2014 Toronto Public Health Student Survey: Research Methods

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1. INTRODUCTION

In 2014, Toronto Public Health (TPH) conducted a school-based survey to assess the health and health behaviours of adolescent students. This document outlines the research methods used for the 2014 Toronto Public Health Student Survey.

1.1 About the 2014 Toronto Public Health Student Survey

Toronto Public Health (TPH) regularly assesses and reports on the health of the city's population. Youth are an important group to monitor because the current health and health behaviours of young people create a foundation for health throughout the life course. Despite the importance of this age group, information on the health of Toronto's youth has been limited. To fill this gap, TPH conducted the 2014 Toronto Public Health Student Survey with support from Toronto's four public school boards.

The Student Survey collected health information from students through:

- A written questionnaire
- Measurement of students' height and weight
- An oral health check

Data were collected on issues related to:

- Wellbeing and mental health
- Bullying and violence
- Physical activity and sedentary behaviour
- Nutrition and body size
- Tobacco, alcohol and other drugs
- Sun Safety
- Sexual health
- Dental and oral health

Information was collected from 6,053 students in grades 7 to 12, representing approximately 5% of students attending schools in the:

- Toronto District School Board (TDSB)
- Toronto Catholic District School Board (TCDSB)
- Conseil scolaire de district catholique Centre-Sud (CSDCCS)
- Conseil scolaire Viamonde (Viamonde)

1.1.1 Research Questions

The Student Survey aimed to answer the following research questions:

1. What is the health status[1] of Toronto students in grades 7 to 12?
2. How is health status affected by the social determinants of health[2]?
3. What factors are related to good health among youth?

1.1.2 Project Objectives

The overall objectives of the project are to:

1. Gather baseline information regarding the health status of Toronto students
2. Develop protocols and processes for future monitoring of student health status
3. Disseminate findings to relevant audiences including TPH staff, the Toronto Board of Health and Toronto school boards, and contribute to the knowledge base in the area of youth health
4. Create opportunities for engagement with school communities, including students, parents, teachers, and school administrators
5. Influence TPH service planning and the development of policy and advocacy strategies focused on youth

1.2 Why We Conducted the TPH Student Survey

Toronto Public Health is interested in youth because:

Adolescence is a period of change. Developing minds and bodies are moving from childhood to adulthood. Youth face pressures from their peers, the media, and their families and communities that affect their choices about who they are and what they do. These pressures and the resulting decisions often impact physical and mental health and wellbeing.

Many of the behaviours that impact health in the adult years start in youth. Behaviours developed during adolescence contribute to current health status and risk for developing chronic diseases in adulthood. Addressing issues early can influence lifelong change, and prevent health problems throughout the life course.

Evidence informed policies and services support the health of youth. Information on the health status of youth contributes to the effective delivery of public health services and policies to more effectively meet the needs of young people. There are 282,000 youth aged 10 to 19

[1] Health status is defined as the state of overall physical, psychological, emotional and social wellbeing of the population. The TPH Student Survey considered positive aspects of health and risk factors for future ill health and disease as aspects of health status.

[2] The social determinants of health are conditions of everyday life, including where a person lives and works, education, income, gender, sexual orientation, ethno-racial background, immigration status and experiences growing up. These social and economic circumstances can result in unfair and avoidable differences in health known as 'health inequities'.

years living in Toronto, representing 11% of the city. Although there are studies on the health and wellbeing of Ontario youth, such as the Ontario Student Drug Use and Health Survey (OSDUHS), the TPH Student Survey is the first to consider the local context, collect information on a comprehensive range of indicators, and exclusively look at Toronto's youth.

The results will help TPH and other agencies provide the best services possible to Toronto youth by identifying priority issues, guiding services and policies, and creating a baseline against which future results can be compared.

1.3 TPH Student Survey Findings

Initial highlights from the TPH Student Survey findings are presented in the *Healthy Futures: 2014 Toronto Public Health Student Survey* report. This report presents key indicators of adolescent health, broken down by grade and sex where relevant. In addition, each chapter has a 'Spotlight on Inequity', showing important differences in health between groups of students, based on selected social determinants of health, including 'socio-economic access', sexual orientation, ethno-racial identity, and immigrant status.

The *Healthy Futures: 2014 Toronto Public Health Student Survey* report and more information on the TPH Student Survey can be found at: tph.to/studentsurvey or by contacting TPH at 416 338 7600.

2. SAMPLING DESIGN

2.1 Target Population

The TPH Student Survey targeted students in grades 7 to 12 enrolled in public schools in Toronto. Youth enrolled in private schools were excluded from the study because private schools do not fall within the scope of TPH's regular school based services and due to the logistical difficulties of coordinating recruitment, ethics and data collection from each private school's administration. Youth who were home-schooled, institutionalized for correctional or health reasons and those who had left the school system were also excluded from the study. Research has shown that under-schooled youth are often at higher risk for adverse health outcomes compared to their school-attending peers. TPH is exploring additional research options for learning more about this important population group.

