

Methodology

SURVEY METHODOLOGY FOR THE 2008 BC AHS IV

The BC Adolescent Health Survey, first conducted in 1992, was developed to monitor the health and risks facing BC youth, and to inform health care planning and health promotion with young people. The second and third cycles of the survey (AHS II and AHS III) were conducted in 1998 and 2003, to update the provincial baseline data started with the first cycle. AHS IV, conducted in 2008, is the fourth cycle of the survey. As with previous cycles, the survey was developed and implemented with province-wide government and community partnerships, and engaged youth, parents, schools, health care providers, and other professionals who work with youth in the process. This approach, a form of participatory epidemiology, helps ensure the survey is relevant and useful for a wide range of stakeholders.

Survey Development

The questionnaire for AHS IV includes most of the topics from previous cycles, to track trends among BC students, plus some new questions on emerging health issues. The choice of topic areas was based on advice from community stakeholders and professional organizations who participated in two day-long Institutes, as well as additional feedback from youth solicited by McCreary Centre Society's Youth Advisory Council, from the Inter-Ministry AHS Advisory Committee of the BC government, and from adolescent health researchers from universities across Canada and the U.S. For a list of Institute attendees, see the report, *A Picture of Health: Highlights of the 2008 British Columbia Adolescent Health Survey*.

Most of the questions on the survey were kept from the previous survey; a few were modified slightly, based on experience from the previous cycles. New questions were primarily drawn from existing measures that had been validated in other surveys with youth; a few were created new for this survey, after being tested for comprehension and clarity with focus groups and individual interviews with youth. The full questionnaire was pilot-tested with youth from a range of ages, diverse backgrounds, and education experiences, to make sure it was clear, made sense, and could be completed in 45 minutes or less by most students. More detailed information on the source of the questions and their psychometric properties in the AHS IV is available on request.

Target Population and Survey Design

The target population for AHS IV included all 283,120 students who were enrolled in grades 7 through 12 in regular public schools during the 2007/08 school year. The sample design for AHS IV was similar in size and scope to that used for II and III. The sample frame was, in essence, a list of all classrooms in the province, stratified by geography and by grade (7 through 12). Independent random samples of classrooms were selected in each region/grade stratum. All students enrolled in each selected classroom fell into the sample.

The sampling frame used the BC Ministry of Education list of all schools, which included enrolment counts by grade for the 2007/08 school year. The AHS IV was designed to produce statistically reliable estimates at each grade level, for each of 16 Health Service Delivery Areas (HSDA), which aggregate to the larger Health Authority (HA) areas. The frame was stratified geographically by these regions, and then by grade. Sample sizes were calculated for each of these strata to ensure that the resulting regional estimates by grade would have maximum standard errors averaging 3.5%. In sparsely populated HSDA, the maximum standard error allowed was 4%; in the denser areas, it was 3%. Because of these very specific geographic requirements, the sampling rate was not constant for all areas of the province. It varied from 1 in 3 classrooms for HSDA with small student populations, to 1 in 15 for those with large populations.

Within an HSDA, the required sample was allocated to each school district, in proportion to the district's enrolment. The sampling of classrooms from a district's schools was roughly proportional to the schools' enrolments. This meant that within an HSDA, all students had roughly the same probability of selection, regardless of their grade level, the size of the school they attend, or the size of the enrolment in their particular school district.

Participation by school districts was voluntary. The AHS IV was conducted in 50 of the 59 districts, which contain 92% of all students enrolled in grades 7 through 12 in public schools the province. In order to maintain the sample size required for each HSDA,



classrooms selected for non-participating districts were reassigned to other randomly selected schools from participating districts in the same HSDA (maintaining the equal probability of selection for students). This sample re-allocation technique was used in all HSDA of the province with the exception of the Northeast and Fraser Valley HSDAs, where the relatively high rate of school district non-participation made it impractical. In total, 44,104 students from 1,760 different classrooms, in 463 different schools, were selected for the AHS IV sample.

Survey Administration and Data Collection

Data collection for AHS IV was similar to that used for the previous cycles. Data collection occurred in school, between February and June 2008 period. Public health nurses were primarily responsible for the data collection in their region; in some areas, nursing students and other trained staff helped conduct the surveys. The survey procedures were approved by the Behavioural Research Ethics Board of the University of British Columbia (#H07-02029).

In classes selected for the survey, students and their parents were notified in advance, via letters sent home, about the survey, the topics covered, and the voluntary nature of student participation. In many districts, additional notice was sent via the school email system, on school newsletters, and mentioned in news stories or editorials in the local newspapers. Parents could review the survey

questionnaire at the school office, or parents and students could see a detailed list of the topics and their rationale (without actual question wording) on the McCreary website.

