



Component of Statistics Canada  
Catalogue no. 82-003-S Health Reports

## Article

# Canadian Health Measures Survey Pre-test: Design, methods, results

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December 5, 2007



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# Canadian Health Measures Survey

## Pre-test: Design, methods, results

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### Abstract

The Canadian Health Measures Survey (CHMS) pre-test was conducted to provide information about the challenges and costs associated with administering a physical health measures survey in Canada. To achieve the specific objectives of the pre-test, protocols were developed and tested, and methods for household interviewing and clinic testing were designed and revised. The cost, logistics and suitability of using fixed sites for the CHMS were assessed. Although data collection, transfer and storage procedures are complex, the pre-test experience confirmed Statistics Canada's ability to conduct a direct health measures survey and the willingness of Canadians to participate in such a health survey. Many operational and logistical procedures worked well and, with minor modifications, are being employed in the main survey. Fixed sites were problematic, and survey costs were higher than expected.

### Keywords

health surveys, data collection, direct measures, health measurement, physical fitness, biological specimens, national survey

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The Canadian Health Measures Survey (CHMS) is a new comprehensive direct health measures survey that will be conducted from 2007 to 2009 by Statistics Canada in partnership with Health Canada and the Public Health Agency of Canada. The CHMS is voluntary and will collect data from a nationally representative sample of Canadians aged 6 to 79. Further details on the background and rationale for the CHMS are presented elsewhere in this supplement.<sup>1</sup>

The collection of direct health measures from a nationally representative sample<sup>2</sup> has rarely been done in Canada. Details of the socio-ethical and legal issues and the logistical challenges are described in detail elsewhere in this supplement.<sup>3,4</sup> Given the complexity and the novelty of such a survey, Statistics Canada adopted a cautious and systematic approach. Based on an examination of similar surveys previously carried out in Canada and elsewhere (for example, National Health and Nutrition Examination

Survey;<sup>5</sup> Finrisk Surveys<sup>6</sup>) and extensive consultations with partners, stakeholders and experts,<sup>3</sup> it was decided that a pre-test should be conducted. This article summarizes the design, methods and results emerging from the pre-test, in the hope that this experience may assist other researchers planning similar surveys. More complete details are available in the *CHMS Fall 2004 Pre-Test Final Evaluation Report*.<sup>7</sup>

The objectives of the pre-test were to:

1. Determine Canadians' willingness to participate in a direct health measures survey.
2. Assess the costs from both the human resources and financial perspectives.
3. Calculate response rates by age group and non-response bias to both components (household questionnaire and physical health assessment).
4. Examine processes and materials.
5. Evaluate the planning assumptions associated with using fixed sites for the physical measures, including logistics and costs of setting up clinical sites, conducting physical measures, and performing laboratory analyses of samples.

### Pre-test design

As closely as possible, the pre-test replicated the design proposed for the full CHMS.<sup>1</sup> The pre-test took place from October through December 2004 in the Calgary Health Region, Calgary, Alberta. The Calgary Health Region was selected because sufficient sample remained from a recent Labour Force Survey to allow the CHMS to simulate a "stand" (survey collection site).<sup>2</sup> A raw sample of 875 households was used for the pre-test. Although this sample was not statistically representative, it did allow for age group stratification (6 to 11, 12 to 19, 20 to 39, 40 to 59, and 60 to 79 years). Approval to conduct the pre-test was received from the Health Canada Research Ethics Board (REB) and the Calgary Health Region REB. All structures and processes used in the pre-test met Statistics Canada's requirements for data security, confidentiality and privacy.<sup>3</sup>

The pre-test consisted of a detailed in-home computer-assisted interview (CAPI) about the respondent's health. This was followed, one day to five weeks later, by a series of direct physical and laboratory measures conducted in a clinic in the South Calgary Health Centre. The physical assessment included anthropometry, spirometry, blood pressure, fitness and physical activity. Blood and urine samples were also collected at the clinic and analyzed for chronic disease, infectious disease, and nutritional and environmental biomarkers.<sup>1</sup>

Because the health centre was new, it was possible to construct and retrofit the offices to meet Statistics Canada's security requirements. The space allocated to the CHMS consisted of a reception office, three examination rooms for physical measures, one phlebotomy room for obtaining and processing biological specimens, and an office for clinic staff and interviewers. A cost-recovery memorandum of understanding with the Calgary Health Region secured the clinic space, office furniture, phlebotomy and laboratory services, and standard office support systems such as shipping/receiving, IT support, and parking. To simulate the logistics of the full survey, CHMS staff from across Canada lived in temporary housing for the duration of the pre-test.

