Centre for
Health Services and Policy Research

The British Columbia
Rx Atlas




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About CHSPR

The Centre for Health Services and Policy Research (CHSPR) is an independent research centre based at the University of British Columbia. CHSPR's mission is to stimulate scientific enquiry into issues of health in population groups, and ways in which health services can best be organized, funded and delivered. Our researchers carry out a diverse program of applied health services and population health research under this agenda.

CHSPR aims to contribute to the improvement of population health by ensuring our research is relevant to contemporary health policy concerns and by working closely with decision makers to actively translate research findings into policy options. Our researchers are active participants in many policy-making forums and provide advice and assistance to both government and non-government organizations in British Columbia (BC), Canada and abroad.

CHSPR receives core funding from the BC Ministry of Health to support research with a direct role in informing policy decision-making and evaluating health care reform, and to enable the ongoing development of the BC Linked Health Database. Our researchers are also funded by competitive external grants from provincial, national and international funding agencies.

Much of CHSPR's research is made possible through the BC Linked Health Database, a valuable resource of data relating to the encounters of BC residents with various health care and other systems in the province. These data are used in an anonymized form for applied health services and population health research deemed to be in the public interest.

CHSPR has developed strict policies and procedures to protect the confidentiality and security of these data holdings and fully complies with all legislative acts governing the protection and use of sensitive information. CHSPR has over 30 years of experience in handling data from the BC Ministry of Health and other professional bodies, and acts as the access point for researchers wishing to use these data for research in the public interest.

For more information about CHSPR, please visit www.chspr.ubc.ca

Acknowledgements

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Access to PharmaNet data was obtained with permission of the BC Ministry of Health and the College of Pharmacists of British Columbia. Therapeutic classification codes were assigned to each drug identification number with the assistance of the College of Pharmacists of BC and the Canadian Institute for Health Information (CIHI). No endorsement of the findings by the College of Pharmacists of BC or CIHI is intended or should be inferred. Assistance in the production of this report was also provided by a number of staff at CHSPR, including Chris Balma, Gillian Hanley and Colette Raymond.

We dedicate this Atlas to the memory of our extraordinary friend and colleague, Peter Schaub [1978-2005]. As with many of the illustrative and informative products of the Centre for Health Services and Policy Research, this Atlas would not have been possible without Peter's geographic expertise, creative talent, and dedicated spirit.

Introduction

The Rx Atlas

At nearly $20 billion and growing by 10% per year, prescription drugs are the second largest cost component of the Canadian health care system. Given the scale of expenditure, surprisingly little is known about the underlying dynamics that determine the magnitude and distribution of pharmaceutical costs across individuals, regions, and therapeutic classes.

Part of the reason for the lack of detailed information about drug utilization and expenditure patterns has been a historic lack of data and analytic methods.

This Rx Atlas takes the first step towards addressing the drug utilization and expenditure information gap for one Canadian province. We combine population-based and patient-specific data for pharmaceuticals and health care services to explore the drivers of change in pharmaceutical expenditure over time and variations across regions.

Determinants of Drug Expenditure

A common claim across the health care system is that an aging population is driving up costs. Older populations have higher (and different) medical needs than younger populations, and can be reasonably assumed to use more prescription drugs.

Beyond the effect of aging, variation in expenditure—over time or across regions—could result from a straightforward increase or decrease in the amount of prescription drugs actually being used, as a result of medical needs or changing patterns of care.

Changes in drug costs can also result from changes in the type or mix of drugs used to treat a given illness. For example, treating uncomplicated hypertension with Angiotensin Converting Enzyme (ACE) inhibitors instead of lower-cost thiazide diuretics would increase expenditure without reflecting a change in the underlying need for treatment, nor, it can be argued, the ultimate health benefit from treatment.

Drug costs can also change simply because of increases in the prices charged by drug manufacturers. Alternatively, costs can be lowered by the choice of generic over brand drugs, the most common type of policy intervention aimed at controlling escalating prescription drug expenditure.

Using a model pioneered by researchers at the Centre for Health Services and Policy Research, we analysed seven utilization and cost dynamics that fall into the four broad categories of expenditure determinants just described:

Aging: the impact of population age

Utilization: the rate and breadth of drug therapy use

Choices: the cost of drugs chosen per course of therapy

Prices: the price of drugs purchased

In addition to assessing trends and regional patterns for overall drug expenditure, we focus on the 15 largest categories of drugs in terms of expenditure.