2.2 Target Sample Size

The target sample size was determined with the objective of providing reliable estimates for each of the six grade levels included in the study.

The target sample size for the Student Survey was approximately 2,000 students per grade for a total of 12,000 students. This estimate was based on the following assumptions:

1. A minimum sample size of 400 students per grade would allow for a 5% coefficient of variation (CV) for a 50% estimate, and would yield adequate power to make comparisons between grades
2. A design effect value of three, given the survey's complex design
3. An anticipated response rate of 60%

Assuming there would be about 25 students in each class, a selection of 160 classes from elementary schools (4,000 grade 7 and 8 students) and 320 classes from secondary schools (8,000 grade 9 to 12 students) were required to yield the target sample size. Since each selected school was expected to contribute one class per grade at the elementary or secondary level, 80 elementary and 80 high schools needed to be recruited.

Overall, 12,097 students were sampled. The questionnaire was completed by 6,053 grade 7 to 12 students in 466 classes from 165 schools in four school boards, representing approximately 5% of all students in the four participating school boards.

2.3 Sample Stratification and Selection

Students were selected for the study based on a stratified, two-stage cluster design. Stage 1 involved the selection of schools (stratified at two levels) and Stage 2 involved the selection of classes within selected schools. All students in selected classes were included in the sample of potential participants.

2.3.1 School Selection

A stratified sampling strategy was adopted for school selection with the following objectives:

- To generate a sample that is representative of the four public school boards in Toronto and adequate sub-sample sizes to allow for reporting of survey results separately for the two major school boards[3]
- To generate a sample that is representative of geographic areas and levels of socio-economic status across Toronto

This strategy involved two sampling frames with two levels of stratification in each.

SAMPLING FRAMES

Two sampling frames, one for elementary schools and one for secondary schools, were created based on complete listings of schools provided by the four participating school boards: Toronto District School Board (TDSB), Toronto Catholic District School Board (TCDSB), Conseil scolaire de district catholique Centre-Sud (CSDCCS) and Conseil scolaire Viamonde (Viamonde). The school

[3] Individual school board results will not be released publicly. They will be provided to the TDSB and TCDSB on a confidential basis to be used for internal planning only. The sample of students from each French school board was not large enough to provide board-specific results for Viamonde or CSDCCS.

listings were current as of June 28, 2013. Twenty-seven (27) schools were excluded from the sampling frames because their student population consisted of adults aged 18 and older, at-risk youth seeking re-entry into the school system in temporary school placements, and youth with severe developmental disabilities needing considerable individual support to complete the questionnaire.

STRATIFICATION LEVEL 1: SCHOOL BOARD OR SIZE

Elementary and secondary schools were first stratified by school board or school size, resulting in four strata:

1. TDSB schools
2. TCDSB schools
3. French schools from both the public and Catholic French school board
4. 'Large schools' from both the TDSB and TCDSB

Given the low number of French schools with grades 7 to 12, all schools (both Catholic and public) in this stratum were included in the sample to maintain sampling efficiency and to ensure that all grades were represented in the French school sub-sample. Similarly, there were only a few large schools in both the TDSB and TCDSB and all were included in the sample to maximize sample representivity. Schools were determined to be 'large' by plotting school enrollment size. Secondary schools with at least 1,600 students and elementary schools with at least 600 grade 7 and 8 students were considered to be 'large schools'.

STRATIFICATION LEVEL 2: SOCIO-ECONOMIC STATUS

At the second level of stratification, both TDSB and TCDSB schools were further stratified by socio-economic status (SES), resulting in three roughly equally sized groups of low, medium and high SES schools. A different SES measure was used for each school board because no appropriate consistent measure was identified.

The measure for TDSB schools was the 2011 *Learning Opportunities Index (LOI)*, which ranked schools by the level of external challenges affecting student success. Each school's level of external challenges was determined using multiple variables measured at the level of students' residential neighbourhoods, including median income, percentage of families living below the Low Income Measure and those receiving social assistance, percentage of adults with low education and those with a university degree, and percentage of lone-parent families. More information about the *LOI* can be found at http://www.tdsb.on.ca/AboutUs/Research/LearningOpportunitiesIndex.aspx.

The measure for TCDSB schools was the 'Low Family Income Ntiles', which used 2007 Statistics Canada tax filer data to divide schools into nine equally sized groups based on the percentage of families living below the after-tax Low Income Measure. The nine 'Ntiles' were then collapsed into three groups for the TPH Student Survey. The 'Ntiles' are used for TCDSB internal planning purposes and are not publicly available.

Due to the small number of schools in the French school and 'large school' strata, these strata were not further stratified.

SCHOOL SELECTION AND SAMPLE SIZE ALLOCATION

Both TDSB and TCDSB Schools within a stratum were ordered by Forward Sortation Area (FSA, the first three digits of a postal code) then selected systematically from the ordered list (e.g., every third or fifth school). The ordering ensured a balanced geographic representation throughout the city. Where two or more schools had the same FSA, the schools were ordered alphabetically.

