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

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Canada

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- and proxy-reported information
- **Assemble** a nationally representative sample for storage in a biobank

HEALTH SURVEYS PROGRAM

	CCHS Annual	CCHS Rapid Response	CCHS Focus Content	CHMS
Content	General health surveillance Sample buy-ins	Emerging need - determined by client	Single content in-depth Sample buy-ins	HH information related to physical measures Physical measures in MEC Laboratory tests Buy-ins
Sample size	65,000 respondents	11,000 respondents by 2 months collection period	27,000 respondents	5,700 respondents per cycle
Frequency	Annual	Up to 6 periods by year	Every three years	2 year cycle
Geography	Canada, provinces, territories & health regions	Canada & provinces	Canada & provinces	Canada only
Age groups	12+	12+	Varies depending on survey	3 - 79

SURVEY PARAMETERS: CYCLE 3



- National estimates: $n = 5,700$
- Survey population aged 3 to 79
- Direct physical measurements completed in mobile clinic over 2 years
- Collection from Jan 2012 to Dec 2013

SAMPLING STRATEGY: CYCLE 3

National sampling frame
(360 eligible collection sites)



- Collection sites stratified in 5 regions
- Covers about 94% 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 3



QUESTIONNAIRE CONTENT: CYCLE 3

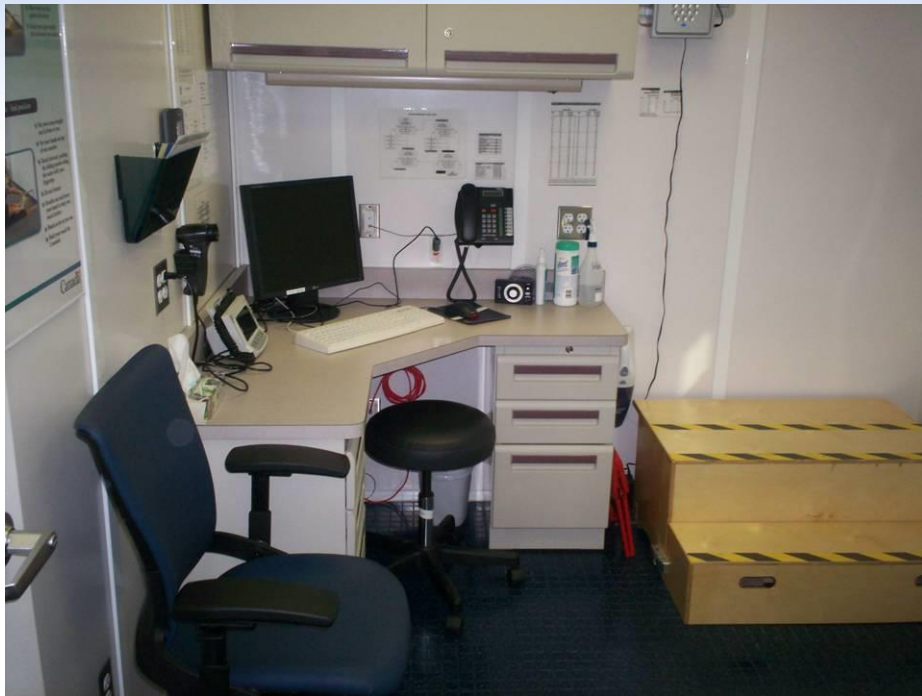
The questionnaire content is to be used only in context with physical measures data and covers the following topics:

- Health status
- Nutrition and food
- Medication use
- Health behaviours
- Environmental factors
- Socio-economic information

THE MOBILE CLINIC



THE MOBILE CLINIC



PHYSICAL MEASURES: CYCLE 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 some randomly selected households)

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 HbA_{1c}
- **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**

Urine

- **Environmental exposure:** Metals (arsenic (speciated), fluoride and inorganic mercury), benzene metabolites, bisphenol A, organophosphate insecticides, polycyclic aromatic hydrocarbons (PAHs), parabens, tobacco and triclosan
- **Kidney function:** Creatinine and microalbumin
- **Nutritional status:** Iodine

MICRODATA FILES (CYCLE 1)

Full sample file

Subsample files

Medication file

Household questionnaire, clinic and laboratory measures done on all respondents

5604 obs.

