Patented Medicine Prices Review Board
Conseil d'examen du prix des médicaments brevetés

Pharmaceutical Trends – Non-Insured Health Benefits Pharmacy Program 1999-2000 to 2001-2002

npduis

Analytical Study Series

National Prescription Drug Utilization Information System

Canada

Ce document est également disponible en français sous le titre
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This report was produced with the assistance of the NPDUIS Steering Committee. The contribution of individual members of the Steering Committee was invaluable.

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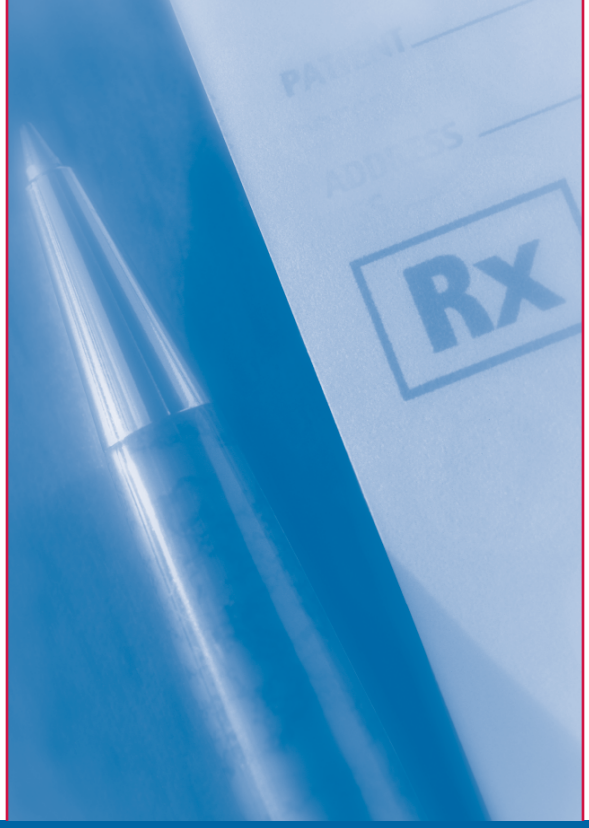


Executive Summary

Background

This study examines spending on drugs within the Non-Insured Health Benefits (NIHB) Program of the First Nations and Inuit Health Branch of Health Canada over the period from 1999-2000 to 2001-2002. As with previous PMPRB Pharmaceutical Trends reports, it provides information to help decision-makers deal with the challenge of providing programs and services in an environment of fixed resource levels.

The NIHB Program is a federal government-sponsored program that reimburses health care expenses not covered by other provincial/territorial public insurance care plans. In 2001-2002, eligible beneficiaries included an estimated 721,000 registered Indians, Inuit, and Innu individuals across Canada. Compared to other government-sponsored drug programs, the eligible population covered by the NIHB program is quite young, 73% of this population being under the age of 40 years.

This research has been done as part of the National Prescription Drug Utilization Information System (NPDUIS), whose purpose is to provide Canada's health system with comprehensive information on the utilization and costs associated with pharmaceuticals.

Expenditure

Drug program cost grew at an annual average rate of 13.9% over the 1999-2000 to 2001-2002 study period. Most of this increase is due to growth of 5.4% in the average number of prescriptions per beneficiary and growth of 6% in the average cost per prescription. The beneficiary base grew by 2% over the study period.

The portion of expenditures included in most of this study is limited to those drugs for which quantities could be accurately measured; i.e., tablets and capsules.

Expenditure Analysis by Market Segment

The share of patented drugs in program spending rose rapidly, from 56.3% to 62.1% over the three-year period. The share of generic products fell slightly, from 27.8% to 25.8%. Among non-patented drugs, there was little change in the shares of multiple- and single-source products.

Analysis of Price Change

Price analysis was performed on per-unit claimed ingredient costs calculated from NIHB data.

- Price indexes encompassing all drugs indicate a cumulative 2% decline over the two-year period.
- The share of individual prices which were within CPI growth was 82.1%. Of the remaining 17.9%, 93% comprised non-patented drugs, and 7% were for patented products. For the latter products, the PMPRB has confirmed that ex-factory price increases were within its CPI guidelines and that the increases reflected cost elements other than ex-factory prices (e.g., wholesale mark-ups).
- A pattern of price decreases is observed across all drug categories except non-patented single source drugs, where prices rose on average by 2% to 3%.
- If price increases of all drug categories had been held at CPI-inflation or lower, the NIHB program would have saved about $1 million over the study period, or slightly less than 1% of program expenditures.

Utilization

The study constructs a number of volume indexes to measure trends in utilization over time. These indicate a cumulative increase in utilization of about 40% over the 2-year period.

Utilization growth varied substantially across product groups. Utilization of patented drugs grew at more than twice the rate of non-patented drugs. Utilization of brand name products also grew much more rapidly than utilization of generics.

Generic/Brand Comparisons

The overall ratio of generic to brand-name prices was 0.73 in 2001-2002, up from 0.69 in 1999-2000. Falling brand-name prices, rather than rising generic prices, accounted for most of this increase.

Based on NIHB data, the generic-to-brand price ratio seems lowest in those markets where the brand name product has 3 to 4 generic competitors.

Decomposition of Expenditure Growth

The change in program spending over any period can be broken down into several components representing the effects of price change, quantity change, the listing of new drug products, the exiting of drug products and interaction effects. Quantity effects account for 95.7% of the spending growth observed over the study period, while price offsets the quantity effect slightly by – 4.8%. New drugs contributed another 11.2% of the spending growth. Exiting drugs and the cross (interaction) effect contributed minimally at -0.7 and -1.3 respectfully.

Anatomical Therapeutic Chemical Analysis

The study also examines spending by therapeutic class, using the World Health Organization's Anatomical Therapeutic Chemical (ATC) system for this purpose. Using the broadest ATC classes (ATC Level-I), the three leading contributors to spending growth were drugs acting on the nervous system (30.2%), the cardiovascular system (28.1%) and the alimentary tract and metabolism (20.6%).

At the next ATC level (ATC Level-II), leading contributors to spending growth included drugs for acid related disorders (12.7%), agents acting on the renin-angiotensin system (12.4%), serum lipid reducing agents (11.3%) and drugs used to treat diabetes (10.1%).

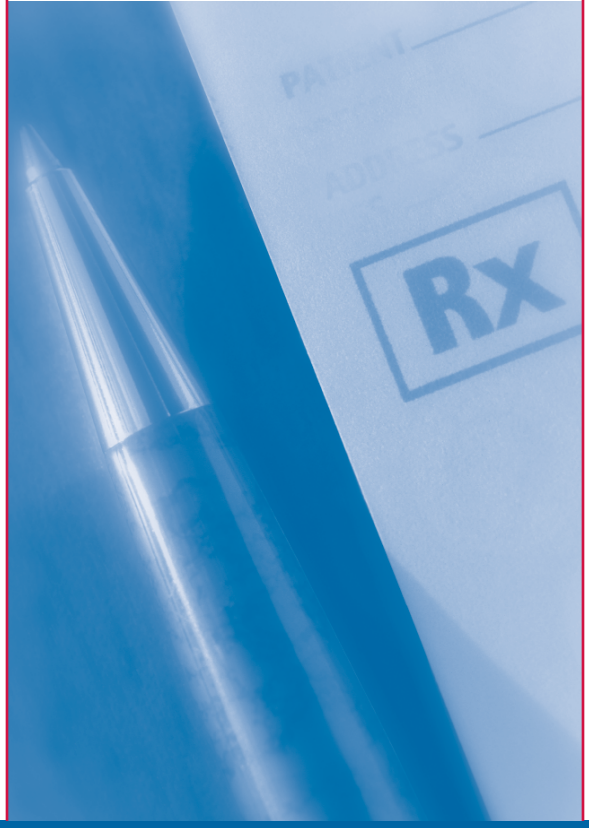
When spending growth at the ATC Level-II is decomposed, the familiar pattern of a strong positive quantity effect, small negative price effect and positive new drug effects emerges in most cases.

Defined Daily Dose Analysis

The Defined Daily Dose (DDD) is the estimated average daily adult maintenance dose for a drug when used for its main indication. The World Health Organization publishes DDDs for most major drug products. These provide a useful means of translating physical quantities of drug products into equivalent volumes of treatment-days for the purpose of analyzing utilization trends. Moreover, expressing the utilization of different drugs in DDDs permits a meaningful analysis of "therapeutic mix" effects; that is, the impact on program expenditures of shifts among drugs due to changes in prescribing behaviour or program policies.

The study applied this decomposition methodology to several leading ATC Level-II classes using DDDs as the measure of volume. This analysis confirms that price change has had a small, typically negative effect on expenditure, that volume effects have had a large positive effect, and that changes in therapeutic mix have substantially influenced average cost-per-DDD and thereby expenditure. Interestingly, in some cases (e.g., serum lipid-reducing agents) the therapeutic mix effect has worked to moderate cost-per-DDD, while in others (e.g., drugs for acid related disorders) the mix effect is decidedly positive.

1 Introduction



1.1 – Background

In September 2001, Federal/Provincial/Territorial Ministers of Health announced the establishment of the National Prescription Drug Utilization Information System (NPDUIS) based on a Business Case prepared by the Patented Medicine Prices Review Board (PMPRB) and the Canadian Institute for Health Information (CIHI). The purpose of the NPDUIS is to provide critical analyses of price, utilization and cost trends for drugs so that Canadians have comprehensive and accurate information on how prescription drugs are being used and on sources of cost increases.

The responsibilities of the PMPRB in this undertaking have been established by the Minister of Health pursuant to Section 90 of the *Patent Act*. In his letter of October 2002, the Minister has requested that the PMPRB "inquire into trends in pharmaceutical prices, expenditures and cost drivers, and such other analytical studies, as described in the Business Case, and endorsed by the Steering Committee." The provisions of this letter are established through a Memorandum of Understanding between Health Canada and the PMPRB covering the period from April 1, 2002 until March 31, 2005.

The NPDUIS initiative involves two major elements:

- the development and implementation of a prescription claims level drug database capable of incorporating program data from publicly-funded drug plans; and
- the production of analytical reports relying on information in this database.

CIHI is responsible for the first of these elements, while as per the request of the Minister of Health, the PMPRB is principally responsible for the second. The roles of both organizations in the NPDUIS undertaking are set out in a Memorandum of Understanding which establishes a working relationship that fulfills each organization's respective mandate, roles and responsibilities.

A steering committee representing the public drug plans of provinces, territories and Health Canada's First Nations and Inuit Health Branch, as well as the Health Policy Branch of Health Canada advises CIHI and the PMPRB regarding the development, the analytical direction and priorities, and the strategic direction of NPDUIS. The Steering Committee also constitutes a mechanism to allow stakeholders and users to make suggestions for improvement and to raise issues related to NPDUIS for consideration and resolution in order to ensure that the NPDUIS continues to be relevant to the information needs of stakeholders and users.[1]

This report has been prepared by the PMPRB under the advice of its management and board, as well as under the review of the First Nations and Inuit Health Branch of Health Canada, and the NPDUIS Steering Committee. The Non-Insured Health Benefits (NIHB) data for this project was provided directly to the PMPRB for this purpose.

For current information on the PMPRB's and CIHI's involvement in other NPDUIS projects, please visit each organization's website at www.pmprb-cepmb.gc.ca and www.cihi.ca/drugs

1.2 – Non-Insured Health Benefits Program

The NIHB Program is provided through the First Nations and Inuit Health Branch of Health Canada. All registered Indians and recognized Inuit and Innu who are normally Canadian residents are eligible for NIHB benefits, regardless of income level or location in Canada. In 2001-2002, approximately 721,000 individuals were eligible for a limited range of medically necessary goods and services not already provided through provincial or territorial plans.

The authority of the NIHB program and responsibility for the health of First Nations is based on the 1979 Indian Health Policy. Since the responsibility is shared amongst different levels of government, First Nations communities, and the private sector, the federal government ensures that other parties meet their obligations by coordinating benefits.

The First Nations and Inuit Health Program includes the First Nations and Inuit Health Program Envelope plus resources approved for specific initiatives. The NIHB Program operates within the fiscal environment of this envelope which represents the maximum resources available to fund all federal First Nations and Inuit Health programs. NIHB Program expenditures account for over 40% of total envelope expenditures.

Benefits include pharmacy, dental services, glasses and other vision care aids and services, transportation to medically required services, health care premiums in both Alberta and British Columbia, and other health services. Pharmacy benefits include prescription and over the counter drugs and medical supplies and equipment.

The NIHB pharmacy program is the 5th largest public drug program in Canada, following the provincial drug plans of Ontario, Quebec, British Columbia, and Alberta.[2] In 2001-2002, the pharmacy program accounted for 40.3% of the $627.8 million total budget for Non-Insured Health Benefits Program. All pharmaceuticals paid by the First Nations and Inuit Health Branch are not, however, captured under the NIHB itself. For instance, prescriptions provided through nursing stations falls under the Primary Health Care and Public Health.

Pharmacy data are mostly drawn from the Health Information and Claims Processing System which is administered by First Canadian Health. The First Nations and Inuit population data are drawn from the Status Verification System (SVS), which is operated by First Nations and Inuit Health Branch (FNIHB), and are based on information provided by Indian and Northern Affairs Canada (INAC), the Governments of the Northwest Territories and Nunavut, and Inuit organizations. These data understate somewhat the actual level of NIHB pharmacy expenditures as they exclude pharmacy services provided through contribution agreements and pharmacy benefits provided through community health facilities.

1.3 – Major Influences of NIHB Program

- The First Nations and Inuit population eligible to receive benefits under the NIHB Program has increased from under 400,000 in 1988 to over 721,000 as of March 31, 2002. This growth is, in part, attributable to Bill C-31, the 1985 changes to the *Indian Act*, which resulted in over 100,000 additional clients registering between 1985 and 1995.
- The total number of eligible clients grew by 9.9% from 656,377 in 1998 to 721,086 in 2002.
- The Manitoba Region had the largest increase in total eligible clients in the five-year period with a growth rate of 11.9%, followed by the Alberta Region (11.7%) and the Saskatchewan Region (11.4%).
- The First Nations and Inuit client population is quite young with 73% of the population under the age of 40 years. 40% of the total population is under the age of 20, while only 5% of the total population consists of clients over the age of 65.
- The 1996 Budget set the First Nations and Inuit Health Program envelope growth for 1998-1999 at 3% less $20 million. Annual resource growth for the period 1999-2000 to 2001-2002 has been set at 3%.

1.4 – Methodology

This study reviews pharmaceutical expenditures incurred by the Non-Insured Health Benefits Program in three fiscal years: 1999-2000, 2000-2001, and 2001-2002. These expenditures are assessed using several approaches: price and volume analyses, market identifiers, time trends, components of expenditure growth, therapeutic categories, and treatment days.

Information on prices, quantities, total expenditures and market shares were obtained from the Health Information and Claims Processing System (HICSPS) of the First Nations and Inuit Health Branch, Health Canada. Health Canada's Drug Product database was used to ensure that only those drugs defined by the *Food and Drugs Act* as prescription medicines were included.[3] The Drug Product database was also used to identify all drug products by their respective Anatomical Therapeutic Chemical (ATC) classification as well as define a daily dose (where available).[4] Finally, the PMPRB database was used to group drugs according to patent status.[5]

Section 3 provides descriptive statistics for NIHB Program costs using (1) the amounts claimed by NIHB beneficiaries of the program and (2) the amounts allowed based on the adjudication of each claim. The amount allowed is the portion of the beneficiary's claimed amount that was reimbursed by the pharmacy program.

The analyses provided in Sections 4 and 5 are based on costs claimed by beneficiaries for drug products that are in oral solid form only, as the NIHB database does not provide consistent measures of products in other forms (e.g., liquids, inhalers). Costs claimed are derived by the NIHB plan by netting out dispensing fees and retail mark-ups from the amounts claimed by beneficiaries. By excluding dispensing fees and retail mark-ups from the price analysis, there is greater control over the regional variation and more precise analysis of ingredient/drug cost. Utilizing allowed amount versus claimed amount in our analyses more accurately reflects the costs faced by the NIHB pharmacy program. Claimed amounts will always be greater than allowed amount.

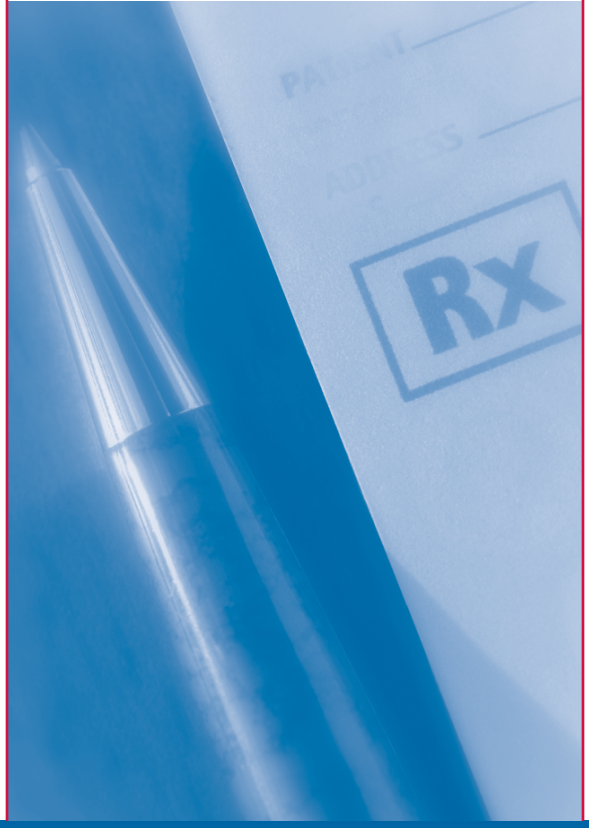
Appendices II and IV provide greater detail on the use of the different databases and the construction of all price indices.

1.5 – Focus of the Report

The analysis is organized in the following manner:

- Section 2 provides aggregate pharmaceutical expenditure trend information for both Canada and NIHB over a period of time.
- Section 3 provides a brief description and history of the NIHB program, and some descriptive statistics on drug utilization.
- Section 4 examines price and volume changes for the different markets that are identified by patent status, single versus multi-source, brand name versus generic, and brand name with generic competition.
- Section 5 presents a cost driver analysis,[6] which examines the relative contribution of major components (price, volume, new drugs, exiting drugs, cross effect) to expenditure growth. A detailed therapeutic class analysis, including Defined Daily Doses, is also included.

2 Aggregate Trends



2.1 – Regional Comparisons – Prescription and OTC Drug Expenditures

This section of the report discusses some of the regional differences based on data from the Non-Insured Health Benefits Annual Reports and the *Drug Expenditure in Canada, 1985 – 2002* report produced by CIHI.[7] The reader is reminded that this analysis is limited to broad comparisons and ignores the possible effects of funding sources, population characteristics, and health care delivery structure. For our purposes, "drug expenditures" in this section are limited to prescription and over-the-counter (OTC) drugs.

In 2000-2001, the total prescription and OTC drug expenditures for all of the NIHB regions were $217 million. As seen in Figure 2.1, Ontario claims 21.3% of these drug expenditures but also has a near equivalent proportion of the total eligible population of 721,000. The near proportional equivalence of drug expenditures and population is seen across the regions with the exception of the Northwest Territories and Nunavut which make up for 6.5% of the population and 3.5% of drug expenditures.

Figure 2.1
NIHB Expenditures (Prescription and OTC drugs) and Population Shares on a Regional Basis 2001-2002

This pattern of proportional equivalency may not be maintained, however, should the growth patterns follow those demonstrated in Table 2.2. Drug expenditures grew at a faster rate than either population or number of beneficiaries.[8,9] In turn, this is reflected in both the per capita and per beneficiary drug expenditure statistics that respectively reached growth rates of 15.6% and 16.5% in 2001-2002. The growth of population was somewhat greater than growth in beneficiaries over the given time period.

Table 2.1

Prescription and OTC

NIHB

Year	Drug Expenditures	Drug Expenditures per Capita	Drug Expenditures per Beneficiary	Population	Beneficiaries
1999-2000	159,388,000	234.0	344.1	681,164	463,170
2000-2001	183,618,000	263.0	386.6	698,245	474,901
2001-2002	216,916,400	303.9	450.6	713,712	481,390
		Annual Growth Rate			
2000-2001	15.2%	12.4%	12.4%	2.5%	2.5%
2001-2002	18.1%	15.6%	16.5%	2.2%	1.4%

As seen in Figure 2.2, the per capita drug expenditures (prescription and OTC drugs only) seen in CIHI's *Drug Expenditures in Canada* report are consistently higher than those calculated from the NIHB Annual Reports. This may be explained by the fact that the NIHB program provides benefits not covered by provincially/territorially insured programs and may potentially insure lower-cost population. The CIHI figures include both privately and public-sourced expenditures; provincial/territorial programs may cover a disproportionate number of individuals with lower health status, such as seniors and lower-income groups.

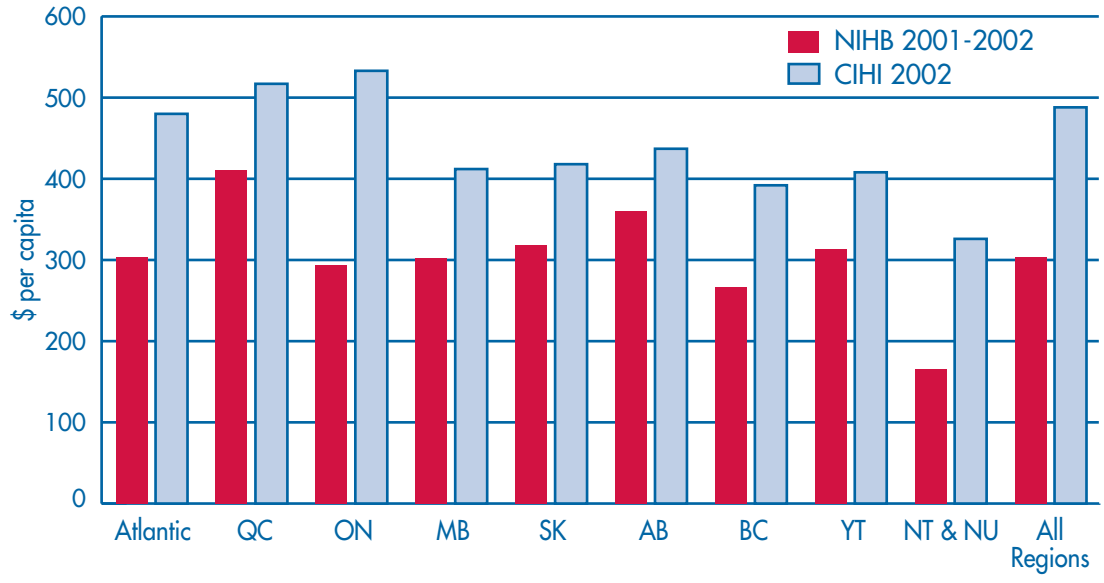


Figure 2.2

NIHB versus CIHI Pharmacy Expenditures per Capita

Prescription and OTC Drugs

As seen in Table 2.2, the average annual growth of expenditures for all regions grew by 16.7% for NIHB and 12.9% for CIHI; this pattern of higher growth rates in expenditures is also noted in the regional analysis. In each region, it is also noted that the population covered under the NIHB program grew at a higher rate than that of the general population reported by CIHI.

Since the growth in expenditures far outpaces population growth; the growth of per capita expenditures is largely positive with an average annual growth of 14.0% for the NIHB program and 12.9% using CIHI figures.

Table 2.2

NIHB and CIHI Expenditure Comparisons

	NIHB – 2001-2002					CIHI – 2001		
	Expenditures	Population	Expenditures per Capita	Beneficiaries	Expenditures per Beneficiary	Expenditures ('000,000s)	Population ('000s)	Expenditures per Capita
Atlantic	10,423,400	34,286	304.0	20,532	507.7	1139.1	2,375.0	480.3
Quebec	21,384,500	51,979	411.4	32,676	654.4	3831.7	7,351.2	516.6
Ontario	46,109,600	156,765	294.1	90,603	508.9	6334.6	11,527.9	532.5
Manitoba	33,016,400	109,147	302.5	77,241	427.4	472.9	1,142.5	411.5
Saskatchewan	34,540,200	108,382	318.7	89,572	385.6	424.9	1,025.6	417.8
Alberta	31,364,500	87,034	360.4	69,862	448.9	1336.1	2,959.6	436.8
British Columbia	30,080,300	112,464	267.5	75,382	399.0	1609.7	4,028.3	392.5
Yukon	2,321,000	7,425	312.6	4,600	504.6	12.3	31.1	407.5
NWT & Nunavut	7,676,500	46,231	166.0	20,922	366.9	22.6	68.0	325.9
TOTAL	216,916,400	713,712	303.9	481,390	450.6	15,184.0	30,509.0	488.1
	Average Annual Growth							
	NIHB – 1999-2000 to 2001-2002					**CIHI – 1999 to 2001**		
	Expenditures	Population	Expenditures per Capita	Beneficiaries	Expenditures per Beneficiary	Expenditures ('000,000s)	Population ('000s)	Expenditures per Capita
Atlantic	16.6%	2.2%	14.1%	1.0%	15.5%	11.0%	-0.1%	11.1%
Quebec	15.2%	1.7%	13.3%	1.2%	13.8%	13.5%	0.5%	12.9%
Ontario	17.3%	2.4%	14.6%	2.8%	14.1%	13.3%	1.6%	11.5%
Manitoba	22.7%	2.9%	19.2%	2.5%	19.7%	11.7%	0.3%	11.4%
Saskatchewan	14.0%	2.6%	11.0%	2.2%	11.5%	9.8%	-0.4%	10.2%
Alberta	14.6%	2.8%	11.4%	1.8%	12.6%	14.1%	1.7%	12.2%
British Columbia	15.8%	1.7%	13.9%	0.2%	15.5%	11.6%	0.9%	10.6%
Yukon	17.4%	1.4%	15.7%	2.8%	14.2%	7.7%	-1.4%	9.3%
NWT & Nunavut	17.1%	2.1%	14.7%	4.0%	12.7%	10.2%	1.1%	9.0%
TOTAL	16.7%	2.4%	14.0%	1.9%	14.4%	12.9%	1.0%	11.8%

For the NIHB Pharmacy Program, the average drug expenditures per capita ranged from a low of $166 (Northwest Territories and Nunavut) to a high of $411 (Quebec). The significantly higher per capita drug expenditures in Quebec can be at least partially explained by the following information:

- The NIHB per capita expenditures include ingredient drug cost and other costs, such as mark-ups and dispensing fees. In the Quebec Region, all drug costs paid by the NIHB pharmacy program include the dispensing fee in full. In other regions, for example, over the counter drugs are paid with a reduced dispensing fee or a retail mark-up only.
- As a result of guidelines published by l'*Ordre des pharmaciens du Québec* (provincial regulatory body for pharmacists), pharmacists in Quebec will seldom dispense medication for periods of over three months or 100 days. The results of this latter practice is that there are more transactions per capita in Québec, and each of these transactions is paid with a full dispensing fee.
- A third explanation for the higher per capita drug expenditures in Quebec is the fact that pharmacists in Québec are allowed to dispense drugs in compliance packaging based on certain criteria on a weekly basis. As a result, the NIHB program may pay the equivalent of two full dispensing fees per month as opposed to one.[10]

Looking at the CIHI per capita figures, the Northwest Territories and Nunavut continue to have the lowest per capita expenditures ($326), while Quebec has the second highest per capita expenditures at $517 and follow the Ontario figure of $532.