Counselling services for respondents found to have sexually transmittable infections were provided on a cost-recovery basis by the Calgary Health Region Sexually Transmitted Diseases Clinic. Rapid follow-up services for urgent laboratory findings which required immediate attention were arranged in collaboration with the Calgary Health Region Medical Officers of Health. No urgent findings were observed, so ultimately, these services were not required. All Calgary Health Region staff involved in these procedures were "deemed" Statistics Canada employees and were governed by the data security and confidentiality provisions of the Statistics Act.

In consultation with the Calgary Health Region staff, a communications plan was designed to introduce the project and encourage participation. Before data collection, all levels of government (municipal, provincial and federal), provincial and regional medical associations, and public health

stakeholder groups were notified of the pre-test. Government support and endorsement were obtained. Strategies were developed for coverage on television and radio and in print. Communications material for respondents was designed, including a respondent information kit that contained details about the survey, the consent process, and how to obtain additional information.

Community relations for the pre-test were extensive. The Calgary Health Region's Medical Officer of Health was involved in the co-ordination of the pre-test communications activities. For the purpose of information dissemination, medical associations in Alberta and Calgary were contacted. Information about the CHMS and/or the pre-test was published in newsletters and/or on the websites of the following organizations:

- Alberta College of Physicians and Surgeons
- Alberta College of Family Physicians
- Alberta Medical Association
- Calgary Regional Medical Staff Association

Other communications avenues included a toll-free number, an e-mail address, and a website. Compared with other Statistics Canada health surveys in the field at the time, the website received substantial traffic during data collection. Endorsements from Alberta organizations were facilitated by the preparation and distribution of survey updates in a quarterly electronic newsletter.

## Methods

### *The household interview*

Ten Statistics Canada interviewers from across Canada worked on the household interviews. After survey orientation, training and interview simulations, each interviewer was assigned approximately 85 cases in a particular region of Calgary.

Sampled households were notified by mail in September and given brief background information. In October, interviewers began contacting the households to create a roster of household members, and select a respondent, based on a computerized sampling vector that was designed to provide the desired age distributions.<sup>2</sup> Once a respondent was selected and agreed to participate,

an appointment was made for the household interview. If the selected respondent was younger than 14, a parent or guardian was present while he or she answered the questionnaire. The cycle 2.1 Canadian Community Health Survey questionnaire,<sup>8</sup> which contained modules on general health, height and weight, chronic conditions, activity restrictions, health and lifestyle behaviours, nutrition, activity levels and medication use, was modified and used for the household interview. Household interviews averaged about 50 minutes.

Before the interview began, all respondents were shown a video that provided an overview of the CHMS Pre-test. After completing the interview, respondents were told that they would receive an honorarium to cover expenses associated with their clinic visit. They were also given pre-testing guidelines,<sup>4</sup> consent forms and a map with directions to the clinic. At this time, interviewers offered to call the clinic on the respondent's behalf to book an appointment. A respondent information form containing key information (for example, age, sex, address, telephone numbers, physical or mental limitations reported by the respondent or observed by the interviewer) was relayed to the clinic. Each evening, the completed questionnaires were sent via encrypted telephone lines to Statistics Canada's head office in Ottawa.

### *The clinic visit*

Qualified professionals were hired as Statistics Canada employees to staff the clinic. They included a manager, Professional Fitness and Lifestyle Consultants,<sup>9</sup> phlebotomists, and administrative personnel. Technical and communications support was provided from head office in Ottawa. Clinic staff underwent training that involved orientation to the survey, an overview of the household interview, cardio-pulmonary resuscitation (CPR), spirometry, and a course on including people with disabilities in the pre-test. Practical training at the clinic allowed staff to practice the measurement procedures, perform data entry, and refine protocols and clinic flow.

