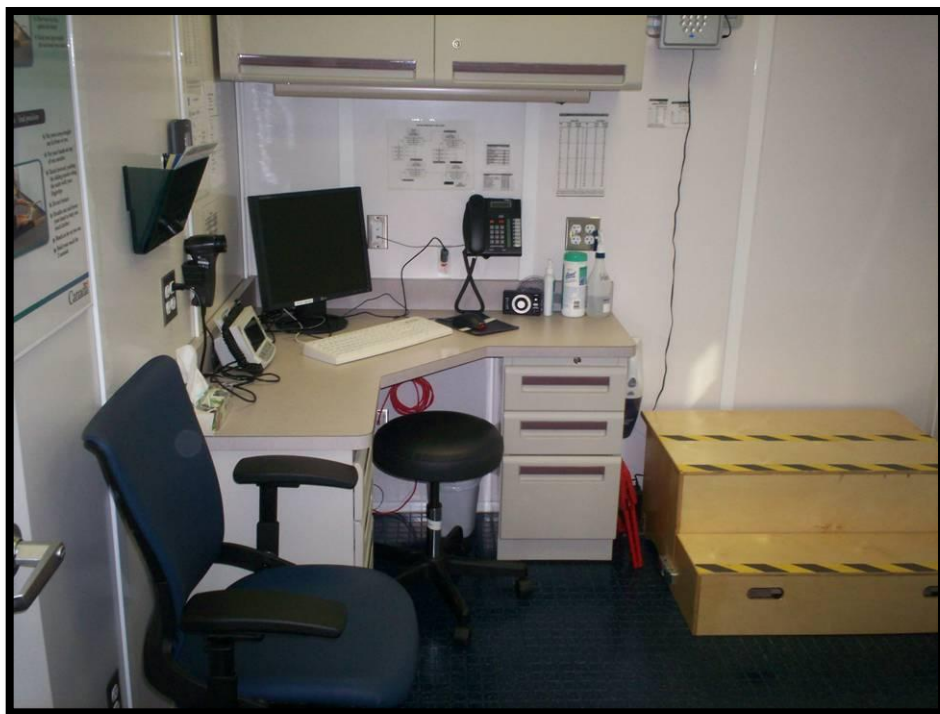
Collection sites: cycle 4

Terrace Kitimat
Edmonton
Saguenay
St-Hyacinthe
Fredericton
Thunder Bay
Laval
Shelburne
Kelowna
Regina
Montreal
Brockville
Kitchener-Waterloo
Toronto (2)
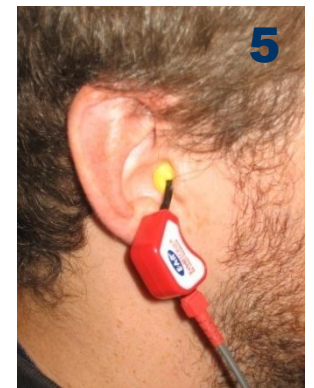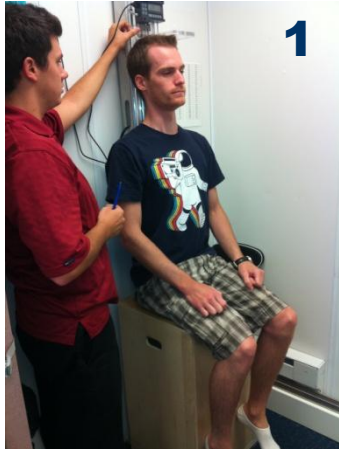Hamilton

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Mobile clinic

Mobile clinic
(cont'd)

Mobile clinic experience

Measures taken at home

Questionnaire content: cycle 3

The questionnaire content should be considered with physical measures data, and covers the following topics:

- health status

- nutrition and food

- medication use

- health behaviours

- environmental factors

- socio-economic information.