Ages 6 to 79

Content	# obs.	Age covered
Fasting measures	2,634	6 to 79
Inorganic mercury	1,123	6 to 79
PBDE / PCB	1,696	20 to 79
PFCs	2,880	20 to 79
Activity monitor	4,441	6 to 79
Phthalates	3,237	6 to 49
Nicotine	2,483	12 to 79

Medication File

5604 obs.

Ages 6 to 79

MICRODATA FILES (CYCLE 2)

Full sample file

Subsample files

Medication file

Household questionnaire, clinic and laboratory measures done on all respondents
6,395 obs.
Ages 3 to 79

Content	# obs.	Age covered
Fasting measures	2,793	6 to 79
Indoor air - hhld	3,857	N/A
Indoor air - person	5,191	3 to 79
Activity monitor	4,948	3 to 79
Environmental blood	1,524	12 to 79
Environmental urine	2,563	3 to 79

Medication File
6,395 obs.
Ages 3 to 79

PLANS FOR MICRODATA FILES (CYCLE 3)

Release date	Topic	Full sample files	Subsample files
October 15, 2014	Most household/clinic data Climate file, postal code file	2 n/a	- n/a
December 17, 2014	Medication, activity monitor and non-environmental lab data	3	3
March 18, 2015	Fluoride and volatile organic compounds	0	4
May 20, 2015	Environmental lab data	1	4
July 15, 2015	Indoor air data	0	2
October 21, 2015	Pooled serum data file (50 environmental variables)	n/a	n/a

CHMS BIOBANK: BACKGROUND



- The National Microbiology Laboratory in Winnipeg is the biorepository (i.e., biobank) for long-term storage of biosamples
- Information on purposes of storage, access and right of withdrawal is provided to respondents prior to collection
- Blood and urine samples from all consenting respondents are stored for future studies
- DNA samples from consenting respondents 14 years and older are stored for future studies
- Invaluable but finite (non-renewable) source of information

CHMS BIOBANK: CURRENT STATUS

- Access requirements developed and posted on Statistics Canada's website (www.statcan.gc.ca/chms)
- Two projects fully approved:
 - to help establish pediatric and adult “normal values” in Canadian populations to allow for appropriate clinical interpretation of laboratory results (K. Adeli, The Hospital for Sick Children, Toronto)
 - to support the hypothesis that individuals within the population respond differently to folate intake depending on genetic predisposition (H. Morrison, PHAC)
- Five projects passed the feasibility stage of approval
- Next call for proposals: Nov 1 – Dec 31, 2013

CHMS BIOBANK: CONSIDERATIONS



- Multi-step access and approval process
- Must do analysis at a Statistics Canada Research Data Centre
- Exclusive access to data file for a year before file becomes available to other researchers in RDCs
- Cost:
 - 2 ml serum, plasma, whole blood: \$7.40 per sample
 - DNA plates: \$12.00 per sample
 - 5 ml urine: \$8.20 per sample
- Statistics Canada's confidentiality and physical security requirements must be satisfied

CHMS BIOBANK: STEPS FOR ACCESS



- Thoroughly review *Access Requirements and Protocols for the Canadian Health Measures Survey Biobank*
- Complete detailed *Application Form to Use Biospecimens*
- Provide additional clarification and information to CHMS Biobank Coordinator at several possible stages
 - Initial feasibility stage
 - Biobank Advisory Committee review stage
 - Statistics Canada's senior management review stage

CHMS DOCUMENTATION



- User guide
 - Survey content, procedures
 - Data quality, weighting
- Data dictionaries
 - Information for all variables on the master file
 - Name, length, data type (character / numeric)
 - Location on the file, applicable values
 - Coverage statements
 - Univariate counts (weighted and unweighted; at RDC only)
- Instructions for combining cycle 1 and cycle 2 CHMS data
- Analytical products released in the Daily



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>

DATA HIGHLIGHTS FROM CYCLE 2



- 22% of Canadian adults suffer from high blood pressure; however, 17% of these individuals are unaware of their condition
- 39% of Canadians aged 6 to 79 have an unhealthy level of total cholesterol
- 96% of Canadians aged 3 to 79 have sufficient vitamin B12 and iron levels
- Over the last 20 years, there has been a reduction in Canadians' exposure to indoor air pollutants (i.e. benzene, toluene, ethylbenzene, and xylenes)