The student population size for each stratum was determined, and the target sample size for each stratum was allocated proportionally based on this population. Schools were selected under the assumptions that one class from each grade would be selected, and each class contained approximately 25 students.

If a selected school declined to participate, a replacement school from the same stratum was randomly selected from the school above or below the originally selected school (i.e., the nearest neighbour method).

Figures 1 and 2 summarize the stratified sampling strategy for elementary and secondary schools respectively.

Figure 1: Secondary Schools: Stratified Sampling Strategy and Target Sample Size and Sample Allocation

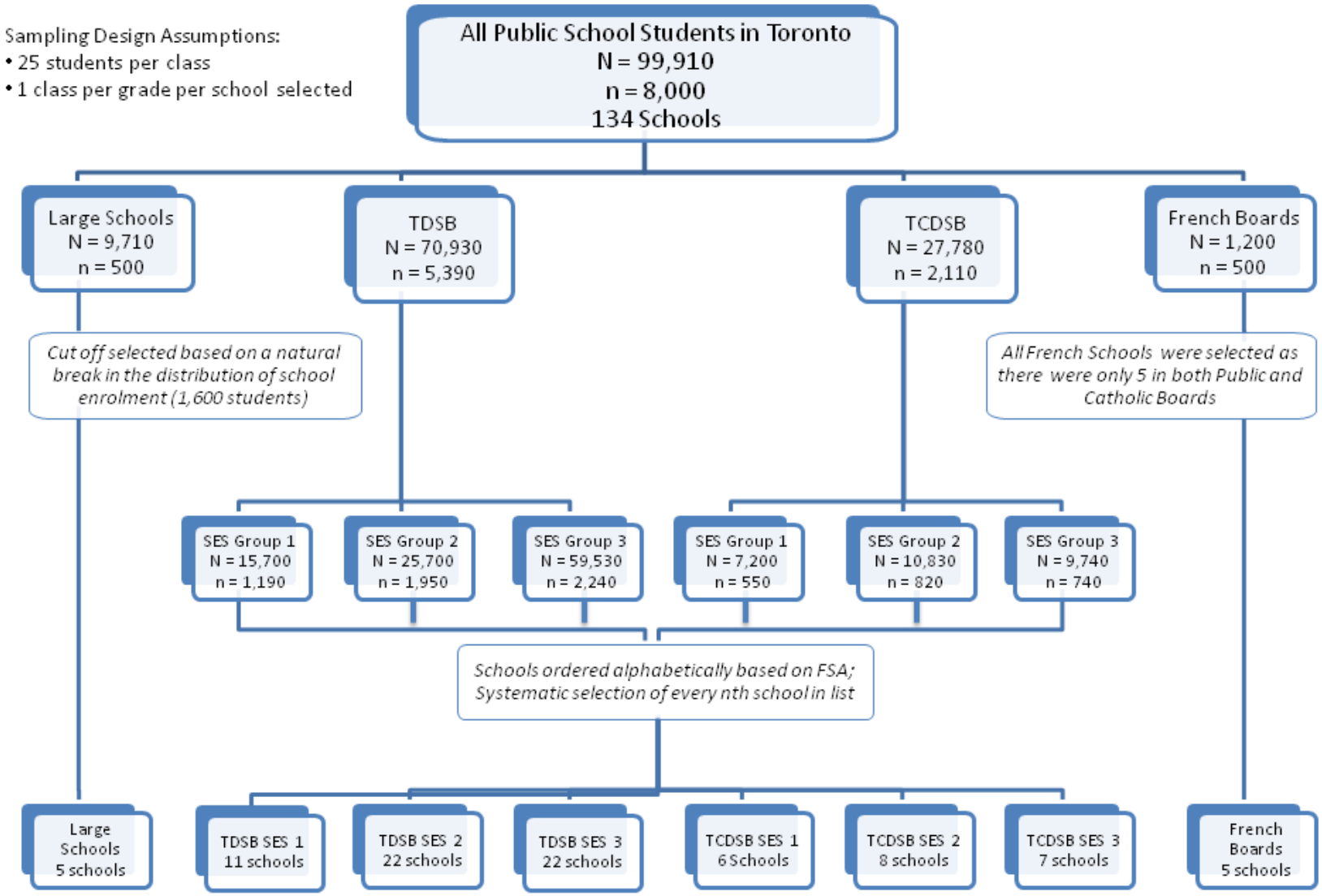
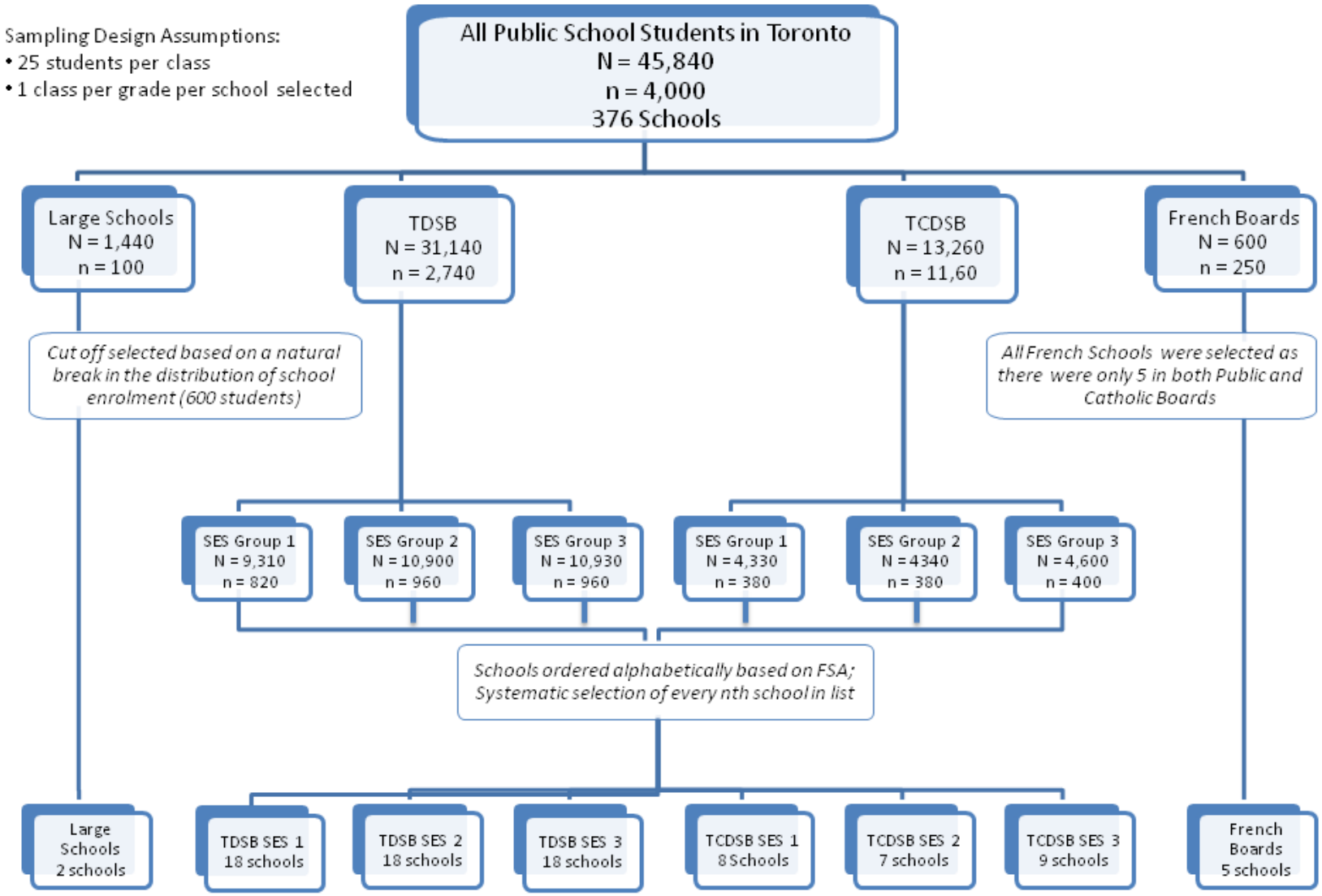