School districts opted for one or both of two forms of eliciting consent: 1) Parental notification and student consent, or 2) Parental and student consent. In districts with parental and student consent, the letter home included a consent form for parents to sign; students in the sampled classrooms were only allowed to participate if they brought the signed form back to school. In school districts with parental notification, parents were encouraged to talk with their students about their decision to participate, but students made the final choice. Participation was completely voluntary, anonymous and confidential. Student names were not recorded and they were instructed not to put their names on the questionnaires. Students received a card at the end of the survey with information about health resources, like the Kids' Helpline, plus the McCreary website, for accessing survey results in reports and fact sheets when they became available.

The survey was administered in school classrooms or lunchrooms during regular school hours. A public health nurse, nursing student, or other trained administrator was on hand to provide instructions for completing the questionnaire, answer student questions, and ensure response privacy. Survey administrators were given specific instructions on how to administer the survey. These instructions and the answers/assistance given to students' queries were standardized across administrations in all grades and schools. Administrators were also provided with forms and detailed instructions for collecting information on classroom enrolment, absenteeism, and parent or student refusals, for use in calculating response rates and weighting the survey data.

Participating School Districts

05 Southeast Kootenay	53 Okanagan Similkameen
06 Rocky Mountain	54 Bulkley Valley
08 Kootenay Lake	57 Prince George
10 Arrow Lake	58 Nicola-Similkameen
19 Revelstoke	61 Greater Victoria
20 Kootenay-Columbia	62 Sooke
22 Vernon	63 Saanich
23 Central Okanagan	64 Gulf Islands
27 Cariboo-Chilcotin	67 Okanagan Skaha
35 Langley	68 Nanaimo-Ladysmith
36 Surrey	69 Qualicum
37 Delta	70 Alberni
38 Richmond	71 Comox Valley
39 Vancouver	72 Campbell River
40 New Westminster	73 Kamloops/ Thompson
41 Burnaby	74 Gold Trail
42 Maple Ridge-Pitt Meadows	75 Mission
43 Coquitlam	78 Fraser-Cascade
44 North Vancouver	70 Cowichan Valley
45 West Vancouver	82 Coast Mountains
46 Sunshine Coast	83 North Okanagan-Shuswap
47 Powell River	84 Vancouver Island West
48 Howe Sound	85 Vancouver Island North
51 Boundary	91 Nechako Lakes
52 Prince Rupert	92 Nisga'a

Sample Representation: Coverage and Response Rates

The coverage rate is the proportion of the target population covered by participating school districts and so actually represented by the sample. The coverage of AHSIV is excellent, with the survey being conducted in 50 of 59 school districts containing, in total, 92% of public school students in grades 7 to 12. The 8% of the student population not covered by the survey is too small to have any appreciable effect on provincial estimates.

The non-participation of school districts exhibited geographic clustering, which may affect regional estimates more profoundly than provincial estimates. Coverage rates were at or near 100% in all HSDA, except for Northeast HSDA and Fraser Valley HSDA. The three school districts in the Northeast HSDA did not participate, so separate results are not available for this area. The low coverage rate in the Fraser Valley HSDA meant that this area had to be combined with South Fraser for the publication of estimates at the

2008 AHS IV Provincial Response Rates

	2007-08 Enrolled	# Students in Sampled Classes	Absent	Parent Refused	Consent Forms Not Returned	Student Refused	Other*	Incomplete /Unusable	Usable	Response Rate
Participating School Districts (50/59)										
Combination (2/59)	21460	1760	9%	4%	2%	2%	1%	1%	1425	81%
Signed Parental Consent (17/59)	132395	24436	5%	5%	33%	1%	4%	0%	12960	53%
Parental Notification (34/59)	106201	17908	13%	0%	0%	3%	1%	0%	14930	83%
Total Participating SDs	260056	44104	8%	3%	18%	2%	2%	0%	29315	66%
Non-Participating Districts (9/59)	23064									
Provincial Total - All School Districts	283120									

* Other = reason for not completing survey is unknown (consent form not returned and student absent), student had unique educational needs (ie. ESL, special needs) and/or survey administrator miscounted

HSDA-level. Once HSDAs are combined into their 5 Health Authorities (HA), the coverage is good, even in the Northern and Fraser Health Authorities.

For the BC Adolescent Health Survey for 2008, the target sample consists of all the students enrolled in the 1,760 classrooms that were randomly selected from among all of the classrooms in the participating school districts. The response rate represents the percentage of students enrolled in the selected classes that completed the survey and provided useable information. To the extent that the response rate is less than 100%, the difference is usually accounted for by the proportion of enrolled students who did not respond to the survey for one of the following reasons: 1) they were absent on the day the survey was given; 2) their parents either failed to provide a consent form or refused their consent; or 3) the students themselves refused consent.