Portrait of a typical 12-year-old boy and girl, 1981 and 2007 to 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/m ²	Body mass index	19.2 kg/m ² *
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*

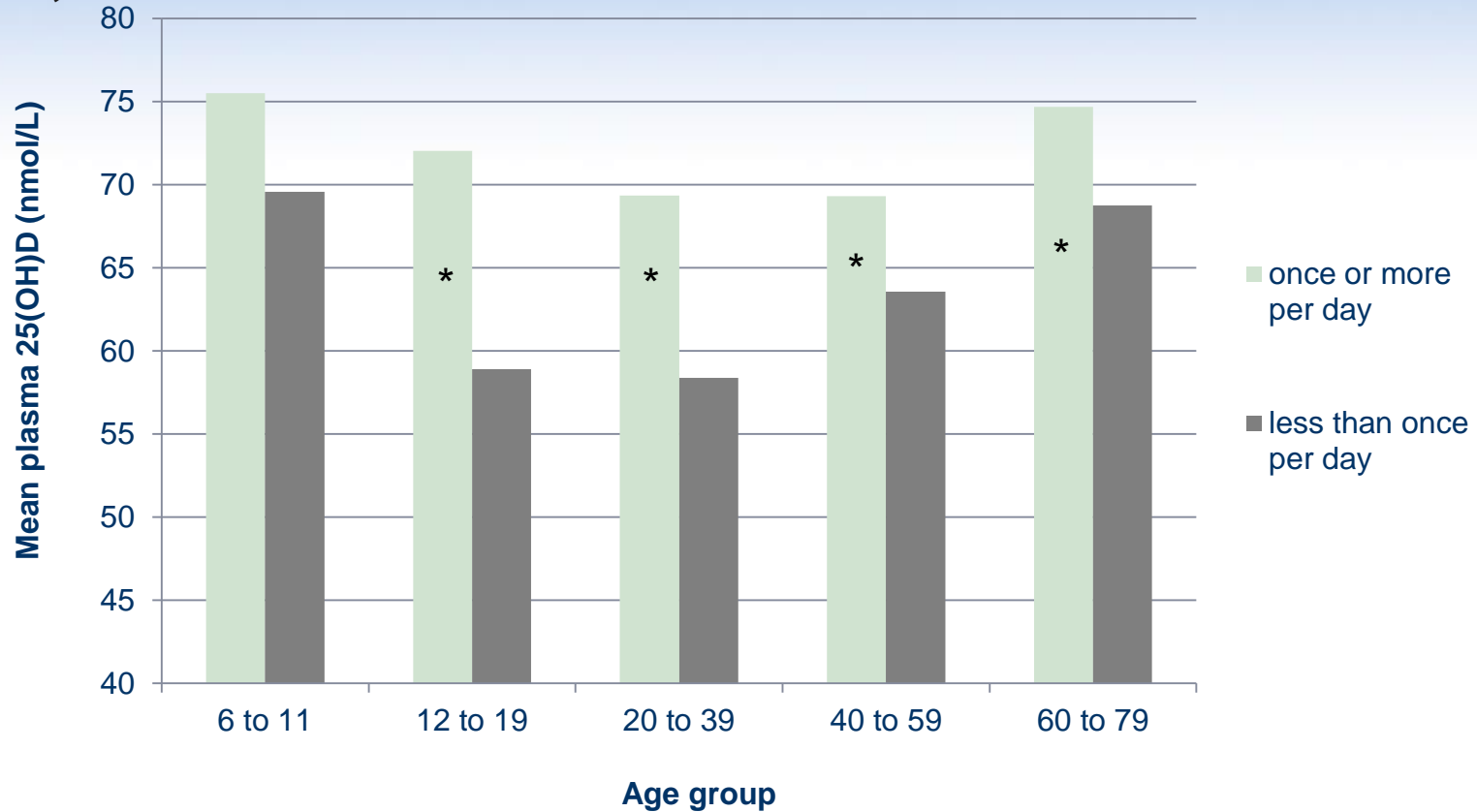
GIRL

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/m ²	Body mass index	19.5 kg/m ² *
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*