Clinic visits were scheduled over six weeks from October to December 2004, Wednesday through

Sunday. Weekday appointments were set up on a split-shift basis from 7 a.m. to 12 noon and from 4 p.m. to 9 p.m.; weekend appointments, from 7 a.m. to 3 p.m. To facilitate the scheduling of appointments, the booking desk hours were from 6:30 a.m. to 10 p.m. Wednesday through Friday, and from 6:30 a.m. to 6 p.m. Saturday and Sunday.

During the household interview, respondents were randomly assigned as morning (50%) or afternoon/evening (50%) appointments. This designation affected some of the testing protocols, since morning appointments required a 12-hour fast, whereas the afternoon/evening appointments required a 2-hour fast.

If respondents failed to book an appointment, the clinic staff followed up. Reasons for refusals were recorded in the clinic database. The clinic booking staff also made an appointment reminder call 24 hours before all scheduled visits, during which respondents were reminded of the pre-testing guidelines, and directions to the clinic were confirmed. No-shows were contacted to re-schedule the missed appointment.

When respondents arrived at the clinic, their identity was verified, they completed consent forms, and pre-test screening was completed to confirm their suitability for the various tests (Table 1). If, according to screening guidelines, a test was contraindicated,<sup>4</sup> respondents were eliminated from that specific test. To ensure confidentiality, each respondent was assigned a 20-digit identification number, which was used throughout the testing procedures, and for labelling paper documentation and biological specimens. All measures were voluntary; respondents could decline to participate in any test or withdraw at any time.

After the testing, respondents completed an exit questionnaire that asked their opinions about the length of the clinic visit, and agreement (hypothetical) to data-sharing and linkage, biospecimen (serum, urine, DNA) storage, and re-contact. They received an honorarium to cover expenses related to the clinic visit, a small gift of appreciation, and a preliminary report of their test results. In January and February 2005, all respondents received a final report of their

laboratory results, including suggestions for medical follow-up if needed.

All data collected during the clinic visit were recorded on paper forms and entered into a single clinic database. Respondent database files were verified against the paper versions before they were transmitted to Statistics Canada's head office. Twice daily, copies of the entire database file were encrypted and sent electronically to Ottawa. Hard-copy respondent files were sent to Ottawa weekly in accordance with Statistics Canada's confidential shipping procedures. Several times each day, blood and urine specimens were shipped to the Diagnostic Services Centre of the Calgary Laboratory Services for analysis and storage. Once a week, specimens were sent to the National Microbiology Laboratory in Winnipeg and l'Institut national de santé publique du Québec in Ste.-Foy for additional analyses.

**Table 1**  
**Clinic measures, Canadian Health Measures Survey Pre-test, October to December, 2004**

**Physical measures**

resting blood pressure  
resting heart rate  
height  
sitting height  
weight  
waist circumference  
skinfolds (triceps, biceps, subscapular, iliac crest, medial calf)  
spirometry  
physical activity monitoring (accelerometry)  
fitness testing (modified Canadian Aerobic Fitness Test, grip strength, partial curl-ups, sit-and-reach (flexibility))

**Laboratory measures**

**Blood**

blood chemistry panel  
complete blood count  
total cholesterol (fasted)  
HDL cholesterol (fasted)  
LDL cholesterol (fasted)  
triglycerides (fasted)  
apolipoprotein B (fasted)  
fasting glucose  
random glucose  
oral glucose tolerance test (morning only)  
red blood cell folate  
vitamin B12  
lead  
varicella antibody  
herpes simplex virus-2 antibody  
hepatitis A  
helicobacter pylori

**Urine**

microalbumin  
creatinine  
human papillomavirus

## Results

*Objective 1: Determine the willingness of Canadians to participate in a health measures survey*

Initially, 875 Calgary households were selected for the CHMS Pre-test, 800 of which were eligible for the survey (Table 2). Of the eligible households, 590 (74%) responded, and in 526 (66%) of these households, the selected person completed the household questionnaire. However, just 369 of these individuals went on to complete the clinic component of the pre-test, yielding an overall response rate of 46%.