Analysis using beneficiaries is limited to the NIHB program. Ontario, Yukon, Northwest Territories, and Nunavut are the only regions where beneficiary growth is greater than population growth.

The difference between per capita and per beneficiary expenditures can be partially explained by the difference in population versus beneficiary growth. Another important element to be examined is the proportion of eligible population that actually benefited from the NIHB pharmacy program. Overall, 67.8% of the eligible population accessed the program over the three-year period. This proportion, however, varies significantly from 44.6% in the northern region of Northwest Territories and Nunavut to 83.2% in Saskatchewan. It is proposed that the age structure of the insured population and extent/type of coverage provided by the provincial/territorial drug plans may provide some explanation.

Non–Insured Health Benefits - 1999-2000 to 2001-2002

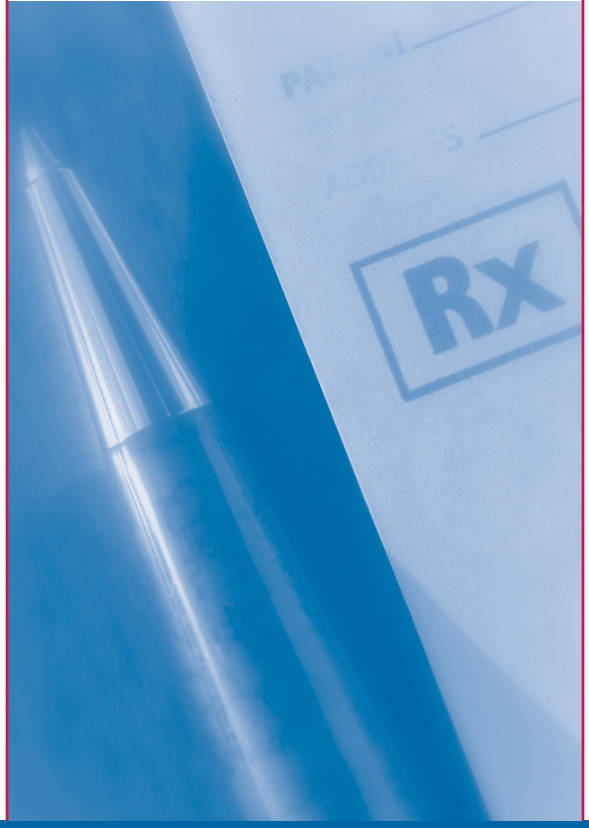
Atlantic	60.6%
Quebec	63.4%
Ontario	57.5%
Manitoba	71.0%
Saskatchewan	83.2%
Alberta	81.5%
British Columbia	68.1%
Yukon	61.4%
NWT & Nunavut	44.6%
All Regions	67.8%

Table 2.3

Proportion of Beneficiary to Eligible Population

3

Non-Insured Health Benefits – Descriptive Utilization Statistics



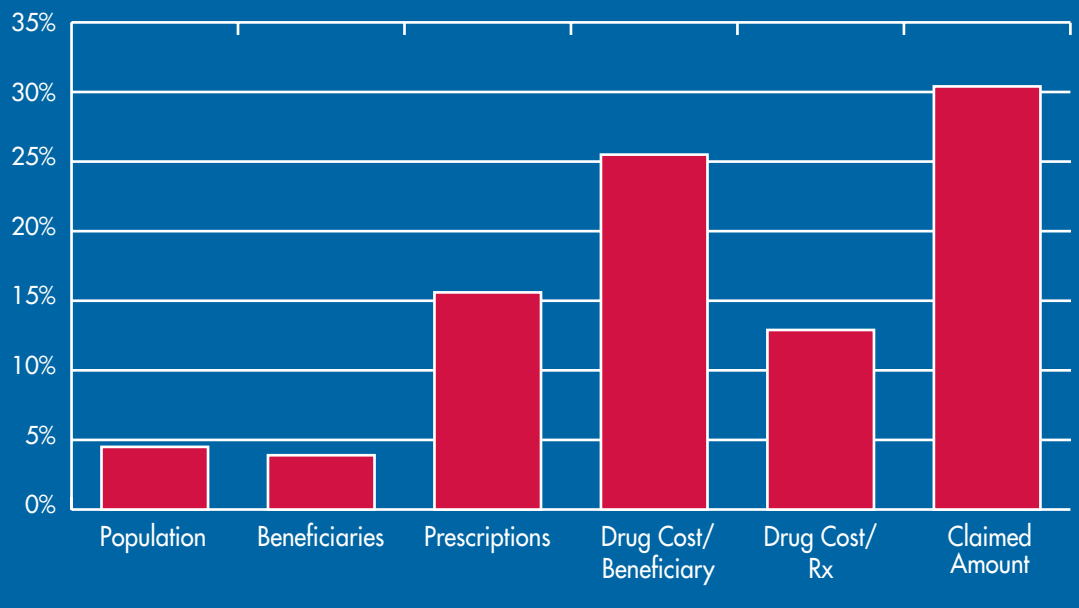
3.1 – General Factors Affecting Pharmaceutical Expenditures

Figure 3.1 summarizes some of the important factors that may have contributed to the growth in NIHB pharmacy expenditures over the 1999-2000 to 2001-2002 period. Over this period, NIHB's eligible population increased by 4.5%; total claimed drug expenditures increased by 30.4%; the average ingredient (drug) cost per prescription increased by 12.9% while the total number of prescriptions increased by 15.6%. The total number of beneficiaries increased by 3.9%, but the average drug cost per beneficiary increased by 25.5%.

Figure 3.1

Percent Change in Total Claimed Amount and Contributing Factors

NIHB Pharmacy Plan 1999-2000 to 2001-2002



It is important to note that many factors may influence the cost of a prescription. These include: manufacturers' unit price; wholesale and retail mark-ups; changes in the size of prescriptions; changes in prescribing habits of physicians (i.e. from older less expensive therapies to newer relatively more expensive ones); the trend toward using drug therapy; and the inclusion of new indications and new drugs for diseases in which drug therapy was not previously available. The following section along with Section 5 (the cost driver section) in the report provide a more complete evaluation of the relative magnitude different factors have on changes in annual drug expenditures.

3.2 – Cost Components of Pharmaceutical Expenditures

3.2.1 – Cost Reimbursements

Table 3.1 below examines changes in the allowed total drug cost[11] by component on an annual basis. Specifically, changes in the allowed drug cost are broken down into the following four components:

1. Changes in ingredient cost per prescription (Rx);
2. Changes in the number of prescriptions per beneficiary[12]; and
3. Changes in the total number of beneficiaries;
4. Residual.

Year	Allowed Drug Cost	Allowed Drug Cost / Rx	Rx/Beneficiary	# of Beneficiaries	Residual
2000-2001	13.3%	5.9%	4.3%	2.5%	0.6%
2001-2002	14.6%	6.1%	6.6%	1.4%	0.5%

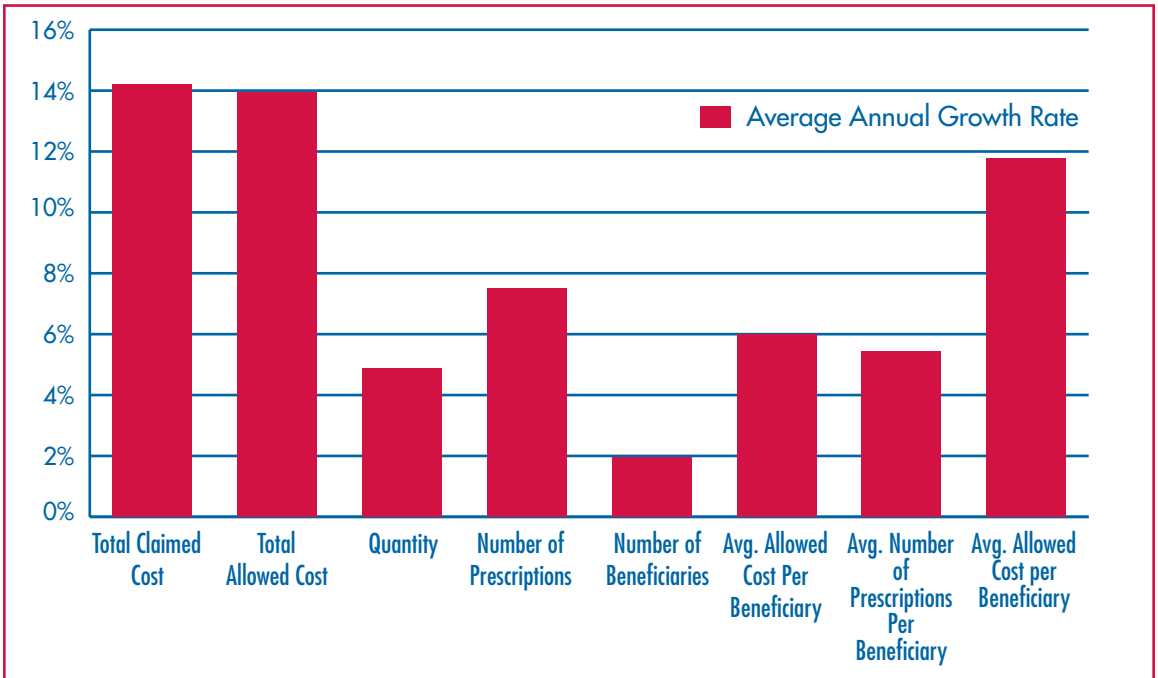
Table 3.1
Percentage Change in Allowed Drug Cost and Components of NIHB Program
1999-2000 to 2001-2002

In 2001-2002 the drug plan experienced the largest percent change in total allowed drug cost of 14.6%, up from 13.3% in the previous year. As well, the average ingredient cost per prescription increased by 6.1% in 2001-2002. Generally, the change in allowed drug cost per prescription and the change in the number of prescriptions per beneficiary were responsible for most of the change in the allowed drug cost. The number of beneficiaries contributed to the increase in the allowed drug cost to a lesser extent.

Figure 3.2 summarizes the average annual growth rates of various cost factors from 1999-2000 to 2001-2002. All elements, in varying degrees, exhibit a positive average annual rate of growth. During the period 1999-2000 and 2001-2002, the number of beneficiaries seen by the plan grew minimally as compared to total claimed cost (14.2%) and accepted ingredient cost (13.95%). The average annual growth of the number of prescriptions is also significant at 7.5%.

Figure 3.2

Average Annual Growth Rate in Selected Factors
NIHB
1999-2000 to 2001-2002



As seen in Table 3.2, the average allowed drug cost per prescription increased by 12.3%, while the number of prescriptions per beneficiary increased by 10.9% from 1999-2000 to 2001-2002. The average allowed drug cost per beneficiary increased by $82.9 (current dollars) or 24.9% over the three-year period.

Table 3.2

General Prescription and Beneficiary Trends
NIHB
1999-2000 to 2001-2002

Year	Avg. Allowed Drug Cost Per Rx	Avg. Number of Rx per Beneficiary	Avg. Allowed Drug Cost per Beneficiary
1999-2000	24.3	13.7	332.6
2000-2001	25.7	14.3	367.6
2001-2002	27.3	15.2	415.5

3.2.2 – Intensity of Drug Use

One way of measuring the intensity of drug use, other than the average the number of prescriptions per beneficiary, is to examine the number of different therapies beneficiaries are on annually. In a sense, the number of different therapies a beneficiary is on can be used as a proxy for the health of the beneficiary population.[13] For the purpose of this analysis, distinct therapies were defined at the ATC classification level 2. ATC2 is a main therapeutic grouping defined by the World Health Organization specifically for inter-jurisdictional utilization analysis, an example of an ATC2 is A10, drugs used in diabetes.[14] A beneficiary would be categorized as having consumed one therapy, if that beneficiary had only filled prescriptions for diabetic drugs in 1999-2000.

Figure 3.3 and Table 3.3 provide the distribution of NIHB Pharmacy Program beneficiaries based on the number of distinct therapies used in 1999-2000 relative to 2001-2002. Between 1999-2000 and 2001-2002, the percentage of beneficiaries with a claim for only one main therapeutic grouping remained fairly constant at 20.1% in 1999-2000 and 19.4% in 2001-2002. As well, the share of beneficiaries taking four or less therapies remained relatively constant at approximately 65%, while the percentage of beneficiaries taking five or more distinct therapies was approximately 35%.

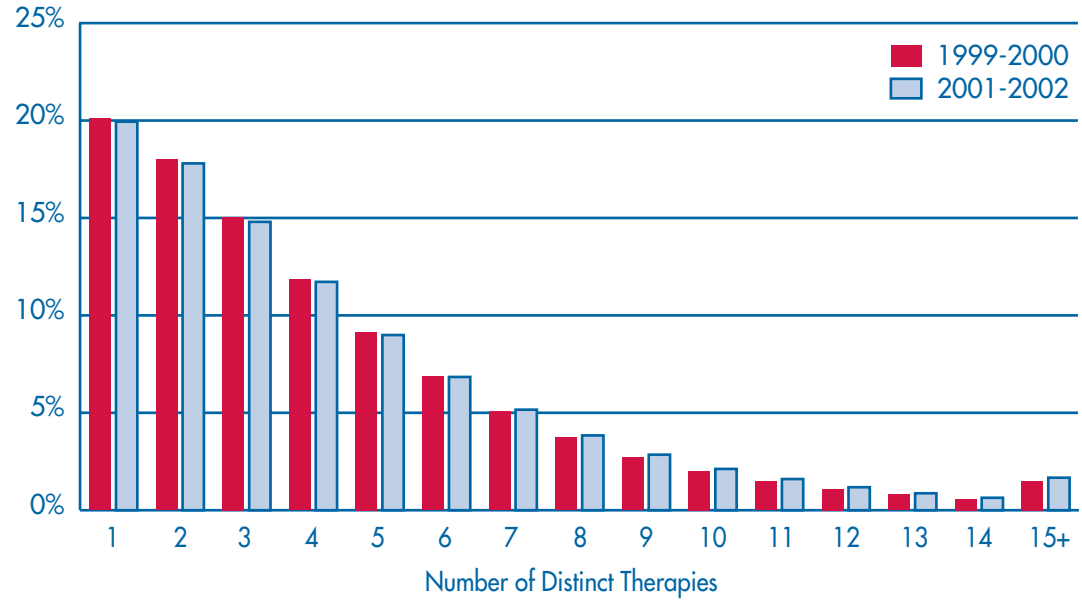


Figure 3.3

Distribution of Beneficiaries by Number of Distinct Therapies Used

NIHB Pharmacy 1999-2000 vs 2001-2002

ATC level 2	# of Beneficiaries 1999-2000	# of Beneficiaries 2001-2002	% Change Between 1999-2000 and 2001-2002
1	93,086	95,991	3.1%
2	83,421	85,693	2.7%
3	69,718	71,231	2.2%
4	54,898	56,417	2.8%
5	42,353	43,281	2.2%
6	31,767	32,912	3.6%
7	23,432	24,827	6.0%
8	17,237	18,489	7.3%
9	12,568	13,713	9.1%
10	9,308	10,182	9.4%
11	6,864	7,682	11.9%
12	5,106	5,689	11.4%
13	3,798	4,165	9.7%
14	2,679	3,059	14.2%
15+	6,935	8,059	16.2%
Total	463,170	481,390	3.9%

Table 3.3

Utilization by Number of Therapeutic Classes (ATC level 2)

NIHB Pharmacy Program

1999-2000 and 2001-2002

Figure 3.4 provides a summary of the average number of prescriptions per beneficiary by the number of distinct therapies. For example, beneficiaries who received only one main distinct therapy in 1999-2000 had an average of two prescriptions that year. Similarly Figure 3.5 provides information on the change in the average cost per beneficiary by degree of therapeutic use. Beneficiaries in category 2 or beneficiaries using only two main therapies had the lowest increase (16.6%) between 1999-2000 and 2001-2002 in cost per beneficiary, while beneficiaries in category 12 had the highest increase (27.2%) over the same time period. The overall average increase for this period was 24.9%.

Figure 3.4

Average Number of Prescriptions per Beneficiary

By Number of Distinct Therapies Used

NIHB Pharmacy

1999-2000 vs 2001-2002

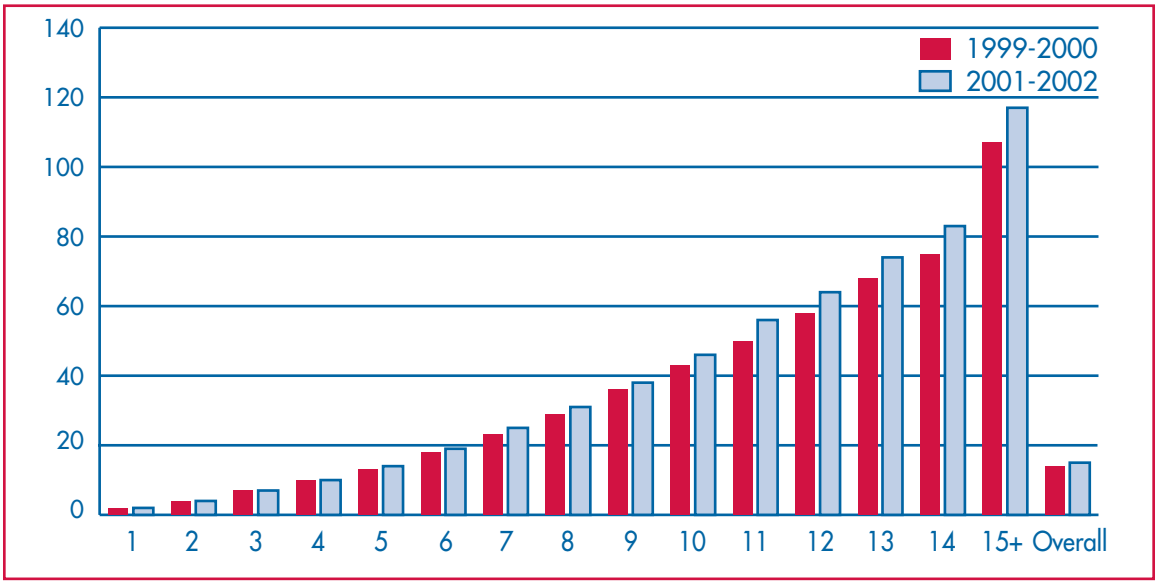


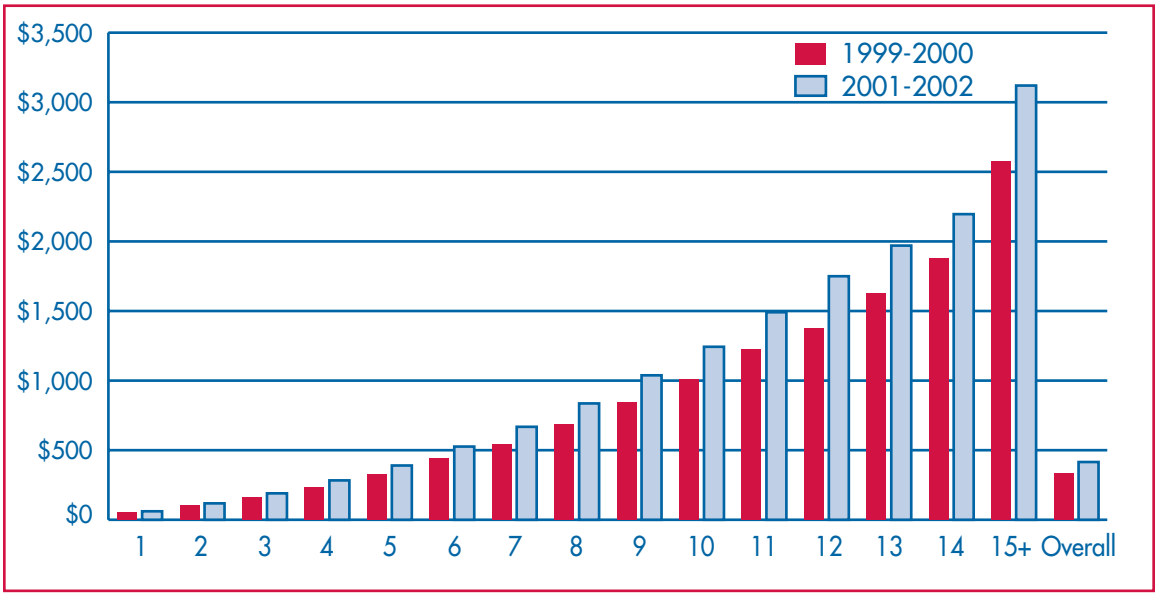
Figure 3.5

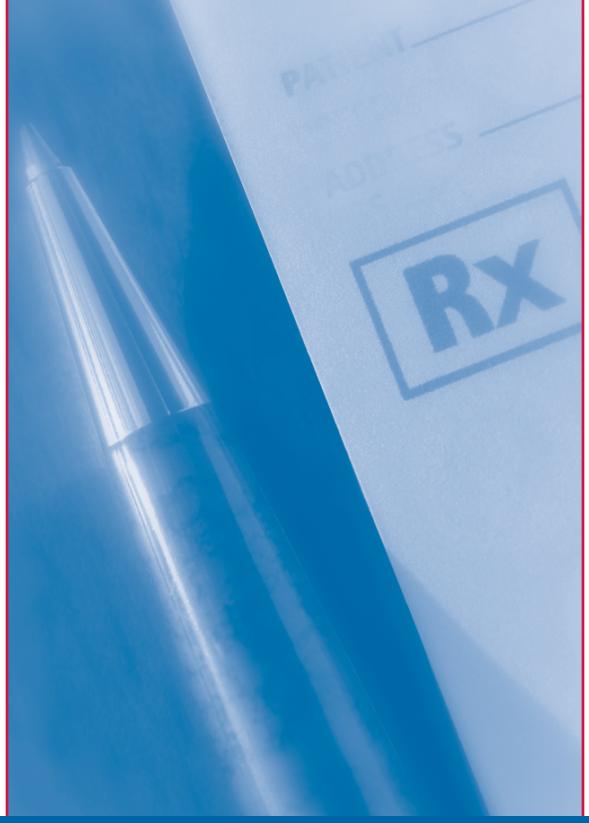
Average Allowed Drug Cost per Beneficiary

By Number of Distinct Therapies Used

NIHB Pharmacy

1999-2000 vs 2001-2002





Price Analysis – by Market Segment

4

4.1 – Expenditure by Market Segment

Overall expenditure on drug products rose steadily from 1999-2000 to 2001-2002. Over this time period, there was an average annual increase of 18.3% per year and a total increase of 40%. This section of the analysis reports on expenditure and price trends by general product groupings.[15]

Table 4.1 shows the total expenditure for all drugs, and then divides this figure into spending on patented versus non-patented drug products and spending on brand name products versus generic products. Table 4.1 also divides the spending on all non-patented drug products into expenditure on multiple source markets versus single source markets.[16]

Table 4.1
Claimed Drug Cost by Market Segment
NIHB Pharmacy
1999-2000 to 2001-2002

Fiscal Year	All Drugs ($millions)	Patented Drugs ($millions)	Non Patented Drugs ($millions)	Brand Name Products ($millions)	Generic Products ($millions)	Non-Patented Multiple Source Products ($millions)	Non-patented Single Source Products ($millions)
1999-2000	80.48	45.32	35.17	58.11	22.38	27.32	7.84
2000-2001	94.72	56.27	38.45	69.96	24.75	29.31	9.14
2001-2002	112.71	70.02	42.69	83.65	29.06	33.32	9.37
			% of Total Expenditures				
1999-2000	100.0	56.31	43.69	72.20	27.80	77.70	22.30
2000-2001	100.0	59.41	40.59	73.86	26.14	76.22	23.77
2001-2002	100.0	62.12	37.88	74.21	25.79	78.05	21.95

A common misunderstanding is that 'Brand Name' companies sell mainly patented drug products. As shown in Table 4.1, total expenditures on brand name drug products exceeded total expenditures of patented drug products by a significant amount each year. In other words, brand name company sales were divided substantially between patented and non-patented drugs. The portion of patented drugs has been increasing substantially over the time frame of analysis. In 1999-2000, patented drugs represented 56.3% of all drugs—by 2001-2002 that proportion had increased to 62.1%. By comparison, information filed by patentees with the PMPRB indicates that patented drug expenditures made up 61.8% of the market share in the year 2002.[17]

Expenditure on non-patented drug products had been $35.2 million in 1999-2000, increasing every year by approximately 10% to $42.7 million in 2001-2002. The percentage of expenditures on non-patented drugs decreased consistently from 43.7% in 1999-2000 to 37.9% in 2001-2002. Patented drug product spending rose by an average of 24.3% a year, or from $45.3 million in 1999-2000 to $70.0 million in 2001-2002. This represents a total increase of 54.5% or $24.7 million over the three year period and accounts for the majority of the $32.2 million increase in overall spending.

While spending on brand name products and generic products increased continually from 1999-2000 to 2001-2002, the average annual rate of increase was significantly and consistently higher for brand name products — 20.0% versus 14.0%. This larger relative increase in spending on brand name drugs resulted in the brand products representing 74.2% of all spending in 2001-2002, while the proportion of expenditures represented by generic products decreased somewhat from 27.8% in 1999-2000 to 25.8% in 2001-2002. Annual growth rates fluctuated for both drug categories over the period of analysis, but brand name growth rate was consistently higher.