Figure 2: Elementary Schools: Stratified Sampling Strategy and Target Sample Size and Sample Allocation



2.3.2 Class Selection

For each recruited school, a date for data collection was determined based on logistics and scheduling. Data were only collected for one class at a time in a given school. A timetable of all classes taking place on the scheduled date for data collection was used. One grade level, without replacement, was randomly selected for data collection for each period in the timetable. Within each timetable period, a class from the selected grade level was randomly selected.

In elementary schools, one grade 7 and one grade 8 class were randomly selected. In secondary schools, four classes were randomly selected, one in each grade from 9 through 12. Class selection was not appropriate for the format of course delivery in some alternative high schools. In these cases, all students attending on the data collection date were invited to participate in the survey.

All students in the selected classes who were in school on the date of data collection and who provided a signed consent form were eligible to participate in the survey. Classes that declined to participate were replaced with another class that was randomly selected from the remaining available classes.

3. ETHICS, CONSENT AND RECRUITMENT PROCEDURES

3.1 Research Ethics Approval

The TPH Student Survey protocol received research ethics approval from Toronto Public Health and by the Research Ethics Boards at each of the four participating school boards.

3.2 Consent and Recruitment

The consent process and recruitment procedures were designed and implemented to protect students' privacy and to ensure anonymous and voluntary participation. Written and verbal communication with school principals, school staff, teachers, parents and students prior to and on the day of data collection explained privacy and confidentiality measures taken and how participation in each component of the study was voluntary.

