2010 National Physician Survey Questionnaire
Design

The 2010 National Physician Survey (NPS) physician questions evolved from questions used on the 2007 NPS. A working group approach was used with participation from the following organizations:

- College of Family Physicians of Canada (CFPC)
- Canadian Medical Association (CMA)
- Royal College of Physicians and Surgeons of Canada (Royal College)
- Canadian Institute for Health Information (CIHI)
- Other affiliated societies and committees
- Canadian Association of Interns and Residents (CAIR)
- Association of Faculties of Medicine of Canada (AFMC)

A total of five questionnaires were developed:

- Family physician/General practitioner questionnaire
- Other specialty physician questionnaire
- Family Medicine resident questionnaire
- Other specialty resident questionnaire
- Medical student questionnaire

All the questionnaires were translated into French.

The refinement process included a call for content input. The group strived to identify new areas of focus, with outreach to a wide range of medical associations/affiliates/groups, medical institutions, governments, research groups, etc. Constructive feedback provided by 2007 respondents was used to ensure that the survey is respondent-friendly.

The rationale for the final questionnaire content was:

1. To repeat questions from the 2007 survey that were essential for longitudinal tracking;
2. To edit questions from the 2007 survey, to improve usefulness of the answers provided;
3. To put aside questions from the 2007 survey, where changes occur more gradually, and the 2007 results were still considered valid;
4. To add new questions in response to new and/or developing issues.
The questions were piloted in the winter of 2010 with a variety of physician and student/resident committees and national specialty societies, and finalized in March 2010. The NPS received ethical approval from the Dalhousie University Ethics Review Board in April, 2010.

2010 National Physician Survey: Mailing List and Data Collection

The 2010 NPS was carried out as a self-reported survey of all physicians licensed to practice in Canada, and sent either by paper or by electronic invitation with a fax reminder sent out as well. The mail and email contact lists were generated from the NPS Masterfile. The NPS Masterfile was populated with information from the CMA Membership System, the CFPC membership database, and the Royal College membership database. The CMA Membership System was used as the template, as it included all physicians in Canada holding a medical license, and is compiled and updated on a daily basis with information received from provincial licensing bodies, associations, CFPC and Royal College membership listings, and individual physicians. The information provided by CFPC and Royal College added additional information (e.g. email addresses, more recently updated mailing addresses) to the content already supplied by the CMA Membership System.

Once fully populated, an NPS survey ID, not related to any existing member ID in any of the membership databases, was assigned to each record in the NPS Masterfile. These identification numbers were used to ensure that physician responses would remain confidential, to enable subsequent mailings/emailings of the questionnaire to be sent only to physicians who had not yet replied, and to provide the opportunity to apply the same numbers to future NPS surveys for longitudinal analyses, if permission was granted by the individuals.

Comparison of the demographic distributions in the 2010 NPS database and the total physician population

To illustrate the overall comparability of the 2010 NPS respondents to the physician population, Figure 1 combines data for several demographic characteristics (Province of practice, Age, Sex, Broad Specialty and Decade of Graduation from Medical School). Each data point in Figure 1 plots information for a physician subgroup as defined by a province or territory,
FP/GP or other specialist physician category, an age by sex group and a graduation year decade. The data that is plotted is the square root of the count of physicians in the defined group, for both the NPS respondents, and the physician population. The square root of the physician count is used in order to plot results for groups of very disparate size. Figure 1 illustrates the strong correlation ($r=0.986$) between subgroup distributions in the NPS respondents, and the physician population, based on five basic demographic characteristics. **The strong similarity between the respondents and the population suggests that non-response bias should be low for estimates from the NPS.**

![Figure 1: Square root of physician counts within the eligible population and among the 2010 National Physician Survey respondents. Groups defined by Province or Territory, Broad Medical Specialty, Sex, Age Group Categories and Graduation Year Decade.](image)

An examination of the representativeness of the NPS respondents can also be focused on physician age and sex distributions. Age and sex comparisons are presented in Figures 2 and 3. Among NPS respondents, there are proportionately more females than the physician population, 39.4% versus 35.3% respectively (see Figure 2).
Physicians aged 55 and older comprise a slightly larger proportion of the group of NPS respondents compared to the population, while physicians aged 44 and under are proportionately less represented (see Figure 3). The discrepancy between NPS respondents and population age group proportions is greatest for physicians aged between 35 and 44, with percentages equal to 24.4% and 21.5% respectively.
Sampling Weights, Estimation Weights, and Non-response Adjustments