Vitamin intake

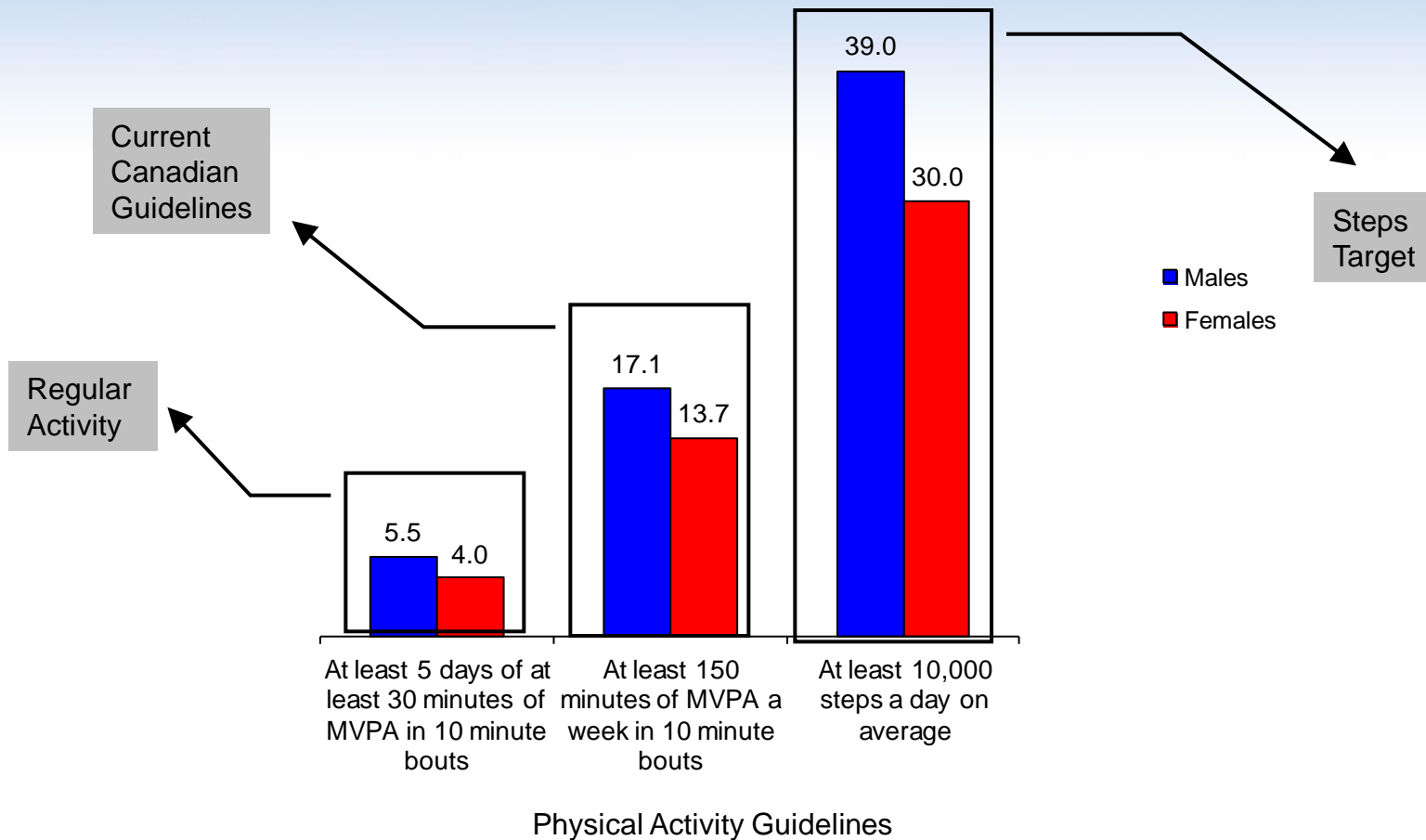
Vitamin D levels (blood) by milk consumption (milk 1+ per day) by age group, Canada, 2007-2009



* Significant difference between 1+ / d and < 1 / d (p < .05)

Physical Activity measures

Proportion of 20 to 79 year olds meeting physical activity guidelines by gender, Canada, 2007-2009



ADDITIONAL INFORMATION



For more information on the CHMS:

Fill out a request for information:

- Specific products needed
- Contact information
- Questions

For general information:

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