Between 1999-2000 and 2001-2002, there was a 10.5% increase in the spending on non-patented multiple source products, and a 9.5% increase in spending on non-patented single source drugs. This resulted in a fairly stable share of the total by non-patented single and multiple source products over the period of analysis. By 2001-2002, 78.05% ($33.3 million), of non-patented spending was on multiple source products and 21.95% ($9.37 million) was on single source products.

The above drug costs include amounts which may have been paid for by beneficiaries.

4.2 – CPI Analysis by Market Segment[18]

One way to measure price shifts in the pharmaceutical market is to track the shift relative to the Consumer Price Index (CPI). The *Patent Act* provides that the PMPRB shall consider changes in the CPI in determining if the price of a patented medicine is excessive. The PMPRB's Guidelines limit price increases of patented drugs to increases in the CPI. The Patented Medicine Price Index (PMPI) methodology was used to determine price increases relative to the CPI.

Tables 4.2 to 4.5 review price increases relative to changes in average annual CPI rate over the 1999-2000 to 2001-2002 period.

Table 4.2 provides information on price changes over the period between 1999-2000 and 2001-2002 in relation to the change in the CPI over that entire period. The CPI rose at an average annual rate of 2.6% over this period. Out of the 418 non-patented drugs that increased by more than the CPI factor, 16% were non-patented single source drugs, while 78.9% were non-patented multiple source drugs. Of the 1432 generic drug products included in this analysis, 56.9% had price increases greater than the CPI over the 1999-2000 to 2001-2002 period of analysis.

Table 4.2

Drug Products with Average Price Increases over 1999-2000 to 2001-2002 in Excess of Average CPI Increases

Market Segment	Number of DINs in Total	Number of DINs with Price Increases Above CPI	Percent of the Market That Increased Above CPI	Share of Products Whose Increase Was Above CPI
All Drug Products	2513	450	17.9	100.0
Patented	342	31	9.1	6.9
Non-Patented	2154	418	19.4	92.9
Patented Single Source	225	16	7.1	3.5
Non-Patented Single Source	285	67	23.5	14.9
Non-Patented Multiple Source	1786	330	18.50	73.3
Brand / Generic Competition Exists	1519	239	15.7	53.1
Generic	1432	256	17.9	56.9
Brand	1081	194	17.9	43.1

Market Segment	Mean Price Increase of All DINs %	Mean Price Increase of DINs with Price Increases Above CPI %	$ Impact 2001-2002	Expenditures on DINs with Price Increases Above CPI (in 2001-2002) ($)	Impact to Total Expenditure on All DINs Ratio (x 100)
All Drug Products	2.9	26.2	990,575	6,398,735	0.94
Patented	-0.1	6.8	43,697	965,569	0.04
Non-Patented	3.4	27.7	946,877	5,433,151	0.90
Patented Single Source	0.1	8.6	30,048	415,152	0.03
Non-Patented Single Source	3.3	18.3	149,045	2,021,440	0.14
Non-Patented Multiple Source	3.5	30.1	750,014	3,157,180	0.71
Brand / Generic Competition Exists	2.6	30.7	673,078	2,477,277	0.64
Generic	4.6	35.6	298,231	1,359,674	0.28
Brand	0.7	13.9	692,343	5,039,060	0.66

Although 9.1% of patented drugs rose by more than CPI, the price increases of these identified drugs were well within PMPRB guidelines. The seeming contradiction can be explained in two ways. Firstly, the definition of "price" used in this report is different from the manufacturers' ex-factory gate prices used by the PMPRB. The NIHB database only allowed for price analysis that includes wholesale mark-ups. Secondly, the PMPRB monitors manufacturers' price increases over a three-year period; which allows for occasional single year increases greater than CPI within any three-year window. Third, the PMPRB conducts its price analysis on a calendar year basis, whereas price trends reviewed in this study are performed on a fiscal year basis.

Between 1999-2000 and 2001-2002, price increases are generally observed with the exception of patented drugs where a slight decrease is noted (-0.1%). Overall, the mean price increase for all categories of drugs is 2.9%. Generic drugs have the highest average price increases at 4.6%, followed by the average price increase for non-patented drugs (3.4%). Had all the drugs that increased by more than the CPI rate, been limited to CPI increases, savings to the drug plan in 2001-2002 alone would have been approximately $ 990,575, representing less than 1% of the total expenditures for all DINs for 2001-2002. Approximately 95.6% of this dollar impact can be attributed to non-patented drug products and 69.9% to brand name products.

Tables 4.3, 4.4 and 4.5 provide details on the distribution of price increases for drug products from the first three rows of Table 4.2 with price increases greater than the CPI between 1999-2000 and 2001-2002. Of all the drug products that experienced a price increase greater than the CPI, approximately 63.7% exceeded CPI growth by less than 10%. For all drug products with greater than CPI price increases, the average price increase was 26.2% over the period of analysis, while for non-patented drug products the increase was measured at 27.7%.

Table 4.3

Distribution of All Drug Products Whose Average Prices Increase Over 1999-2000 to 2001-2002 Exceeded the Average CPI Increase

NIHB Pharmacy

1999-2000 to 2001-2002

Price Change CPI +	Number of DINs	% of Total DINs Above CPI	$ Impact 2001-2002	% of Total Impact	Total Expenditures 2001-2002 ($)	Impact to Total Expenditures Ratio (x 100) 2001-2002
0 – 2%	115	4.6	25,342	2.6	1,614,202	1.6
2% - 5%	93	3.7	116,894	11.8	2,030,705	5.8
5% - 10%	79	3.1	109,923	11.1	787,848	14.0
10% - 20%	57	2.3	89,545	9.0	350,028	25.6
20% - 50%	65	2.6	524,278	52.9	1,431,648	36.6
> 50%	41	1.6	124,594	12.6	184,305	67.6
<= CPI	2063	n/a	n/a	n/a	99,295,086	n/a
Total	2513	17.9	990,575	100.0	105,693,822	0.9

Table 4.4

Distribution of Patented Drug Products Whose Average Prices Increase Over 1999-2000 to 2001-2002 Exceeded the Average CPI Increase NIHB Pharmacy, 1999-2000 to 2001-2002

Price Change CPI +	Number of DINs	% of Total DINs Above CPI	$ Impact 2001-2002	% of Total Impact	Total Expenditures 2001-2002 ($)	Impact to Total Expenditures Ratio (x 100) 2001-2002
0 – 2%	18	5.3	12,029	27.50	731,018	1.6
2% - 5%	7	2.0	5,974	13.70	149,340	4.0
5% - 10%	3	0.9	85	0.20	719	11.9
10% - 20%	1	0.3	6,474	14.80	26,820	24.1
20% - 50%	2	0.6	19,134	43.80	57,671	33.2
<= CPI	311	n/a	n/a	n/a	65,334,611	n/a
Total	342	9.1	43,697	100.00	66,300,181	0.10

Table 4.5

Distribution of Non-Patented Drug Products Whose Average Prices Increase Over 1999-2000 to 2001-2002 Exceeded the Average CPI Increase NIHB Pharmacy, 1999-2000 to 2000-2002

Price Change CPI +	Number of DINs	% of Total DINs Above CPI	$ Impact 1999-2000	% of Total Impact	Total Expenditures 1999-2000 ($)	Impact to Total Expenditures Ratio (x 100) 2001-2002
0 – 2%	96	4.5	13,312	1.40	883,168	1.50
2% - 5%	86	4.0	110,919	11.70	1,881,364	5.90
5% - 10%	76	3.5	109,837	11.60	787,128	14.00
10% - 15%	56	2.6	83,070	8.80	323,207	25.70
15% - 50%	63	2.9	505,143	53.30	1,373,976	36.80
> 50%	41	1.9	124,594	13.20	184,304	67.60
<= CPI	1736	n/a	n/a	n/a	33,176,093	n/a
Total	2154	19.4	946,877	100.00	38,609,245	17.40

4.3 – Price, Cost and Volume Indices

4.3.1 – Introduction

This section of the report analyzes price and volume trends in Non-Insured Health Benefits Pharmacy Program between 1999-2000 and 2001-2002. Shifts in prices are usually calculated using a price index, similar to the commonly cited CPI. Price indexes are weighted by quantity, while quantity (volume) indexes are weighted by price. Various approaches may be taken in building price indices, and each approach may have differing results depending on what is assumed. Factors influencing results and conclusions regarding price trends include what drugs compose the index; the frequency with which price, volume and the "basket" are updated, the criteria used to define a "new" drug, and the weighting scheme used. Several different approaches in constructing an index have been taken for the purpose of this study to explore how results may differ with varying assumptions and to assist readers with the interpretation of a price index.

The following are presented below:

- a constant basket (i.e. the same drug products) using a Paasche weighting scheme;
- a moving basket using a Laspeyres weighting scheme.[19]

Three other indices and related methodology are included in Appendix IV of the report. The level of analysis is at the drug level or chemical bioequivalency level.[20] Products with new active ingredient(s), strengths(s), dosage form, or route of administration were treated as new drugs.

4.3.2 – Results

The Constant Basket and Weighting Paasche Price Index (CB&WPPI), uses the utilization patterns in the last year of analysis, 2001-2002, and calculates price trends captured in the Non-Insured Health Benefits Pharmacy Program for the entire period, 1999-2000 to 2001-2002.[21] Drugs that were not available between 1999-2000 to 2001-2002 are by construction not included in this index. What this Paasche index does is allow one to measure the cost of a fixed basket of drugs, with the current patterns of utilization for the entire period of analysis. In contrast, the Chained Laspeyres Price Index (CLPI), updates both the basket and the weights annually. Presenting both indices allows one to gain insight into the effect of adding new drugs and updating weighting scheme on the trends recorded.

As shown in Table 4.6, for all drug products, prices in the pharmacy component of Non-Insured Health Benefits have fallen by almost 1.85% as recorded by the CB&WPPI and by approximately 1.93% as recorded by CLPI.[22] In contrast, the volume indices, increase significantly between 1999-2000 and 2001-2002. The Constant Basket and Weighting Paasche Volume Index (CB&WPVI) and the Chained Laspeyres Volume Index (CLVI) increases by 40.2% and by 41.8% respectively.

Table 4.6

All Drugs

Price and Volume Index Analysis

NIHB Pharmacy

1999-2000 to 2001-2002

Year	Constant Basket and Weighting Scheme Paasche Price Index (CB&WPPI) and Volume Index (CB&WPVI)					Chained Laspeyres Price Index (CLPI) and Volume Index (CLVI)				
	#	Price Index	% change	Volume Index	% change	#	Price Index	% change	Volume Index	% change
1999-2000		100.00		100.00			100.00		100.00	
2000-2001	1056	98.77	-1.23	119.67	19.67	1103	98.68	-1.32	118.18	18.18
2001-2002	1056	98.15	-0.63	140.25	17.19	1108	98.07	-0.61	141.88	20.05

Tables 4.7 to 4.14 apply the same methodology as described above but present the results based on market segment. In particular, a CB&WPPI and CLPI and parallel volume indices are presented for all patented drugs, patented single source drugs, all non-patented drugs, non-patented single source drugs, non-patented multiple source drugs, drugs with brand and generic competition, generic drugs, and brand name drugs.

In general, the price changes as measured by the CPLI and CB&WPPI were similar in their direction and extent. With the exception of non-patented single source products, all drug categories generally experience price stability or mild price decreases. The volume indices of all of the drug categories have increased, but are associated with greater differences between drug categories.

The price decreases for patented products, ranging from 0.4% to 0.23%, compares to 1.73% and 1.53% price decreases for non-patented drugs, using the CB & WPPI and CLPI methodologies respectfully. Volume increases were substantially higher for patented drugs (52.7% - 54.31%) versus non-patented drugs (19.7%– 21.7%).

Patented single source products make up approximately 70% all DINS associated with patented products. As noted in table 4.8, the price decreases are relatively small, but this market segment leads in drug intensity with volume increases of 77.6% (CB&WPVI) and 78.45% (CLVI).

Non-patented products may also be examined within the following categories: total non-patented drugs, non-patented single source products, and non-patented multiple source products. Here, the pattern of price decreases for all other drug categories is interrupted by non-patented single source products where prices increases of 2.2% and 3.0% are noted. This market segment is also noted for the second highest volume increases in our analysis, ranging from 62.3% (CB&WPVI) to 64.1% (CLVI).

Non-patented multiple source products, on the other hand, are characterized by mild price decreases (1.40% and 1.78%) and moderate volume increases (10.6% and 10.8%).

Of all of the categories, price decreases are most pronounced in market products where brand and generic competition exists; 4.1% (CB&WPPI) and 3.8% (CLPI). This market segment also had the lowest volume increases (approximately 6.0%) of all drug categories under analysis.

When examining brand versus generic products, relative price stability was evident with price changes that ranged from -0.02% to 0.07% for brand products and -1.68% to -1.76% for generic drugs. This relative price stability is offset, however, by substantial volume increases, particularly for brand products. Volume increases between 40.97% and 42.75% are noted for brand products, while the volume increases for generic are more limited at 25.45% and 24.34%.

Table 4.7

Patented Products

Price and Volume Index Analysis

NIHB Pharmacy

1999-2000 to 2001-2002

Year	Constant Basket and Weighting Scheme Paasche Price Index (CB&WPPI) and Volume Index (CB&WPVI)					Chained Laspeyres Price Index (CLPI) and Volume Index (CLVI)				
	#	Price Index	% change	Volume Index	% change	#	Price Index	% change	Volume Index	% change
1999-2000		100.00		100.00			100.00		100.00	
2000-2001	304	99.61	-0.39	127.14	27.14	327	99.72	-0.28	124.33	24.33
2001-2002	304	99.64	0.03	152.67	20.08	332	99.77	0.04	154.31	24.11

Table 4.8

Patented Single Source Products

Price and Volume Index Analysis

NIHB Pharmacy

1999-2000 to 2001-2002

Year	Constant Basket and Weighting Scheme Paasche Price Index (CB&WPPI) and Volume Index (CB&WPVI)					Chained Laspeyres Price Index (CLPI) and Volume Index (CLVI)				
	#	Price Index	% change	Volume Index	% change	#	Price Index	% change	Volume Index	% change
1999-2000		100.00		100.00			100.00		100.00	
2000-2001	215	99.65	-0.35	138.41	38.41	239	99.76	-0.24	133.83	33.83
2001-2002	215	99.75	0.10	177.58	28.30	244	99.96	0.20	178.55	33.41

Table 4.9

Non-Patented Products

Price and Volume Index Analysis

NIHB Pharmacy

1999-2000 to 2001-2002

Year	Constant Basket and Weighting Scheme Paasche Price Index (CB&WPPI) and Volume Index (CB&WPVI)					Chained Laspeyres Price Index (CLPI) and Volume Index (CLVI)				
	#	Price Index	% change	Volume Index	% change	#	Price Index	% change	Volume Index	% change
1999-2000		100.00		100.00			100.00		100.00	
2000-2001	801	98.56	-1.44	110.45	10.45	841	98.73	-1.27	108.81	8.81
2001-2002	801	98.27	-0.29	119.71	8.39	835	98.47	-0.26	121.65	11.80

Table 4.10

Non-Patented Single Source Products

Price and Volume Index Analysis

NIHB Pharmacy

1999-2000 to 2001-2002

Year	Constant Basket and Weighting Scheme Paasche Price Index (CB&WPPI) and Volume Index (CB&WPVI)					Chained Laspeyres Price Index (CLPI) and Volume Index (CLVI)				
	#	Price Index	% change	Volume Index	% change	#	Price Index	% change	Volume Index	% change
1999-2000		100.00		100.00			100.00		100.00	
2000-2001	279	100.18	0.18	128.87	28.87	337	100.79	0.79	129.98	29.98
2001-2002	279	102.19	2.01	162.32	25.96	314	103.00	2.19	164.10	26.25

Table 4.11

Non-Patented Multiple Source Products

Price and Volume Index Analysis

NIHB Pharmacy

1999-2000 to 2001-2002

Year	Constant Basket and Weighting Scheme Paasche Price Index (CB&WPPI) and Volume Index (CB&WPVI)					Chained Laspeyres Price Index (CLPI) and Volume Index (CLVI)				
	#	Price Index	% change	Volume Index	% change	#	Price Index	% change	Volume Index	% change
1999-2000		100.00		100.00			100.00		100.00	
2000-2001	449	98.42	-1.58	106.34	6.34	473	98.53	-1.47	103.55	3.55
2001-2002	449	98.60	0.19	110.61	4.01	472	98.22	-0.31	110.84	7.04

Table 4.12

Products in Markets Where Brand and Generic Competition Exists

Price and Volume Index Analysis

NIHB Pharmacy

1999-2000 to 2001-2002

Year	Constant Basket and Weighting Scheme Paasche Price Index (CB&WPPI) and Volume Index (CB&WPVI)					Chained Laspeyres Price Index (CLPI) and Volume Index (CLVI)				
	#	Price Index	% change	Volume Index	% change	#	Price Index	% change	Volume Index	% change
1999-2000		100.00		100.00			100.00		100.00	
2000-2001	329	96.20	-3.80	102.21	2.21	352	97.35	-2.65	102.27	2.27
2001-2002	329	95.86	-0.35	106.33	4.04	348	96.22	-1.16	106.21	3.85

Table 4.13

Generic Products

Price and Volume Index Analysis

NIHB Pharmacy

1999-2000 to 2001-2002

Year	Constant Basket and Weighting Scheme Paasche Price Index (CB&WPPI) and Volume Index (CB&WPVI)					Chained Laspeyres Price Index (CLPI) and Volume Index (CLVI)				
	#	Price Index	% change	Volume Index	% change	#	Price Index	% change	Volume Index	% change
1999-2000		100.00		100.00			100.00		100.00	
2000-2001	508	98.11	-1.89	114.30	14.30	518	98.11	-1.89	110.44	10.44
2001-2002	508	98.24	0.13	125.45	9.76	527	98.32	0.21	124.34	12.58

Table 4.14

Brand Products

Price and Volume Index Analysis

NIHB Pharmacy

1999-2000 to 2001-2002

Year	Constant Basket and Weighting Scheme Paasche Price Index (CB&WPPI) and Volume Index (CB&WPVI)					Chained Laspeyres Price Index (CLPI) and Volume Index (CLVI)				
	#	Price Index	% change	Volume Index	% change	#	Price Index	% change	Volume Index	% change
1999-2000		100.00		100.00			100.00		100.00	
2000-2001	877	100.00	0.00	121.08	21.08	938	100.23	0.23	118.89	18.89
2001-2002	877	99.98	-0.02	140.97	16.42	930	100.07	-0.15	142.75	20.07

4.4 – Brand/Generic Analysis

As discussed in section 4.1, both relative and absolute spending on brand products increased from 1999-2000 to 2001-2002. Over the three-year period, the average annual increase was calculated to be 20%, bringing brand drug product expenditure to $83.65 million dollars. Brand product spending nudged upward from 72.2% of total drug expenditure in 1999-2000 to 74.2% in 2001-2002. The number of bioequivalent markets with brand and generic products remained stable over the period of analysis with a slight decrease in the latter year.[23] Table 4.15 shows that the mean generic to brand ratio increased from 69.3% to 73.3% between 1999-2000 and 2001-2002. Most of this increase was seen between 2000-2001 and 2001-2002.

Table 4.15

Annual Changes in the Average Generic To Brand Comparison, Average Generic Price and Average Brand Price, Including New Bioequivalent Markets

NIHB Pharmacy

1999-2000 to 2001-2002

	Number of Bioequivalent Markets	Mean Generic to Mean Brand Product Price Ratio	Mean% Change in Generic-to-Brand Product Price Ratio	Mean% Change in Generic Price	Mean% Change in Brand Price
1999-2000	329	0.69			
2000-2001	329	0.70	1.1%	-0.8%	-1.9%
2001-2002	328	0.73	4.6%	2.6%	-2.0%

*Geometric mean

Although this analysis is limited by the number of years of data, the mean percentage change in brand prices remained stable at approximately -2.0%. There was an initial decline by 0.8% in the price of generics, followed by a positive change of 2.6% in following year.

Changes in the generic to brand product price ratio can be driven by changes in the numerator (generic prices), the denominator (brand prices) or both. Changes in these values can also be influenced by changes in the basket of bioequivalent markets for which the statistics may be generated.

As shown in Figure 4.1, the average change in generic-to-brand price ratios and the average change in generic prices remained closely parallel during 2000-2001 and 2001-2002. Meanwhile, the average change in brand product prices remained rather static at -2.0%. Additional years of data would be required to substantiate that these findings represent a true trend.

To further understand relative changes in brand generic prices on examination of their ratio's distribution can be useful. Table 4,16 provides information on the number of bioequivalent drugs that have a generic to brand price ratio which is <50%, 50% - 75%, … >110% - over the three year time period.

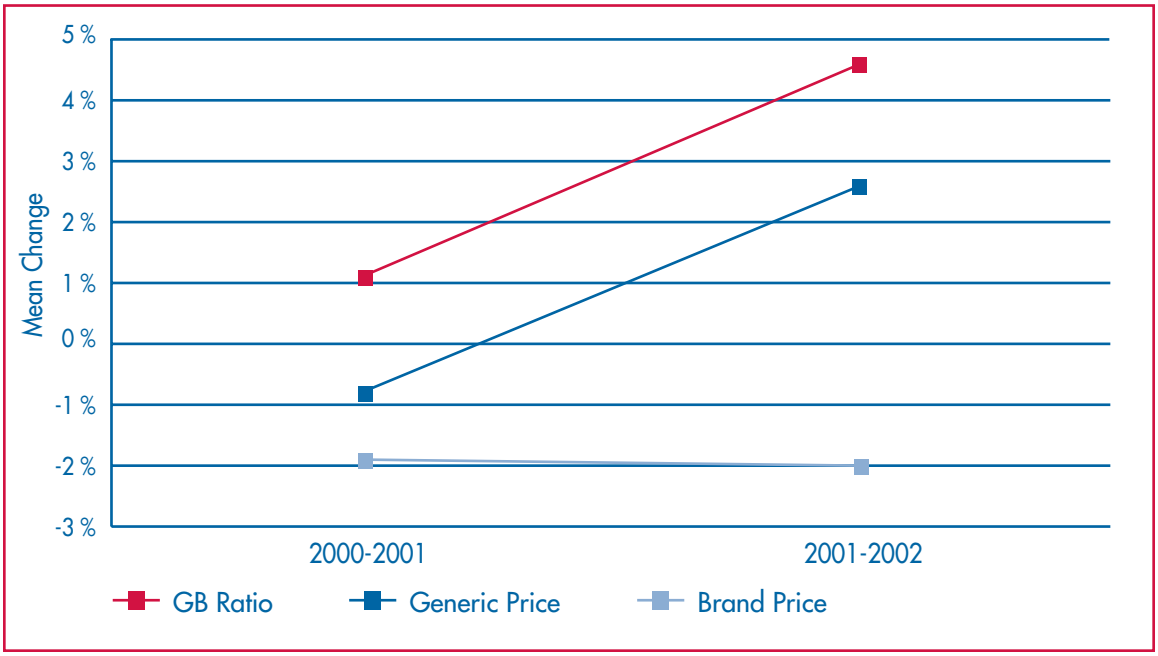


Figure 4.1

Summary of Mean Generic-to-Brand Price Ratio

Table 4.16 and Figure 4.2 demonstrate the trends in the relative generic-to-brand price ratio over time. The market share of bioequivalency markets where generic-to-brand price ratios were below 100% decreased from 83.3% in 1999-2000 to 79.3% in 2001-2002. Reciprocally, the market share of the bioequivalency markets, where the generic-to-brand price ratios were > 100%, increased from 16.7% to 20.7% in 2001-2002. This increase in market share is attributable to those bioequivalency markets where the generic-to-brand price ratio was > 110%. Here, the number of bioequivalency markets increased from 26 in 1999-2000 to 42 in 200/01, an increase of 61.5%.

Table 4.16

Distribution of Generic-to-Brand Name Drug Price Ratios

NIHB Pharmacy

1999-2000 to 2001-2002

	1999-2000		2000-2001		2001-2002		
Generic Price Relative to Brand Name Price	**# of bioequiv markets**	**%**	**# of bioequiv markets**	**%**	**# of bioequiv markets**	**% of Total**	**% Change between 1999-2000 and 2001-2002**
< 50%	51	15.5	50	15.2	50	15.2%	-1.96%
50% - 75%	110	33.4	117	35.6	118	36.0%	7.27%
75% - 90%	58	17.6	48	14.6	40	12.2%	-31.03%
90% - 100%	55	16.7	50	15.2	52	15.9%	-5.45%
100% - 110%	29	8.8	33	10.0	26	7.9%	-10.34%
> 110%	26	7.9	31	9.4	42	12.8%	61.54%
Total	329	100	329	100	328	1.00	-0.30%

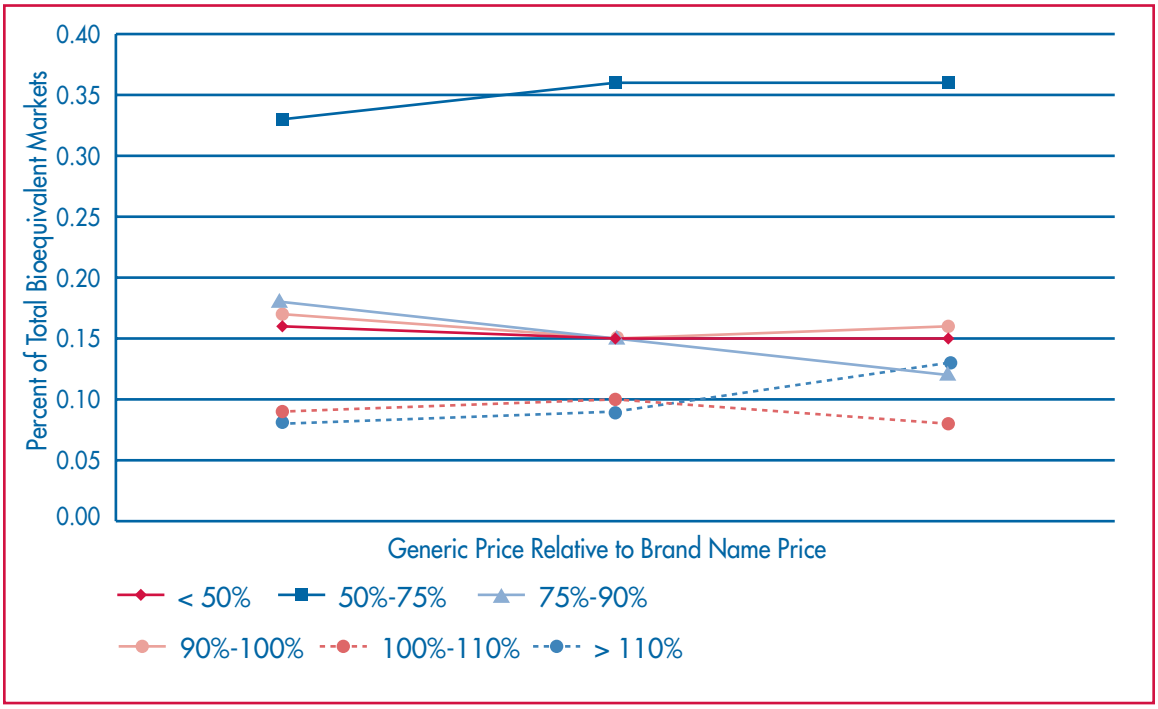
Figure 4.2

Percentage Distribution of Bioequivalent Markets

Generic-to-Brand Name Drug Prices

NIHB Pharmacy

1999-2000 to 2001-2002



The only other section where the number of bioequivalent markets increased (7.3%) was where the brand-to-generic ratio was 50 to 75%. It is also this segment of the market that has the highest frequency, representing almost 36% of all the bioequivalency markets in 2001-2002.