For AHS IV, the overall response rate for the province was 66%. In school districts requiring signed parental consent, the resulting response rate was just 53%. On the other hand, in school districts that permitted parental notification, the response rate was 83%. This difference suggests that a significant portion of non response occurred because students or parents failed to return consent forms. In fact, in districts requiring signed parental consent, fully 1 in 3 students failed to return consent forms to the school by the survey day, while only 5% of parents actually refused their consent. The differences in characteristics between students who returned consent forms and those who did not may be a source of bias. However, this bias cannot be accurately measured. In school districts opting for parental notification and student consent, absenteeism is the largest source of non-response (13%), and any differences between students present or absent on the survey day may have a slight effect on the results. This bias is likely to be negligible, since absenteeism on any given day is generally a random event.

The incidence of other sources of non-response (student refusals, incomplete questionnaires, interviewer miscounts, etc.) was relatively low and not likely to affect the estimates.

There was little variation in response rates by grade, indicating that the target population's grade structure is well represented by the AHS IV sample. Response rates did vary among HSDA, according to whether an area's school districts had opted for signed parent and student consent or parental notification and student consent. With the amalgamation of Fraser Valley and South Fraser into a single area, all of the HSDA response rates were above 60%, with one exception: Vancouver. This school district changed to signed parental consent for the first time, and the high rate of consent forms not returned resulted in a disappointing response rate of 40%. Aggregation of HSD areas into Health Authority areas results in improvements in sample representation with respect to both survey coverage and response rates. Any regional or grade differences in coverage and response rates were accounted for in the weighting.

Response Rate by Grade

	2007-08 Enrolment	Enrolled in Participating SDs	Coverage	Response Rate
Grade7	43443	39722	91%	72%
Grade8	46023	42162	92%	68%
Grade9	46446	42633	92%	68%
Grade10	49035	45009	92%	64%
Grade11	51166	47023	92%	64%
Grade12	47007	43507	93%	63%
Total	283120	260056	92%	66%

Data Processing and Weighting

Some of the students' data records were deleted from the final sample during the data cleaning stage. This was done to maximize the validity and accuracy of the survey estimates. Only 118 survey records were deleted based on one or more of the following criteria:

- respondents who failed to answer 50% or more of questions;
- respondents who provided a number of inconsistent, contradictory or joking answers; or
- respondents who exhibited response set biases across one or more sections of the questionnaire.

Survey data from the 29,315 students who provided valid data have been weighted so that they provide an accurate representation of all 283,120 public school students in grades 7 through 12 in all regions of the province, including those attending schools in non participating school districts, as well as students in schools and classrooms who were not among those randomly selected in participating districts. The weight attached to each respondent ensures his or her appropriate representation, and can be thought of as the number of students in the population that the respondent represents. The weight is the product of three broad factors:

- the probability of selection (ie, being in a classroom randomly selected for inclusion);
- the non-response adjustment;
- population readjustments, used to ensure population representation according to provincial region, school district, and grade level.

Just as the sampling rates and school district coverage rates vary geographically, so do the weights. Accurate results can only be produced from the AHS IV sample if the weights are used.

Missing Data

As in all surveys, respondents occasionally refuse, or are just unable to provide a valid response to every question. Examples include "don't know", "not sure" or "does not apply" responses, and instances of not providing any response or answer at all (ie, leaving it blank). Levels of this type of non response to individual questions on the AHS IV are very low in general, about 1 to 3% of the sample. Unless such non responses are greater than 10%, they are usually not shown in reports and fact sheets from the survey. But where "don't know" or "not sure" is an informative response, such as with knowledge questions, this response option is routinely reported.

Release Criteria and Significance Testing

Survey estimates from AHS IV, in the form of proportions or percentages, are based on a sample of students who were randomly selected. Somewhat different figures might have been obtained if a

complete census of the target population had been conducted. The difference between an estimate based on a sample and the value obtained from a census taken under similar conditions (i.e., same questionnaires, procedures and data processing methods) is called the sampling error. An indication of the size of the sampling error, or the relative precision of an estimate, can be estimated from the sample itself using a measure called the standard error (SE).

The complex random cluster-stratified design of the BC Adolescent Health Survey makes it inappropriate to calculate standard errors based on simple random sampling theory. The exact standard errors for AHS IV estimates have been calculated using SPSS Complex Samples software. These were also calculated for the previous cycles of the AHS. For most analyses, Complex Samples software is required for statistical testing.

