

# Income-Based Drug Coverage in British Columbia: The Impact on the Distribution of Financial Burden

Un régime d'assurance-médicaments fondé  
sur le revenu en Colombie-Britannique :  
Incidence sur la répartition du fardeau financier



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## Abstract

**Background and Objectives:** In May 2003, the government of British Columbia adopted an income-based pharmacare program, replacing the previous age-based program. Stated policy goals included improving the distribution of pharmaceutical payments across incomes. This analysis assesses the policy's effect on the distribution across incomes of both private payments and public subsidy for prescription drugs.

**Methods:** This analysis focuses on how the 2003 policy change affected the extent to which higher-income households pay a larger share of private drug expenditures and/or receive a smaller share of available public subsidies. Demographic information and drug spending data were extracted from BC PharmaNet and the BC PharmaCare Program for the years 2001–2004. These data were then graphed to assess (using concentration curves) changes in the progressivity of private and public pharmaceutical financing.

**Results:** Overall, the move to Fair PharmaCare resulted in larger but slightly less regressive private payments and smaller but slightly more progressive public subsidies. Because total drug spending increased while the total subsidy available decreased, average private household spending as a proportion of household income increased across virtually all age and income levels.

**Discussion:** The PharmaCare Program redistributed public subsidies in a manner that was more progressive than previous programs; this reduced the regressivity of private pharmaceutical payments. However, total public subsidy decreased, and private spending increased by a commensurate amount. This makes the program's overall financial impact on BC households somewhat ambiguous. Income-based pharmacare could improve financial equity unambiguously if public shares of drug spending are expanded.

## Résumé

**Contexte et objectifs :** En mai 2003, le gouvernement de la Colombie-Britannique a instauré un régime d'assurance-médicaments fondé sur le revenu pour remplacer l'ancien régime fondé sur l'âge. Parmi les objectifs visés, mentionnons une meilleure répartition des dépenses en médicaments selon le revenu. L'analyse évalue l'effet de la politique sur la répartition, en fonction du revenu, des dépenses privées et publiques en médicaments d'ordonnance.

**Méthodes :** Cette analyse cherche principalement à déterminer dans quelle mesure les foyers à revenu plus élevé paient une plus grande portion des dépenses en médicaments et/ou reçoivent une plus petite portion des fonds publics disponibles, suite au changement de politique effectué en 2003. Nous avons extrait des renseignements démographiques et des données sur les dépenses en médicaments de PharmaNet et du Régime d'assurance-médicaments de la C.-B. pour les années 2001 à 2004. Nous avons ensuite converti ces données en un diagramme afin d'évaluer (à l'aide de courbes de concentration) les changements survenus dans le financement privé et

public des médicaments.

**Résultats :** Dans l'ensemble, la mise en œuvre d'un régime équitable d'assurance-médicaments a entraîné des paiements légèrement moins régressifs et plus faibles dans le privé, mais des subventions publiques légèrement plus progressives. Étant donné que les dépenses totales en médicaments ont augmenté alors que les subventions totales disponibles ont diminué, les dépenses moyennes par foyer – en tant que proportion du revenu du foyer – ont augmenté pour presque tous les âges et niveaux de revenu.

**Discussion :** Le régime d'assurance-médicaments a eu pour effet de redistribuer les subventions publiques d'une manière plus progressive que les programmes précédents, ce qui a réduit le caractère régressif des paiements privés à ce chapitre. Cependant, les subventions publiques totales ont diminué et les dépenses privées ont augmenté de façon proportionnelle, ce qui rend l'incidence financière globale du programme sur les foyers de la C.-B. quelque peu ambiguë. L'assurance-médicaments fondée sur le revenu pourrait améliorer l'équité financière de façon plus nette si la portion publique des dépenses en médicaments est maintenue ou augmentée.



**T**HROUGH A SEQUENCE OF TWO POLICY REFORMS, THE BC PHARMACARE Program recently underwent a major transformation. BC PharmaCare circa 2001 could be characterized as a “mixed pharmacare model,” involving relatively comprehensive coverage for social assistance recipients and seniors, and fixed-deductible coverage for catastrophic drug costs for all others. In January 2002, the BC Ministry of Health introduced new co-payments under the seniors’ drug program in an effort to meet budgetary targets for government spending on prescription drugs. Then, in May 2003, the fixed-deductible catastrophic program and the seniors’ program were combined into a new, income-based drug plan called Fair PharmaCare. Details of the policy change and the objectives that motivated it are provided in an accompanying paper (Morgan and Coombes, page 92). However, as its name indicates, equity was a central concept in the development of Fair PharmaCare.

In this paper, we analyze whether public subsidy and private payments became more closely related to income after the introduction of Fair PharmaCare. Because a significant proportion of public drug subsidies in British Columbia (and elsewhere) has long been targeted towards low-income groups, it can be expected that people with lower incomes received larger subsidies and made smaller private payments for drugs than those with higher incomes both before and after Fair PharmaCare was implemented. However, whether the distributions of subsidies and private payments before and after the policy change were “fair” or “equitable” depends on how these distributions relate to the distribution of income (Daniels et al. 2000). If, under a pharmacare

program, low-income households contribute a greater share of their income towards prescription drugs than households with high incomes, the program would exacerbate prevailing income inequality and would be considered regressive. If households of different incomes paid an equal share of their income towards pharmaceuticals, the scheme would leave income inequality unchanged and would be considered proportional. Finally, if households with high incomes contribute a larger share of income towards drug payments than those with low incomes, the system would reduce income inequality and would be considered progressive. The opposite is true in the case of subsidies: public subsidies would be considered progressive if they represented a larger share of income for people with low incomes than for people with high incomes.