Table 2  
**Household, person and clinic visit response rates, Canadian Health Measures Survey Pre-test, October to December, 2004**

Response level	Number	Response rates % <sup>†</sup>
<b>Total households</b>	<b>875</b>	...
Eligible households	800	100
Responding households	590	74
Responding person	526	66 <sup>‡</sup>
Respondent went to clinic	369	46 <sup>§</sup>

<sup>†</sup> percentage of eligible households

<sup>‡</sup> 90% of responding households

<sup>§</sup> 70% of responding persons

... not applicable

Among the factors that may have affected participation in the clinic portion of the pre-test was the time of day at which appointments were scheduled. Afternoon and evening appointments were better attended than morning appointments (74% versus 66%). Based on post-appointment questionnaire results, 26% of respondents who had an afternoon appointment would not have been able to participate if only morning appointments had been available. The main barrier to attending morning appointments was work responsibilities.

The length of appointments was another deterrent to clinic visits. Because of the types of tests done in the morning, particularly the oral glucose tolerance test (OGTT), these appointments averaged 2 hours and 19 minutes, compared with 1 hour and 23 minutes for those in the afternoon.

When interpreting the clinic response rates, three points should be considered: 1) clinic appointments filled up quickly, that is, too few openings were

available; 2) interviewers and clinic staff did not have time to try to convince potential respondents to complete the clinic portion of the survey; 3) if clinic operations could have been extended a few more days, it is anticipated that the final response rate would have been much higher.

*Objective 2: Determine the human resources and financial costs*

Determining the costs of conducting a physical measures survey was a major impetus for the pre-test. To simulate a CHMS site, 10 interviewers and 11 clinic staff were considered sufficient. Support from Statistics Canada head office employees is not reflected in these numbers, although head office staff worked many overtime hours to ensure that the clinic and operations in Calgary were ready on time, and that the Calgary team had the support they needed. This support carried through to the mail-out of final reports to respondents, which involved reception and collation of the report, confirmation of addresses, secure mail delivery, and follow-up, all of which proved to be more burdensome and time-consuming than anticipated. Preparation of respondent information kits, interviewer manuals, clinic protocol manuals and report forms required extensive effort that is difficult to quantify.

The number of interviewers was appropriate for the number of respondents (about 85 per interviewer). However, the burden on the clinic staff associated with scheduling appointments and accommodating respondents was underestimated. Insufficient appointment times were available, which increased the need for follow-up. The split-shift schedule often meant that staff worked considerable overtime to accommodate respondents who arrived early or late. In general, the number of clinic staff was not sufficient for the hours of operation.

The estimated cost of the pre-test was \$1.78 million (Table 3). Most of this amount reflects head office costs of approximately \$1.2 million covering the period from May 2004 to early 2005. These costs included:

- negotiation with the Calgary Health Region for space and services;

Table 3  
**Summary of costs, Canadian Health Measures Survey Pre-test, October to December, 2004**

Item description	Cost \$000
<b>Ottawa operations</b>	
<b>Head office</b>	
Planning and development	650
Sample selection and methods	180
Interview staff material and operations development	123
Data systems and applications development	57
Communications	15
Data capture development	7
Translation	11
Printing	15
Shipping and postage	6
Travel	68
Returning results to respondents	21
Head office costs	1,153
<b>Calgary operations</b>	
<b>Interviewers</b>	
Salaries	77
Living expenses	133
Non-salary expenses	15
Interviewer costs	225
<b>Clinic</b>	
Salaries	147
Living expenses	75
Testing equipment and disposables	36
Office equipment and supplies	42
Respondent expenses	24
Non-salary expenses	6
Site set-up	35
Clinic costs	406
<b>Total costs</b>	<b>1,784</b>

- drafting Memoranda of Understanding with the Calgary Health Region, the National Microbiology Laboratory and l'Institut national de santé publique du Québec;
- developing the survey sampling frame and statistical methodology;
- developing collection methods and materials;
- developing, translating and printing respondent relations material;
- preparing and presenting a submission on the pre-test to the Research Ethics Boards of Health Canada and the Calgary Health Region; and
- communicating and liaising with stakeholder groups, including media.