The largest decrease in market share (31.0%) was the market segment identified by a generic-to-brand price ratio of 75% to 90%. Overall, the number of bioequivalency markets was static at approximately 330 markets.

Table 4.17 provides information on the brand/generic ratio based on the number of generic firms providing the product.

The minimum or lowest generic-to-brand ratios are noted in those markets where the market is characterized by three or four generic competitors. The minimum points are followed by a gradual and general increase in the generic-to-brand ratio. The increase in generic competition may contribute to a lowering of the generic-to-brand ratio but only to a certain point.

The decrease observed in the generic to brand name price ratio ranged from 3.1% to 9.2% as the number of generic firms increases from one to two. The most consistent and notable decrease in the generic-to-brand ratio, however, occurs when the number of generic competitors increases from two to three. In the latter case, the decreases in the generic-to-brand price ratio ranged from 13.6% to 16.5%.

Another interesting trend is that there was a decrease in the share of brand/generic markets as the number of generic competitors increases. At the same time, the brand/generic market shares appear to be consistent across the study period.

Markets characterized with one generic competitor comprise the largest percentage share of all brand/generic markets at approximately 23%. The lowest generic-to-brand ratios are seen in those markets with one to five generic competitors. These same markets also dominate in their percentage share of the brand/generic market from 83.3% in 1999-2000 to 79.3% in 2001-2002.[24]

As stated earlier, the generic to brand ratio can be influenced by changes in the generic prices from year to year, changes in the brand price from year to year, or changes in the basket of bioequivalent markets being analyzed.

Table 4.17

Generic to Brand Ratio, by the Number of Generic Competitors, Including New Markets

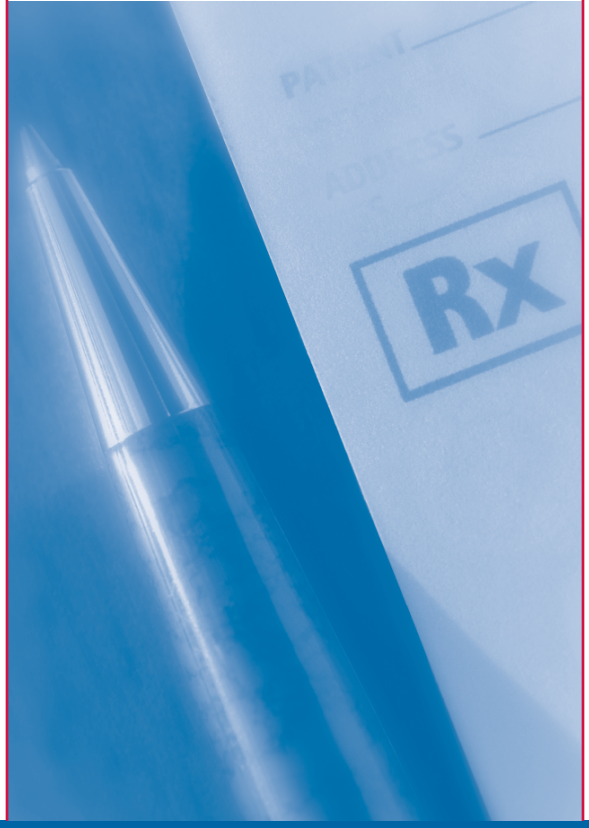
NIHB Pharmacy

1999-2000 to 2001-2002

Number of Generic Competitors	Mean Generic to Brand Price* Ratio and Percent of All Bioequivalent Market with Brand and Generic Competition					
	1999-2000		2000-2001		2001-2002	
1	0.75	23.7%	0.75	23.1%	0.75	22.0%
2	0.73	14.9%	0.68	14.9%	0.71	15.9%
3	0.63	18.8%	0.59	19.1%	0.59	18.9%
4	0.56	15.2%	0.57	14.9%	0.63	14.0%
5	0.63	10.6%	0.71	8.5%	0.82	8.5%
6	0.84	7.9%	0.94	8.8%	0.85	8.8%
7	0.74	4.0%	0.76	4.3%	0.97	5.8%
8	0.81	1.8%	0.92	2.4%	1.12	2.1%
9	0.89	0.9%	0.83	1.8%	0.99	2.1%
10	1.15	1.2%	1.01	1.8%	1.58	1.5%
11	0.95	0.6%	2.21	0.3%	0.68	0.3%
12	1.46	0.3%	~	~	~	~

*Geometric mean

5 Cost Driver Analysis



5.1 – Why Study Cost Drivers?

An examination of cost drivers provides both public and private drug plan managers, policy makers and other stakeholders including consumers with a better understanding of the major components that influence annual increases and trends in pharmaceutical spending. During the 1990's, increases in the annual cost of drugs in Canada were, on average, approximately 13% per year.[25] This growth in total spending was occurring while annual average increases in overall prices was less than 2% with the exception of 1991 (5.6%) and 1995 (2.2%).[26] This demonstrates that changes in annual costs of pharmaceuticals are reflective of a combination of many factors which are summarized in Figure 5.1.[27]

Figure 5.1
Factors Affecting Total Drug Expenditures

1. Changes in the total population
2. Changes in the demographics and health status of the population (i.e. towards those with increased medication needs)
3. Changes in the unit prices of drugs (both patented and non-patented)
4. Changes in retail and wholesale mark-ups and professional fees
5. Changes in the prescribing habits of physicians (i.e. from older, less expensive medications to newer, relatively more expensive medications to treat the same underlying diagnosis)
6. Changes in utilization of drugs on a per patient basis (i.e. more medications per patient per year)
7. Trends towards using drug therapy instead of other treatments (e.g. as alternatives to surgery in some cases)
8. The appearance of new diseases requiring pharmaceutical therapy
9. The introduction of new drugs to treat conditions for which effective pharmaceutical therapies previously did not exist
10. The introduction of new drugs embodying appreciable improvements over existing pharmaceutical therapies

While it is difficult to quantify the relative effect that the above factors[28] may have on increases in drug costs, some studies have attempted to do so.[29] These studies have employed different methodologies to assess the impact of the various factors and have found that price changes represent only one factor influencing changes in the total cost of drugs. Other important factors include utilization (i.e. changes in the amount of drugs consumed) and the introduction of new therapies.

5.2 – Distribution of Expenditure Change by Component

This section of the report breaks out annual changes in the cost of drugs into the following major components:

- Annual volume (utilization) changes of older and newer drugs;[30]
- Annual price changes of older and newer drugs;
- Annual influence from the introduction of new drugs (patented and non-patented); and,
- Annual influence of newer drugs by therapeutic class or disease groups.

This analysis provides further insight into several factors outlined in Figure 5.1. Each of these factors has been examined to assess their individual influence on annual drug cost changes; i.e. to determine what percentage of the increase in annual cost of drugs can be attributed to each factor.[31]

A further disaggregation by therapeutic class allows an investigation of whether certain disease-specific drug categories are experiencing proportionately greater increases in annual costs. Furthermore, an investigation of the extent to which new drugs are being substituted for older drugs and the relative cost of new drugs to older drugs can be done. Finally, breaking out the drugs into patented and non-patented drugs allows us to examine drugs by market segment.

The change in total annual expenditure can be broken down into a price effect, a volume effect, exiting drugs effect, new drugs effect, and other effects.[32] Table 5.1 summarizes the relative contribution of each component to the total annual change in drug expenditures.

Year	Price Effect (%)	Quantity Effect (%)	New Drugs Year 1 (%)	New Drugs Year 2 (%)	Existing Drugs Effect (%)	Cross Effect (%)
2000-2001	-7.5	102.8	6.3	—	-0.1	-1.5
2001-2002	-2.8	90.0	1.3	13.8	-1.3	-1.1
Average	-4.84	95.67	3.51	7.68	-0.74	-1.28

Table 5.1

Average Percentage Contribution to Pharmaceutical Expenditures by Major Components

NIHB Pharmacy

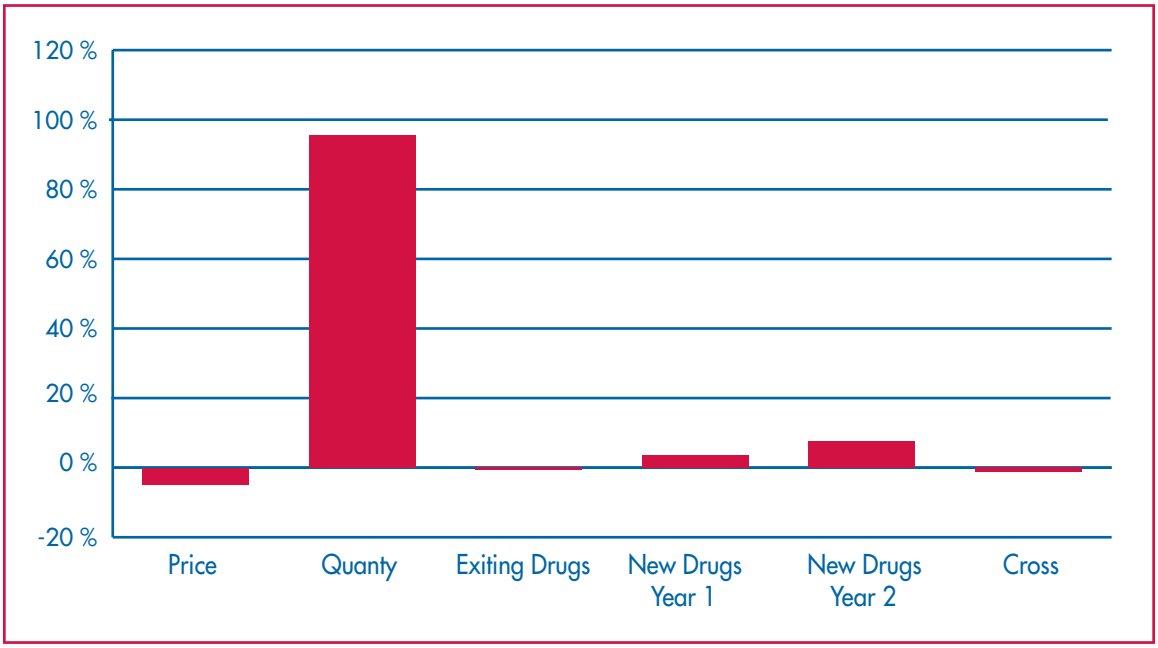
1999-2000 to 2001-2002

Figure 5.2

Contribution to Changes in Pharmaceutical Expenditures by Major Components

NIHB Pharmacy

1999-2000 to 2001-2002



On average, between 1999-2000 and 2001-2002, changes in volume or utilization seen by NIHB Pharmacy were responsible for 95.7% of the total change in pharmaceutical expenditures, unit price changes were responsible for -4.8%[33], entry of new drugs in year 1 accounted for 3.5%, while exiting drugs and other factors accounted for -1.28%.[34] These findings demonstrate that utilization accounted for the largest portion of the increase in total drugs expenditures over the period covered by the analysis. The table also shows that entry of new drugs in Year 2 had a larger impact than they did in Year 1. Figure 5.2 gives a visual picture of the growth of the relative contributions of the different components to total pharmaceutical expenditure changes between 1999-2000 and 2001-2002.

In Table 5.1, some contributions stand out more than others due to their large magnitude, whether positive or negative. These are the quantity effects for 2000-2001 (102.8%) and 2001-2002 (90%), the price effect of 2000-2001 (-7.5%) and the second year new drugs effect for 2001-2002 (13.8%).

The expenditure decomposition portrays the relative importance of changes in utilization of existing and newer drugs. It is important to keep in mind that the effects reported represent the relative impact each component had on changes in total expenditure levels. Although the analysis demonstrates a positive price effect in this analysis, the reader is reminded that price effect is greatly influenced by generic competition, which reduces the cost of the entire chemical, and cost containment policies. Future analysis at the ATC level will provide further details.

Table 5.2 breaks out annual total expenditures into "all" and "existing" drugs. Existing drugs are those drugs that were paid for by the drug plan in 1999-2000, i.e. drugs that were included as benefits in 1999-2000 or before.[35] Newer drugs are those drugs that were introduced after 1999-2000. Expenditures on drugs that existed in 1999-2000 increased at an average annual rate of 14.6% between 1999-2000 and 2001-2002, while expenditure on all drugs increased by an annual average rate of 18.3% over the same period of time. The share of expenditures on newer drugs increased steadily throughout the period.

Year	All Drugs 1999-2000 to 2001-2002			Existing Drugs 1999-2000 to 2001-2002		
	Expenditures	Difference from preceding year	Percent Change (%)	Expenditures	Difference from Preceding Year	Percent Change (%)
1999-2000	$80.50	—	—	$80.50	—	—
2000-2001	$94.70	$14.20	17.60%	$93.10	$12.60	15.70%
2001-2002	$112.70	$18.00	19.00%	$105.70	$12.60	13.50%
Average			18.30%			14.60%

Table 5.2

Pharmaceutical Expenditures

Non-Insured Health Benefits

1999-2000 to 2001-2002

(000,000's)

Figure 5.3 shows the contribution of each component as a percentage of average annual growth in expenditures between 1999-2000 and 2001-2002. Pharmaceutical expenditures increased, on average, at an annual rate of 16.67% during the period of the analysis. By 2001-2002, expenditures were 36.09% higher than 1999-2000. Figure 5.3 shows that utilization, and new drugs were responsible for this growth.

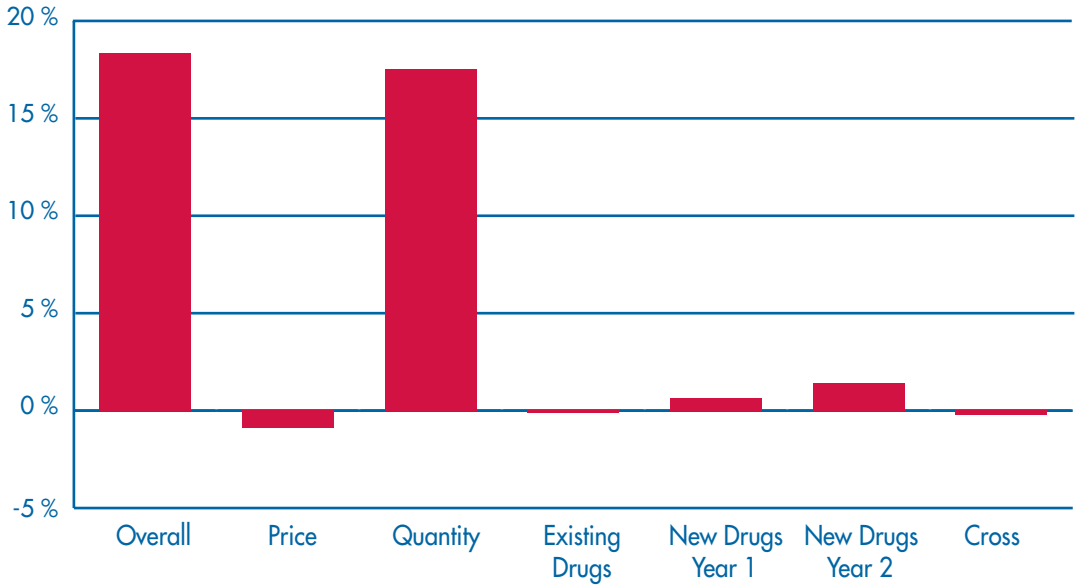


Figure 5.3

Percentage Contribution of Components to Average Growth Rate

NIHB Pharmacy

1999-2000 to 2001-2002

Figure 5.4 corresponds to Table 5.2, in that it shows trends in expenditure on all drugs, existing drugs and newer drugs. It illustrates that as expenditures on existing drug products were increasing over the years, expenditures on newer drug products were increasing at a higher rate. Other than the replacement of older drug products by newer ones, price changes and/or utilization changes can drive changes in expenditures.[36]

Figure 5.4

Expenditure Levels of Existing and Newer Drugs

NIHB Pharmacy

(000's)

1999-2000 to 2001-2002

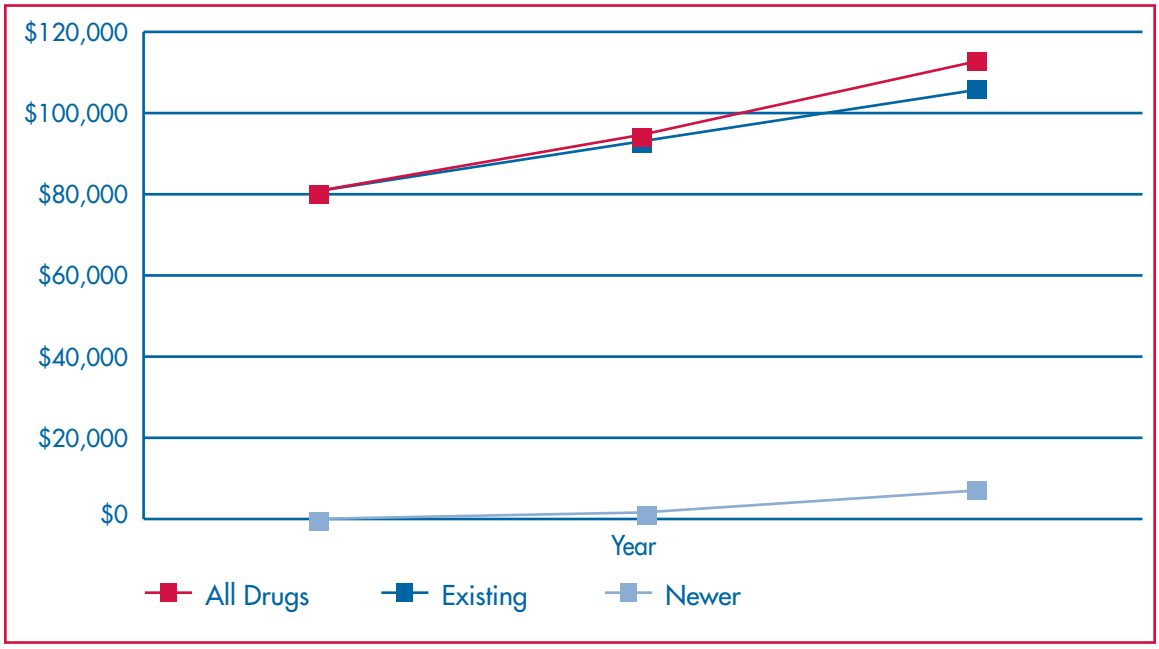


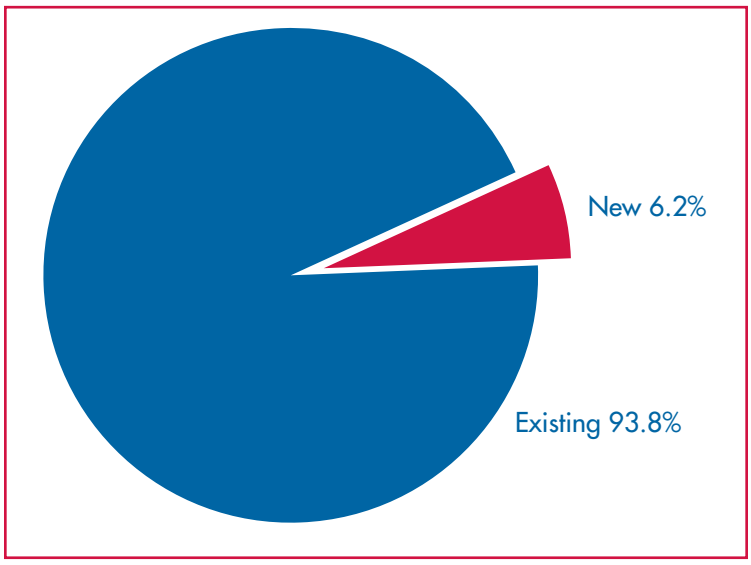
Figure 5.5 breaks down total pharmaceutical expenditures into expenditures on newer and existing drugs. Newer drugs accounted for 6.2% of expenditures in 2001-2002. From Figure 5.6, it can be seen that in 1999-2000, the proportion of patented and non-patented expenditures to total drug costs were 56.3% and 43.7% respectively. In 2001-2002, expenditures on patented drugs increased to 62.1%. About 95% of these expenditures on patented pharmaceuticals were for existing drugs. The growth in patented drug expenditures is consistent with what has been reported in PMPRB Annual Reports.

Figure 5.5

Contribution of Existing and Newer Drugs to Total Pharmaceutical Expenditures

NIHB Pharmacy Program

2001-2002



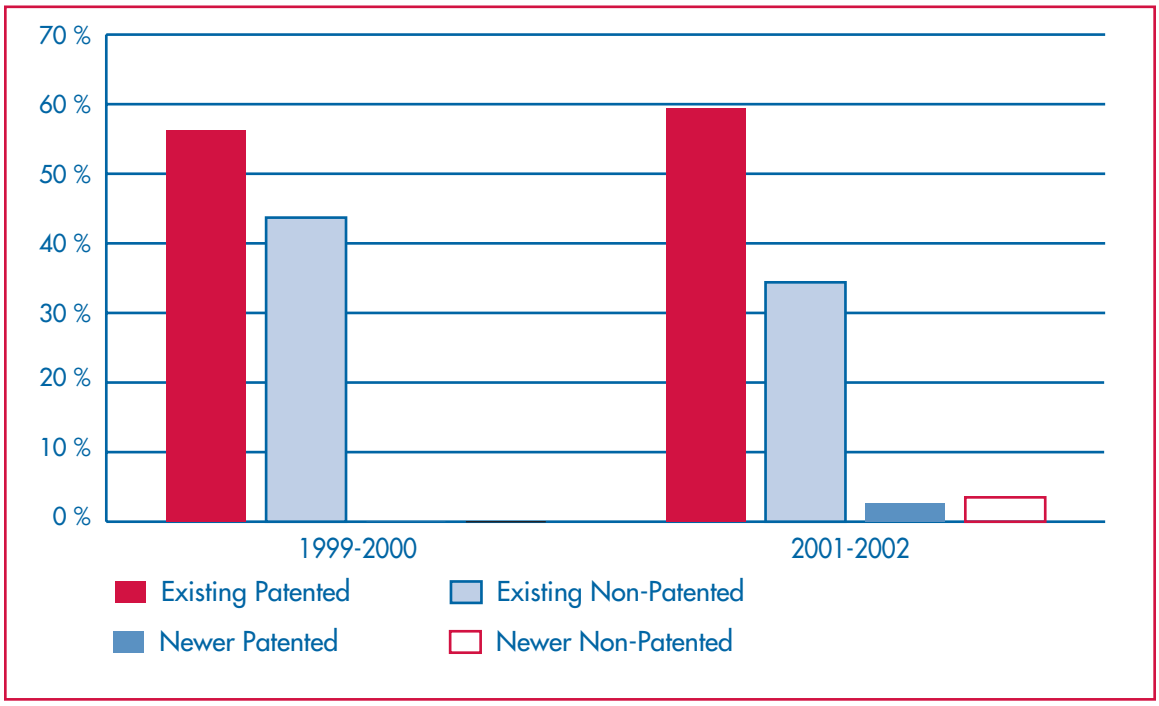


Figure 5.6

Proportion of Total Pharmaceutical Expenditure by 'Newer and Existing' and 'Major Groups'

NIHB Pharmacy

2001-2002

5.3 – Breakdown of Pharmaceutical Expenditure by Patent Status/Category

Figure 5.7 shows the share of patented and non-patented drug products in total pharmaceutical expenditures. The patented portion can be broken down into Category 1 (line extensions of an existing drug product), Category 2 (a breakthrough or substantial improvement over an existing product), Category 3 (moderate, little or no improvement over an existing drug product), and non-categorized patented drug products. It should be noted that, while the expenditures for Category 1, Category 2 and Category 3 drug products are reported separately, they are often different brands, strengths and dosage forms of a single medicine. Category 1 products are sometimes a line extension of a Category 2 or Category 3 product.

In 1999-2000, of the $53.3 million of expenditures accounted for by patented drugs, Category 1 drugs made up 30.0% ($16.0 million), Category 2 drugs accounted for 9.4% ($5.0 million), Category 3 drugs accounted for 5.5% ($38.0 million) and older non-categorized patented drug products accounted for 5.6% ($3.0 million). In 2001-2002, of the $65.8 million of expenditures on patented drugs, Category 1 made up 30.8% ($20.2 million), Category 2 drugs accounted for 6.9% ($4.5 million); Category 3 drugs comprised 57.8% ($38.0 million) and older non-categorized patented drug products accounted for 4.5% ($3.0 million) of total patented pharmaceutical expenditures.