We assess the distribution of public and private payments, relative to income, before and after changes to BC PharmaCare. We do not offer an overall equity assessment. Rather, we separately assess the progressivity or regressivity of public subsidies and private payments and provide simulated results of policy changes that would have been more (and less) successful in achieving stated policy goals regarding the distribution of financial burden.

## Methods

The unit of analysis in this study is the household. Our cohort contained all households in British Columbia that included at least one member who was a resident of the province and registered for benefits under the BC Medical Services Plan from 2000 to 2004 – approximately 1.7 million households. Because the BC PharmaCare Program treated senior and non-senior households differently before and after the policy change, the analysis is stratified by age. A senior household is one in which any member was aged 65 or older at the time of the policy change.

For each year, we tabulated total household expenditure on prescription drugs as well as the total subsidy received from BC PharmaCare. The expenditure information includes both the ingredient cost of medicines and the dispensing fees charged by pharmacists. What is not paid for publicly is paid for privately, either through private insurance or out of pocket.

Owing to data limitations, we cannot distinguish between private payments made out of pocket and those paid through private insurance. We do not believe that this is a serious limitation in the present assessment of equity between different levels of income, though it would be a serious limitation in assessing equity within income levels. This is not a serious limitation for the present study, largely because the vast majority (~98%) of private drug insurance in Canada is group-based insurance offered as part of employment-related compensation packages, and because employees of different incomes generally receive the same benefits at the same premiums (I. Klatt, Canadian Life and Health Insurance Association, personal communication, August

16, 2006). Private insurance premiums for drug coverage offered through employment would therefore be regressive (assuming that the cost of premiums is paid by the employee or accounted for when determining wage/salary compensation). Also, because there is a correlation between employment and private insurance, insurance is most likely to pool drug expenditures among middle- and higher-income groups. Thus, inability to distinguish between insurance payments and out-of-pocket payments likely moderates the regressivity of our findings, but does not qualitatively alter their nature.

Income information for this study was derived from a combination of sources. Household-specific income information was obtained for those households that registered for Fair PharmaCare. Such data were available for 95% of senior households in British Columbia, but only 73% of non-senior households. For all households, regardless of registration status, household income could be estimated using average incomes by neighbourhood as recorded in the 2001 Census (Morgan and Yan 2006).

To test the impact of different income variables on our study results, both household-specific data and neighbourhood-defined data were used to depict patterns of seniors' total drug expenditures and subsidy levels across income percentiles. The results of this robustness test are shown in Appendix 1. As would be expected, neighbourhood-defined data mask some household-specific variation by averaging incomes within the Census Dissemination Areas used to construct them. Within the context of the present study, household-specific data are more sensitive to outliers in the tails of the income distribution: household-specific data show more pronounced extremes in high drug expenditures among households with very low incomes and low public subsidies among households with very high incomes. However, these differences are not significant enough to alter income gradients or the general findings of this study.

Given the availability of over 95% of the study cohort, income data obtained from Fair PharmaCare were used to perform the analysis on senior households. Fair PharmaCare validates these income data against registrants' household income as reported in their tax returns of the previous year (which pertain to earnings two years prior to the given year). Given that the general findings of our seniors' analysis are robust to differences in income measures used, the analysis pertaining to non-seniors utilizes the neighbourhood-defined income estimates for all families in the study cohort, rather than restricting attention to the 73% of non-senior households for which household-specific income measures could be obtained.

Information about household composition (number of children, working-age adults and seniors) was used to equalize income, private payments and subsidies for households of different compositions. Aronson, Johnson and Lambert's equivalence scale was used (Aronson et al. 1994). Taking household composition into consideration is important for at least two reasons. First, a large household with a total income of \$30,000 has less ability to pay than a small household with the same total income. Second, as income is held constant and the number of household members

increases, ability to pay does not decline proportionately; two can live nearly as cheaply as one (Aronson et al. 1994). Thus, two households with the same total income and same private drug payments but of differing compositions are not comparable. Equalization makes them more comparable.