Borrowing the questionnaire from the Canadian Community Health Survey (cycle 2.1) reduced development time for the household interview. Even so, modifications and the creation of

additional materials necessitated changes to CAPI applications and testing to ensure that the questionnaire application was functional.

The data capture and data transfer systems created for the pre-test were rudimentary, with many of the data capture and verification processes conducted by hand. This was adequate for the pre-test, but was prone to error, and the scale of the full CHMS required more advanced systems. Consequently, the costs of an appropriate data transfer system are not reflected here. As well, some other administrative and production costs related to the pre-test activities, including the preparation of this report, are not included.

*Objective 3: Evaluate response rates, by age group, and non-response bias to household questionnaire and clinic visit*

The likelihood that a respondent who completed the household questionnaire would participate in the clinic component of the CHMS Pre-test varied by age (Table 4). The highest clinic participation rates were among children aged 6 to 11 and seniors aged 60 to 79 years: 77% and 79%, respectively. Among youths aged 12 to 19 years, the rate was 70%, and for people aged 40 to 59 years, 68%. Younger adults aged 20 to 39 years had the lowest rate: 65%. Overall, 30% of respondents who completed the household questionnaire were either unwilling or unable (personal conflicts or barriers; scheduling limitations; logistical issues such as transportation or weather) to visit the clinic.

Because the survey was conducted in two phases (in-home interview and clinic appointment), some

Table 4  
**Participation in household interview and clinic, by age group, Canadian Health Measures Survey Pre-test, October to December, 2004**

Age group (years)	Respondents		Clinic visits as % of household interviews %
	Household interviews	Clinic visits number	
<b>Total</b>	<b>526</b>	<b>369</b>	<b>70</b>
6 to 11	90	69	77
12 to 19	83	58	70
20 to 39	188	122	65
40 to 59	93	63	68
60 to 79	72	57	79

information was collected about respondents who did not visit the clinic. Non-response bias was assessed by comparing the household interview data of those who attended the clinic with those who did not, using the following variables: age, sex, marital status, household size, mother tongue, race, student status, labour force attachment, work schedule, number of weeks worked, income adequacy, time of appointment, self-rated general health, mental health, level of stress, self-reported BMI, and self-reported high blood pressure. For only four of these variables was the difference between clinic participants and non-participants significant. Higher reported stress levels, non-white race, employment, and morning appointments were each associated with a reduced likelihood of participating in the clinic portion of the survey. It was not possible to assess non-response bias for those who did not participate in the household interview.

#### *Objective 4: Evaluate survey processes and materials*

To administer the pre-test, CHMS staff developed new methods, procedures and processes, as well as a large amount of new material. This was achieved by drawing on experience within Statistics Canada and from direct health measures surveys previously conducted in Canada and elsewhere. The successes and failures of communication materials and processes, interviewer materials and clinic practices and protocols (see objectives) were all assessed.

#### *Communications – Media coverage and respondent relations*

Media coverage of the pre-test was positive, but not extensive. During the planning of the media event to launch the pre-test and open the clinic, several challenges emerged: provincial and municipal elections were called after planning was complete but before the clinic opened; an e-coli outbreak in the Calgary area pulled public health officials and journalists away from the media event; and the Olympic athlete who agreed to undergo the clinic testing for the media had a personal emergency and was unable to attend. Nevertheless, the objectives of informing the community about the survey and maintaining a positive relationship with the media

and opinion leaders were achieved. Although it was not directly assessed, it is likely that the media plan had a positive impact on respondent relations, and that this could be accomplished at each CHMS data collection site. In general, media relations should focus on local exposure (for instance, clinic opening attended by local health and political officials) and be sensitive to the culture of the particular community.

Communications activities also included telephone and electronic contact with the public. Evaluation of the dedicated phone line suggested that the nature and number of calls did not justify the expenditure; regular Statistics Canada phone lines would be able to handle CHMS enquiries.

The e-mail account set up for the pre-test proved valuable, not only for answering enquires, but also for disseminating information and seeking endorsements from government and non-government organizations. The e-mail account is currently used to distribute a quarterly electronic newsletter that informs subscribers about the progress of the CHMS.