Physical measures: cycle 3

- **Anthropometry**
  - Standing height, sitting height, weight
  - Waist and hip circumference

- **Cardiorespiratory fitness**
  - Resting blood pressure and heart rate
  - Spirometry
  - Fractional exhaled nitric oxide (FENO)

- **Muscular strength**
  - Hand grip strength

- **Hearing assessment**

- **Skin pigmentation**

- **Physical activity**
  - Accelerometer

- **Indoor air sampler**

- **Tap water samples** (taken from randomly selected households)

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Blood and urine tests: cycle 3

Blood

- **General:** Complete blood count (CBC), blood chemistry panel

- **Allergies**

- **Cardiovascular health:**
  C-reactive protein (high sensitivity), HDL, LDL, total cholesterol and triglycerides and fatty acids

- **Diabetes:** Fasting, non-fasting and random glucose, fasting insulin and HbA1$_c$

- **Environmental exposure:** Metals (cadmium, lead and mercury [total and methyl]), acrylamide and volatile organic compounds (VOCs)

- **Infectious diseases:** Hepatitis B and C

- **Nutritional status:** Ferritin, red blood cell folate, vitamin B12, vitamin C and vitamin D

- **Reproductive hormones**

- **Thyroid status**

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Blood and urine tests: cycle 3

Urine

- **Environmental exposure:** Metals (arsenic - speciated, fluoride, and inorganic mercury), benzene metabolites, bisphenol A, organophosphate insecticides, polyaromatic hydrocarbons (PAHs), parabens, tobacco and triclosan

- **Kidney function:** Creatinine and microalbumin

- **Nutritional status:** Iodine

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CHMS Biobank: background

- Blood, urine and DNA samples from consenting respondents are stored for future studies.

- Information on purposes of storage, access and right to withdraw is provided to respondents prior to collection.

- The National Microbiology Laboratory in Winnipeg is the biorepository (Biobank) for long-term storage of biospecimens.

- Invaluable but finite (non-renewable) source of information.

- For more information on accessing the CHMS Biobank, please visit www.statcan.gc.ca/eng/survey/household/5071g.

Biobank process

- Call for proposals twice a year (spring and fall)
- Feasibility assessment by CHMS staff
- Biobank Advisory Committee
  - four federal members
  - four external members (academics)
- Statistics Canada's senior management
- **Key points**
  - Proof of funding
  - Research Ethics Board approval
  - Security Clearance – facility and personnel

Current status of Biobank projects

- First ever results available for a CHMS Biobank project – September 30, 2015

  - ➤ Project studying "The modifying effect of genetic polymorphisms involved in folate and B12 metabolism on the relationship between folate/B12 intake and vitamin status"

  - ➤ Will be releasing a data file containing results from 116 markers related to folate and B12 metabolism to the Research Data Centres (RDCs)

- One project has been fully approved

  - ➤ Analysis will start later this year

- Two other projects still going through approval process

  - ➤ Funding, Reasearch Ethics Board (REB) approval, Biobank Advisory Committee follow-up

- Next call for proposals November and December 2015

Statistics Canada analytical products

- Health Reports journal articles
  - ➢ Peer-reviewed, academic, fairly lengthy
  - ➢ Cycle 3 releases
    - Prevalence of hearing loss – 20- to 79-year-old (July 15, 2015)
    - Omega 3 index – 3- to 79-year-old (November 18, 2015)
    - Activity monitor results – 3- to 5-year-old (Spring 2016)

- *Health at a Glance* articles
  - ➢ Moderate length
  - ➢ Cycle 3 release
    - Volatile organic compounds in air, water and blood - 3- to 79-year-old (Spring 2016)

- Data tables

Statistics Canada analytical products (cont'd)

- ## Fact sheets
  - ➤ Plain language, basic descriptive analysis
  - ➤ Cycle 3 released
    - Blood pressure: 1. adults, 2. children and youth
    - Body composition/BMI: 1. adults, 2. children and youth
    - Chronic obstructive pulmonary disease
    - Metabolic syndrome
    - Cholesterol levels
    - Vitamins: 1. C, 2. D
    - Physical activity: 1. adults, 2. children and youth
    - Hearing loss
    - Bisphenol A
    - Tobacco use
    - Lead, mercury and cadmium
    - Omega 3 index (for release November 18, 2015)