## Findings

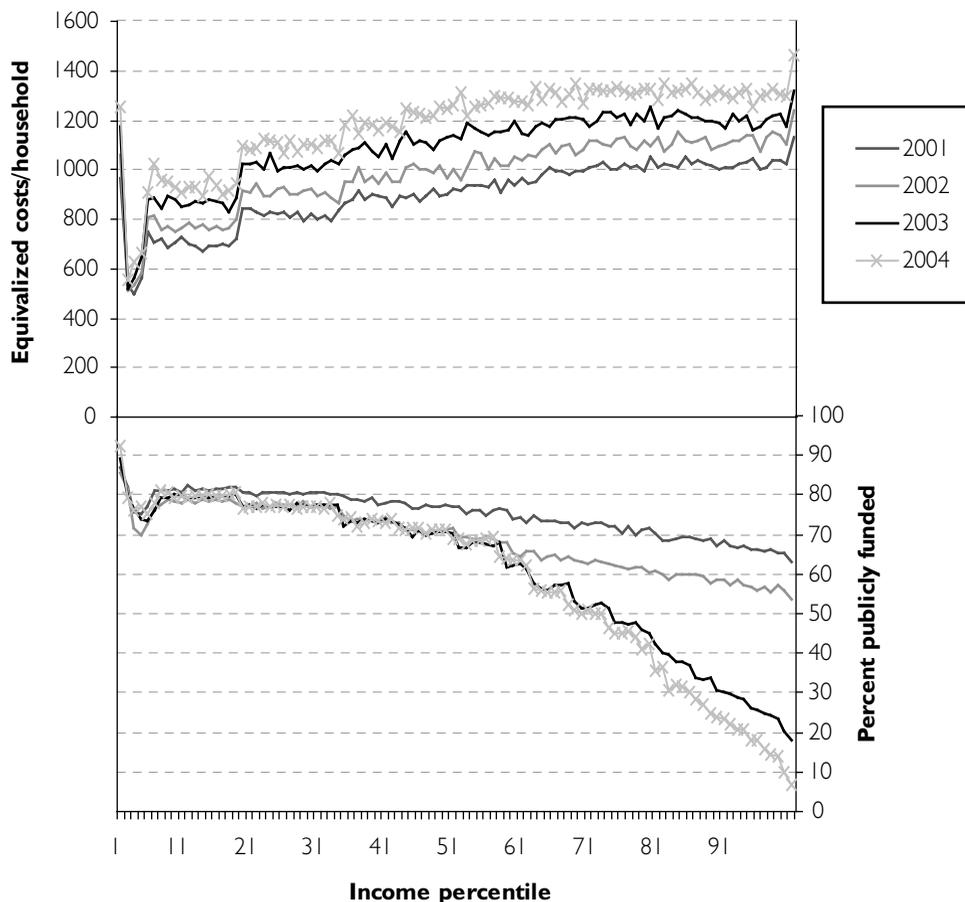
### Expenditure and subsidy levels for senior households

Figure 1 illustrates total drug expenditures and public subsidy from 2001 to 2004 for households with at least one senior member. For illustrative purposes, we stratify by income percentiles. Total drug expenditures had a slight, but positive, income gradient in all the years studied. This suggests that expenditures are linked more closely with ability to pay than with health status, raising questions about income and access that will be studied in future analyses. Figure 1 also illustrates that average levels of drug expenditure for senior households increased substantially over time: average equalized expenditures for senior households were 32% higher in 2004 than in 2001.

In 2001, BC PharmaCare paid approximately 80% of total drug expenditures for senior households below the 36th income percentile. Those between the 36th and 80th percentiles had an average of 75% of their pharmaceutical purchases subsidized. In 2001, subsidies for senior households above the 80th percentile declined: from 72% for the 80th percentile to 63% for the 99th percentile. The introduction of co-payments within the seniors' drug benefits program in 2002 reduced the public share of drug expenditures by between 7% and 10% for senior households with incomes above the median. Senior households with the lowest incomes (below the 7th percentile) saw the publicly funded portion of their drug expenditures fall by approximately 4%.

The implementation of Fair PharmaCare had a more significant impact on seniors' drug subsidy. In 2003 and again in 2004, there was a slight increase in the share of drug expenditures publicly funded for senior households with incomes below the 4th percentile, and no decline in subsidy for those below the 8th percentile. The proportion of total expenditures paid by BC PharmaCare (the public share of drug expenditures) fell for all other senior households. Moreover, the decline in public subsidy was substantially larger for higher-income households. The 20% of senior households with the highest incomes experienced a decrease in public subsidy of more than 30% between 2001 and 2004, from over 70% to less than 40%. The 10% of senior households with the highest incomes experienced decreases of more than 45%, with the 99th percentile receiving subsidies covering only 7% of their drug expenditures.

FIGURE 1. Total drug expenditures and public subsidy, senior households, stratified by income percentiles, 2001–2004