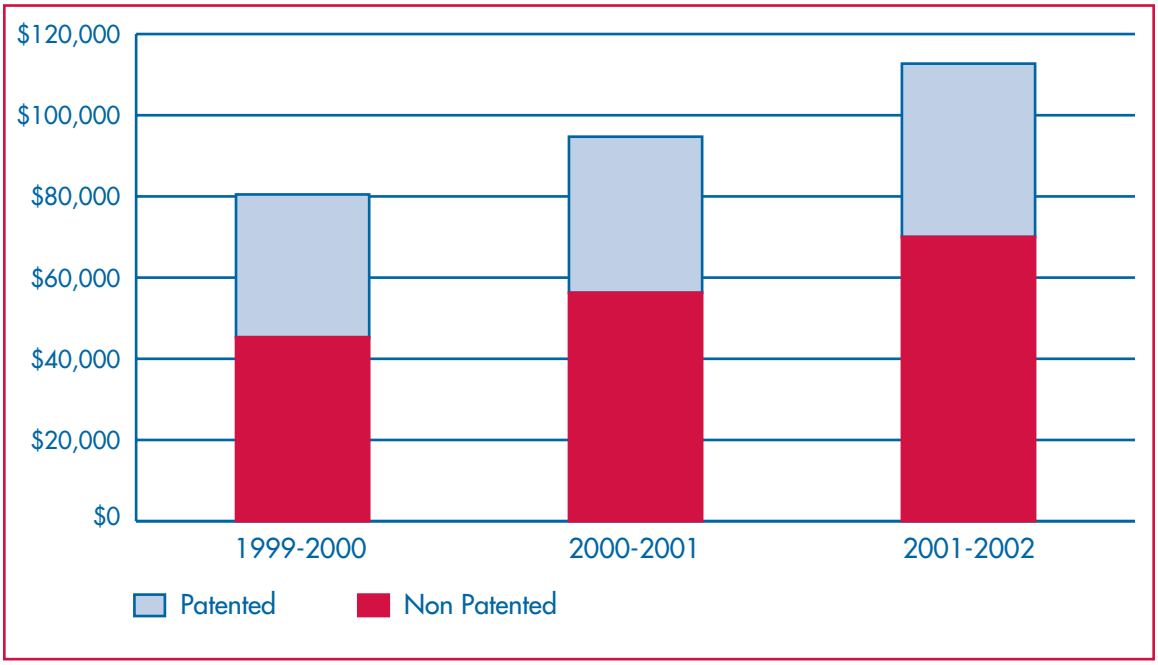
Figure 5.7

Distribution of Total Pharmaceutical Expenditures for All Drug by Patent Status

NIHB Pharmacy

(000's)

1999-2000 to 2001-2002



5.4 – Growth in Expenditure on Newer Drug Products

The information on Table 5.3 demonstrates how fast the market responds to new drugs. For example, expenditures on drugs introduced in 2000-2001 were $1.86 million in that year, but had risen to $5.71 million in 2001-2002. However, it should be noted that, depending on the month of introduction, expenditures during the first year may represent expenditures during a "partial" year. For instance, if a drug was introduced in July of any year, the data on expenditures would represent expenditures for six months only.

Table 5.3

Expenditure on Newer Drug Products

NIHB Pharmacy

(000's)

1999-2000 to 2001-2002

Year of Introduction	2000-2001	2001-2002
2000-2001	1.86	5.72
2001-2002	N / A	2.41
Total	N / A	8.13

5.5 – Therapeutic Class Analysis

In order to identify which disease groups are contributing proportionately more to increases in pharmaceutical expenditures, the analysis is further broken down by second level ATC classification. The second level of the ATC classification groups drugs of different pharmacological classes that have the same main therapeutic use. The top sixteen therapeutic classes were identified based on their level of expenditures relative to other therapeutic classes. Table 5.4 shows the percentage contribution of these top sixteen therapeutic classes in total expenditures and their contributions to the changes in expenditures between 1999-2000 and 2001-2002.

The top sixteen therapeutic classes, which were approximately 17% of the total number of therapeutic classes (at the second level), accounted for 90.8% of total pharmaceutical expenditures in 2001-2002. These groups of drugs experienced an average annual expenditure growth rate of 19.9% between 1999-2000 and 2001-2002.

Table 5.4 shows the percentage contributions of the top sixteen second-level therapeutic classes to total expenditures, as well as the contribution of each of the eight ATC groups to which these sixteen therapeutic classes belong. These eight ATC first-level groups are as follows:

- Alimentary Tract and Metabolism,
- Blood and Blood Forming Organs,
- Cardiovascular System,
- Genitourinary System and Sex Organs,
- General Anti-Infectives for Systemic Use,
- Anti-Neoplastic and Immunomodulating Agents,
- Musculo-Skeletal System, and
- Nervous System.

Expenditures on these ATC groups were $109.5 million or 97.1% of total expenditures in 2001-2002.

The last column of Table 5.4 shows the contribution of each of the eight ATC groups and top sixteen therapeutic classes to the total increase in expenditures between 1999-2000 and 2001-2002. Among the eight first-level ATC groups, drugs related to the Nervous System made the largest contribution to increases in pharmaceutical expenditures (30.2%), followed closely by drugs related to the Cardiovascular System (28.1%) and then drugs related to the Alimentary Tract and Metabolism (20.6%).

Among the second-level therapeutic classes, Drugs for Acid Related Disorders (Alimentary Tract and Metabolism) made the largest contribution to expenditure growth (12.7%), followed by Agents Acting on the Renin-Angiotensin System with 12.4% (Cardiovascular System), followed by Serum Lipid Reducing Agents with a 11.3% (Cardiovascular System) contribution to expenditure growth between 1999-2000 and 2001-2002. Other second-level therapeutic classes that contributed significantly to expenditure growth during the years covered are Drugs used in Diabetes (10.1%) and Psychoanaleptics (9.4%), Psycholeptics (9.0%), and Anti-inflammatory and Anti-rheumatic products (8.9%).

Table 5.4

Percentage Contribution of Selected Therapeutic Classes to Total Drug Expenditures

NIHB Pharmacy

1999-2000 to 2001-2002

Therapeutic Class	ATC	1999-2000		2001-2002		1999-2000 to 2001-2002	
	ATC	Expenditure ($000)	% of Total	Expenditure ($000)	% of Total	Average Growth Rate of Expenditures	% of Total Expenditure Change
Alimentary tract and metabolism	A	13,772	17.1	20,418	18.1	21.8	20.6
Drugs for Acid Related Disorders	A02	9,082	11.3	13,164	11.7	20.4	12.7
Drugs used in diabetes	A10	2,500	3.1	5,751	5.1	51.7	10.1
Others		2,191	2.7	1,502	1.3	-17.2	-2.1
Blood and blood forming organs	B	785	1.0	1,358	1.2	31.5	1.8
Antithrombotic Agents	B01	766	1.0	1,328	1.2	31.7	1.7
Others		20	0.0	30	0.0	24.2	0.0
Cardiovascular system	C	20,406	25.4	29,463	26.1	20.2	28.1
Beta Blocking Agents	C07	1,378	1.7	1,696	1.5	10.9	1.0
Calcium channel blockers	C08	4,635	5.8	5,637	5.0	10.3	3.1
Agents acting on the renin-angiotensin system	C09	8,135	10.1	12,138	10.8	22.1	12.4
Serum lipid reducing agents	C10	5,178	6.4	8,805	7.8	30.4	11.3
Others		1,079	1.3	1,187	1.1	4.8	0.3
Genitourinary System and Sex Hormones	G	4,080	5.1	4,754	4.2	7.9	2.1
Sex Hormones and Modulators of the Genital System	G03	3,552	4.4	4,000	3.5	6.1	1.4
Others		529	0.7	754	0.7	19.4	0.7
General anti-infectives for systemic use	J	11,727	14.6	12,983	11.5	5.2	3.9
Antibacterials for systemic use	J01	8,764	10.9	9,306	8.3	3.0	1.7
Antivirals for Systemic Use	J05	2,285	2.8	3,041	2.7	15.4	2.3
Others	Others	678	0.8	636	0.6	-3.1	-0.1
Anti-neoplastic and immunomodulating agents	L	1,740	2.2	2,552	2.3	21.1	2.5
Immunosuppressive Agents	L04	1,281	1.6	1,886	1.7	21.3	1.9
Others	Others	459	0.6	666	0.6	20.4	0.6
Musculo-skeletal system	M	6,080	7.6	9,093	8.1	22.3	9.3
Anti-inflammatory and anti-rheumatic products	M01	5,210	6.5	8,085	7.2	24.6	8.9
Others	Others	870	1.1	1,008	0.9	7.7	0.4
Nervous system	N	19,110	23.7	28,853	25.6	22.9	30.2
Analgesics	N02	3,496	4.3	5,666	5.0	27.3	6.7
Antiepileptics	N03	2,025	2.5	2,977	2.6	21.2	3.0
Psycholeptics	N05	4,146	5.2	7,043	6.2	30.3	9.0
Psychoanaleptics	N06	8,818	11.0	11,849	10.5	15.9	9.4
Others	Others	624	0.8	1,317	1.2	45.3	2.2
Total - ATC Level 2		71,252	88.5	102,373	90.8	19.9	96.6
Total – ATC Level 1		77,701	96.5	109,473	97.1	18.7	98.6
Total – All Drugs		80,485	100.0	112,713	100.0	18.3	100.0

The share in total expenditures of Drugs for Acid Related Disorders increased from 11.3% in 1999-2000 to 11.7% in 2001-2002. Agents acting on the Renin-Angiotensin System accounted for 10.1% of total expenditures in 1999-2000, a share which grew to 10.8% by 2001-2002. The share of Serum Lipid Reducing Agents in total pharmaceutical expenditures went from 6.4% in 1999-2000 to 7.8% in 2001-2002. A more detailed discussion of the three top therapeutic groups may be found in section 5.6. Refer to Appendix VI for background details on the ATC classification system and a detailed analysis of the remaining therapeutic classes.

5.6 – Expenditure Decomposition for the Top 16 ATC Classes

Similar to the analysis presented in section 5.2, Table 5.5 reports on the average component contribution to expenditure change for the top 16 second-level therapeutic classes. Generally speaking, the trends reported in Table 5.1 are consistent with the averages reported for the top 16 second-level classes. However, some interesting differences exist, particularly in the price effect. For instance, although price changes contribute negatively to expenditure change on average, positive price effect is seen for Analgesics (19%), Sex hormones and Modulators of the Genital System (13.3%), Agents Acting on the Renin-angiotensin system (5.2%), and Psycholeptics (4.0%). Large negative price effects are seen in the following ATC level 2 drugs: Antibacterials for Systemic Use (-56.7%), Antithrombotic Agents (-26.5%), and Antiepileptics (-25.4%).

Table 5.5

Average Percentage Contribution to Pharmaceutical Expenditure by Major Disease Groups

Top 16 Second Level Therapeutic Classes

NIHB Pharmacy

1999-2000 to 2001-2002

Therapeutic Class	ATC	Price Effect (%)	Quantity Effect (%)	New Drugs Year 1 Effect (%)	New Drugs Year 2 Effect (%)	Exiting Drugs Effect (%)	Cross Effect (%)
Drugs for Acid Related Disorders	A02	-5.00	104.30	0.50	0.10	0.00	0.10
Drugs Used in Diabetes	A10	-3.20	32.50	20.20	51.10	0.00	-0.60
Antithrombotic Agents	B01	-26.50	125.70	1.40	2.40	0.00	-3.00
Beta Blocking Agents	C07	-11.10	109.50	0.20	2.40	0.00	-1.00
Calcium channel blockers	C08	-1.90	101.90	0.00	0.00	-0.10	0.20
Agents acting on the renin-angiotensin system	C09	5.20	91.30	0.50	2.50	0.00	0.50
Serum lipid reducing agents	C10	-12.20	110.60	0.40	2.40	0.00	-1.20
Sex Hormones and Modulators of the Genital System	G03	13.30	83.20	1.60	8.10	-0.30	-5.80
Antibacterials for systemic use	J01	-56.70	158.00	5.90	3.00	-1.40	-8.80
Antivirals for Systemic Use	J05	-12.10	102.60	1.90	15.10	-0.50	-7.00
Immunosuppressive Agents	L04	-0.40	46.70	21.30	35.00	0.00	-2.70
Anti-inflammatory and anti-rheumatic products	M01	-3.60	102.00	0.40	1.40	-0.10	-0.20
Analgesics	N02	19.00	80.80	0.60	0.40	-2.10	1.20
Antiepileptics	N03	-25.40	121.00	4.00	7.40	0.00	-7.00
Psycholeptics	N05	4.00	93.70	2.20	0.10	0.00	0.10
Psychoanaleptics	N06	-19.10	118.60	0.50	0.00	-0.10	0.10
Average		-4.80	94.80	3.40	7.60	-0.20	-0.80

The quantity effect for all 16 therapeutic classifications is positive, ranging from a low of 32.5% for Drugs used in Diabetes to a high of 158.0% for Antibacterials for Systemic Use. The impact of new drugs in Year 1 and Year 2 was most pronounced for Drugs Used in Diabetes (20.2% in Year 1and 51.1% in Year 2) and Immunosuppressive Agents (21.3% in Year 1 and 35.0% in Year 2. Reporting on general trends, as well as on specific trends observed in different therapeutic categories, provides policy makers with more specific details and facilitates informed decision making.

Following is a detailed analysis of the impact of existing and newer drugs for Drugs for Acid Related Disorders, Agents Acting on the Renin-Angiotensin System, and Serum Lipid Reducing Agents. Refer to Appendix VI for background details on ATC classification system and detailed analysis of the remaining 12 therapeutic classes.

5.6.1 – Drugs for Acid Related Disorders

Total expenditure in this therapeutic class increase from $9.1 million in 1999-2000 to $ 13.2 million in 2001-2002. This amounts to an average annual growth rate of 20.4%. During the same time frame, the share of patented drugs went from 56.9% to 71.4% with the increase being largely driven by Category 3 drug products. Between 1999-2000 and 2001-2002, the share of Category 3 drugs of patent expenditures increased from 16.6% to 23.8% while the Category 1 share of patent expenditures decreased from 83.0% to 75.8%.

In 2001-2002, the top three drug products within this therapeutic class were Omeprazole ($6.6 million), Ranitidine ($2.96 million) and Lansoprazole ($1.45 million).

Table 5.6

Expenditure on Drugs for Acid Related Disorders

NIHB Pharmacy

1999-2000 to 2001-2002

(000's)

Year of Introduction	Market Segment	Expenditure 1999-2000	Expenditure 2000-2001	Expenditure 2001-2002
1999	Non-Patented	3,910.1	3,816.5	3,678.6
1999	Patented	5,171.5	6,867.7	9,318.4
2000	Non-Patented	0.0	5.0	78.4
2000	Patented	0.0	5.0	78.4
2001	Non-Patented	0.0	0.0	10.5
2001	Patented	0.0	0.0	21.4
1999-2001	Total	9,081.6	10,709.2	13,163.7
1999-2001	Patented	5,171.5	6,887.6	9,396.2
1999-2001	Non-Patented	3,910.1	3,821.5	3,767.5

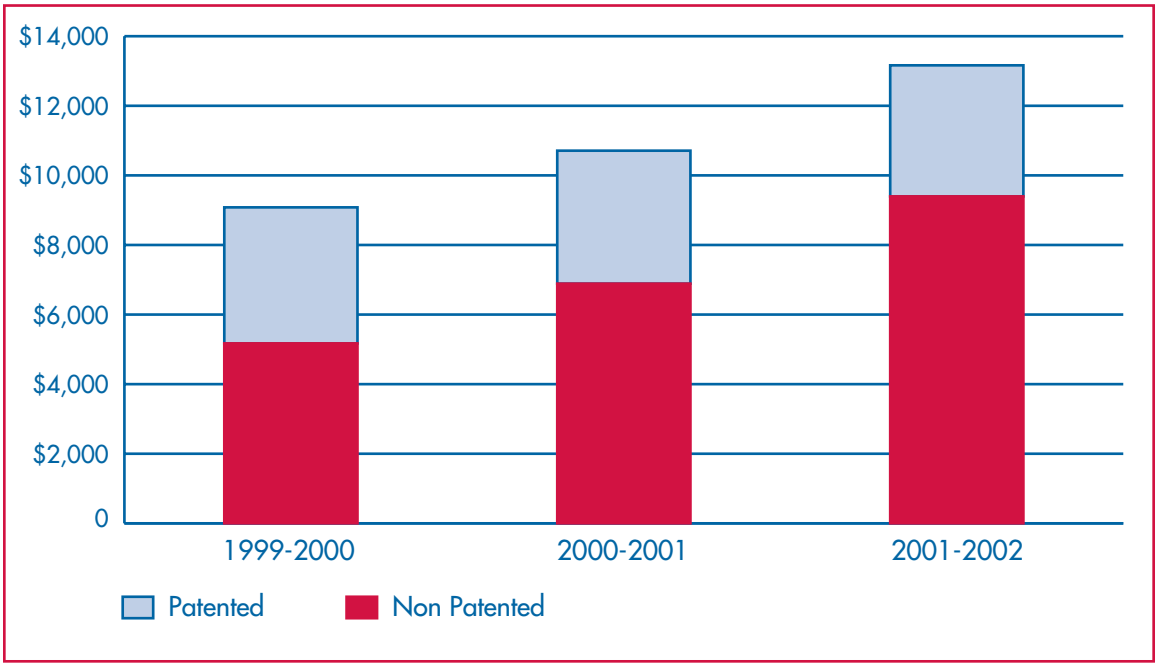


Figure 5.8

Expenditures on Drugs for Acid Related Disorders

Non-Insured Health Benefits

(000's)

1999-2000 to 2001-2002

5.6.2 – Agents Acting on the Renin-Angiotensin System

Expenditures in this therapeutic class grew at an average annual rate of 22.1% between 1999-2000 and 2001-2002. In 1999-2000, patented drugs accounted for 76.1% of expenditures for this therapeutic class. This share decreased slightly to 71.9% in 2001-2002. Expenditures on patented pharmaceuticals were heavily concentrated on Category 3 drugs, whose share in total expenditures had fallen slightly from 98.6% in 1999-2000 to 97.5% in 2001-2002.

In 2001-2002, the top three drug products in this therapeutic class were Enapranil ($4.04 million), Ramipril ($2.67 million) and Lisinopril ($1.57 million).

Table 5.7

Expenditure on Agents Acting on the Renin-Angiotensin System

NIHB Pharmacy

1999-2000 to 2001-2002

(000's)

Year of Introduction	Market Segment	1999-2000	2000-2001	2001-2002
1999	Non-Patented	1,943.1	2,069.9	2,964.3
1999	Patented	6,192.0	8,018.1	8,601.7
2000	Non-Patented	0.1	5.3	219.7
2000	Patented	0.0	15.0	114.0
2001	Non-Patented	0.0	0.0	231.8
2001	Patented	0.0	0.0	6.6
1999-2001	Total	8,135.1	10,108.3	12,137.9
1999-2001	Patented	6,192.0	8,033.1	8,722.2
1999-2001	Non-Patented	1,943.2	2,075.2	3,415.7

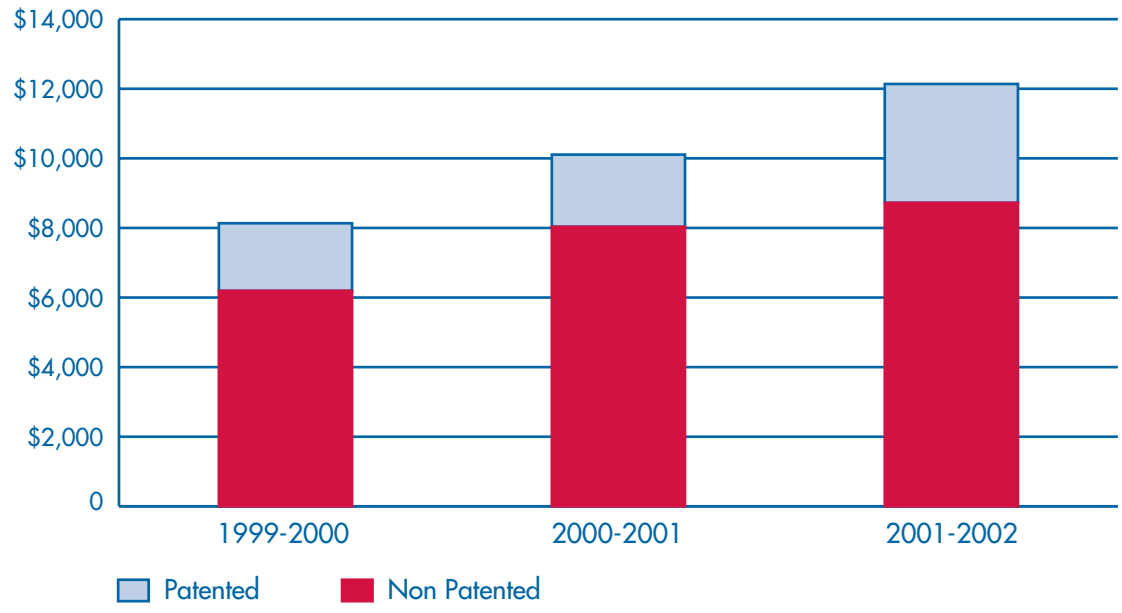
Figure 5.9

Expenditures on Agents Acting on the Renin-Angiotensin System

Non-Insured Health Benefits

(000's)

1999-2000 to 2001-2002



5.6.3 – Serum Lipid Reducing Agents

Expenditures in this therapeutic class had a relatively high average annual growth (30.4%) among the top sixteen therapeutic classes. Table 5.8 shows that expenditures in this class increased from $5.2 million in 1999-2000 to $7.8 million in 2001-2002.

In 1999-2000, patented drugs accounted for 84.2% of total expenditures in this therapeutic class, decreasing to 78.8% in 2001-2002. Category 3 drugs accounted for 68.9% of patent expenditures in 1999-2000; increasing to 76.1% in 2001-2002. Expenditures on Category 1 drug products accounted for 30.1% of patent expenditures in 1999-2000, but by 2001-2002 that share had declined somewhat to 23.9%.

In 2001-2002, the top three drug products within this therapeutic class were Atorvastatin ($4.48 million), Simvastin ($1.93 million) and Pravastatin ($0.8 million).

Table 5.8

Expenditure on Serum Lipid Reducing Agents

NIHB Pharmacy

1999-2000 to 2001-2002

($000's)

Year of Introduction	Market Segment	1999-2000	2000-2001	2001-2002
1999	Non-Patented	815.9	1,095.9	1,147.0
1999	Patented	4,362.0	5,557.5	6,930.4
2000	Non-Patented	0.0	97.7	416.5
2001	Non-Patented	0.0	0.0	300.6
2001	Patented	0.0	0.0	10.9
1999-2001	Total	5,177.9	6,751.0	8,805.4
1999-2001	Patented	4,362.0	5,557.5	6,941.3
1999-2001	Non-Patented	815.9	1,193.6	1,864.0

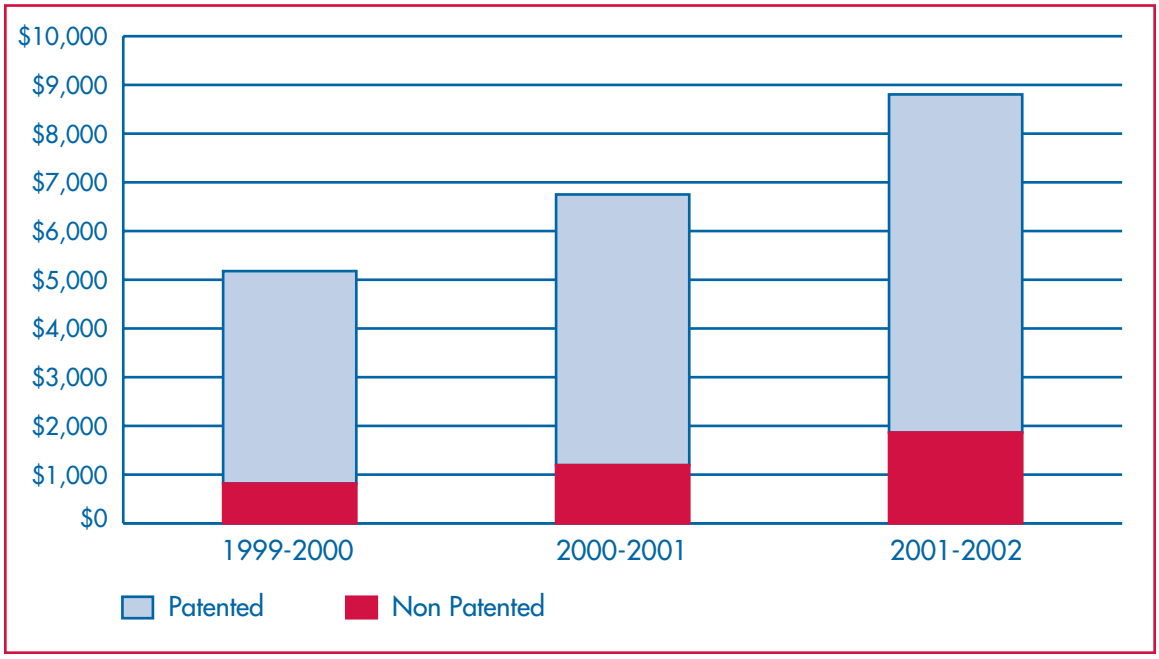


Figure 5.10

Expenditures on Serum Lipid Reducing Agents Non-Insured Health Benefits (000's) 1999-2000 to 2001-2002

5.7 – Defined Daily Dose Analysis

A Defined Daily Dose (DDD) analysis of four ATC classes is included in this report to provide further insight into utilization trends.

The World Health Organization (WHO) defines ATC classification and corresponding DDDs.[37] DDDs are based on a daily average maintenance dose for a drug used for its main indication in adults. An analysis of the cost per DDD is provided in order to capture the cost trends of these therapeutic categories previously chosen on the basis of their relative contribution to the growth of expenditures in the pharmacy program of Non-Insured Health Benefits.

Decomposition of expenditures, based on DDD metric, into a price effect, a quantity effect, therapeutic mix effect, and cross effect is done. The methodology used to compute these effects is demonstrated in Appendix I. Here, quantity is the number of DDDs and the unit price is defined as the claimed drug cost per DDD.

The price effect measures the impact of price changes occurring at the level of individual drugs. It is calculated by multiplying base-period utilization (measured in DDDs) by the price change, and then summing the resulting impacts across all drugs in the therapeutic class.