TPH Liaison Public Health Nurses (LPHN) who work with schools on a regular basis were assigned to each school and were responsible for recruiting schools for participation. For each selected school, a letter of invitation was sent to the school principal and followed up by the LPHNs by phone, email and/or personal visit(s) to confirm school participation, address any questions about the study and coordinate data collection logistics. TDSB schools were required to participate by their school board and participation was voluntary for schools from the other three boards. An honorarium of a $100 grocery store gift card was provided to all schools that participated voluntarily.

Students needed written parental consent and had to personally agree to participate for each of the three data collection components: the questionnaire, height and weight assessment, and oral health assessment. LPHNs assigned to each school worked with teachers and other school staff to promote the completion of consent forms and to manage the consent process. Parental consent was obtained in advance of data collection. Students 18 years and older did not require parental consent as these students had the legal right to decide about study participation and provide consent themselves. An information letter and permission form were sent home with every student. Information and consent letters were provided in English and other languages commonly spoken by students and their parents. The information and consent letter described the background, purpose and three components of the study, and addressed the voluntary nature of the study, risks, and measures taken to protect the privacy and confidentiality of survey participants. The permission form required a parent (or student aged 18 or older) to check off a 'yes' or 'no' box for each of the three study components and provide a signature of consent at the bottom. Students were encouraged to return their consent forms regardless of their decision to participate. All students who returned completed consent forms were entered into a random draw for one of ten Apple iPads.

On the day of data collection, the students who had parental consent (or were 18 or older and provided their own consent) were asked to provide their assent to participate in each component of the study. All students with permission to participate were given questionnaires and were brought to the height, weight and oral health assessment areas. Students could choose not to answer all or part of the questionnaire and were asked for their assent before height and weight assessments and oral health assessments were completed.

3.3 Support and Follow-up for Students

A variety of measures were taken to ensure that the TPH Student Survey was sensitive to students' concerns, offered appropriate support, and provided teaching, advice, counselling and follow-up where appropriate. Liaison Public Health Nurses (LPHNs) provided a verbal introduction and debrief to all students in participating classes at the beginning and end of the data collection process. During the introduction and debrief, LPHNs addressed how students may be feeling during or after the survey, that they might have questions, and how they might need different kinds of support on different topics and issues. LPHNs encouraged students to let a TPH nurse know if they had any concerns or questions or needed support during the survey process. Students were reminded about various adults, role models, leaders and service providers in different roles in the community who they can turn to with questions, for help or if they want to talk. Students were also informed about how they can access counselling and information services offered by Kids Help Phone. After the survey was completed, Kids Help Phone posters were provided and posted in each classroom that participated.

Data collection involved TPH Public Health Nurses (PHNs), Dental Hygienists and Dental Assistants interacting one-on-one with students, creating opportunities for students to seek education, counselling, health advice and referrals. These interactions also created some opportunities for TPH staff to identify students' learning, counselling, health advice and referral needs, as well as the possible need for intervention on child abuse and suicide related issues.

All TPH PHNs, Dental Hygienists and Dental Assistants were trained, encouraged and guided by protocols to act on opportunities to support and follow up on students' needs.

All TPH staff interacting with students were encouraged to respond to students' questions and concerns, provide health information, and refer students to resources and services as appropriate. To assist with making referrals, all TPH staff were provided with comprehensive lists of resources and services for youth in Toronto, addressing a range of topics and sub-populations. All TPH staff were also guided by policies followed on a regular basis, including their duty to report suspicions of children needing protection and to provide assessment and intervention on suspicions of suicide risk. Due the confidentiality and anonymity of the survey tool, these protocols could only be followed when a student identified him or herself directly to TPH staff.

PHNs were instructed to provide general health information, health assessment, counselling, health advice, follow-up and immediate intervention as appropriate. PHNs were encouraged to use an ethical, supportive and caring approach to measuring height and weight that minimized potential harm for students, including helping to ease students' anxiety about the measurement process, being sensitive to students' sensitivities and concerns about body size, respecting and being extra careful about the privacy and confidentiality of each student's height and weight measurements, being non-judgemental, promoting healthy weights and discouraging unrealistic body ideals.

Dental Hygienists and Dental Assistants were encouraged to provide oral health teaching and counselling to students where appropriate. Dental Hygienists were also instructed to follow up when students needed dental treatment. Dental treatment follow-up for different situations included providing referral notes and information about treatment needs, notifying students' parents about treatment needs and booking appointments (including emergency appointments) at TPH dental clinics.