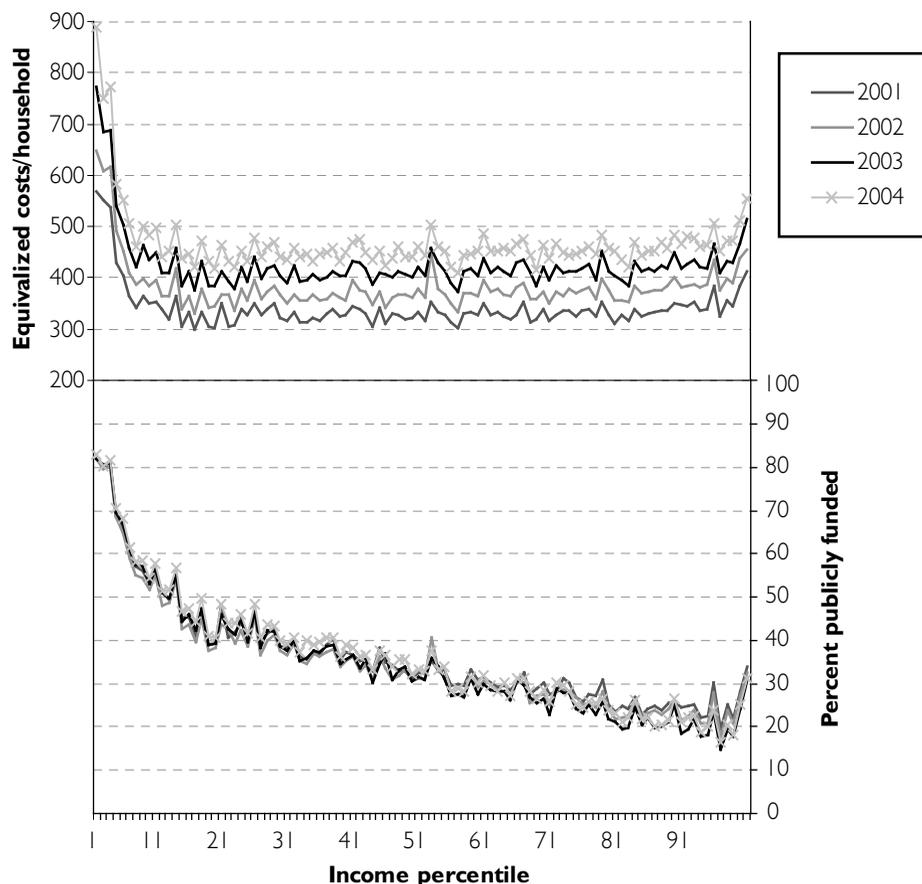


### Expenditure and subsidy levels for non-senior households

Figure 2 illustrates total drug expenditures and public subsidy from 2001 to 2004 for households with no senior members. Average equivalized expenditures for non-senior households with incomes below the 4th percentile were unusually high – more than \$800 in 2004. This likely reflects particularly acute healthcare needs in British Columbia's poorest neighbourhoods, for example, those with high rates of treatment for addiction and mental illness. Beyond the very poorest percentiles, average drug expenditures for non-senior households are relatively constant across income strata. Differences over time were more significant. Between 2001 and 2004, average equivalized expenditures for non-senior households increased by 37%.

BC PharmaCare consistently funded over 80% of drug expenditure for households with incomes below the 3rd percentile between 2001 and 2004. This consist-

FIGURE 2. Total drug expenditures and public subsidy, non-senior households, stratified by income percentiles, 2001–2004



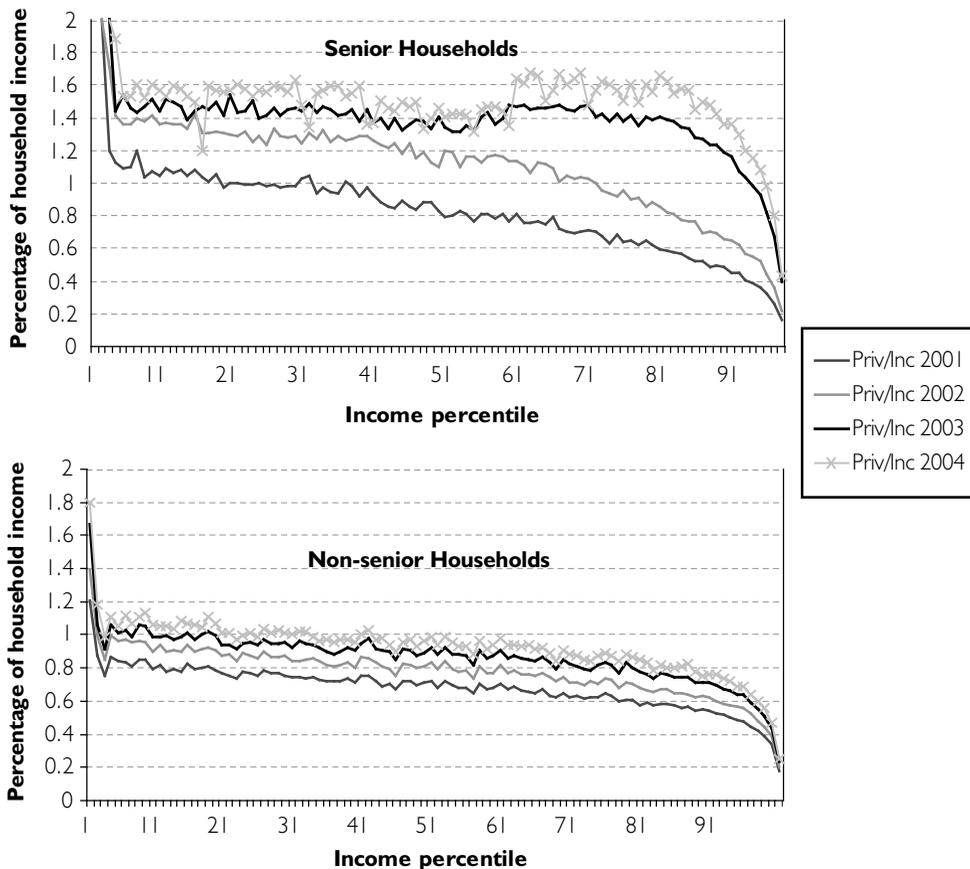
ency reflects the lack of changes to BC PharmaCare programs for social assistance recipients and individuals with specific medical conditions, such as clients of mental health services programs. Above the 10th income percentile, the share of publicly funded drug expenditure declines steadily. Figure 2 illustrates that both the 2002 and 2003 policy changes had very small effects on the share of public funding for non-senior households.