A webpage was also developed for the pre-test. Although traffic was modest (~700 page views during the pre-test), the webpage is an excellent medium for disseminating information to the public and the media.

A considerable amount of respondent relations material was prepared for the pre-test (Table 5) in order to: 1) ensure that respondents were informed; 2) maximize participation; and 3) minimize misunderstanding and miscommunication.

**Table 5**  
**Respondent relations materials, Canadian Health Measures Survey Pre-test, October to December, 2004**

<b>Sent in advance of collection</b>	Introductory letter Introductory brochure
<b>Provided at time of interview</b>	Information and consent booklet Sample consent forms Assent booklet for 6- to 13-year-olds Examples of data uses Explanations of laboratory tests on blood and urine Descriptions of each physical measure Pre-testing guidelines Flash video on interviewer's laptop
<b>Provided after clinic visit</b>	Report of physical measures taken at clinic Report of laboratory tests on blood and urine

Interviewers rated the communications material favourably, reporting that reactions to the respondent information kit and the video were “positive” or “very positive.” However, the video did not engage children as well as it did adults.

Many respondents commented positively on the quality and professional appearance of the communications material, but some questioned the cost of producing it. Consequently, it was recommended that while some documents must be designed to capture attention, others should be plain and simple.

Respondents appreciated that their expenses for participating in the survey were covered and that the survey included a fitness test. These benefits are strong selling points for participation in the survey and should be emphasized in the respondent relations materials.

To determine the effectiveness of the communications material, focus group meetings were held with a sample of pre-test participants in February 2005. In general, the respondent relations materials seemed to have provided the right amount of information to help respondents understand the survey and were instrumental in convincing them to participate.

Overall, feedback from interviewers, respondents and focus groups identified minor improvements, but generally indicated that the communications material contained appropriate information.

No evidence suggested that the CHMS Pre-test had a negative impact on other Statistics Canada surveys that were in the field at the same time.

More specific details on the evaluations of the pre-test communications and material can be found in the *CHMS Fall 2004 Pre-test Final Evaluation Report*<sup>7</sup> and in the *Pre-test Follow-up Respondent Consultation Report*.<sup>10</sup>

#### *Household interviewers*

Material and procedures used for the household interview were evaluated through debriefings with the interviewers. Their recommendations included: better integration of the household interview and clinic components of the CHMS during training, orientation and data collection; better orientation

to a new city; and a household questionnaire specifically designed for the CHMS.

The interviewers felt that clinic participation rates could be increased if it was easier to schedule appointments, and that reaching a live voice at the clinic would be preferable to having respondents leave messages when trying to book appointments. Additional booking staff would be required to comply with this recommendation.

Normally, Statistics Canada interviewers work on several surveys at the same time. However, for the pre-test, interviewers worked solely on the CHMS. This was regarded as important for maximizing response rates and facilitating communication with the clinic staff. The interviewers enjoyed working with clinic staff and saw this as a positive team-building element of the survey.

*Objective 5: Evaluate planning assumptions associated with using fixed sites for the physical measures, including logistics and costs of setting up clinical sites, conducting physical measures and performing laboratory analyses of samples.*

The clinic setting was a new venue for a Statistics Canada survey. The fixed site used for the CHMS Pre-test was a trial of one of two possible clinic formats, the second being a mobile clinic.

Moving into a newly constructed medical building brought a number of advantages: municipal services were already connected; there was ample parking space; some office equipment was present; and clinic examination rooms were available. A good working relationship was established with the South Calgary Health Centre, and the facility provided, at no extra cost, access to some of their equipment such as the stadiometer and wheelchair scale, and use of laboratory specimen transporting services. The space allocated to the CHMS needed some reconstruction. This was expensive, but sincere efforts were made to accommodate Statistics Canada's needs.

