

# Canadian Population Prescription Drug Reimbursement Model Technical Document

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## Model History

The **Canadian Population Prescription Drug Reimbursement Model** is the result of a series of research assignments conducted over a 5 year period.

The Model was created to shed light on public policy issues around insurance for prescription drug expenses. It has evolved through several generations to answer increasingly demanding questions:

- How many people have drug plan coverage?
- What kind of coverage do they have?
- How effective is this coverage in protecting families from financial hardship in the event of serious drug expenses?
- What are the financial implications of various national Pharmacare proposals?

One generation of the work was financed by Health Canada; the balance was financed by the Canadian Life and Health Insurance Association.

Results from earlier versions of the Model were published by the research sponsors:

*Protection from Severe Drug Expenses, 2002, CLHIA*

*Canadians' Access to Insurance for Prescription Medicines, 2000, Health Canada*

These documents are available at [www.frasergroup.com](http://www.frasergroup.com)

Results from this analytical tool were also quoted extensively in the Senate's Report on *The Health of Canadians*.

The current version of the model also has a costing engine which can model the financial effects of changes in plan designs on plan sponsors and covered individuals. The results from this portion of the Model have not been published.

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## Model Construction

### Data source

A microdata file was purchased from Statistics Canada. The 1998 Survey of Labour Income Dynamics (SLID) is a longitudinal survey of approximately 40,000 families (70,000 individuals) randomly selected to represent the population of Canada with certain limitation. The sample excludes residents of the territories and residents of First Nations reserves.

### Adjustments

Adjustments to the data file were made to bring the data up to the year 2000.

- Incomes were inflated.
- The known under-reporting of Social Assistance was corrected to match administrative data from Human Resources Development Canada (HRDC)
- Similarly the number of Guaranteed Income Supplement (GIS) recipients was adjusted
- The number of employed and unemployed were adjusted to match year 2000 labour force targets
- The age and gender distribution was modified to match the year 2000
- The distribution of population by province was adjusted.

Except for income, all adjustments were done by altering the survey weights assigned to the various individuals in the sample.

### Public plan membership

In the simplified world of the model, an individual can be covered by a maximum of one public and one private plan.

In most cases, provincial plan membership is determined by demographic characteristics such as age and income and the model follows these rules. A few provincial plans are voluntary; in these cases, we constructed simple probabilistic models that generated enrollments equal to administrative data. Where appropriate, these selection models included an assumption that

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individuals would act in their economic self interest.

## **Private plan membership**

A custom tabulation of data from Statistics Canada's Survey of Work Arrangements provided frequencies of employer plan membership by such characteristics as age, union membership and tenure of employment.

Using logistic regression techniques, probabilities of employer plan membership were assigned to each individual and a joint probability was computed for each family.

Supplemental assignment routines identified retirees and assigned retiree coverage to a proportion of this group. The proportions were based on estimates derived from proprietary Fraser Group data.

Another supplemental process assigned coverage to university and college students. Fraser Group research indicates that virtually all students have access to such plans.

A final routine randomly assigned a small number of persons without other coverage to have individual policies. The assignment probabilities were biased by income (higher income people being assumed more likely to purchase)

## **Plan provisions**

The benefit parameters such as deductible and co-payment for each public and private plan were summarized in a parameter string.

Parameter strings for public plans are based on the actual features of the plans as detailed in public documents.

For the private plans, Fraser Group had access to a database of 80,000 employer plan designs. These 80,000 plans were mapped unto 37 "Plan Stereotypes", representing the most common plan designs.

The frequencies of these plans were tabulated by province and each individual in the sample with employer plan coverage was randomly assigned a parameter string based on their residence.

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## **Costing engine**

Each individual in the Model universe is assigned a “demand” or need for prescription drugs (a dollar value). This is determined by age and gender. The factors used are based on information contributed by several large insurers combined with publicly available information from the Ontario Drug Plan.

Severity distribution is based on the Fraser Group Large Claim Study extrapolated for over age 65. This is a proprietary study based on data from 56% of all private plan claims in the year 2000.

Each individual is also assigned an actual expenditure number for prescription drugs. This expense number is a function of demand, income and coverage. The relationships are hypothesized from the authors’ personal underwriting experience and limited academic research from outside Canada.

However, the total expenditures in the Model are reconciled to a target consistent with the actual expenditures reported by the Canadian Institute for Health Information.

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## Model Applications and Limitations

The model can address questions such as the following:

- How many people have drug plan coverage?
  - What are their demographic characteristics?
- How comprehensive is the coverage?
  - Does the coverage have plan maximums? Deductible thresholds? Co-payment requirements?
- What is the source of coverage? Public coverage, private, both.
- How is the financing of prescription drug expenditure distributed among public drug plans, private drug plan and out of pocket resources for specified sub-populations?
  - For actual or hypothetical expenditure patterns, how important are the various sources of coverage for different population segments?
- How effective is the system of coverage in protecting families from financial hardship in the event of serious drug expenses?
- What are the financial implications of various national Pharmacare proposals?

## Model Limitations

The Model inherits the limitations of the underlying Statistics Canada surveys. Of particular interest is the exclusion of residents of First Nations reserves. This will produce an underestimate of population counts and proportion of population covered in most provinces but tends to be immaterial except in Alberta, Saskatchewan and Manitoba.

As noted earlier, the Model provides for membership in only one public plan and one private plan. This will understate the comprehensiveness of coverage for a small section of the population.