Portrait of a typical 12-year-old boy and girl, 1981 and 2007-2009

BOY

1981	BODY COMPOSITION	2007-2009
150.9 cm (4'11")	Height	155.8 cm (5'1")*
41.6 kg (92 pounds)	Weight	48.0 kg (106 pounds)*
18.1 kg/m²	Body mass index	19.2 kg/m²*
64.9 cm (25.6")	Waist circumference	66.2 cm (26.1")
78.0 cm (30.7")	Hip circumference	84.0 cm (33.1")*
0.83	Waist-to-hip ratio	0.82*
	FITNESS TESTS	
49 kg	Grip strength	44 kg*
26.5 cm	Sit-and-reach	21.4 cm*

GIRL

1981	BODY COMPOSITION	2007-2009
153.1 cm (5'0")	Height	155.9 cm (5'1")*
42.7 kg (94 pounds)	Weight	47.6 kg (105 pounds)*
18.4 kg/m²	Body mass index	19.5 kg/m²*
62.4 cm (24.6")	Waist circumference	68.0 cm (26.8")*
81.2 cm (32.0")	Hip circumference	86.0 cm (33.9")*
0.76	Waist-to-hip ratio	0.79*
	FITNESS TESTS	
43 kg	Grip strength	40 kg*
32.0 cm	Sit-and-reach	28.2 cm*

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Portrait of a typical 45-year-old male and female, 1981 and 2007-2009

MALE

1981	BODY COMPOSITION	2007-2009
173.0 cm (5'8")	Height	175.3 cm (5'9")
77.4 kg (171 pounds)	Weight	86.6 kg (191 pounds)*
25.7 kg/m² - overweight	Body mass index	27.9 kg/m²* - overweight
90.6 cm (35.7") - low risk	Waist circumference	97.0 cm (38.2")* - increased risk
99.0 cm (39.0")	Hip circumference	102.7 cm (40.4")*
0.91	Waist-to-hip ratio	0.95*
	FITNESS TESTS	
104 kg - very good	Grip strength	94 kg* - good
23.1 cm - fair	Sit-and-reach	26.7 cm* - good
–	Predicted maximal aerobic power (VO₂max)	39.2 ml·(kg·min)⁻¹ - good

FEMALE

| 1981	BODY COMPOSITION	2007-2009
161.5 cm (5'4")	Height	162.3 cm (5'4")
63.2 kg (139 pounds)	Weight	68.4 kg (151 pounds)*
24.1 kg/m² - normal weight	Body mass index	25.8 kg/m²* - overweight
76.3 cm (30.0") - low risk	Waist circumference	83.4 cm (32.8")* - increased risk
98.5 cm (38.8")	Hip circumference	102.5 cm (40.4")*
0.77	Waist-to-hip ratio	0.81*
	FITNESS TESTS	
62 kg - very good	Grip strength	56 kg* - good
30.2 cm - good	Sit-and-reach	31.5 cm - good
–	Predicted maximal aerobic power (VO₂max)	32.8 ml·(kg·min)⁻¹ - good

Data highlights from cycle 3

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

- 22% of Canadian adults aged 20 and older and 2% of children and youth aged 19 and younger suffer from high blood pressure

- 65% of Canadians aged 3 to 79 had vitamin D levels that are likely sufficient to fulfill the body's requirement for optimal bone health, while 25% 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

- 38% of Canadian adults aged 18 to 79 suffer from dyslipidemia; however, half of those individuals were unaware of their condition