The quantity effect measures the impact on expenditure of the overall growth in utilization. It is calculated by multiplying base-period cost per DDD by the change in the total number of DDDs across all drugs in the therapeutic class.

Even with all prices and total DDDs remaining constant, changes in expenditure can occur because of changes in therapeutic choice. The therapeutic mix effect measures the impact on expenditure in prescribing behaviours. Qualitatively, a positive therapeutic mix effect indicates prescribing behaviour has shifted in favour of drugs whose cost per DDD exceeds the therapeutic class average, while a negative mix effect indicates a shift toward drug of lower-than average cost.

The cross effect measures the impact of interaction between changes in utilization and cost per DDD not otherwise included in the calculations.

The following analysis provides a DDD-based analysis for each of four leading ATC Level-II therapeutic classes.

5.7.1 – Drugs for Acid Related Disorders

Table 5.9 below details the rates of utilization for each drug within the Drugs for Acid Related Disorders group, and for the entire class is presented at the bottom.[38] The table shows that utilization rates of Drugs for Acid Related Disorders experienced progressive growth between 1999-2000 and 2001-2002, where the total rate of utilization grew from 40.5 per 1000 beneficiaries per day in 1999-2000 to 49.3 per 1000 beneficiaries per day in 2001-2002 yielding an overall percentage change of 21.6%. The major drivers of the observed growth include Ranitidine and Omeprazole. Since the cross effect is relatively small and mostly included for algebraic completeness, its discussion is limited.

Table 5.9

Rates of Utilization Using the DDD Metric

Drugs for Acid Related Disorders

Non-Insured Health Benefits

1999-2000 to 2001-2002

Drug	Rate of Utilization (per 1000, per day)		
	1999-2000	2000-2001	2001-2002
Ranitidine	19.88	20.85	21.46
Omeprazole	9.69	11.98	15.23
Cimetidine	4.08	3.63	3.22
Pantoprazole	0.91	1.75	3.09
Lansoprazole	1.11	1.76	2.62
Famotidine	2.43	2.28	2.09
Nizatidine	1.50	1.21	1.01
Misoprostol	0.62	0.45	0.35
Sucralfate	0.29	0.23	0.20
Total	40.52	44.14	49.27

Table arranges 2001-2002 figures in descending order

As shown in Table 5.10, there has been a negative price effect (-13% an -0.4%) in both years of the analysis, while the number of DDDs (quantity effect) increased by 59% to 69%. The Therapeutic Mix Effect was responsible for 42% and 45% increase of drug expenditures.

The therapeutic mix effect can be furthered analysed by looking at the cost components of the individual ingredients in Table 5.11 which lists ingredients by descending order of their cost per DDD. It can be seen that the top three ingredients (Proton Pump Inhibitors) have increased their DDD market share by nearly 14% while each of the four lowered priced ingredients (H2-receptor antagonists) has reduced their DDD share by over 12%.

Table 5.10

Decomposition of Expenditure Increase Based on DDD Metric

Drugs for Acid Related Disorders

Non-Insured Health Benefits 1999-2000 to 2001-2002

	% Price Effect	% Quantity Effect	% Therapeutic Mix Effect	% Cross Effect
2000-2001	-13.4%	68.8%	44.9%	-0.3%
2001-2002	-0.4%	58.5%	41.8%	0.2%

Table 5.11

Cost per DDD and DDD Percentage Share

Drugs for Acid Related Disorders

Non-Insured Health Benefits 1999-2000 to 2001-2002

ATC Description	Cost per DDD	% DDD Share 1999-2000	% DDD Share 2000-2001	% DDD Share 2001-2002	Difference in % Share over 3 Years
Omeprazole[1]	2.46	23.9%	27.1%	30.9%	7.0%
Lansoprazole[1]	2.29	2.7%	4.0%	5.3%	2.6%
Pantoprazole[1]	2.16	2.3%	4.0%	6.3%	4.0%
Misoprostol	2.11	1.5%	1.0%	0.7%	-0.8%
Sucralfate	1.27	0.7%	0.5%	0.4%	-0.3%
Famotidine[2]	1.15	6.0%	5.2%	4.2%	-1.8%
Nizatidine[2]	1.15	3.7%	2.7%	2.0%	-1.7%
Ranitidine[2]	0.79	49.1%	47.2%	43.6%	-5.5%
Cimetidine[2]	0.26	10.1%	8.2%	6.5%	-3.5%
Average	1.47				

1 indicates Proton Pump Inhibitors

2 indicates H2-receptor Antagonists

5.7.2 – Agents Acting on the Renin-Angiotensin System

Table 5.12 shows that rates of utilization of Agents Acting on the Renin-Angiotensin System grew between 1999-2000 and 2001-2002, where the total rate of utilization increased from 49.3 per 1000 beneficiaries per day in 1999-2000 to 97.5 per 1000 beneficiaries per day in 2001-2002 or an overall percentage change of 97.8%. Generally speaking, except for Captopril which had a negative trend, most drugs experienced mild positive growth in their rates of utilization. Most notable growth in rate of utilization was observed for Ramipril, where the rate per 1000 beneficiaries per day increased from 8.0 in 1999-2000 to 40.9 in 2001-2002. As well, Enapranil rate grew from 14.8 per 1000 beneficiaries per day in 1999-2000 to 21.0 in 2001-2002.

Table 5.12

Rates of Utilization Using the DDD Metric

Agents Acting on the Renin-Angiotensin System

NIHB Pharmacy

1999-2000 to 2001-2002

Drug	Rate of Utilization (per 1000, per day)		
	1999-2000	2000-2001	2001-2002
Ramipril	8.0	21.6	40.9
Enalapril	14.8	20.3	21.0
Lisinopril	9.8	10.8	11.2
Fosinopril	4.1	5.0	5.7
Quinapril	2.7	3.1	3.4
Losartan	2.5	2.8	3.1
Cilazapril	2.5	2.7	2.8
Perindopril	1.3	1.8	2.1
Valsartan	0.9	1.4	2.0
Irbesartan	0.7	1.2	1.8
Candesartan	0.1	0.6	1.4
Captopril	1.7	1.3	1.1
Telmisartan	0.0	0.4	0.9
Benazepril	0.2	0.2	0.2
Total	49.3	73.2	97.5

Table arranges 2001-2002 figures in descending order

Table 5.13 shows that for Agents Acting on the Renin-Angiotensin System, there is a moderate negative price effect (-9% to -20%) and significant positive quantity effect (142% to 189%) on drug expenditures. The mix effect on expenditures for this classification of drugs is negative: -27% in 1999-2000 and -64% in 2001-2002.

For a greater understanding of the therapeutic mix effect, it is helpful to note that this classification of drugs can be further subdivided into plain ACE Inhibitors and plain Angiotensin II antagonists. During the given time period, all of the plain ACE Inhibitors, with the exception lower-priced Ramipril, decreased their DDD market share, while all of the plain angiotensin II antagonists increased their DDD market share with the exception of higher priced losartan. Ramipril was by far the biggest player responsible for the negative therapeutic mix effect or "switching" to lower-priced therapies. Ramipril whose unit price is only 29% of the highest cost drug (0.37 per DDD versus 1.08 per DDD) increased its share of the DDD market share by 26%.

Table 5.13

Decomposition of Expenditure Increase Based on DDD Metric

Agents Acting on Renin-Angiotensin System

Non-Insured Health Benefits 1999-2000 to 2001-2002

	% Price Effect	% Quantity Effect	% Therapeutic Mix Effect	% Cross Effect
2000-2001	-9.3%	141.5%	-26.9%	-5.2%
2001-2002	-19.6%	188.6%	-63.9%	-5.1%

Table 5.14

Cost per DDD and DDD Percentage Share

Agents Acting on Renin-Angiotensin System

Non-Insured Health Benefits 1999-2000 to 2001-2002

ATC Description	Cost per DDD	% DDD Share 1999-2000	% DDD Share 2000-2001	% DDD Share 2001-2002	Difference in % Share over 3 Years
Enalapril[1]	1.08	29.9%	27.7%	21.5%	-8.4%
Losartan[2]	1.07	5.0%	3.8%	3.1%	-1.9%
Fosinopril[1]	0.96	8.3%	6.8%	5.8%	-2.5%
Irbesartan[2]	0.93	1.4%	1.6%	1.9%	0.5%
Valsartan[2]	0.89	1.9%	1.9%	2.1%	0.2%
Perindopril[1]	0.87	2.7%	2.5%	2.2%	-0.5%
Candesartan[2]	0.84	0.2%	0.8%	1.4%	1.2%
Quinapril[1]	0.80	5.4%	4.3%	3.5%	-2.0%
Lisinopril[1]	0.68	19.9%	14.7%	11.4%	-8.5%
Telmisartan[2]	0.62	0.0%	0.6%	0.9%	0.9%
Captopril[1]	0.56	3.5%	1.8%	1.2%	-2.4%
Cilazapril[1]	0.51	5.1%	3.7%	2.8%	-2.2%
Benazepril[1]	0.42	0.4%	0.3%	0.2%	-0.2%
Ramipril[1]	0.37	16.2%	29.6%	42.0%	25.7%
Average	0.68				

1 indicates plain ACE Inhibitors

2 indicates plain Angiotensin II Antagonists

5.7.3 – Serum Lipid Lowering Agents

Table 5.15 below details the rates of utilization for each drug within the Serum Lipid Reducing Agents group, and for the entire class is presented at the bottom. The table shows that rates of utilizations of Serum Lipid Reducing Agents experienced substantial growth between 1999-2000 and 2001-2002, where the total rate of utilization grew from 18.62 per 1000 beneficiaries per day in 1999-2000 to 35.26 per 1000 beneficiaries per day in 2001-2002 yielding an overall percentage change of 89.4%. The major drivers of the observed growth are the members of the statin group, as all other drugs have experienced mild to negative growth. Growth in the rates of utilization of other drugs is dwarfed by this group, in particular Simvastatin and Atorvastatin.

Table 5.15

Rates of Utilization Using the DDD Metric

Serum Lipid Reducing Agents

Non-Insured Health Benefits

1999-2000 to 2001-2002

Drug	Rate of Utilization (per 1000, per day)		
	1999-2000	2000-2001	2001-2002
Atorvastatin	7.50	12.71	20.50
Simvastatin	3.58	4.31	6.47
Fenofibrate	1.88	2.27	2.82
Pravastatin	3.01	3.20	2.19
Cerivastatin	0.30	1.46	1.05
Lovastatin	1.30	1.16	1.00
Gemfibrozil	0.57	0.57	0.62
Fluvastatin	0.30	0.35	0.36
Bezafibrate	0.17	0.22	0.25
Colestipol	0.00	0.00	0.00
Total	18.62	26.25	35.26

As shown in Table 5.16, drug expenditures are negatively affected by the price effect (-18% and -28%), very positively affected by the quantity effect (139% and 147%), and negatively affected by the therapeutic mix effect (-24% and -11%).

Table 5.16

Decomposition of Expenditure Increase Based on DDD Metric

Serum Lipid Lowering Agents

Non-Insured Health Benefits 1999-2000 to 2001-2002

Year	% Price Effect	% Quantity Effect	% Therapeutic Mix Effect	% Cross Effect
2000-2001	-18.0%	146.6%	-23.7%	-4.9%
2001-2002	-27.6%	139.4%	-10.7%	-1.1%

The moderately negative therapeutic effect is further analysed in Table 5.16 where that the market share for the eight higher-priced drug ingredients has been reduced, while the two lower-priced drug ingredients have increased their DDD market share. Most notably, Atorvastatin increased its market share from 40% to 58%.

Table 5.17
Cost per DDD and DDD Percentage Share
Serum Lipid Lowering Agents
Non-Insured Health Benefits
1999-2000 to 2001-2002

ATC Description	Cost per DDD	% DDD Share 1999-2000	% DDD Share 2000-2001	% DDD Share 2001-2002	Difference in % Share over 3 Years
Colestipol	5.518	0.0%	0.0%	0.0%	0.0%
Bezafibrate	2.611	0.9%	0.8%	0.7%	-0.2%
Lovastatin	2.102	7.0%	4.4%	2.8%	-4.2%
Simvastatin	1.700	19.2%	16.4%	18.4%	-0.9%
Gemfibrozil	1.420	3.0%	2.2%	1.8%	-1.3%
Fluvastatin	1.377	1.6%	1.3%	1.0%	-0.6%
Fenofibrate	1.371	10.1%	8.6%	8.0%	-2.1%
Pravastatin	1.294	16.2%	12.2%	6.2%	-10.0%
Atorvastatin	1.244	40.3%	48.4%	58.1%	17.9%
Cerivastatin	1.000	1.6%	5.6%	3.0%	1.4%
Average	1.372				

5.7.4 – Drugs Used in Diabetes

Table 5.18 shows that rates of utilizations of Drugs Used in Diabetes experienced relatively mild growth between 1999-2000 and 2001-2002, where the total rate of utilization for that group grew from 46.5 per 1000 beneficiaries per day in 1999-2000 to 54.3 per 1000 beneficiaries per day in 2001-2002 yielding an overall percentage change of 16.7%. The major drivers of the observed growth are Metformin, as all other drugs have experienced much lower utilization growth.

Table 5.18
Rates of Utilization Using the DDD Metric
Drugs Used in Diabetes
NIHB Pharmacy
1999-2000 to 2001-2002

Drug	Rate of Utilization (per 1000, per day)		
	1999-2000	2000-2001	2001-2002
Glibenclamide	27.3	27.1	27.4
Metformin	14.9	17.7	21.4
Gliclazide	3.3	3.5	3.6
Repaglinide	0.0	0.5	1.1
Acarbose	0.6	0.6	0.5
Chlorpropamide	0.3	0.3	0.2
Tolbutamide	0.1	0.1	0.1
Total	46.5	49.7	54.3

Table arranges 2001-2002 figures in descending order

As shown in Table 5.19, the familiar pattern of negative price effect (-9% and -21%) and positive quantity effect (67%) applies to Drugs used in Diabetes. The therapeutic mix effect for this classification of drugs is strongly positive at 63% and 46% in 1999-2000 and 2001-2002 respectively.

Table 5.20 demonstrates the sub-group of lower-priced drugs (sulfonamides, urea derivatives) have lost approximately 9% of their DDD market share which seems to have been overtaken by higher-priced Repaglinide and moderately-priced Metformin. Metformin increased its DDD market share by over 7%, while Repaglinide increased its share by a more moderate 2%.

Table 5.19

Decomposition of Expenditure Increase Based on DDD Metric

Drugs Used in Diabetes

Non-Insured Health Benefits 1999-2000 to 2001-2002

	% Price Effect	% Quantity Effect	% Therapeutic Mix Effect	% Cross Effect
2000-2001	-20.9%	67.5%	63.1%	-9.8%
2001-2002	-9.0%	67.4%	46.2%	-4.6%

Table 5.20

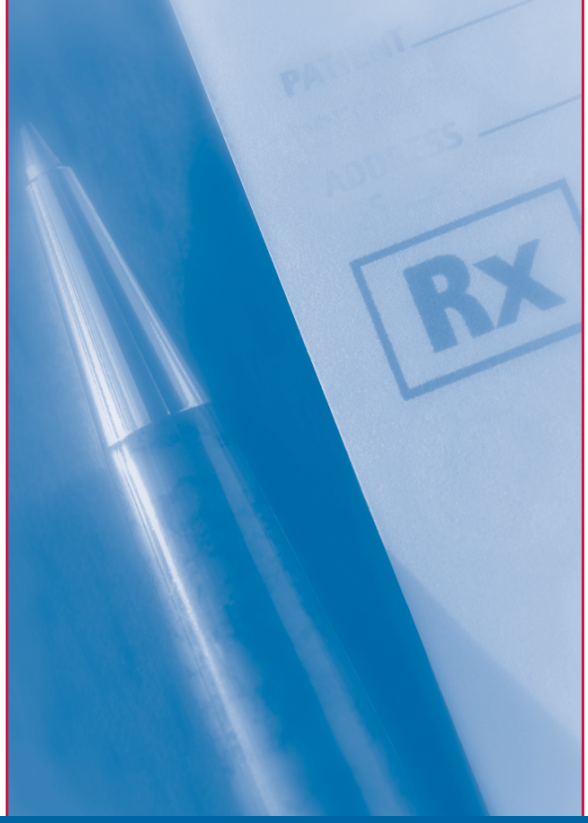
Cost per DDD and DDD Percentage Share

Drugs Used in Diabetes

Non-Insured Health Benefits 1999-2000 to 2001-2002

ATC Description	Cost per DDD	% DDD Share 1999-2000	% DDD Share 2000-2001	% DDD Share 2001-2002	Difference in % Share over 3 Years
Acarbose	1.39	1.3%	1.2%	0.9%	-0.4%
Repaglinide	1.23	0.1%	1.0%	2.1%	2.0%
Gliclazide[1]	0.67	7.0%	7.0%	6.6%	-0.4%
Metformin	0.50	32.0%	35.6%	39.4%	7.4%
Tolbutamide[1]	0.14	0.2%	0.1%	0.1%	-0.1%
Glibenclamide[1]	0.14	58.7%	54.5%	50.5%	-8.3%
Chlorpropamide[1]	0.10	0.7%	0.6%	0.4%	-0.3%
Average	0.35	100.0%	100.0%	100.0%	0.0%

1 indicates sulfonamides, urea derivatives



Appendix I – Methodology

This study provides analyses of pharmaceutical expenditures, drug prices, and components of expenditures growth from 1999-2000 to 2001-2002 in the Non-Insured Health Benefits Pharmacy Program. Expenditure information, including price and quantity data, was obtained from the Health Information and Claims Processing System (HICSPS) of the First Nations and Inuit Health Branch, Health Canada. Health Canada's Drug Product database was used to ensure that only those drugs defined by the Food and Drug Act were included. The Patented Medicine Prices Review Board Form 1 database was used to group drugs according to patent status. Market identifiers are used to categorize drugs according to identifiable market characteristics such as, patent versus non-patented drugs, generic versus brand name drugs, single versus multi-source drugs.

Prices. Sections 4 and 5 refer to "prices"; these prices are based on claimed cost expenditures, meaning wholesale mark-ups are included and both dispensing and retail mark-ups are excluded. To capture the full ingredient cost of drug products both the beneficiary and program portion of cost are included. As compared to previous studies where prices were calculated at the DIN level, this study calculates price at the bioequivalency level: drug pricing based on identifying/grouping pharmaceuticals by ingredient, strength, and route. This change in definition was adopted to more accurately analyse price effects for multi-source drugs.

Growth-Based Decompositions. Section 5 decomposes expenditure growth into a number of "effects". These effects are defined as follows.

- The price effect measures the impact of price change on expenditures, while holding constant all other factors used in the decomposition (e.g. quantity).
- The volume/quantity effect measures the impact on expenditures of changes in quantity of drug products consumed, while holding constant all other factors (e.g. prices).

- In this study drugs with claims in 1999-2000 or before are termed as "existing" drugs while drugs with claims starting in 2000-2001 or later are termed as "new" drugs. The new drug effect shows the amount by which expenditure increase as a result of listing new drugs on the formulary. The new drugs effect is broken into Year 1 and Year 2 effects. "Year 1" refers to the first year of recorded claims for the drug in question, "Year 2" the next year.
- The exiting drug effect measures the impact of drugs removed from coverage.
- The cross effect is the product of the change in price and the change in quantity. This is usually a small component and is included in the analysis for reasons of algebraic exactness.

Algebraically, the various effects are calculated using the following formula

$$
\begin{aligned}
e(i) - e(i-1) &= \Sigma 0\,[p(i) - p(i-1)]q(i-1) && \text{(price effect)}\\
&+ \Sigma 0\,[q(i) - q(i-1)]p(i-1) && \text{(quantity effect)}\\
&+ \Sigma 0\,[p(i) - p(i-1)]\,[q(i) - q(i-1)] && \text{(cross effect)}\\
&+ \Sigma n1\ e(i) && \text{("Year 1" new drug)}\\
&+ \Sigma\ n2\ e(i) && \text{("Year 2" new drug effect)}\\
&+ \Sigma\ x\ e(i-1) && \text{(exiting drug effect)}
\end{aligned}
$$

where

$e(i)$ = expenditure in year i

$p(i)$ = price in year i

$q(i)$ = quantity in year i

$\Sigma 0$ signifies summation over all existing drugs

$\Sigma n1$ signifies summation over all "Year 1" new drugs

$\Sigma n2$ signifies summation over all "Year 2" new drugs

Σx signifies summation over all exiting drugs

DDD-Based Decompositions. Section 5 presents results for several therapeutic classes using Defined Daily Dosage (DDD) as the metric of utilization (rather than physical quantities). In this case changes in expenditure are attributed to price, volume, cross and therapeutic mix effects.

- The price effect measures the impact of price (cost-per-DDD across the various drugs in the therapeutic class) changes on expenditures, holding other factors constant e.g. quantity.
- The volume effect measures the impact of volume/quantity (number of DDDs) changes on expenditures, holding other factors constant. e.g. price
- The therapeutic mix effect measures the impact of shifts among drugs in the therapeutic class, holding other factors constant e.g. quantity. To the extent cost-per-DDD varies among drugs such shifts can in themselves produce appreciable changes in expenditure. Roughly speaking, if a disproportionate share of the growth in utilization occurs among drugs whose cost-per-DDD is higher (lower) than the overall average for the therapeutic class the therapeutic mix effect will be positive (negative).
- The cross effect measures the impact of interactions between cost-per-DDD and volume changes. This is usually a small component and is included in the analysis for reasons of algebraic exactness.

The decomposition formula in this instance is as follows.

$$e(i) - e(i-1) = \Sigma\,[p(i) - p(i-1)]q(i-1) \quad \text{(price effect)}$$

$$+\ P(i-1)\,[Q(i) - Q(i-1)] \quad \text{(quantity effect)}$$

$$+\ \Sigma\,[p(i) - p(i-1)]\,[q(i) - q(i-1)] \quad \text{(cross effect)}$$

$$+\ \Sigma\,[q(i) - q(i-1)]\,[p(i-1) - P(i-1)] \quad \text{(therapeutic mix effect)}$$

where

$e(i)$ = expenditure in year i

$p(i)$ = cost-per-DDD price in year i for an individual drug

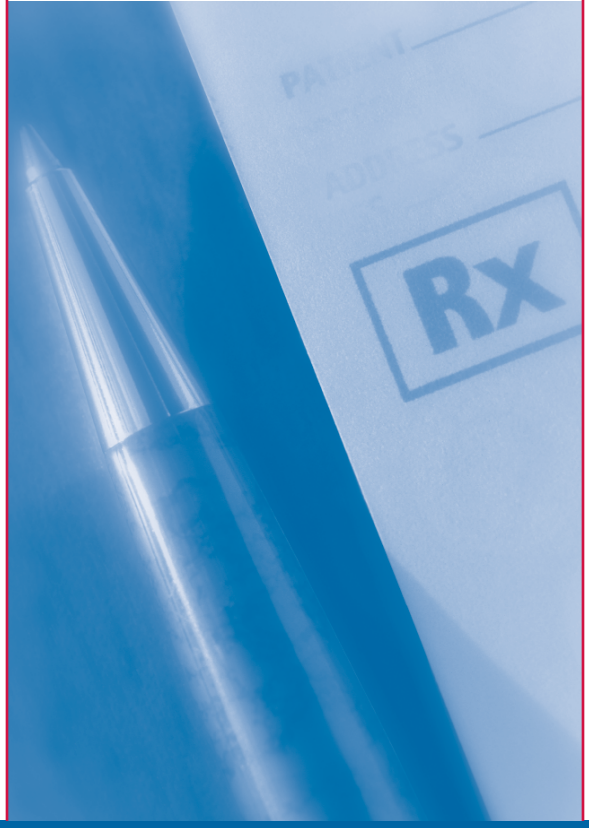
$P(i)$ = cost-per-DDD price in year i for the therapeutic class

$q(i)$ = number of DDDs in year i for an individual drug

$Q(i)$ = number of DDDs in year i for the therapeutic class

Σ signifies summation over all existing drugs

Appendix II – Data Description and Sources



Data Description

Data Variable	Definition	Source
DIN	Drug Identification Number	NIHB, Health Canada's Drug Product Database, PMPRB databases
Expenditures: Claimed Amount	Dollar value submitted for claim	NIHB dataset (Health Information and Claims Processing System)
Expenditures: Allowed Amount	Dollar value allowed on a claim as based on adjudication	NIHB dataset
Expenditures: Claimed Cost	Dollar value submitted as cost of claimed item or procedure (excluding dispensing fee and mark-up)	NIHB dataset
Claimed Quantity	Claimed quantity of item	NIHB dataset
ATC classification number	In the ATC classification system, the drugs are divided into different groups according to the organ or system on which they act and their chemical, pharmacological and therapeutic properties.	Health Canada's Drug Product Database
Brand Name	Brand or Trade name under which the drug product is marketed	Health Canada's Drug Product Database
Active Ingredient	Any component that has medicinal properties, and supplies pharmacological activity or other direct effect in the diagnosis, cure, mitigation, treatment or prevention of disease, or to affect the structure or function of the body of man or other animals	Health Canada's Drug Product Database
Strength	Refers to strength of active ingredient	Health Canada's Drug Product Database
Pharmaceutical Form	Form of presentation in which the product is supplied. i.e. tablet, capsule	Health Canada's Drug Product Database
Route of Administration	Indicate the part of the body on which, through which, or into which the product is to be introduced. i.e. oral	Health Canada's Drug Product Database
Defined Daily Dosage	DDDs are based on a daily average maintenance dose for a drug used for its main indication in adults and	World Health Organization

Data Variable	Definition	Source
	correspond to the ATC classification.	
Brand / Generic Status	Brand and Generic Status determined by those companies listed with their membership with the Canadian Generic Pharmaceutical Association	http://www.cdma-acfpp.org/ http://www.canadapharma.org
Bioequivalence Level	Bioequivalence Identification Number for DIN's that have identical ingredient dosage, strength, and route of administration	BC Pharmacare dataset
Patent Status	Patent Status	PMPRB database
Year of Introduction	Year that the pharmaceutical product entered the market	PMPRB database
OTC and Prescription Drugs	National OTC and Prescription Drugs presented on a regional basis for broad comparison to NIHB pharmacy program.	- NIHB Annual Reports - CIHI Report: Drug Expenditures in Canada 1985 – 2002

Description of Expenditure and Population Variables and their Values

Name	Year	Statistics	Sections in Report	Source	Notes
Expenditures: Prescription and OTC drugs	1999-2000	$159,388,000	Section 2	NIHB Annual Reports	Prescription and OTC drug expenditures used for broad regional comparisons between NIHB pharmacy program and National Expenditures as reported by CIHI.
	2000-2001	$183,618,000			
	2001-2002	$216,916,400			
Expenditures: Claimed Amount-(XCLM)	1999-2000	$164,503,722	Section 3	NIHB Database	Data cleaned and merged with Health Canada's Drug Database file. Excludes non-drug expenditures such as diagnostic test strips.
	2000-2001	$186,795,845			
	2001-2002	$214,527,626			
Expenditures: Allowed / Accepted amount-(XALL)	1999-2000	$154,047,397	Section 3	NIHB Database	As above.
	2000-2001	$174,568,274			
	2001-2002	$200,011,738			
Expenditures: Claimed cost (XCOST)	1999-2000	$119,029,070	Section 4 & 5	NIHB Database	As above. Used as basis for price, volume, and cost driver analysis, since it was the only variable where the effects of dispensing fees and retail mark-up could be factored out.
	2000-2001	$136,621,130			
	2001-2002	$159,095,058			
Expenditures: Price, Volume, and Cost Driver Analysis	1999-2000	$80,484,612	Section 4 & 5	NIHB Database	As above. Data also limited to pills and capsules, reducing sum of expenditures.
	2000-2001	$94,715,605			
	2001-2002	$112,712,619			
Eligible Population	1999-2000	681,164	Section 2	NIHB Annual Reports	Since eligible population was estimated at the end of the fiscal year, the midpoint between two years was utilized.
	2000-2001	698,245			
	2001-2002	713,712			
Beneficiaries	1999-2000	463,170	Section 3, 4 & 5	NIHB Database	
	2000-2001	474,901			
	2001-2002	481,390			
Prescriptions	1999-2000	6,340,576	Section 3, 4 & 5	NIHB Database	
	2000-2001	6,783,199			
	2001-2002	7,327,003			

Appendix III – Non-Insured Health Benefits Program, Pharmacy Component

Non-Insured Health Benefits

In 2001-2002, the Non-Insured Health Benefits (NIHB) Program provided an estimated 721,000 registered Indians, Inuit and Innu individuals with a range of health benefits not included in provincially/territorially administered insured health care programs. These benefits include pharmacy (including prescription and over-the-counter drugs and medical supplies/equipment), dental services, glasses and other vision care aids and services, transportation to access medically required services; health care premiums in Alberta and British Columbia only, and other selected health care services. NIHB eligibility applies to all registered Indians and recognized Inuit and Innu normally resident in Canada, regardless of location in Canada or income level. The 1979 Indian Health Policy provides the authority for NIHB Program and describes the shared responsibility for the health of First Nations amongst First Nations communities, different levels of government, and the private sector.