Between 2002 and 2004, the public share of drug expenditures for households below the 20th income percentile increased by an average of 2%. Public subsidy increased by nearly 1.5% for households with incomes between the 20th and 50th percentiles. Average public subsidy fell by approximately 0.75% for non-senior households with incomes between the 50th and 80th percentiles, by 2.25% for households between the 80th and 90th percentiles and by 3.4% for households above the 90th percentile.

### Private drug expenditures as a percentage of household incomes

As a function of increases in total drug spending and the decrease in total subsidies provided by the BC PharmaCare Program, the average share of household income spent privately on pharmaceuticals increased consistently throughout the period of study. Figure 3 illustrates that this increase is most notable for seniors, who saw private drug expenditures increase significantly as a percentage of income. This resulted from continued increases in prescription drug expenditure, and from the reduction in public subsidy that occurred with the 2002 and 2003 BC PharmaCare policy changes. Non-senior households also saw an increase in the percentage of their income being spent privately on drugs; however, these changes were largely due to increased expenditures, not reduced subsidy.

FIGURE 3. Average share of household income spent privately on prescription drugs, senior and non-senior households, stratified by income percentiles, 2001–2004



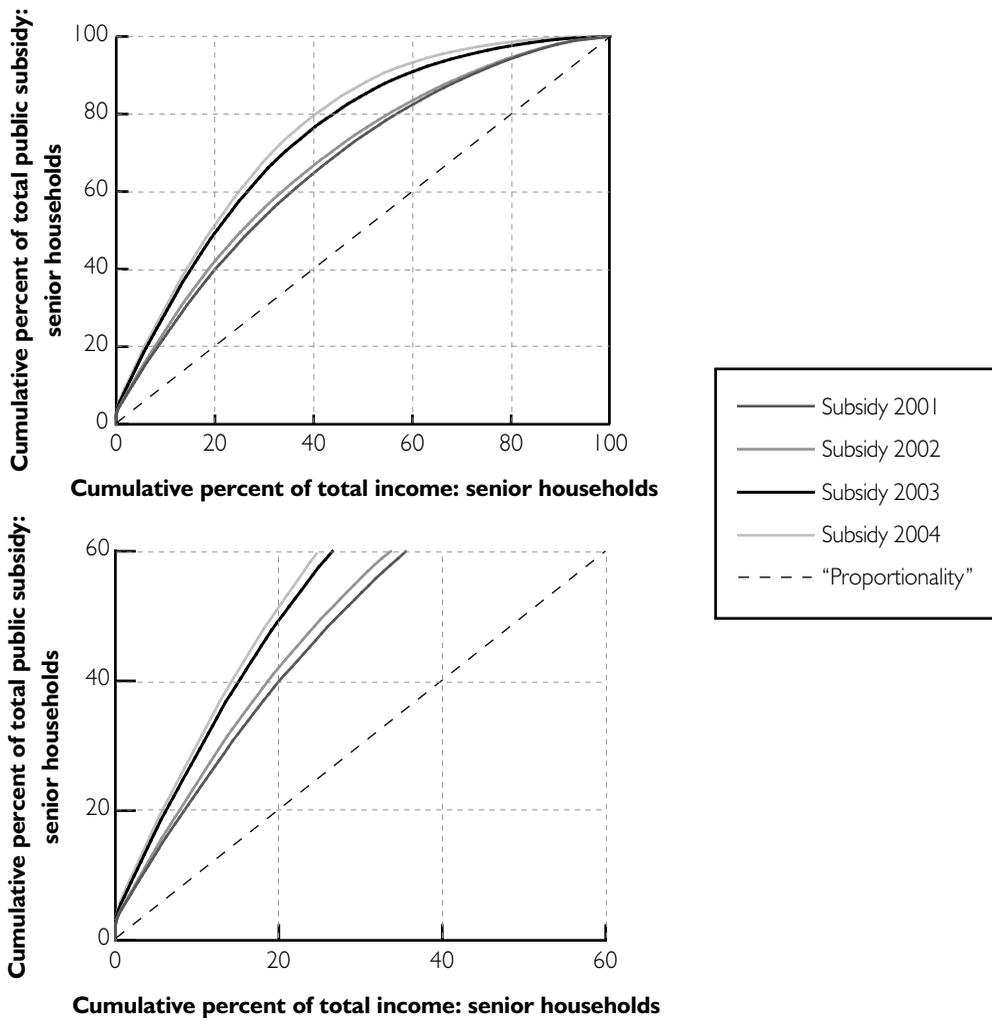
Average private drug spending as a proportion of household income increased for virtually all households across all income strata throughout the period of study. Most notably, there is a sharp increase in the portion of income spent privately on prescription drugs for seniors above the 60th income percentile after the implementation of Fair PharmaCare. The “notch effect” prominent in Figure 3 is the result of increases in both deductibles and out-of-pocket maximums at the \$33,000 annual income mark under Fair PharmaCare (from no deductible and an out-of-pocket maximum of 1.25% of household income for those with less than \$33,000 annual income, to a deductible of 1% of household income and an out-of-pocket maximum of 2% of household income for those with more than \$33,000 annual income). The \$33,000 level occurs at the 61st income percentile among seniors. It is worth noting that the private drug expenditures reported in Figure 3 exceed the out-of-pocket maximums for many income groups because our data include all prescription drug expenses, even drugs not listed in the provincial formulary and prescriptions that do not qualify as a benefit because of coverage restrictions.