Although the clinic space was pristine and functional, several disadvantages were associated with the fixed site. The Health Centre is in a new industrial development in the southeast corner of Calgary. This location, combined with traffic patterns and construction, caused some

Table 6

**Comparison of fixed versus mobile clinics, Canadian Health Measures Survey Pre-test, October to December, 2004**

	<b>Advantages</b>	<b>Disadvantages</b>
<b>Fixed clinic</b>	<ul style="list-style-type: none"> <li>• Existing structure and infrastructure</li> <li>• Low initial capital expense</li> <li>• Less susceptible to damage and vandalism</li> <li>• Support services in place (shipping and receiving, security, laundry, office cleaning services, snow removal)</li> <li>• Parking</li> <li>• Accessible, known location</li> <li>• Opportunity to exploit partnership with regional health authority</li> <li>• On-site staff room</li> </ul>	<ul style="list-style-type: none"> <li>• Repeated research ethics reviews</li> <li>• Unknown costs and infrastructure challenges at each new site</li> <li>• Maintenance, renovations and space controlled by landlord</li> <li>• Substantial and ongoing structural and infrastructural investments are lost</li> <li>• Based on pre-test expenses, total cost expected to be higher</li> <li>• Staff must attend occupational health and safety training at each site</li> <li>• Location options limited to existing structures</li> <li>• Statistics Canada security and access requirements instituted at each site</li> <li>• Possible labour (union) issues</li> <li>• Provincial licensing for health professionals required</li> <li>• Ambient conditions (temperature, humidity) cannot always be controlled and/or harmonized across sites</li> <li>• Need to accept existing work flow at fixed site</li> <li>• Building access problems</li> </ul>
<b>Mobile clinic</b>	<ul style="list-style-type: none"> <li>• Standardized testing environment and conditions</li> <li>• Single research ethics review</li> <li>• Retain assets</li> <li>• One-time staff occupational health and safety training (with periodic updates)</li> <li>• Maintenance, renovations and space controlled internally</li> <li>• Many location options</li> <li>• Statistics Canada security and access requirements built in</li> <li>• Mobile federal property with associated jurisdictional oversight</li> </ul>	<ul style="list-style-type: none"> <li>• Service and utility set-up required at each site</li> <li>• High initial capital expense</li> <li>• Location options require cooperation of property owner</li> <li>• More susceptible to damage and vandalism</li> <li>• Space – small rooms</li> <li>• Equipment must tolerate transport</li> <li>• Storage limitations</li> <li>• Insufficient room for interviewers to work out of clinic</li> <li>• No staff room (additional trailer required)</li> <li>• Cold climate</li> </ul>

transportation problems and delays during peak commuting hours. No examination rooms were available on Mondays and Tuesdays, which required the storage and set-up of the testing rooms each week. Some rooms were less than ideal for the needs of the CHMS; for example, the reception area was too small and ill-equipped, causing limitations in some tasks and duplication of others.

Thus, while fixed sites have undeniable advantages, these are outweighed by some serious shortcomings, and fixed sites do not match the flexibility afforded by mobile clinics (Table 6). Indeed, many facility-related experiences that came out of the pre-test support the use of mobile clinics. The survey will be successful only if the response rate is high. This requires a good location and accessibility, which the mobile clinic option is best suited to accommodate. Moreover, other countries (for example, Finland and the United States) have successfully used the mobile clinic model for their physical measures surveys.<sup>5,6,11</sup>

## Conclusions

The pre-test provided valuable insight about the challenges and costs involved in implementing the full Canadian Health Measures Survey. The most important findings are that Statistics Canada is able to conduct an extensive, direct measures health survey and that the Canadian public is willing to participate in such a survey. More specifically, the pre-test yielded essential information about staffing and living accommodation needs and the extent of technological and head office support required. The lessons learned from the pre-test were used to refine the design and methods for the full CHMS to: 1) increase response rates; 2) limit non-response bias; 3) optimize survey outcomes while controlling costs; 4) optimize respondent and media communications; 5) optimize interview, clinic, and head-office staffing and training; and 6) redesign the direct health measures collection infrastructure by using mobile clinics rather than fixed sites. ●

## Acknowledgements

The authors acknowledge the commitment, cooperation and support of the Statistics Canada interviewers, the pre-test clinic staff, the management staff at the South Calgary Health Centre and the Calgary Health Region.

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