4. QUESTIONNAIRE DEVELOPMENT

The development of the questionnaire was an iterative process and involved many stakeholders from across Toronto Public Health (TPH) and the four participating school boards. Initially, the stakeholders involved hoped to include more items than what was feasible in a self-administered student questionnaire. Several rounds of prioritizing items and refining the questionnaire took place. Items were prioritized based on:

1. Whether items could accurately measure something relevant about the topic. Key considerations included the availability of a valid instrument for data collection, feasibility of data collection in terms of cost and effort, and whether the data generated would be clearly defined and easy to interpret
2. Whether items could be acted upon, considering and prioritizing TPH’s mandate

4.1 Questionnaire Content

The questionnaire consisted of closed-ended questions on health and wellbeing, covering a range of topics including:

- Demographic characteristics and socio-economic factors
- Wellbeing and mental health
- Physical activity, sedentary behaviour and body size
- Eating and nutrition
- Tobacco
- Alcohol and other drugs
- Bullying and violence
- Injury prevention
- Dental and oral health
- Sun exposure
- Sexual health

Four different versions of the survey were used in both English and French. Grade 7 and 8 students in all four school boards, as well as grade 9 to 12 students in the Catholic school boards, were not asked questions on sexual activity, safer sex practices, sexual orientation and gender identity. Questions on suicide and self harm were excluded for grade 7 to 12 students in the Catholic school boards. All questionnaire items were included for grade 9 to 12 students in the Toronto District School Board (TDSB) and Conseil scolaire Viamonde (Viamonde).

French and English language versions of the TPH Student Survey questionnaire can be found at: tph.to/studentsurvey or by contacting Toronto Health Connections at 416 338 7600. The posted version of the questionnaire includes all items, but all four versions are available in French and English upon request.

To help ensure the validity and comparability of TPH Student Survey data, existing questionnaire items that were validated, previously used, and consistent with other Canadian surveys were used in the TPH Student Survey questionnaire where possible. In some cases, existing survey questions were modified or adapted to reflect the local context and the information needs of TPH. TPH Student Survey questions were derived from the following sources:

- *Health Behaviour in School-Aged Children (HBSC) Survey*, World Health Organization (WHO)
- *National Longitudinal Survey of Children and Youth (NLSCY)*, Statistics Canada and Human Resources and Skills Development Canada (HRSDC)
- *Ontario Student Drug Use and Health Survey (OSDUHS)*, Centre for Addiction and Mental Health
- *Peel Public Health Student Health Survey*, Peel Public Health
- *Toronto District School Board (TDSB) Census*, Toronto District School Board

- *Youth Risk Behavior Survey (YRBS)*, United States Centers for Disease Control and Prevention (CDC)
- *Canadian Student Tobacco, Alcohol and Drug Survey (CSTADS)*, formally known as the *Youth Smoking Survey (YSS)*, Propel Centre for Population Health Impact, University of Waterloo

4.2 Pilot Testing of Questionnaire

The questionnaire was pilot tested in with 218 students in six schools. A pilot questionnaire was completed by 103 grade 7 and 8 students and 115 grade 9 to 12 students. Following the pilot, revisions to the questionnaire were made.

5. DATA COLLECTION

Trained TPH staff teams visited participating schools between January and March 2014 to collect data for the Student Survey. Members of the data collection team included:

- A Liaison Public Health Nurse (LPHN) who works with schools on a regular basis and acted as the primary contact for the study
- Public Health Nurses (PHNs) who administered the questionnaire and conducted the height and weight assessments
- Dental Hygienists and Dental Assistants who conducted the oral health assessments

Data collection was typically completed in approximately 60 to 75 minutes over one or two class periods and consisted of all three study components: a written questionnaire, height and weight assessment and oral health assessment. Data collection protocols were designed to protect students' privacy and to ensure anonymous and voluntary participation.

Data collection began with the designated LPHN introducing the team, describing the study and outlining the data collection process. Students were assured that participation was voluntary and they may choose to participate in all or some of the data collection components. Questionnaires were distributed to participating students in the classroom. The forms for recording height, weight and oral health status assessments were attached to each student's questionnaire. While the questionnaire was being completed in the classroom, small groups of students were directed out of the room to have their height, weight and oral health assessments conducted in designated private areas. Students were instructed to bring along their questionnaires to ensure the confidentiality of their responses and to provide data collection team members with the necessary forms to record measurements. The forms for height and weight assessment and oral health assessment were torn off the questionnaire booklet and given to the appropriate data collector for completion.

At the end of the data collection period for each class, students were instructed to place their completed questionnaires in a blank envelope. Completed questionnaires were then collected and sealed in classroom-specific envelopes labeled with class information. The forms for height

and weight assessment and oral health assessment were also sealed in class-specific envelopes. The designated LPHN collected and personally brought all sealed data collection envelopes back to his or her office. They were then sent by courier to the appropriate TPH team for data processing. Consent forms were collected and stored separately from student data. A list of students with consent to participate was created and used in each class in order to track data collection. All copies of the class lists were destroyed on the school premises when data collection was complete.

Each page of every survey, including the tear-outs for height and weight assessment and oral health assessment, was stamped with a unique identification number to enable the three components of the survey to be linked at the data entry stage. A master list outlining which survey identification numbers had been sent to each school was essential for keeping track of school information for each respondent while maintaining anonymity and confidentiality.

Data collection details for each study component are described below.

5.1 Questionnaire Administration

Students recorded their questionnaire responses directly on a paper version of the questionnaire using a pencil. The questionnaire took approximately 30 to 50 minutes to complete.