### Expenditure and subsidy allocations

The progressivity or regressivity of both public subsidies and private payments can be measured graphically using concentration curves that plot the cumulative share of these variables against the cumulative share of provincial income accounted for by households ranked according to income. If, for example, the concentration curve for private drug payments lies on the diagonal line of proportionality, then all households are contributing a share of private drug payments equal to their share of the province’s total income. If the curve lies above the diagonal, private drug expenditures represent a greater share for lower-income households than their share of the province’s total income. A private payment is regressive if its concentration curve lies above the diagonal line of proportionality (it increases income inequality). A subsidy is *progressive* if its concentration curve lies below the diagonal line (it reduces income inequality).

Figure 4 illustrates concentration curves for public subsidy for senior households from 2001 to 2004. The allocation of BC PharmaCare subsidies for senior households was progressive in each year: the subsidy for lower-income households was greater than their cumulative share of total income, even though the actual dollar value transferred may be comparable across households of different incomes. The introduction of co-payments in 2002 altered the distribution of public subsidy, demonstrated by the fact that the subsidy concentration curve for 2002 lies just above that for 2001. The 2003 and 2004 concentration curves in Figure 4 further illustrate that public subsidy became more concentrated among low-income senior households with the introduction of Fair PharmaCare. In light of the findings illustrated in Figure 1, we know that

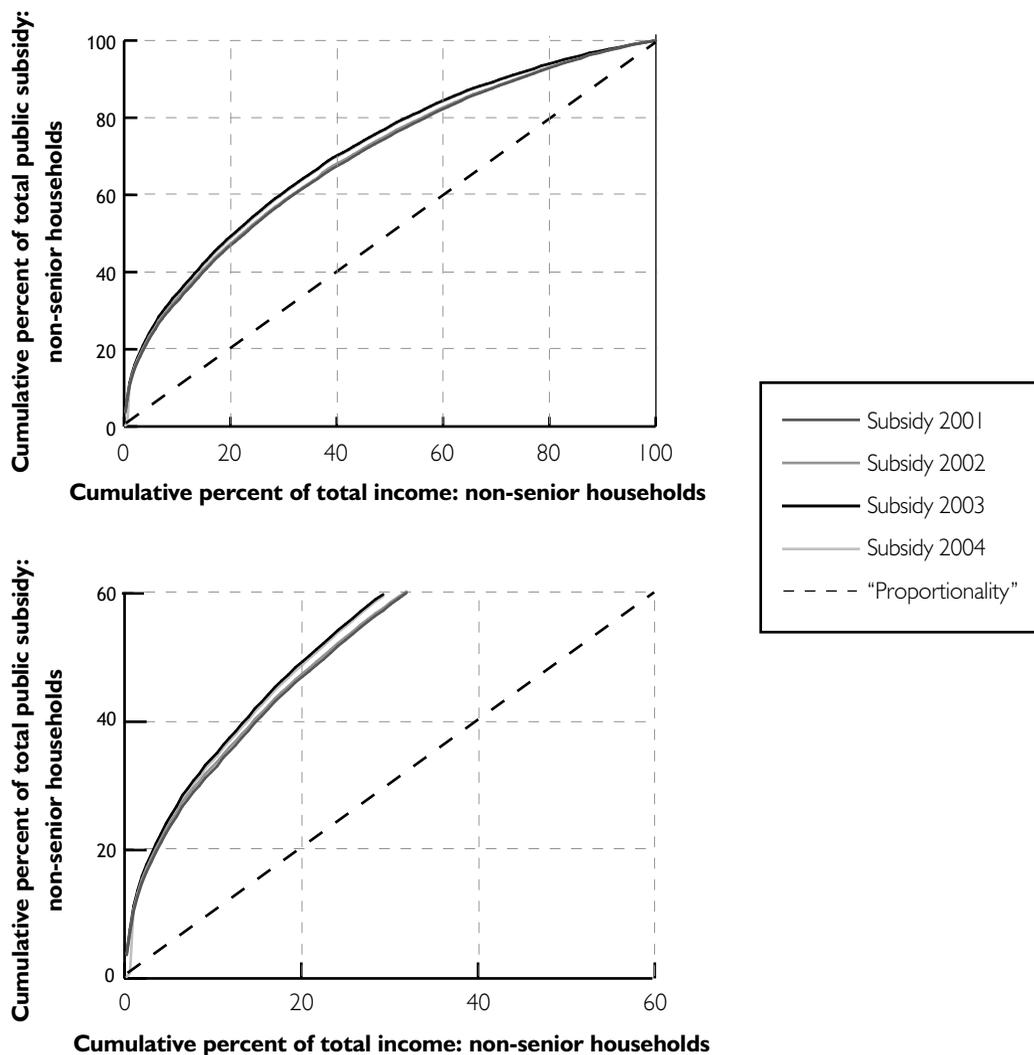
FIGURE 4. Concentration curves for public subsidy of drug expenditures for senior households, 2001–2004 (magnified below)



the increased concentration of seniors' drug subsidy stems from the reduction in subsidy for higher-income seniors, rather than increased subsidy for lower-income seniors.

Figure 5 illustrates the BC PharmaCare subsidy concentration curves for non-senior households. These curves are more steeply sloped than the curves for senior households because, although smaller in total value, public drug subsidies offered to non-seniors are much more concentrated among those with lower incomes. The effect of program changes on the concentration of subsidies among non-seniors was modest: public subsidy became slightly more concentrated among low-income, non-senior households with the introduction of Fair PharmaCare.