The publication or release of estimates from AHS IV is governed by the size of their standard errors:

- survey estimates with SE's less than 4.99 are published without qualification;
- survey estimates with SE's between 5.00 and 12.49 are published with reservation because of potentially high sampling variability (indicated by a * to denote a qualified estimate that should be used with caution);
- survey estimates with SE's exceeding 12.5 are suppressed (indicated by a #) to denote that they are not releasable.

Differences in proportions or percentages between groups were tested for statistical significance before they are noted in the text of reports or fact sheets. These include comparisons of subgroups within AHS IV (e.g. comparisons by gender or by grade), as well as comparisons between AHS IV and previous cycles.

Because of the large sample for the AHS in each cycle many of the differences observed may be statistically significant, but not practically important. There is also the risk, when multiple analyses are done, that a few will be significant by random chance. The best way to avoid either is to ensure there is a theoretically sound hypothesis for any differences tested. Among the various reports and fact sheets produced from the AHS IV, not all statistically significant differences are reported; however, any differences that are noted in the text have been tested for statistical significance.

Finally, all survey estimates published from the AHS IV in fact sheets and community reports have been rounded to whole numbers, as this aids readability and provides an appropriate level of precision. Due to rounding, however, the percentages shown in some figures and tables may not always sum to exactly 100%. Papers published in professional journals will usually include more precise numbers, with 2 decimal places, as well as test statistics and confidence intervals.

Comparability of AHS IV to Previous Cycles

From a methodological perspective, there are two aspects of the AHS III where differences from previous cycles could affect comparisons:

- Differences in the student population actually covered by the participating school districts;
- Lower response rates (and potential non-response bias) caused by an increase in the number of school districts requiring signed parental consent, coupled with the high rate of consent forms not returned.

Coverage of the student population in grades 7 through 12, increased steadily (albeit, slightly) throughout the first three cycles of the AHS, to a high of 72% in AHS III. Coverage improved dramatically to 92% in AHSIV due to the participation of school district #36 (Surrey) and #37 (Delta) for the first time, and the return of #43 (Coquitlam) which had not participated in AHS III. This improvement raises the concern about whether the 'covered population' is essentially the same for the four cycles, and, hence, whether trends can be tracked with accuracy.

Prior to the release of the provincial highlights, analyses were undertaken to see whether this coverage improvement had a large enough impact on the estimates to warrant a caution about comparability. We compared key outcomes both with the new school districts in the calculations and without, to see if there were any significant shifts in the estimates. The estimates were not significantly different in any of the analyses, and usually did not differ by even 1% or 2%.

The shift to signed parental consent, with its lower response rates, raises a different concern. Studies over the past two decades have shown that student report of some risk behaviours, such as alcohol or drug use, and some risk exposures, like physical or sexual abuse, may be lower in school surveys that require signed consent compared to the same surveys that allow parental notification. One reason is that youth with higher risk profiles may have difficulty getting parental signatures and returning the consent form to school in time. While only about a third of students were from school districts with signed consent in 1992, 1998 or 2003, in the 2008 survey, fully half of the students were from school districts requiring signed parental consent.

In AHS IV, as with previous cycles, because we expected lower response rates with signed parental consent forms, we over-sampled in those school districts (i.e., set the needed sample at a higher total). This may not prevent bias due to the type of consent,

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however. There is also the issue of changing consent within the school district; while many school districts kept the same consent procedures from prior cycles, several school districts shifted from parental notification to signed parental consent, and some shifted from signed consent to parental notification. This raises concerns about being able to test trends over time at the Provincial, Health Authority, or HSDA level.

In order to test whether this would affect the trend estimates overall, we also conducted further tests around sensitive items, comparing the direction of trends in school districts whose type of consent did not change (separated by signed consent and notification), compared to those who shifted to a new form of consent, and those who were new to the survey. As expected, those from signed parental consent districts had different percent estimates than those from parental notification districts in some items, but the trends remained the same direction (increasing, decreasing, or unchanged) for nearly all outcomes we tested. Where there were differences in trends between the full dataset and the smaller group school districts who did not change their form of consent between 2003 and 2008, we have noted that in reports, with a caution about the reliability of the estimate.

Unfortunately, we cannot report trends for those HSDAs where the majority of school districts changed their form of consent between 2003 and 2008. We cannot be sure that differences in proportions between the years represent true population changes or are due to the change in the type of students who completed surveys, especially in those school districts where the response rate dropped dramatically between 2003 and 2008. Thus, only some of the regional reports can include trends.

For Further Information

In-depth analyses and psychometric testing of measures in the AHS IV are ongoing. If you have additional questions about some aspect of the survey results, please contact the McCreary Centre Society Research Director.

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