A PHN distributed questionnaires to participating students in the classroom. Non-participating students were asked to work quietly at their desks and refrain from walking around the classroom to ensure the confidentiality of other students' responses. Teachers were asked to help supervise students and to minimize walking around the classroom to help ensure the confidentiality of survey participants' responses. At the end of the class period, a PHN collected all questionnaires and placed them in an envelope.

5.2 Height and Weight Assessment

Trained Public Health Nurses followed a standard protocol for height and weight measurement to ensure that it was standardized and accurate, while being sensitive and supportive to students. This protocol was adapted from the Public Health Ontario (PHO) and Association of Local Public Health Agencies (alPHa) 2010 *Monitoring Heights and Weights of Ontario School Children* initiative. Two height and weight measurement stations were set up in a different room from questionnaire administration. Both stations were in the same room to help ensure the safety of students and PHNs, but were set up in such a way that each student was offered privacy. Measurements were conducted out of sight from fellow classmates, were only shown to students upon request, and were never spoken out loud. PHNs measured weight first, followed by height, so that students were more likely to leave the measurement area thinking about their height.

To ensure accurate measurements, students were requested to remove their shoes and coat and empty their pockets. Weight was measured using portable digital scales and recorded in pounds (rounded to the nearest 0.1 lb). Height was measured using a stadiometer and recorded

in centimeters (rounded to nearest 0.1 cm). Two height measurements were collected. If the measurements differed by more than 0.5 cm, a third height measurement was taken. For students who were wearing a headpiece or hair style that were not removed for religious or other reasons, PHNs adjusted the measurement accordingly. If adjustment was not possible, measurements were noted as unreliable on the data collection form. All height and weight data collection forms were placed in an envelope when completed.

The height and weight assessment protocol was pilot tested with 205 students in six schools, including 92 grade 7 and 8 students and 113 grade 9 to 12 students. Following the pilot, revisions were made to the height and weight assessment protocol.

5.3 Oral Health Assessment

Trained Public Health Dental Hygienists and Dental Assistants followed a standard protocol for oral health assessment to ensure that oral health assessments were standardized while being sensitive and supportive to students. The oral health assessment protocol was consistent with standard procedures used for oral health screening conducted in schools by TPH on a regular basis.

To ensure student privacy, oral health assessments were conducted in private areas that were out of sight from fellow classmates and that allowed for confidential follow-up on students' oral health questions, teaching and treatment needs. TPH Dental Hygienists used standard procedures to screen both permanent and primary teeth and recorded findings for each tooth on a data collection form. Possible findings for each tooth in each student's mouth were: sound (no evidence of treated or untreated caries), decayed, filled or treated, missing due to caries, or absent but not due to caries. The presence of gingivitis and presence of urgent conditions requiring immediate attention were also assessed. As described above in section *3.3 Support and Follow-up for Students*, students in need of follow-up treatment were referred to the appropriate service. All oral health data collection forms were placed in an envelope when completed.

The oral health assessment procedure was pilot tested in with 162 students in six schools, including 70 grade 7 and 8 students and 92 grade 9 to 12 students. Following the pilot, revisions were made to the oral health assessment protocol.

6. DATA PROCESSING

The Student Survey data was processed by CCI Research, an external firm. Standard quality assurance procedures were followed and documented.

Once the data was returned to TPH, additional quality assurance procedures were performed. The Student Survey data was checked for errors and edited to improve data quality.

A random check of 2% of surveys was performed by pulling hard copy surveys and checking them against the electronic data file. This check found that data from all three components of

the survey (questionnaire, height and weight assessment, and oral health assessment) were entered and merged correctly. Answers that were written in by survey participants were reviewed and recoded or assigned to a newly created category where appropriate. Unusual or implausible written answers were also identified.

Questionnaire completeness was checked and errors were detected by performing standard data cleaning processes. These included identification of missing, multiple, non-applicable, out of range and inconsistent responses. Errors were further investigated where necessary by pulling and reviewing original hard copy questionnaires.

Where possible and appropriate, errors were corrected in the dataset. Corrections were made based on:

- Standard recoding rules applied to certain situations
- Logic and flow of responses in individual questionnaires
- Apparent data entry errors found in individual hard copy questionnaires

In some cases, survey participants were removed from the dataset:

- Eight survey participants were removed because they did not have the "About You" demographics section and at least one other section of the questionnaire completed
- One survey participant was removed due to unusual written-in answers in the questionnaire that raised questions about reliability of the survey participant's responses
- 158 survey participants who completed height and weight and/or oral health assessments were removed because they did not also complete questionnaires, which contained information essential to indicator derivation and estimation

7. WEIGHTING AND ESTIMATION

7.1 Survey Weights

The TPH Student Survey used a complex sampling strategy, specifically a stratified, two-stage cluster design. In order for estimates yielded from a complex sampling strategy to be representative of the population surveyed, and not just the sample itself, survey weights must be applied to each observation when estimates are generated. In the Student Survey data, each respondent is assigned a survey weight that corresponds to the number of students that he or she represents in the Toronto student population. For example, if five students were sampled from a population of ten students, each student would have a weight of two that is applied to his or her response for all estimation.