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Hearing loss among adults aged 19 to 79, by sex and age group, Canada, 2012 and 2013
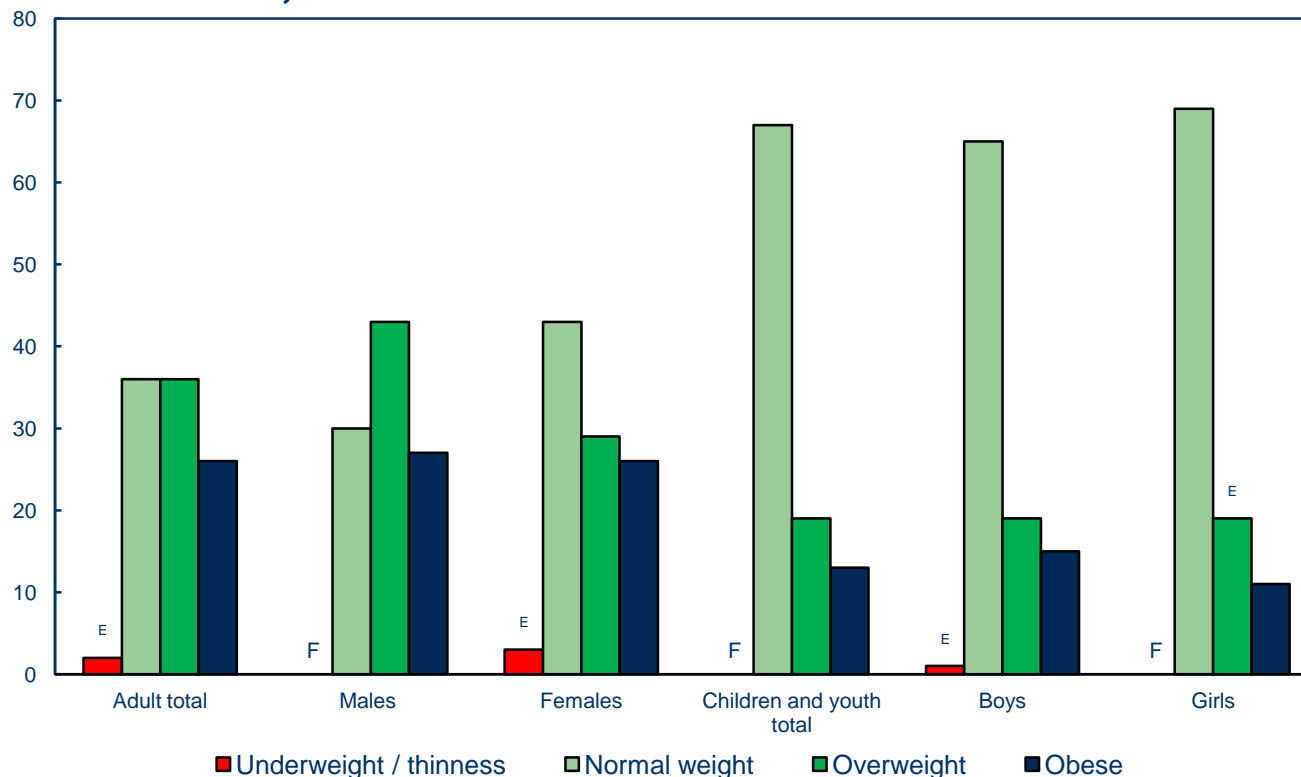
percent
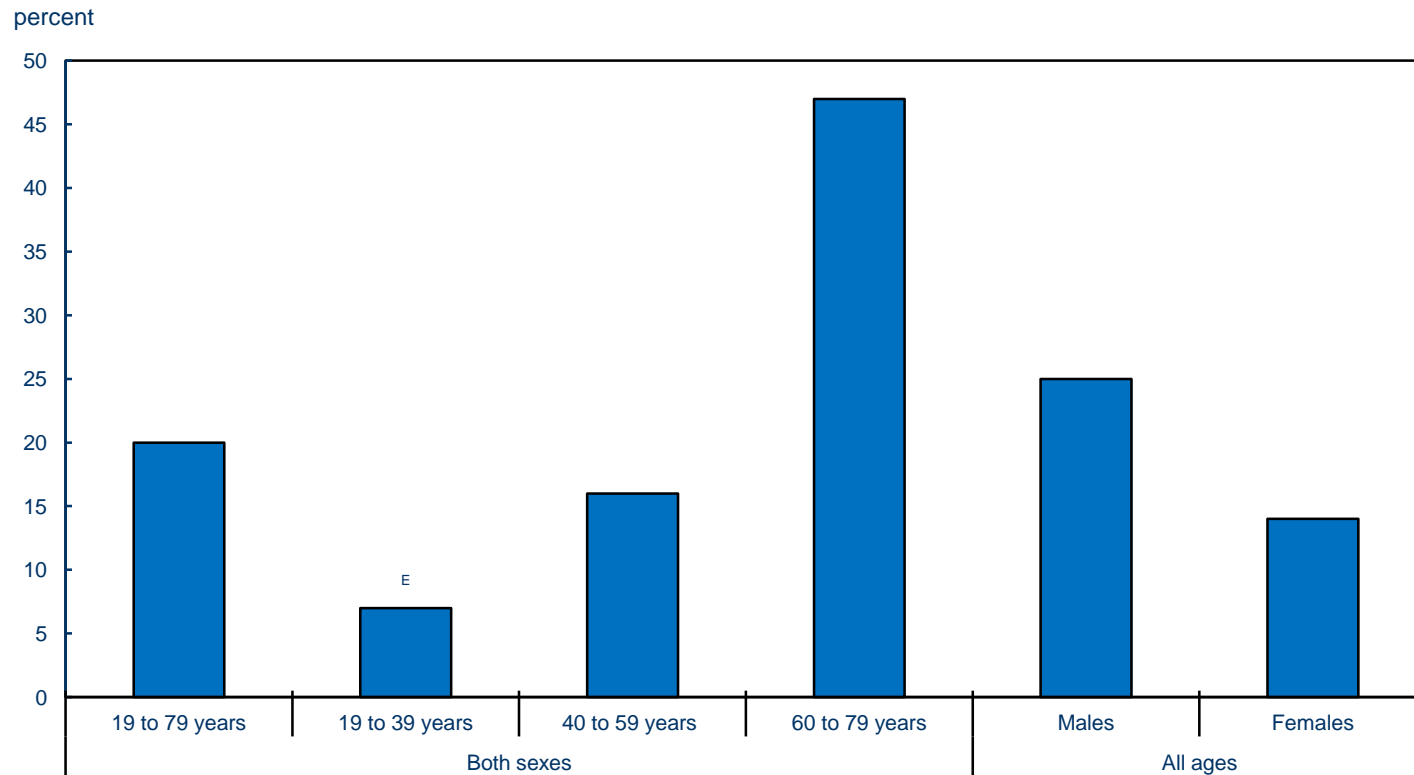
E use with caution (data with a coefficient of variation from 16.6% to 33.3%)