When a census is conducted, but there is non-response, weights are used when making estimates in order that the weighted sample is representative of the population. These weights are typically designed to reduce possible non-response biases. With the 2010 NPS, the non-response adjustments were performed at the province by physician type by age-group by gender level, using the method of calibration (reference: Survey Methods and Practices. Statistics Canada catalogue no.12-587-XPE, 2003.) The reference population for this calibration was the NPS Masterfile.

Eligible Population: The total population of eligible physicians (66,405) is an estimate because eligibility could not be determined for all 67,941 physicians on the initial list. Of the 67,941 physicians on the initial list, eligibility could be determined for 12,394 physicians, of whom 318 were found to be ineligible. The weighting and non-response adjustment process included both the 12,076 physicians who responded to the survey and the 318 found to be ineligible and assumes the same ineligibility rate (by demographic group) among the indeterminate cases as among those for which eligibility was determined. This allows the estimation of the number of ineligible physicians among the 55,547 physicians whose eligibility was not confirmed. This method produces an estimate of 66,383 eligible physicians.

Estimated eligible population, 2010 NPS:

<table>
<thead>
<tr>
<th></th>
<th>Eligibility Determined</th>
<th>Eligibility Estimated</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eligible</td>
<td>12076</td>
<td>54307</td>
<td>66383</td>
</tr>
<tr>
<td>Not Eligible</td>
<td>318</td>
<td>1240</td>
<td>1558</td>
</tr>
<tr>
<td>Total</td>
<td>12394</td>
<td>55547</td>
<td>67941</td>
</tr>
</tbody>
</table>

Responding Sample: There were 12,076 responses representing the (estimated) 66,383 eligible physicians. After the non-response adjustments for different demographic groups, the estimation weights for these responses average 5.50, and range from 3.05 to 11.89.

Using the Weights
When a census is conducted and there is non-response, unweighted estimates will be biased if the rates of non-response vary between demographic groups. Weights are used when making estimates in order that the weighted estimates are more representative of the population. Groups with higher non-response get larger weights and those with lower non-response get smaller weights. In this way the weights will tend to reduce non-response biases due to the over- and under-representation of the groups.

For the demographic groups used for producing the weights for the 2010 NPS, there are large differences in response rates. The rates for the groups with the lowest response rates were only about one quarter of the highest rates. Thus, there is the possibility of unweighted estimates being highly unrepresentative, or biased.

The weights should be used when making any estimates and for all analysis using the 2010 NPS data.

**Sampling Variability of Estimates**

The data from the 2010 NPS are based on a census with considerable non-response. Different results would have been obtained if a census with no non-response had been conducted. These differences are called non-response errors, and sampling theory gives us a way to estimate how large they might be. For the NPS is has been assumed that the non-response was approximately at random and so that it can be treated essentially uncorrelated with the questions asked.

Using the usual formula for the sampling variance of estimates from simple random samples (ref: Cochrane, W. (1977). Sampling Techniques. John Wiley and Sons, New York), and a conservative design effect adjustment to account for stratification and calibration, variability guidelines can be established. The variability of an estimate depends upon many factors, such as the size of the sample, its distribution among the strata, and the size of the estimate. Estimates using questions from the NPS for proportions of the entire population of physicians over all provinces will be within .83 percentage points of the true proportion, 19 times out of 20. For Canada level estimates restricted to the Specialist or Family/General subpopulations, the estimates will be within 1.1 percentage points, 19 times out of 20.
These are conservative guidelines, based on the population and sample sizes, and on the most difficult proportion to estimate. This proportion is 50%; for smaller or larger estimates the confidence intervals are considerably narrower. For instance, an estimate of 5% (or 95%) for all physicians across Canada can be expected to be within .36 percentage points of the true value, 19 times out of 20.

The width of these confidence intervals is highly dependent on the sizes of the population and of the sample. The confidence interval widths for estimates for Newfoundland and Labrador or Prince Edward Island are about ten times the width of those for Canada, while those for Quebec or Ontario are only about three times the width of those for Canada.