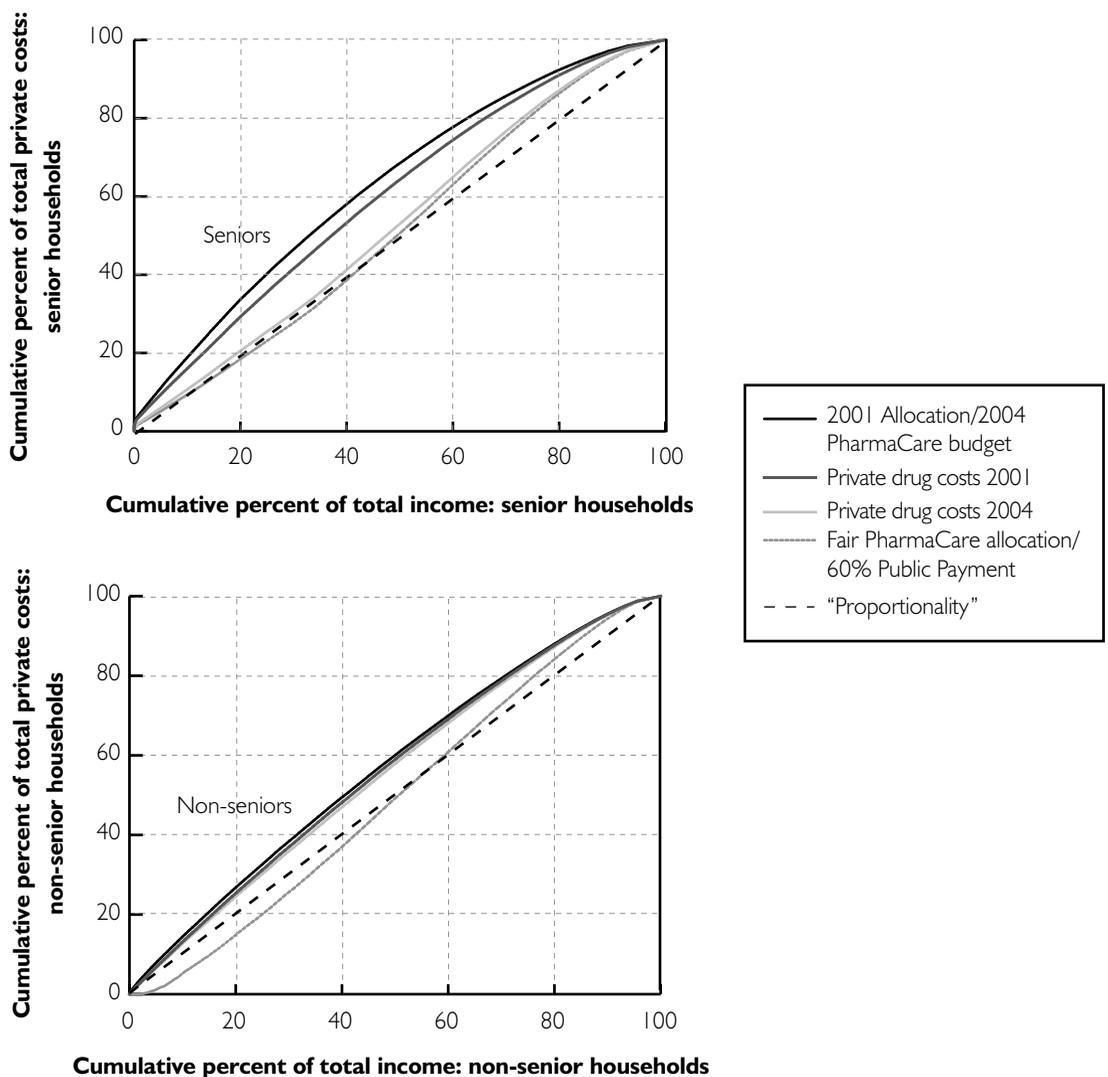
FIGURE 5. Concentration curves for public subsidy of drug expenditures for non-senior households, 2001–2004 (magnified below)



Reallocation of the BC PharmaCare subsidy may also affect the distribution of private payments for pharmaceuticals, which now account for the majority of total pharmaceutical spending. Figure 6 illustrates the concentration curves for private payments for both senior and non-senior households throughout the period of study, along with two concentration curves that depict hypothetical scenarios (described below). Both the 2001 and 2004 private drug expenditure concentration curves lie

above the line of proportionality, indicating that private payments for prescription drugs were regressive in both years: low-income individuals were paying “more than their share” of total private payments. However, because the concentration curves for 2004 are closer to the line of proportionality than the 2001 curves, the changes in BC PharmaCare reduced the regressivity of this component of financing. This reduction in regressivity is less pronounced in non-senior households.

FIGURE 6. Concentration curves for private drug expenditures, senior and non-senior households, 2001, 2004 and hypothetical policy scenarios



## Policy scenarios with unambiguous impacts on the distribution of financial burden

The first hypothetical scenario in Figure 6 shows what would have happened if the total share of drug expenditures subsidized by the BC PharmaCare Program had been reduced to its 2004 size but the relative allocation of subsidies across households of different ages and incomes were left unchanged from their 2001 allocation. Under such a scenario, private payments would have been more regressive than they were in 2001 and substantially more regressive than they actually were in 2004. Reducing the program size without reallocating remaining subsidies based on income would have unambiguously resulted in more regressive private pharmaceutical payments than when the program size was reduced and subsidy was reallocated based on income.