Pharmacy Component

The NIHB Program Drug Benefit List includes drugs with demonstrated evidence of therapeutic efficacy, demonstrated safety, demonstrated incremental benefit in proportion to incremental cost; and, consistency with NIHB Program mandate and policies. Generic products are added according to provincial interchangeability lists. Drugs from the Drug Benefit List may be deleted for the following reasons: the product is discontinued from the Canadian market, new products possessing therapeutic and safety advantages have been listed, new toxicity data make the continued listing of the product inappropriate, new information reveals that the product does not have the therapeutic benefit as previously thought, the purchase cost of a drug is disproportionate to the benefits provided, and a drug has a high potential for misuse or abuse.

Under NIHB, specific criteria are used to group pharmaceuticals in the following categories: Drug Benefit List, Limited Use, Exceptions, and Exclusions.

Drugs may be categorized as Limited Use Benefits when a drug has (i) demonstrated potential for widespread use outside the indications, (ii) proven effectiveness that is accompanied by predictable severe adverse effects, (iii) alternative first and second choice treatments that are either not effective or not tolerated by the client, and (iv) cost-effective alternative treatments.

Drugs, not listed in the Drug Benefit List, may also receive special approval under the Exception Criteria category, following documented support by the prescribing doctor or dentist.

Exclusions include drug products that are not within the mandate of the program i.e. Anti-obesity drugs, hair growth stimulants.

Data Sources:

General demographic data for the First Nations and Inuit population originates from the Status Verification System (SVS), which is operated by First Nations and Inuit Health Branch (FNIHB), and are based on information provided by Indian and Northern Affairs Canada (INAC), the Governments of the Northwest Territories and Nunavut, and Inuit organizations such as the Inuvialuit Regional Corporation, the Nunavut Tunngavik Incorporated, the Labrador Inuit Association, and the Makivik Corporation in Quebec. FNIHB's Health Information and Claims Processing System (HICPS) is used to process all claims for drugs, medical supplies and equipment and dental benefits.

Pricing & Quantity Policies

The NIHB program normally reimburses only the best/lowest priced alternative product in a group of interchangeable drug products. Identification of interchangeable products and selection of the lowest-priced brand is done in accordance with the respective provincial/territorial pharmacy legislation and policies.

Normally, the entire quantity of the prescribed drug should be dispensed. When a beneficiary is stabilized on a drug used for ongoing treatment and future adjustments are not anticipated, a maximum 100-day supply is suggested.

Drug Utilization Review

A drug utilization review, part of the point-of-service or on-line adjudication system, provides analysis of both previous claims data and current claims data to identify potential drug-related problems, such as potential drug interactions, duplicate drugs, and duplicate therapy.

Appendix IV – Price and Volume Indices

The information presented in this section complement the analysis presented in section 4.3, Price, Cost and Volume Indices.

The price and volume indices[39] presented below, like the fixed-weight Paasche index presented in main text, cover a fixed set (or "constant basket") of drug products. This set consists of products for which program claims were recorded in each of the years 1999-2000 through 2001-2002. Only the Chained Laspeyres Price Index (CLPI) and Chained Laspeyres Volume Index (CLVI) presented in the main text departs from the constant basket approach: in this case the set of products covered in any given year consists of products for which program claims were recorded in that and the previous year. Year-to-year changes in the number of products covered by the CLPI and CLVI thus reflect corresponding changes in the range of products covered by the program.

For all formulas, year-to-year changes in index values are obtained by comparing the cost of purchasing given quantities at prices prevailing in the current and preceding year. The constant basket indexes differ in only the quantities used to make this comparison. The fixed-weight Laspeyres index uses quantities observed in 1999-2000; the fixed-weight Paasche index uses quantities observed in 2001-2002. The moving-weight Paasche index value for a given year is based on quantities for that year, the moving-weight Laspeyres index value on quantities observed in the preceding year.

For example, the fixed-weight Laspeyres (Paasche) index for year "x" shows how much more or less it would have cost to cover 1999-2000 (2001-2002) quantities at year "x" prices. The moving-weight Laspeyres and Paasche indexes are comparable to the CLPI/CLVI, except that they exclude products that entered or exited from program coverage between 1999-2000 and 2001-2002: roughly speaking, they measure the price/volume effect generated within the set of "old" or "existing "drugs.

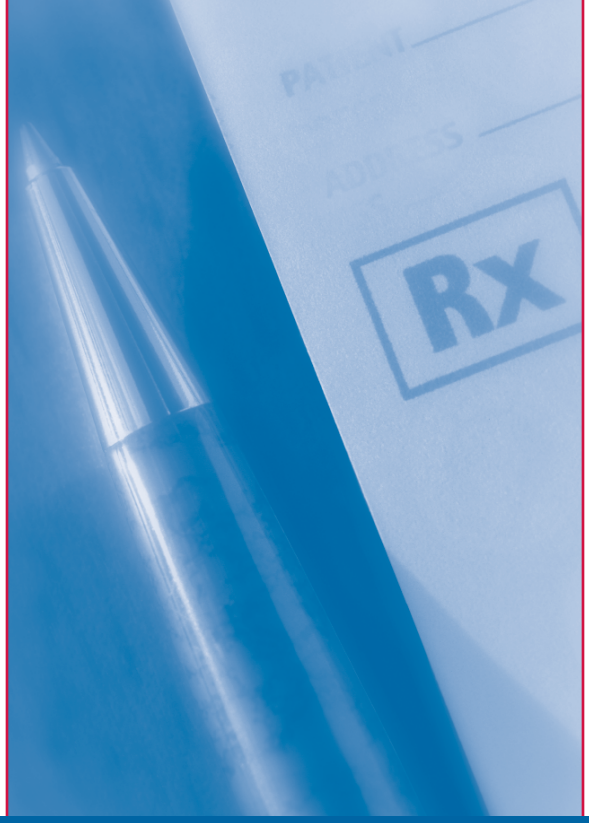
Year	Number of Bioequivalent Markets	Constant Weight Laspeyres Index (Weighted by 1999-2000 Utilization)		Moving Weight Laspeyres Price Index (Weighted by Annual Utilization)		Moving Weight Paasche (Weighted by Annual Utilization)	
		Price Index	Annual Percent Change (%)	Price Index	Annual Percent Change (%)	Price Index	Annual Percent Change (%)
Total Basket							
1999-2000		100.00		100.00		100.00	
2000-2001	1056	98.65	-1.35	98.65	-1.35	98.65	-1.35
2001-2002	1056	98.14	-0.51	98.12	-0.53	98.03	-0.63
Patented							
1999-2000		100.00		100.00		100.00	
2000-2001	304	99.70	-0.30	99.70	-0.30	99.57	-0.43
2001-2002	304	99.96	0.26	99.89	0.19	99.59	0.03
Patented Single Source							
1999-2000		100.00		100.00		100.00	
2000-2001	215	99.73	-0.27	99.73	-0.27	99.64	-0.36
2001-2002	215	100.26	0.53	100.12	0.39	99.74	0.10
Non-Patented							
1999-2000		100.00		100.00		100.00	
2000-2001	801	98.66	-1.34	98.66	-1.34	98.56	-1.44
2001-2002	801	98.86	0.21	98.53	-0.12	98.27	-0.29
Non-Patented Single Source							
1999-2000		100.00		100.00		100.00	
2000-2001	279	101.01	1.01	101.01	1.01	100.51	0.51
2001-2002	279	103.65	2.61	103.28	2.25	102.53	2.01
Non-Patented Multiple Source							
1999-2000		100.00		100.00		100.00	
2000-2001	449	98.45	-1.55	98.45	-1.55	98.41	-1.59
2001-2002	449	98.97	0.53	98.72	0.28	98.60	0.19
Products With Brand and Generic Competition							
1999-2000		100.00		100.00		100.00	
2000-2001	329	96.21	-3.79	96.21	-3.79	98.03	-1.97
2001-2002	329	95.87	-0.34	95.87	-0.35	98.16	0.13
Generic Products							
1999-2000		100.00		100.00		100.00	
2000-2001	508	98.01	-1.99	98.01	-1.99	98.03	-1.97
2001-2002	508	98.52	0.52	98.21	0.21	98.16	0.13
Brand Name Products							
1999-2000		100.00		100.00		100.00	
2000-2001	877	100.22	0.22	100.22	0.22	100.01	0.01
2001-2002	877	99.92	-0.29	100.18	-0.04	99.99	-0.02

Volume Indices with a Constant Basket And Various Weighting Schemes

Non-Insured Health Benefits

1999-2000 to 2001-2002

Year	Number of Bioequivalent Markets	Constant Weight Laspeyres Index (Weighted by 1999-2000 Utilization)		Moving Weight Laspeyres Price Index (Weighted by Annual Utilization)		Moving Weight Paasche (Weighted by Annual Utilization)	
		Volume Index	Annual Percent Change (%)	Volume Index	Annual Percent Change (%)	Volume Index	Annual Percent Change (%)
Total Basket							
1999-2000		100.00		100.00		100.00	
2000-2001	1056	119.70	19.70	119.70	19.70	119.70	19.70
2001-2002	1056	140.23	17.16	140.41	17.30	140.27	17.19
Patented							
1999-2000		100.00		100.00		100.00	
2000-2001	304	127.40	27.40	127.40	27.40	127.23	27.23
2001-2002	304	153.17	20.22	153.24	20.28	152.78	20.08
Patented Single Source							
1999-2000		100.00		100.00		100.00	
2000-2001	215	138.75	38.75	138.75	38.75	138.62	38.62
2001-2002	215	178.49	28.65	178.51	28.66	177.84	28.30
Non-Patented							
1999-2000		100.00		100.00		100.00	
2000-2001	801	110.92	10.92	110.92	10.92	110.81	10.81
2001-2002	801	120.43	8.57	120.43	8.57	120.11	8.39
Non-Patented Single Source							
1999-2000		100.00		100.00		100.00	
2000-2001	279	129.98	29.98	129.98	29.98	129.33	29.33
2001-2002	279	164.64	26.67	164.10	26.25	162.91	25.96
Non-Patented Multiple Source							
1999-2000		100.00		100.00		100.00	
2000-2001	449	106.64	6.64	106.64	6.64	106.60	6.60
2001-2002	449	111.02	4.11	111.03	4.11	110.88	4.01
Products With Brand and Generic Competition							
1999-2000		100.00		100.00		100.00	
2000-2001	329	102.36	2.36	102.36	2.36	102.21	2.21
2001-2002	329	106.35	3.90	106.50	4.04	106.34	4.04
Generic Products							
1999-2000		100.00		100.00		100.00	
2000-2001	508	114.63	14.63	114.63	14.63	114.66	14.66
2001-2002	508	125.80	9.75	125.91	9.83	125.84	9.76
Brand Name Products							
1999-2000		100.00		100.00		100.00	
2000-2001	877	121.02	21.02	121.02	21.02	120.77	20.77
2001-2002	877	140.88	16.41	140.87	16.40	140.60	16.42



Appendix V – Population Change and Top Selling Drugs

The table below provides the breakdown of the eligible client population by age group and the average annual growth rate for each age category.

Age Group	Population 1999-2000		Population 2001-2002		Growth Rates	
	Number	Distribution (%)	Number	Distribution (%)	Overall (%)	Average Annual (%)
0-4	59,846	8.7%	59,047	8.2%	-1.3%	-0.7%
5-9	79,820	11.6%	80,010	11.1%	0.2%	0.1%
10-14	73,376	10.6%	78,587	10.9%	7.1%	3.5%
15-19	64,300	9.3%	68,205	9.5%	6.1%	3.0%
20-24	58,502	8.5%	60,535	8.4%	3.5%	1.7%
25-29	58,635	8.5%	57,765	8.0%	-1.5%	-0.7%
30-34	59,481	8.6%	60,262	8.4%	1.3%	0.7%
35-39	57,066	8.3%	59,187	8.2%	3.7%	1.8%
40-44	46,614	6.8%	51,547	7.1%	10.6%	5.2%
45-49	35,251	5.1%	39,461	5.5%	11.9%	5.8%
50-54	27,535	4.0%	30,038	4.2%	9.1%	4.4%
55-59	20,244	2.9%	22,705	3.1%	12.2%	5.9%
60-64	15,652	2.3%	16,959	2.4%	8.4%	4.1%
65+	33,829	4.9%	36,778	5.1%	8.7%	4.3%
All Ages	690,151	100%	721,086	100%	4.5%	2.2%

Source: NIHB Program Annual Reports, 1999-2000 and 2001-2002

Population Growth by Age Group
Non-Insured Health Benefits Pharmacy Program
1999-2000 to 2001-2002

Top 25 Patented and Non-Patented Drug Products

Non-Insured Health Benefits

1999-2000 to 2001-2002

DIN	INGRED	BRAND	ATC	Year of Intro-duction	1999-2000	2000-2001	2001-2002
2190915	Omeprazole (Omeprazole Magnesium)	Losec 20 Mg	A02BC01	1996	$4,014,086	$5,076,327	$6,568,864
1940481	Paroxetine (Paroxetine Hydrochloride)	Paxil Tab 20mg	N06AB05	1993	$2,442,018	$2,988,194	$3,378,387
2230711	Atorvastatin (Atorvastatin Calcium)	Lipitor 10mg Tablets	C10AA05	1997	$891,949	$1,481,634	$2,300,342
878936	Amlodipine Besylate	Amlodipine Tab 10mg	C08CA01	1992	$1,421,444	$1,866,110	$2,276,554
878928	Amlodipine Besylate	Amlodipine Tab 5mg	C08CA01	1992	$1,627,557	$1,927,304	$2,248,684
2239942	Celecoxib	Celebrex 200mg	M01AH01	1999	$525,294	$1,745,126	$2,198,229
894745	Clozapine	Leponex Tab 100mg	N05AH02	1991	$884,883	$1,302,690	$1,671,668
2230713	Atorvastatin (Atorvastatin Calcium)	Lipitor 20mg Tablets	C10AA05	1997	$580,081	$1,012,792	$1,642,283
2229285	Olanzapine	Zyprexa - 10mg	N05AH03	1996	$771,659	$1,024,707	$1,589,237
670901	Enalapril Maleate	Vasotec Tab 10mg	C09AA02	1987	$1,024,975	$1,485,965	$1,529,822
2213605	Fluticasone Propionate	Flovent Inhalers - Aem Inh-Orl 125mcg/Aem	R03BA05	1995	$824,841	$1,383,795	$1,494,167
1917056	Diclofenac Sodium	Arthrotec 50	M01AB55	1993	$1,844,870	$1,635,822	$1,453,188
2241113	Rosiglitazone (Rosiglitazone Maleate)	Avandia 4mg	A10BG02	2000		$526,213	$1,424,077
2155966	Ciprofloxacin (Ciprofloxacin Hydrochloride)	Cipro 500 - Tab 500mg	J01MA02	1989	$1,216,088	$1,389,202	$1,383,759
2241108	Rofecoxib	Vioxx Tab 25mg	M01AH02	1999	$24,807	$619,039	$1,320,464
708879	Enalapril Maleate	Vasotec Tab 5mg	C09AA02	1987	$976,961	$1,275,811	$1,199,310
2221853	Ramipril	Altace - Cap 10mg	C09AA05	1997	$164,833	$553,107	$1,198,292
733059	Ranitidine (Ranitidine Hydrochloride)	Apo-Ranitidine Tab 150mg	A02BA02	1987	$1,144,934	$1,204,024	$1,185,876
2229453	Pantoprazole (Pantoprazole Sodium Sesquihydrate)	Pantoloc 40mg	A02BC02	1997	$332,947	$653,846	$1,169,886
1984853	Clarithromycin	Biaxin Bid 250mg	J01FA09	1991	$1,169,347	$1,260,364	$1,139,011
2163926	Codeine Phosphate	Tylenol With Codeine No. 3 - Tab	N02AA59	1964	$603,934	$935,047	$1,114,987
884340	Simvastatin	Zocor Tab 20mg	C10AA01	1994	$643,887	$780,755	$1,106,140
2237280	Venlafaxine (Venlafaxine Hydrochloride)	Effexor Xr Capsules, 75mg	N06AX16	1998	$418,808	$717,857	$1,095,890
585092	Medroxyprogesterone Acetate	Depo-Provera Sterile Aqueous Suspension 150 M	G03DA02	1997	$852,702	$953,553	$1,075,022
2239607	Citalopram (Citalopram Hydrobromide)	Celexa 20 Mg	N06AB04	1999	$34,300	$521,415	$1,064,096

Year of Introduction refers to the year that the product was introduced to the market. In previous Pharmaceutical Trend Reports Year of Introduction referred to the year in which the drug product was introduced onto the formulary.

Top 10 Category 1 Patented Drug Products

Non-Insured Health Benefits

1999-2000 to 2000-2001

DIN	INGRED	BRAND	ATC	Year of Intro-duction	1999-2000	2000-2001	2001-2002
2190915	Omeprazole (Omeprazole Magnesium)	Losec 20 MG	A02BC01	1996	$4,014,086	$5,076,327	$6,568,864
2213605	Fluticasone Propionate	Flovent Inhalers - Aem Inh-Orl 125MCG/AEM	R03BA05	1995	$824,841	$1,383,795	$1,494,167
884340	Simvastatin	Zocor TAB 20MG	C10AA01	1994	$643,887	$780,755	$1,106,140
2237280	Venlafaxine (Venlafaxine Hydrochloride)	Effexor XR Capsules, 75MG	N06AX16	1998	$418,808	$717,857	$1,095,890
2229837	Diclofenac Sodium	Arthrotec 75	M01AB55	1998	$795,029	$948,014	$981,012
2212021	Azithromycin	Zithromax - TAB 250MG	J01FA10	1999	$159,641	$689,425	$945,099
2155990	Nifedipine	Adalat XL - SRT 60MG	C08CA05	1992	$634,710	$691,183	$802,005
2126710	Clarithromycin	Biaxin BID 500MG	J01FA09	1994	$550,958	$685,915	$777,927
2231587	Epoetin Alfa	Eprex Sterile Solution 10000IU/1.0ML	B03XA01	1997	$290,758	$481,226	$751,829
2231586	Epoetin Alfa	Eprex Sterile Solution 4000IU/0.4ML	B03XA01	1997	$545,345	$620,868	$723,332

Top 10 Category 2 Patented Drug Products

Non-Insured Health Benefits

1999-2000 to 2000-2001

DIN	INGRED	BRAND	ATC	Year of Intro-duction	1999-2000	2000-2001	2001-2002
2155966	Ciprofloxacin (Ciprofloxacin Hydrochloride)	Cipro 500 - TAB 500MG	J01MA02	1989	$1,216,088	$1,389,202	$1,383,759
2212161	Sumatriptan (Sumatriptan Succinate)	Imitrex - TAB 100MG	N02CC01	1992	$665,581	$679,039	$708,159
2230694	Imiglucerase	Cerezyme	A16AB02	1997	$431,575	$490,287	$675,309
2242903	Etanercept	Enbrel*	L04AA11	1999	—	—	$498,099
2025299	Risperidone	Risperdal TAB 2MG	N05AX08	1993	$358,304	$416,681	$464,913
2155958	Ciprofloxacin (Ciprofloxacin Hydrochloride)	Cipro 250 - TAB 250MG	J01MA02	1989	$417,918	$454,064	$453,138
1968017	Filgrastim (R-Methug-CSF)	Neupogen	L03AA02	1992	$190,281	$151,496	$269,981
2025302	Risperidone	Risperdal TAB 3MG	N05AX08	1993	$232,105	$249,064	$254,451
1978926	Budesonide	Pulmicort Nebuamp 0.5 MG/ML	R03BA02	1992	$233,367	$215,593	$203,449
2244016	Infliximab	Remicade	L04AA12	2001	—	—	$199,509

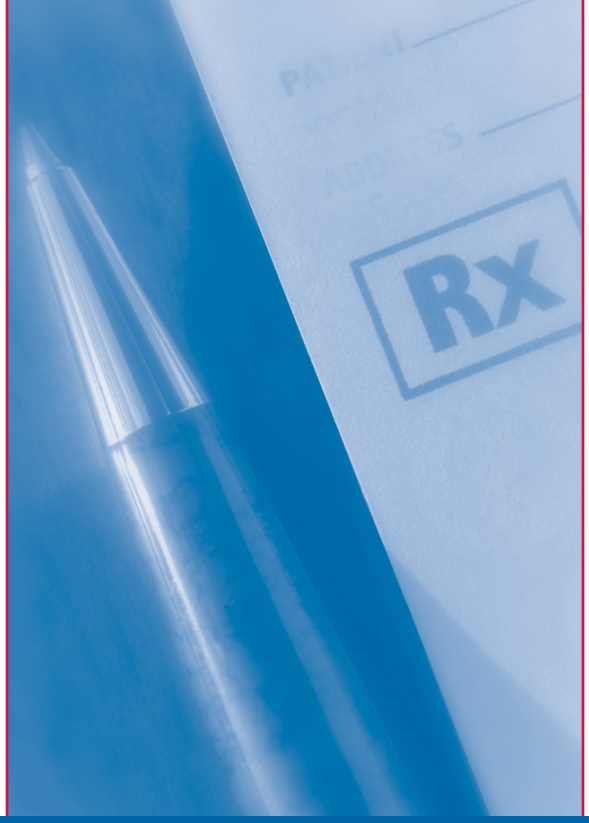
* Patented in 2001-2002

Top 10 Category 3 Patented Drug Products

Non-Insured Health Benefits

1999-2000 to 2000-2001

DIN	INGRED	BRAND	ATC	Year of Introduction	1999-2000	2000-2001	2001-2002
1940481	Paroxetine (Paroxetine Hydrochloride)	Paxil TAB 20MG	N06AB05	1993	$2,442,018	$2,988,194	$3,378,387
2230711	Atorvastatin (Atorvastatin Calcium)	Lipitor 10MG Tablets	C10AA05	1997	$891,949	$1,481,634	$2,300,342
878936	Amlodipine Besylate	Amlodipine TAB 10MG	C08CA01	1992	$1,421,444	$1,866,110	$2,276,554
878928	Amlodipine Besylate	Amlodipine TAB 5MG	C08CA01	1992	$1,627,557	$1,927,304	$2,248,684
2239942	Celecoxib	Celebrex 200MG	M01AH01	1999	$525,294	$1,745,126	$2,198,229
2230713	Atorvastatin (Atorvastatin Calcium)	Lipitor 20MG Tablets	C10AA05	1997	$580,081	$1,012,792	$1,642,283
2229285	Olanzapine	Zyprexa - 10MG	N05AH03	1996	$771,659	$1,024,707	$1,589,237
670901	Enalapril Maleate	Vasotec TAB 10MG	C09AA02	1987	$1,024,975	$1,485,965	$1,529,822
1917056	Diclofenac Sodium	Arthrotec 50	M01AB55	1993	$1,844,870	$1,635,822	$1,453,188
2241113	Rosiglitazone (Rosiglitazone Maleate)	Avandia 4MG	A10BG02	2000	—	$526,213	$1,424,077



Appendix VI – Anatomical Therapeutic Chemical Classes

Anatomical Therapeutic Chemical (ATC)

The Anatomical, Therapeutic Chemical (ATC) classification is a therapeutic classification system adopted by the World Health Organization (WHO). It groups drug products according to their therapeutic use. The WHO recommends the ATC classification system [and the Defined Daily Dose (DDD)] as a measuring unit for facilitating therapeutic comparisons.