The validity of the estimates of sampling variability and the resulting confidence intervals and tests of hypotheses depends on the validity of the assumptions on which they are based. The essential assumption is that the effect of non-response is approximately like that of a random sample within the classes that have been used for calibration. This is also the assumption under which the 2010 NPS estimates will accurately reflect the entire population of eligible physicians.

There were relatively few data elements available to test this assumption, but for the characteristics of physicians that were known for both the respondents and non-respondents the two groups looked very similar (see previous section).

The weighting adjusts for over- or under-representation of groups defined by province, type of physician (specialist versus FP/GP), age, and sex. Hence any response bias due to differential non-response between these groups has been removed through the calibration of the weights.

**2010 National Physician Survey (NPS) Survey Methodology**

The National Physician Survey (NPS) is an ongoing collaborative initiative led by the College of Family Physicians of Canada (CFPC), the Canadian Medical Association (CMA) and the Royal College of Physicians and Surgeons of Canada (Royal College). Every three years, all practicing physicians, medical residents, and medical students in Canada are surveyed about what they are doing (or intend to do) in their practices in response to both societal needs and personal and professional interests.
Medical residents and medical students

Questionnaire Design

The questions for the medical resident and medical student components of the 2010 National Physician Survey (NPS) evolved from questions used on the 2007 and 2004 NPS. A working group approach, including representatives from the College of Family Physicians of Canada (CFPC), the Canadian Medical Association (CMA), the Royal College of Physicians and Surgeons of Canada (Royal College), the Canadian Institute for Health Information (CIHI), and input from the CFPC Section of Residents and Section of Teachers, and organizations such as the Canadian Association of Interns and Residents (CAIR), the Association of Faculties of Medicine of Canada (AFMC), the Canadian Federation of Medical Students (CFMS), etc. was used to review and refine the 2004 and 2007 questions.

For medical residents, two questionnaires were developed, one specific for family medicine residents, and a second specific to residents in all other specialty programs. For students, one questionnaire was developed. All questionnaires and survey communications were available in English and French.

The questions were piloted in the winter of 2010 with a variety of residents and students (through the student and resident associations/societies), and finalized in May 2010. The resident and student components of the NPS received ethical approval from the Dalhousie University Ethics Review Board. Additional approval was received from the University of Western Ontario Ethics Review Board.

Data Collection

This component of the 2010 NPS was carried out as a self-reported online survey of all medical residents and medical students training in Canada. Residents and students were contacted on four separate occasions. The email invitations to complete the NPS questionnaire were forwarded by the undergraduate and postgraduate medical offices at each of the 17 medical schools to their students and residents respectively, on behalf of the NPS. This was done in order to ensure that all students and residents would be invited to participate, and to protect student and resident confidentiality. The NPS-related emails started in late September 2010 with an advanced notification, followed one week later with an invitation containing the http link to the questionnaire, followed by a reminder message again containing the link eight days later, and a final invitation after another eight days. The questionnaire completion phase ended December 1st, 2010. All responses
were captured directly into two separate databases, one for student responses and one for residents.

Undergraduate and postgraduate medical offices were asked for the number of students and residents respectfully that they were forwarding the NPS invitations to, and what year of training the students were in or whether the residents were in family medicine or another specialty training program. Based on this information, a total of 10,627 medical students, and 12,546 medical residents were invited to complete the 2010 NPS.

Upon completion of the survey, students and residents were eligible for a cash draw. There were two $1,000 draws available — one for students and one for residents. After completing and submitting the questionnaire, respondents were invited to provide their name and address (and complete a skill testing question) in order to be eligible for the cash draw. The draws were carried out in December, 2010. This cash draw process was completely separate from the questionnaire responses.

Response Rates

Of the 10,627 students invited to complete the 2010 NPS, 3,139 replied to the survey for an overall study response rate of 29.5%. Of the 12,546 medical residents invited to complete the 2010 NPS, 2,546 replied to the survey for an overall study response rate of 20.3% (24.9% among family medicine residents and 19.1% among residents in all other specialty programs).

National level estimates based on the 2010 student NPS study results are considered accurate within +/- 1.7%, 19 times out of 20.

National level estimates based on the 2010 resident NPS study results are considered accurate within +/- 1.9%, 19 times out of 20.