Student Survey weights were calculated based on three factors: survey design, non-response and sample representivity. The final weights are based on:

- The probability of the student being selected within a school, which accounts for non-response
- The probability of the school being selected within the strata
- Post-stratification adjustments to the distributions of sex for each grade

The post-stratification adjustments were based on a representivity assessment of the survey data with the design and non-response weights applied. This assessed additional adjustments needed to ensure that survey estimates were based on a similar socio-demographic distribution to that of the broader Toronto student population. The distribution of sex needed adjustment at each grade level after survey design and non-response weights were applied.

7.2 Resampling Weights

The TPH Student Survey used clustering, where groups of students were sampled from the same school and class, rather than a simple random sample where each individual student would be sampled from all Toronto students. Schools were the primary sampling unit, from which one class in each grade was selected, and all students in those classes were sampled. Estimates yielded from a sample using clustering have a higher variance than those yielded from a simple random sample because intra-class correlation tends to be higher than inter-class correlation. In other words, students within the same school are more likely to be similar to one another than students in different schools. Traditional statistical methods used to calculate variance are based on the premise of a simple random sample. Complex samples such as the TPH Student Survey sample need additional techniques to appropriately calculate variance and confidence intervals.

In order to appropriately estimate variance for the Student Survey data, replicate weights, or resampling weights, were created by removing students from one randomly selected school from each strata and repeating the weights calculation 500 times. These 500 resampling weights were then used for variance estimation using StataMP 12, which provides the appropriate tools to correctly analyze data from complex sample designs.

8. DATA QUALITY

8.1 Response Rates

The target sample size for the TPH Student Survey was 12,000 students. Overall, 6,053 students in grades 7 to 12 in 466 classes from 165 schools in four school boards participated in the survey.

At the school level, participation was mandatory for TDSB schools and voluntary for TCDSB and French schools. There were no refusals by the five French schools. Four TCDSB schools (two elementary and two secondary schools) declined participation and were replaced with schools from the same stratum using the nearest neighbour method. Reasons given by non-

participating schools included prior commitments to other survey projects, logistical difficulties in implementing the survey, and disinterest from teachers and students.

At the student level, rates for each of the three survey components are presented below:

- **Questionnaire**: There were 6,053 students who completed the questionnaire out of 12,097 enrolled students in the selected schools and classes, resulting in a student response rate of 50%
- **Height and Weight Assessment**: There were 5,515 students who participated in the height and weight assessment, resulting in a response rate of 46%
- **Oral Health Assessment**: There were 5,194 students who participated in the oral health assessment, resulting in a response rate of 43%

For all three components, the student response rate was lowest for French schools and highest for TCDSB schools. By grade, the response rate for grade 7 and 8 students was higher compared to secondary school students.

8.2 Sample Representivity Assessment

A representivity assessment was conducted to determine whether the survey sample was representative of various socio-demographic sub-groups in the broader population of TDSB and TCDSB students. This representivity assessment was conducted for all three components of the study, was based on unweighted data, and was done separately for the TDSB and TCDSB boards. Socio-demographic profiles were created for survey participants in the two boards and were compared to administrative school board data, using different indicators depending on the data available for each board. Indicators compared for the TDSB were sex, grade, ethno-racial identity, home language, nativity (immigrant status) and sexual orientation. Indicators compared for the TCDSB were grade, sex, nativity (immigrant status) and home language. A similar analysis was not conducted for the French boards because the sub-sample per board was too small to apply this kind of analysis.

Any differences of more than four percentage points between the survey sample and administrative school board data are outlined below. For TDSB students, the Student Survey questionnaire sample under-represented:

- Male students
- Grade 11 and 12 students
- Students who speak a language other than English at home
- Immigrant students in grade 7 and 8

The samples of TDSB students who participated in the height and weight assessment and oral and health assessment components were similar to the TDSB questionnaire sample and under-represented the same groups.

For TCDSB students, the samples for all three study components under-represented male students and high school students.

As described in section *7.1 Survey Weights*, the representivity assessment was repeated using the design and non-response weights in order to determine post-stratification adjustments needed. After applying the design and non-response weights to the data, estimates had a similar socio-demographic distribution to that of the broader Toronto student population, with the exception of males and females. Post-stratification weights were then calculated to adjust for the distribution of males and females in each grade.

8.3 Missing Responses

Rates of missing responses were low for most questionnaire items and sections. For two questionnaire items, no response was provided for more than 5% of questionnaires:

- Sex (male or female) was missing for 8% of questionnaires
- Year of birth was missing for 6% of questionnaires

It is likely that these rates of missing responses were high because of question placement in the questionnaire. The visual layout of the questionnaire may have made it difficult for some students to notice these two items, making students more likely to accidentally skip them.