Source: Canadian Health Measures Survey, 2012 and 2013.

Distribution of adults aged 18 to 79 and children and youth aged 5 to 17, by body mass index (BMI) and gender, household population, Canada, 2012 and 2013

percent

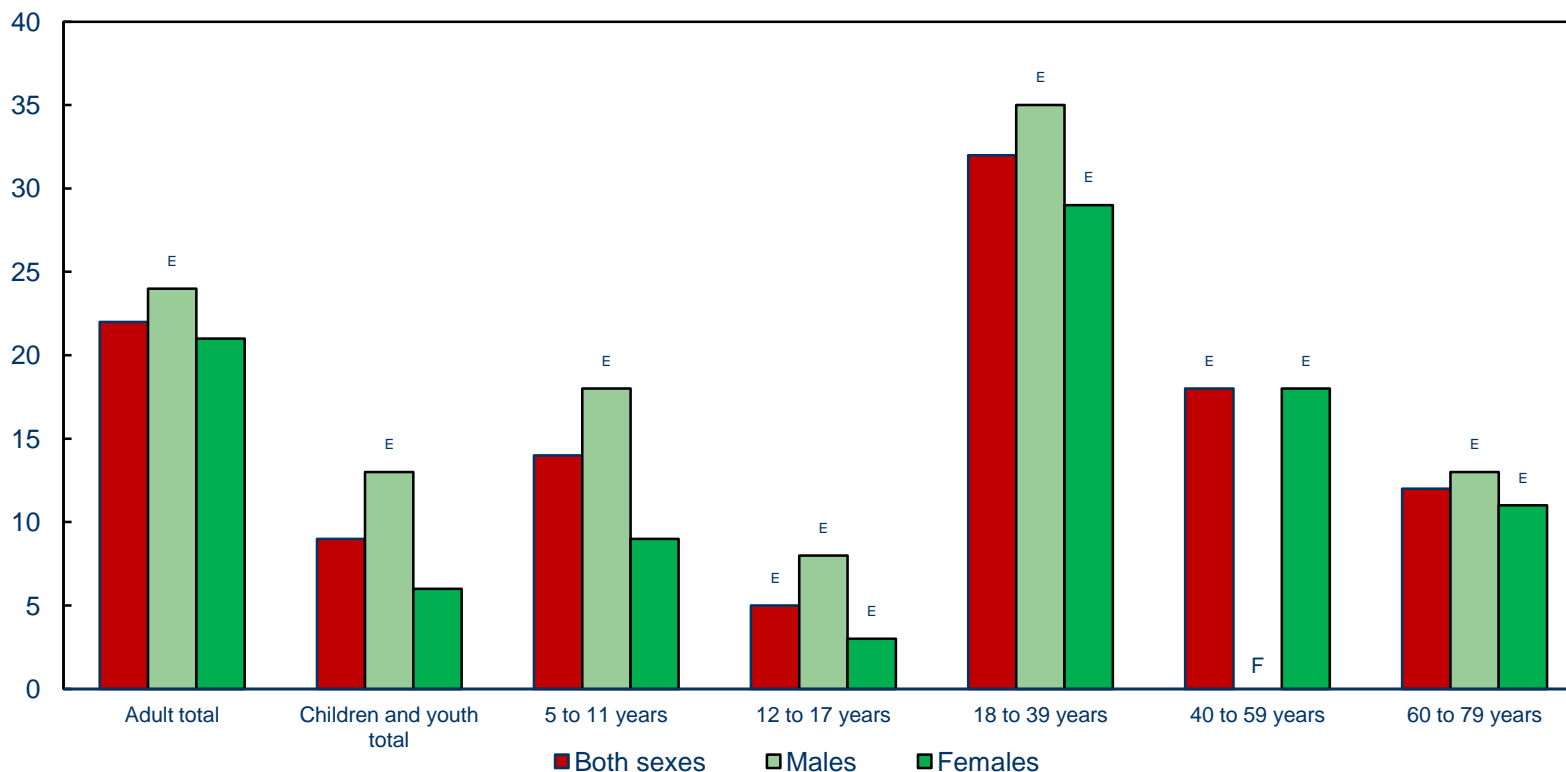E use with caution (data with a coefficient of variation (CV) from 16.6% to 33.3%)

F too unreliable to be published (data with a coefficient of variation (CV) greater than 33.3%; suppressed due to extreme sampling variability)

Source: Canadian Health Measures Survey, 2012 and 2013.

Proportion of adults aged 18 to 79 and children and youth aged 5 to 17 meeting the Canadian Physical Activity Guidelines, by age group and sex, Canada, 2012 and 2013

E use with caution (data with a coefficient of variation from 16.6% to 33.3%)
F too unreliable to be published (data with a coefficient of variation (CV) greater than 33.3%; suppressed due to extreme sampling variability

Source: Canadian Health Measures Survey, 2012 and 2013

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Future content: cycles 5 to 8

- Cycles 5 and 6
  - Neighbourhood environment
  - Sleep apnea
  - Vision
  - pQCT and mechanography
  - Toxoplasmosis
  - Hair (metals)
  - Saliva (DNA)
  - Phthalate metabolites & alternate plasticizers in urine
- Cycles 7 and 8
  - Dual-energy x-ray absorptiometry (DXA)

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For more information visit...

www.statcan.gc.ca