In the ATC classification system, the drugs are divided into different groups according to the organ or system on which they act and their chemical, pharmacological and therapeutic properties. Drugs are classified in groups at five different levels. The drugs are divided into fourteen main groups (1st level), with two therapeutic/pharmacological subgroups (2nd and 3rd levels). The 4th level is a therapeutic/pharmacological/chemical subgroup and the 5th level is the chemical substance.

Medicinal products are classified according to the main therapeutic use of the main active ingredient, on the basic principle of only one ATC code for each pharmaceutical formulation (i.e. similar ingredients, strength and pharmaceutical form). A medicinal product can be given more than one ATC code if it is available in two or more strengths or formulations with clearly different therapeutic uses.

The following pages provide a description of the top 16 second-level ATC classes as well as an expenditure decomposition of the 12 remaining classes from the analysis in Section 5.6.

ATC	Therapeutic Class	Subgroups
A02	Drugs for Acid Related Disorders	Antacids; H2-receptor antagonists; Prostaglandins; Proton pump inhibitors; Combinations for eradication of Helicobacter pylori & Others such as sucralfate
A10	Drugs used in diabetes	Insulins and analogues; Biguanides; Sulfonamides; Alpha glucosidase inhibitors; Thiazolidinediones & Others such as repaglinide
B01	Antithrombotic Agents	Vitamin K antagonists; Heparin group; Platelet aggregation inhibitors, Enzymes, and Others
C07	Beta Blocking Agents	Beta blocking agents; Beta blocking agents with thiazides; Beta blocking agents with other diuretics; Beta blocking agents , thiazides and other diuretics;beta blocking agents and vasodilators; Beta blocking agents and other antihypertensives.
C08	Calcium channel blockers	Selective Calcium channel blockers with mainly vascular effects; Selective Calcium channel blockers with direct cardiac effects; Non-selective Calcium channel blockers & Calcium channel blockers and diuretics
C09	Agents acting on the renin-angiotensin system	ACEIs, plain; ACEIs, combinations; Angiotensin II antagonists, plain; Angiotensin II antagonists, combinations & Others
C10	Serum lipid reducing agents	HMG CoA reductase inhibitors; Fibrates; Bile acid sequestrants; Nicotinic acid and derivatives
G03	Sex hormones and modulators of the genital system	Hormonal contraceptives and modulators of the genital system;androgens; estrogrns;progestogens;; combinations of androgens female sex hormones; combinations of progestogens and estrogens; gonadotropins and other ovulation stimulants; antiandrogens; other sex hormones and modulators of the genital system.
J01	Antibacterials for systemic use	Tetracyclines; Amphenicols (chloramphenicol); Penicillins; Beta-lactamase inhibitors; Cephalosporins; Monobactams; Carbapenems; Sulfonamides and Trimethoprim; Macrolides and Lincosamides (clindamycin); Aminoglycosides; Quinolones & Others such as vancomycin, fusidic acid, metronidazole
J05	Antivirals for Systemic Use	Direct acting antivirals such as Aciclovir, abacavir, and lysozyme.
L04	Immunosuppressive agents	Selective immunosuppressive agents & others such as azathioprine and thalidomide.
M01	Anti-inflammatory and anti-rheumatic products	Anti-inflammatory and anti-rheumatic products, Non-steroids (butylpyrazolidines, acetic acid derivatives and related substances, oxicams, propionic acid derivatives, fenamates, coxibs & others such as nabumetone & glucosamine); Anti-inflammatory/ anti-rheumatic agents in combination; Specific anti-rheumatic agents (gold preparations, penicillamine)
N02	Analgesics	Opioids; other analgesics and antipyretics such as salicyclic acid and derivatives, corticosteroid derivatives & antimigraine preparations.
N03	Antiepileptics	Barbituates and derivatives; hydantoin derivatives; oxazolidine derivatives; succinimide derivatives; benzodiazepine derivatives; carbamide derivatives; fatty acid derivatives & others such as felbamate.
N05	Psycholeptics	Antipsychotics (phenothiazines; butyrophenone derivatives; indole derivatives; thioxanthene derivatives; diphenylbutylpiperidine derivatives such as pimozide; diazepines, oxazepines and thiazepines such as clozapine, olanzepine & quetiapine; neuroleptics in tardive dyskinesia such as tetra benazine; benzamides; lithium); Anxiolytics (benzodiazepine derivatives, carbamates, buspirone); Hypnotics and sedatives (barbiturates-plain, barbiturates-combinations,aldehydes and derivatives, benzodiazepine derivatives, piperidinedione derivatives, benzodiazepine related drugs such as zopiclone)
N06	Psychoanaleptics	Antidepressants; Psychostimulants and nootropics (centrally acting sympathomimetics, xanthine derivatives); Psycholeptics and psychoanaleptics in combination (antidepressants in combination with psycholeptics); Anti-dementia drugs

A10 – Drugs Used in Diabetes

Year of Introduction	CAT	1999-2000	2000-2001	2001-2002
1999	Non-Patented	2,346.1	2,601.6	2,932.7
1999	Patented	153.8	303.3	473.4
2000	Non-Patented	0.0	0.2	14.9
2000	Patented	0.0	653.1	2,315.4
2001	Non-Patented	0.0	0.0	15.1
1999-2001	Total	2,499.9	3,558.2	5,751.5
1999-2001	Patented	153.8	956.4	2,788.8
1999-2001	Non-Patented	2,346.1	2,601.8	2,962.7

Impact of Existing and Newer Drugs by Major Disease Groups

Drugs Used in Diabetes

Non-Insured Health Benefits 1999-2000 to 2001-2002

(000's)

The top three drugs in this class were Rosiglitazone ($1.96 million), Metformin ($1.87 million) and Insulin Isophane Human Biosynthetic ($1.44 million).

B01 – Antithrombotic Agents

Year of Introduction	CAT	1999-2000	2000-2001	2001-2002
1999	Non-Patented	555.0	548.4	343.2
1999	Patented	210.7	463.5	841.9
2000	Non-Patented	0.0	2.6	113.3
2000	Patented	0.0	7.8	21.2
2001	Non-Patented	0.0	0.0	8.0
1999-2001	Total	765.7	1,022.2	1,327.8
1999-2001	Patented	210.7	471.3	863.1
1999-2001	Non-Patented	555.0	551.0	464.6

Impact of Existing and Newer Drugs by Major Disease Groups

Antithrombotic Agents

Non-Insured Health Benefits 1999-2000 to 2001-2002

(000's)

The top three drugs in this class were Clopidogrel ($0.84 million), Warfarin Sodium ($0.31 million) and Ticlopidine Hydrochloride ($0.14 million).

C07 – Beta-Blocking Agents

Impact of Existing and Newer Drugs by Major Disease Groups

Beta Blocking Agents

Non-Insured Health Benefits

1999-2000 to 2001-2002

(000's)

Year of Introduction	CAT	1999-2000	2000-2001	2001-2002
1999	Non-Patented	1,294.5	1,386.1	1,514.5
1999	Patented	83.8	109.0	156.0
2000	Non-Patented	0.0	2.8	10.6
2000	Patented	0.0	8.8	9.0
2001	Non-Patented	0.1	0.0	6.3
1999-2001	Total	1,378.4	1,506.6	1,696.4
1999-2001	Patented	83.8	117.7	165.0
1999-2001	Non-patented	1,294.6	1,388.9	1,531.4

The top three drugs in this class were Atenelol ($0.71 million), Metoprolol ($0.34 million) and Carvedilol ($0.15 million).

C08 – Calcium Channel Blockers

Impact of Existing and Newer Drugs by Major Disease Groups

Calcium Channel Blockers

Non-Insured Health Benefits

1999-2000 to 2001-2002

(000's)

Year of Introduction	CAT	1999-2000	2000-2001	2001-2002
1999	Non-Patented	1,584.5	1,472.5	1,332.9
1999	Patented	3,050.2	3,614.0	4,237.8
2000	Non-Patented	0.0	9.1	53.8
2001	Non-Patented	0.0	0.0	12.6
1999-2001	Total	4,634.7	5,095.6	5,637.0
1999-2001	Patented	3,050.2	3,614.0	4,237.8
1999-2001	Non-patented	1,584.5	1,481.6	1,399.2

The top three drugs in this class were Amlodipine ($4.5 million), Nifedipine ($1.6 million) and Diltiazem Hydrochloride ($1.2 million).

G03 – Sex Hormones and Modulators of the Genital System

Year of Introduction	CAT	1999-2000	2000-2001	2001-2002
1999	Non-Patented	2,937.8	3,070.0	3,172.6
1999	Patented	614.1	706.1	784.3
2000	Non-Patented	0.0	2.4	38.7
2001	Non-Patented	0.0	0.0	0.1
2001	Patented	0.0	0.0	4.4
1999-2001	Total	3,551.8	3,778.5	4,000.2
1999-2001	Patented	614.1	706.1	788.8
1999-2001	Non-patented	2,937.8	3,072.4	3,211.4

Impact of Existing and Newer Drugs by Major Disease Groups

Sex Hormones and Modulators of the Genital System

Non-Insured Health Benefits

1999-2000 to 2001-2002

(000's)

The top three drugs in this class were Levonorgestrel ($1.3 million), medroxyprogesterone acetate ($1.2 million) and norgestimate ($0.6 million).

J01 – Antibacterials for Systemic Use

Year of Introduction	CAT	1999-2000	2000-2001	2001-2002
1999	Non-Patented	3,831.0	3,436.7	2,958.4
1999	Patented	4,933.1	5,609.7	5,686.3
2000	Non-Patented	0.0	282.9	425.9
2000	Patented	0.0	1.7	17.8
2001	Non-Patented	0.0	0.0	187.5
2001	Patented	0.0	0.0	29.7
1999-2001	Total	8,764.1	9,331.1	9,305.5
1999-2001	Patented	4,933.1	5,611.4	5,733.8
1999-2001	Non-patented	3,831.0	3,719.7	3,571.7

Impact of Existing and Newer Drugs by Major Disease Groups

Antibacterials for Systemic Use

Non-Insured Health Benefits

1999-2000 to 2001-2002

(000's)

The top three drugs in this class were Clarythromysin ($2.4 million), Ciprofloxacin ($1.9 million) and Azithromycin ($1.3 million).

J05 – Antivirals for Systemic Use

Impact of Existing and Newer Drugs by Major Disease Groups

Antivirals for Systemic Use

Non-Insured Health Benefits

1999-2000 to 2001-2002

(000's)

Year of Introduction	CAT	1999-2000	2000-2001	2001-2002
1999	Non-Patented	349.8	464.0	201.6
1999	Patented	1,935.7	2,179.8	2,698.1
2000	Non-Patented	0.0	3.5	12.9
2000	Patented	0.0	5.4	119.8
2001	Non-Patented	0.0	0.0	1.9
2001	Patented	0.0	0.0	6.8
1999-2001	Total	2,285.5	2,652.7	3,041.1
1999-2001	Patented	1,935.7	2,185.3	2,824.8
1999-2001	Non-patented	349.8	467.5	216.4

The top three drugs in this class were zidovudine ($0.47 million), valacyclovir ($0.39 million) and Efavirenz ($0.30 million).

L04 – Immunosuppressive Agents

Impact of Existing and Newer Drugs by Major Disease Groups

Immunosuppressive Agents

Non-Insured Health Benefits

1999-2000 to 2001-2002

(000's)

Year of Introduction	CAT	1999-2000	2000-2001	2001-2002
1999	Non-Patented	150.5	154.4	165.9
1999	Patented	1,130.9	1,274.0	1,378.0
2000	Non-Patented	0.0	115.7	327.3
2001	Non-Patented	0.0	0.0	1.9
2001	Patented	0.0	0.0	13.2
1999-2001	Total	1,281.5	1,544.1	1,886.3
1999-2001	Patented	1,130.9	1,274.0	1,391.3
1999-2001	Non-patented	150.5	270.1	495.0

The top three drugs in this class were Cyclosporine ($0.68 million), Etanercept ($0.50 million) and Mycophenolate Mofetil ($0.46 million).

M01 – Anti-Inflammatory and Anti-Rheumatic Products

Year of Introduction	CAT	1999-2000	2000-2001	2001-2002
1999	Non-Patented	2,108.9	1,919.8	1,843.5
1999	Patented	3,101.4	5,061.9	6,150.9
2000	Non-Patented	0.0	10.0	52.9
2001	Non-Patented	0.0	0.0	37.7
1999-2001	Total	5,210.3	6,991.8	8,084.9
1999-2001	Patented	3,101.4	5,061.9	6,150.9
1999-2001	Non-patented	2,108.9	1,929.9	1,934.1

Impact of Existing and Newer Drugs by Major Disease Groups

Anti-Inflammatory and Anti-Rheumatic Products

Non-Insured Health Benefits

1999-2000 to 2001-2002

(000's)

The top three drugs in this class were Diclofenac Sodium ($3.14 million), Celecoxib ($2.55 million) and Rofecoxib ($1.59 million).

N02 – Analgesics

Year of Introduction	CAT	1999-2000	2000-2001	2001-2002
1999	Non-Patented	2,229.8	2,866.6	3,534.3
1999	Patented	1,266.5	1,586.4	2,082.7
2000	Non-Patented	0.0	0.1	1.6
2000	Patented	0.0	9.3	18.2
2001	Non-Patented	0.0	0.0	2.9
2001	Patented	0.0	0.0	26.3
1999-2001	Total	3,496.2	4,462.3	5,666.0
1999-2001	Patented	1,266.5	1,595.7	2,127.2
1999-2001	Non-patented	2,229.8	2,866.7	3,538.8

Impact of Existing and Newer Drugs by Major Disease Groups

Analgesics

Non-Insured Health Benefits

1999-2000 to 2001-2002

(000's)

The top three drugs in this class were Codeine Phosphate ($1.43 million), Morphine Sulfate ($1.37 million) and Sumatriptan ($0.89 million).

N03 – Antiepileptics

Impact of Existing and Newer Drugs by Major Disease Groups
Antiepileptics
Non-Insured Health Benefits
1999-2000 to 2001-2002
(000's)

Year of Introduction	CAT	1999-2000	2000-2001	2001-2002
1999	Non-Patented	1,762.4	2,052.0	1,859.4
1999	Patented	262.6	420.5	609.0
2000	Non-Patented	0.3	46.8	131.2
2000	Patented	0.0	2.0	3.3
2001	Non-Patented	0.0	0.0	374.5
1999-2001	Total	2,025.3	2,521.4	2,977.4
1999-2001	Patented	262.6	422.5	612.3
1999-2001	Non-patented	1,762.7	2,098.8	2,365.1

The top three drugs in this class were Gabapentin ($0.93 million), Carbamazepine ($0.46 million) and Topiramate ($0.40 million).

N05 – Psycholeptics

Impact of Existing and Newer Drugs by Major Disease Groups
Psycholeptics
Non-Insured Health Benefits
1999-2000 to 2001-2002
(000's)

Year of Introduction	CAT	1999-2000	2000-2001	2001-2002
1999	Non-Patented	1,659.5	1,952.9	2,297.0
1999	Patented	2,486.0	3,340.3	4,675.4
2000	Non-Patented	0.1	0.3	1.6
2000	Patented	0.0	1.4	4.1
2001	Non-Patented	0.0	0.0	3.7
2001	Patented	0.0	0.0	61.3
1999-2001	Total	4,145.6	5,294.8	7,043.1
1999-2001	Patented	2,486.0	3,341.7	4,740.7
1999-2001	Non-patented	1,659.7	1,953.2	2,302.4

The top three drugs in this class were Olanzapine ($2.75 million), Clozapine ($1.75 million) and Respiradone ($1.52 million).

N06 – Psychoanaleptics

Year of Introduction	CAT	1999-2000	2000-2001	2001-2002
1999	Non-Patented	2,819.6	3,532.5	3,493.4
1999	Patented	5,998.5	6,536.7	8,038.3
2000	Non-Patented	0.0	22.6	161.0
2000	Patented	0.0	0.2	0.0
2001	Non-Patented	0.0	0.0	89.1
2001	Patented	0.0	0.0	67.3
1999-2001	Total	8,818.1	10,091.9	11,849.1
1999-2001	Patented	5,998.5	6,536.9	8,105.6
1999-2001	Non-patented	2,819.6	3,555.1	3,743.5

Impact of Existing and Newer Drugs by Major Disease Groups

Psychoanaleptics

Non-Insured Health Benefits

1999-2000 to 2001-2002

(000's)

The top three drugs in this class were Paroxetine ($4.23 million), Venlafaxine ($1.98 million) and Sertraline ($1.33 million).

Appendix VII – Glossary

Beneficiary

Someone who has made a claim to the Non-Insured Health Benefits Pharmacare Program.

Category 1 Drugs

PMPRB DIN categorization - a new DIN of an existing or comparable dosage form of an existing medicine, usually a new strength of an existing drug (line extension).

Category 2 Drugs

PMPRB DIN categorization - the first drug product to treat effectively a particular illness or which provides a substantial improvement over existing drug products, often referred to as "breakthrough" or "substantial improvement".

Category 3 Drugs

PMPRB DIN categorization - a new drug or new dosage form of an existing medicine that provides moderate, little or no improvement over existing medicines.

Cross Effect

Cross effect is the product of the change in price and the change in quantity. This is usually a relatively small component and is included in the analysis for the reason of algebraic completeness.

Exiting Drug Effect

Exiting Drug Effect shows the impact on expenditures that is a result of de-listing drugs from the formulary, discontinuation of the products by the manufacturer, or lack of claims during follow-up periods

Existing Drug Products

In this Study, Existing Drug Products are defined as drug products that were reimbursed in or before 1999-2000.

New Drug Effect

New Drug Effect shows the impact on expenditures that is a result of listing new drugs on the formulary.

Newer Drug Products

In this Study, new drug products are defined as drug products that were listed on the formulary in 1999-2000 or during subsequent years.

Price Effect

Price effect shows the impact of price changes on expenditures, while holding other factors (e.g. volume) constant.

Therapeutic Mix Effect

The Therapeutic Mix Effect captures the impact of shifts amongst different therapies on expenditures, while holding other factors (e.g. price and volume) constant.

Quantity / Volume Effect

Volume effect shows the impact of volume changes on expenditures, while holding other factors (e.g. prices) constant.

Endnotes

[1] The terms of reference for the NPDUIS Steering Committee are available from the CIHI website at www.cihi.ca/drugs.

[2] NIHB pharmacy program is compared to provincial public drug expenditures as described in the Canadian Institute for Health Information publication: Drug Expenditure in Canada, 1985 – 2002. The NIHB pharmacy program includes non-drug items such as medical supplies and equipment.

[3] Further categorization of drugs was done based on a supplemented database provided by the British Columbia (BC) Ministry of Health which maintains a database classifying drugs as bioequivalent and brand or generic. This data, along with information from the PMPRB and Health Canada, was used to reconcile and group DINs (old and new).

[4] For a greater discussion of the methodology and use of World Health Organization (WHO) WHO's defined daily dose see Appendix II and VI.

[5] PMPRB has established three categories of patented drug products (1999 Annual Report, p.28):

- Category-1 drugs are new DINs of an existing or comparable dosage form of an existing medicine, usually a new strength of an existing drug (a line extension).
- Category-2 drugs are the first drug products to effectively treat a particular illness or which provides a substantial improvement over existing drug products, often referred to as a *breakthrough* or *substantial improvement* drug product.
- Category-3 drugs are new drugs or new dosage forms of an existing medicine that provides moderate, little or no improvement over existing medicines.

[6] The analysis presented in this report may differ from other jurisdictions due to data availability.

[7] To enhance comparability between regions, drug expenditures are limited to prescription and OTC drugs as reported in both the Non-Insured Health Benefits Annual Reports and the Drug Expenditure in Canada, 1985-2002 report produced by CIHI. As well, provinces and territories were grouped to be consistent with the "regions" as they are defined in NIHB's Annual Reports. British Columbia is interpreted to be equivalent to the Pacific; the Atlantic consists of Newfoundland and Labrador, Nova Scotia, Prince Edward Island and New Brunswick. The Northwest Territories and Nunavut are also grouped together.

[8] Number of beneficiaries was obtained from the NIHB database. The number of beneficiaries may be somewhat overestimated since infants generally do not receive unique identifiers to be used in the database until they reach one year of age. This results in the assignment of a different "temporary" identifier for each prescription that is filled for infants.

[9] Since NIHB eligible population, as reported in Annual Reports, are measured at the end of each fiscal year, this report utilizes the mid-points between two years to better capture the size of the population over the time period. Mid-point calculations are demonstrated in Appendix II.

[10] Personal communication with NIHB pharmacy program managers.

[11] Accepted or allowed drug cost is defined as the dollar value allowed on a claim as based on adjudication.

[12] As compared to provincial drug plans, over-the-counter drugs (OTCs) are included in the NIHB database. Given this information, it would be expected that the number of prescriptions per beneficiary in this public drug plan would be comparatively higher.

[13] Korff, Wagner, and Sauders, "A Chronic Disease Score From Automated Pharmacy Data", Journal of Clinical Epidemiology, Vol. 45, No. 2, pp. 197-203, 1992. This research demonstrated that it is feasible to use pharmacy claims data to measure chronic disease status. The authors concluded that scoring automated pharmacy data can provide a stable measure of chronic disease status which is associated with physician-rated disease severity, patient-rated health status, and predicts subsequent mortality and hospitalization rates.

[14] See Appendix VI for a more detailed discussion of WHO's ATC classification system.

[15] The BC Ministry of Health maintains a database, which classifies drugs as brand, or generic, and keeps a historical tracking of new and old dins. Information from the PMPRB and HPB was also used to determine prescription and patent status as well as verify the BC data and classify missing information. Generally speaking, drug produced by brand name manufacturers were considered to be brand name drugs for the purpose of this analysis. The final DIN classification was then applied to all jurisdictions uniformly.

[16] For the purposes of this analysis, multiple source and single source markets are defined by the number of products sharing a unique combination of active ingredient(s), strength(s), dosage form, and route of administration.

[17] Source: Patented Medicines Prices Review Board Annual Report 2002.

[18] Expenditures presented in this section are based on claimed drug cost to provide a sense of magnitude and relative importance of the price changes recorded at the retail pharmacy level.

[19] This index is the same type of index as the price index (Patented Medicine Price Index – PMPI) calculated by the PMPRB and reported annually for patented drugs. There are two differences though, one is that price is defined at the bioequivalent level and not at the DIN level; to take into account the introduction of generic drugs and the frequency with which price and volume information is updated in the index is every 12 months, rather than every six months.

[20] Drug products for which the combination of active ingredient(s), strengths(s), dosage form, and route of administration are the same

[21] Claimed price for drugs that are part of the database provided to the PMPRB by staff at the Non-Insured Health Benefits Pharmacy Plan.

[22] Similar results are found if the same analysis is done with a moving weighted scheme or a constant Laspeyres index—see Appendix IV. Not all patents ensure market exclusivity as more than one patent can exist for any one drug product, with different expiring dates. As well, patentees may enter into licensing agreements or may produce their own generics prior to patent expiration.

[23] Bioequivalent markets, for the purposes of this analysis, are defined to be groups of drug products for which the combination of active ingredient(s), strengths(s), dosage form, and route of administration are the same.

[24] It is important to keep in mind that this analysis reflects data gathered for administrative purposes by the Non-Insured Health Benefits drug plans and may be reflective of drug plan/formulary design and as such is a proxy for the true trends observed in the market place.

[25] Source: Canadian Institute for Health Information. Drug Expenditure in Canada, 1985 – 2002.

[26] Source: Statistics Canada, CANSIM II, table 326-0002 and Catalogue nos. 62-001-XPB and 62-010-XIB.

[27] This figure was partly reproduced from the PMPRB's Discussion Paper, "*Examining the Role, Function and Methods of the Patented Medicine Prices Review Board.*" November 1997.

[28] Another factor worth mentioning is the shift to community care over the last several years. In addition to replacing surgery, community based drug plans are experiencing utilization increases because hospital stays are shorter and more treatment is taking place in the community that previously may have required hospitalization.

[29] See for example Green Shield Canada "A Report on Drug Costs", 1994; Gorecki, P.K., "Controlling Drug Expenditures in Canada, The Non-Insured Health Benefits Experience", 1991; Angus, D.E. et al. "Sustainable Health Care for Canadians", 1995; and, Brogan Inc. (1998) "Handbook on Private Drug Plans: 1993 - 1996.

[30] New drugs are defined at the chemical, dose, form and route level. Generic bioequivalent products are not considered as new drugs in the major component decomposition.

[31] See Appendix 1 for methodology details and methodological and definitional changes from previous cost driver studies.

[32] Others represents the cross effect. .

[33] It is important to note that this does not mean that the average price of drugs in Non-Insured Health Benefits has declined by 4.8% over the specified time frame. A marginal decline in the unit price of a popular drug can drive a large negative price effect. In addition, the introduction of generic substitutes played an important role in reducing the cost of multiple source markets with that period.

[34] "New" as an expenditure on the formulary may not necessarily correspond to new to the market. As well, the increase in expenditures reported may be a comparison of a partial year of expenditures with a full year depending on when the drug was recorded on the NIHB pharmacy plan.

[35] This definition does not distinguish between drugs that were regularly covered and those that may need prior approval.

[36] Per unit prices are not intended to measure the relative cost of existing and newer drugs, but to provide a sense of what is driving the change in expenditures over time. Specifically, the information identifies whether the decrease in existing drug expenditures is driven by changes in price or changes in utilization.

[37] Guidelines for ATC classification & DDD assignment may be purchased through WHO's website at www.whocc.nmd.no/order-forms.htm

[38] The computed rates of utilization presented in the main text of this analysis are not adjusted for age or gender and are crude rates of utilization per 1000 beneficiaries per day.

- Number of DDDs = (quantity * strength)/DDD
- Rate of Utilization= 1000 * (number of DDDs/(number of beneficiaries * 365 days). The rate is expressed as a measure of utilization per 1,000 beneficiaries per day.
- Number of beneficiaries is the total number of persons covered by the drug plan that year.
- Rate is the number of DDDs per 1000 beneficiaries per day; it's a measure of the percentage of beneficiaries who theoretically received a standard dose every day.

[39] For a discussion the Laspeyres Methodology Used to Construct the Patented Medicine Price Index and adapted and presented in this study (CLPI) see PMPRB's study: S-9710, July 1997.