The second hypothetical scenario in Figure 6 illustrates what would happen if the distribution of subsidy across ages and incomes was unchanged from the income-based allocation of Fair PharmaCare, but the program was scaled up to provide public subsidy for 60% of total provincial drug expenditures. Under such a scenario, private payments for pharmaceuticals become progressive for senior households below the 40th income percentile and substantially less regressive than the actual 2004 distribution for all other senior households. For non-senior households, such an increase in coverage would result in progressive payments for all households below the 60th income percentile, most significantly for households below the 25th percentile.

## Discussion

Against a backdrop of steadily increasing prescription drug expenditures, the reduction in size of the BC PharmaCare Program increased average private payments as a proportion of income for all households, irrespective of age or income level. It should be noted that private payments for healthcare are consistently found to be regressive in all manner of financing arrangements, stemming in part from higher rates of illness and consumption of medical care among those with lower incomes (Wagstaff et al. 1992; Wagstaff and van Doorslaer 1997; van Doorslaer et al. 1999; Castano et al. 2002). However, the increase in private expenditures among both senior and non-senior households of lower income is surprising given that the policy was specifically designed to protect low-income seniors and improve coverage for lower-income non-seniors. This finding suggests a need for further research into program participation rates and the factors that influence them.

However, notwithstanding the increase in private payments created by the reduction in the BC PharmaCare budget, the Fair PharmaCare Program was successful in redistributing public subsidies in a manner that was more progressive. Specifically, by increasing private drug expenditures much more for higher-income households than lower-income households, and by decreasing the level of public subsidy to high-income

seniors while slightly increasing subsidy for low-income non-seniors, the program did shift the distribution of financial burden in a way that slightly improved the prevailing level of income inequality in the province. However, it should be noted that the stated policy goal of redistributing public subsidy from high-income seniors to low-income non-seniors does not appear to have been realized. While a significant share of the public subsidy was no longer distributed among high-income seniors, our results suggest that this share was not redistributed among low-income non-seniors. Instead, the share of drug expenditures that were publicly subsidized decreased, and thus non-seniors appear to have benefited very little from the 2003 move to Fair PharmaCare. Simulated results indicate that increases in subsidy, under income-based pharmacare, could unambiguously improve the distribution of financial burden across income levels and age groups. We return to this point in an accompanying paper summarizing the major lessons learned from our evaluation of the policy (Morgan et al., page 115).

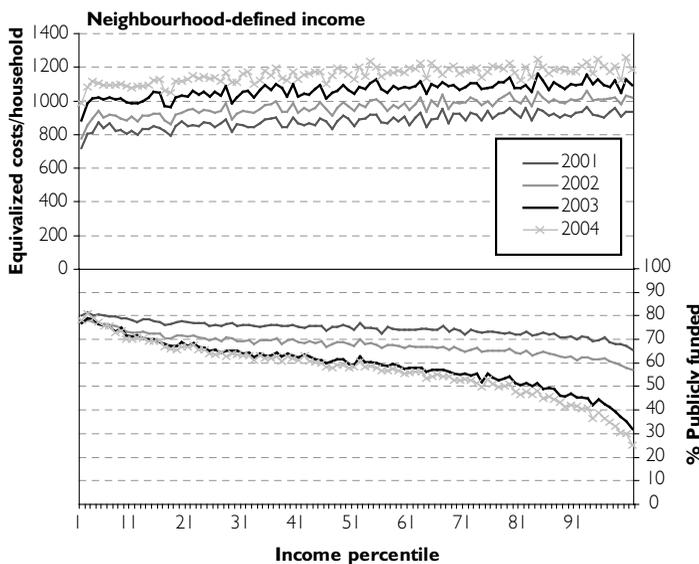
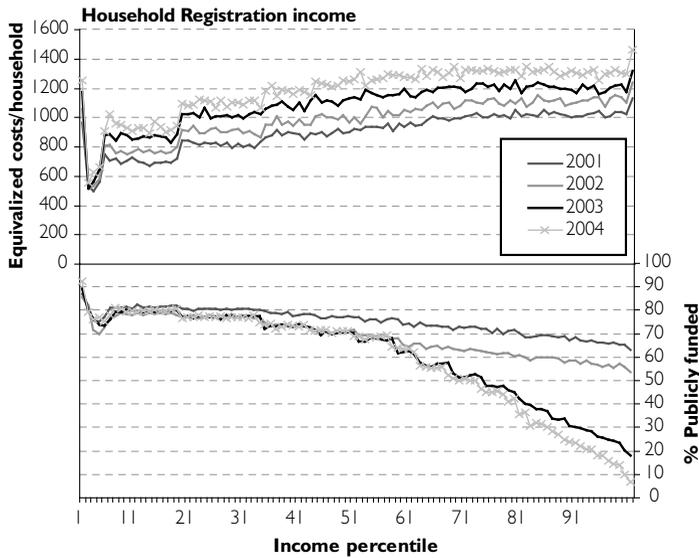
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## Appendix 1

Comparison of seniors' results using neighbourhood-defined versus household-registration-based income data



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