Key Findings

Between 1996 and 2003, expenditure per capita grew at rates between 10% and 13% per year across the province.

In most regions, the major determinant of change in expenditure was the increased utilization of prescription drugs.

More is spent on hypertension drugs than on any other therapeutic drug category. Trends towards choosing newer, more costly classes of hypertension treatments increased per capita expenditure on this class of medicines by 3% to 4% a year.

Drugs commonly used to treat depression and anxiety (psychoanaleptics) comprised the second-largest category of medicine in terms of spending in 2003. Growth in spending on these drugs was fastest for residents aged over 85.

The third-largest category of spending was cholesterol-lowering drugs. Expenditure on these drugs more than tripled between 1996 and 2003, driven almost exclusively by increased utilization.

Increases in spending on antacids and antipsychotic medicines (psycholeptics) were driven primarily by the selection of more expensive drug treatments.

Spending on diabetes drugs more than doubled between 1996 and 2003, and grew most rapidly among baby boomers (those aged 45 to 64).

The cost of analgesics varied more across regions than any other therapeutic drug category studied in this Atlas.

Growth in drug expenditure was slowest for antibacterials, one of the largest categories of drug therapy for children.

While overall expenditure on immunostimulants was relatively small, costs per user exceeded $10,000 in 2003.

Basis for Future Research

This Rx Atlas provides what we believe to be the world's most detailed portrait of the determinants of the use and cost of pharmaceuticals to date. However, it is a descriptive report that deliberately contains minimal analysis and interpretation of findings.

The findings highlighted above (and throughout this Rx Atlas) only provide signposts to areas for further investigation by those policy makers, practitioners and researchers best placed to focus on the underlying dynamics and possibilities for policy intervention.

Methods

Data

This Rx Atlas combines population-based and patient-specific information for pharmaceuticals and health care services.

Prescription drug claims data from 1996 to 2003 were extracted from BC PharmaNet, a dataset containing records of every prescription dispensed in the province. These data reflect purchases in the community and long-term care facilities but not acute care hospitals. Non-prescription drugs and medical supplies were also excluded.

The study cohort comprised all 4.1 million residents of British Columbia except First Nations, veterans, and Royal Canadian Mounted Police (approximately 4% of the population).

Analyses were conducted for each of the 16 Health Service Delivery Areas (HSDAs) in British Columbia. Within each HSDA, the population was further stratified into five age categories.

Expenditure and Utilization

Expenditure information includes both private and public contributions and excludes pharmacists' dispensing fees unless otherwise stated (e.g. section on public subsidy).

Utilization was measured as the number of patients that filled one or more prescriptions for any drug within the therapeutic category in a given year.

The World Health Organization's Anatomical Therapeutic Chemical classification codes classify drugs in the database into a hierarchy of 64 mutually exclusive therapeutic categories and 248 mutually exclusive drug classes.

Fast facts

Data sources: BC PharmaNet and the BC Linked Health Database

Population studied: All beneficiaries of the BC Medical Service Plan

Population size: Approx. 4.1 million

Period: 1996 to 2003, inclusive

Total prescription records: 214 million

Specific regions: 16 Health Service Delivery Areas (HSDAs)

Statistical methods: Index-theoretic

Analyses of use and expenditure were conducted for the 15 therapeutic categories exhibiting the largest per capita expenditure in 2003.

Measures of Variation

Regional values were compared to provincial averages using log-deviations: the log of the regional observation divided by the log of the provincial average. This standardizes differences so that, for example, a region that spends half the provincial average receives a deviation value that is comparable to a region that spends twice the provincial average. The log-deviations for these two regions would be –0.69% and +0.69%, respectively.

Variation across regions was measured using the coefficient of variation (CV). The CV is the standard deviation of all regional measures divided by the mean of the regional measures. The larger the CV, the greater the relative variation across regions.

Diagnoses

Diagnoses of conditions for which certain drug classes are commonly used in treatment were sought from Medical Services Plan and hospital discharge records for 2003. Conditions were identified using Expanded Diagnostic Clusters, a tool that groups ICD-9 diagnosis codes into specific diseases or symptoms.

Determinants of Expenditure

The conceptual framework used in this Rx Atlas takes advantage of the therapeutic classifications for drugs to calculate seven types of utilization and cost dynamics that determine drug expenditures. As illustrated in the conceptual framework below, these determinants of drug expenditure fall into four broad categories:

Aging: the impact of population age

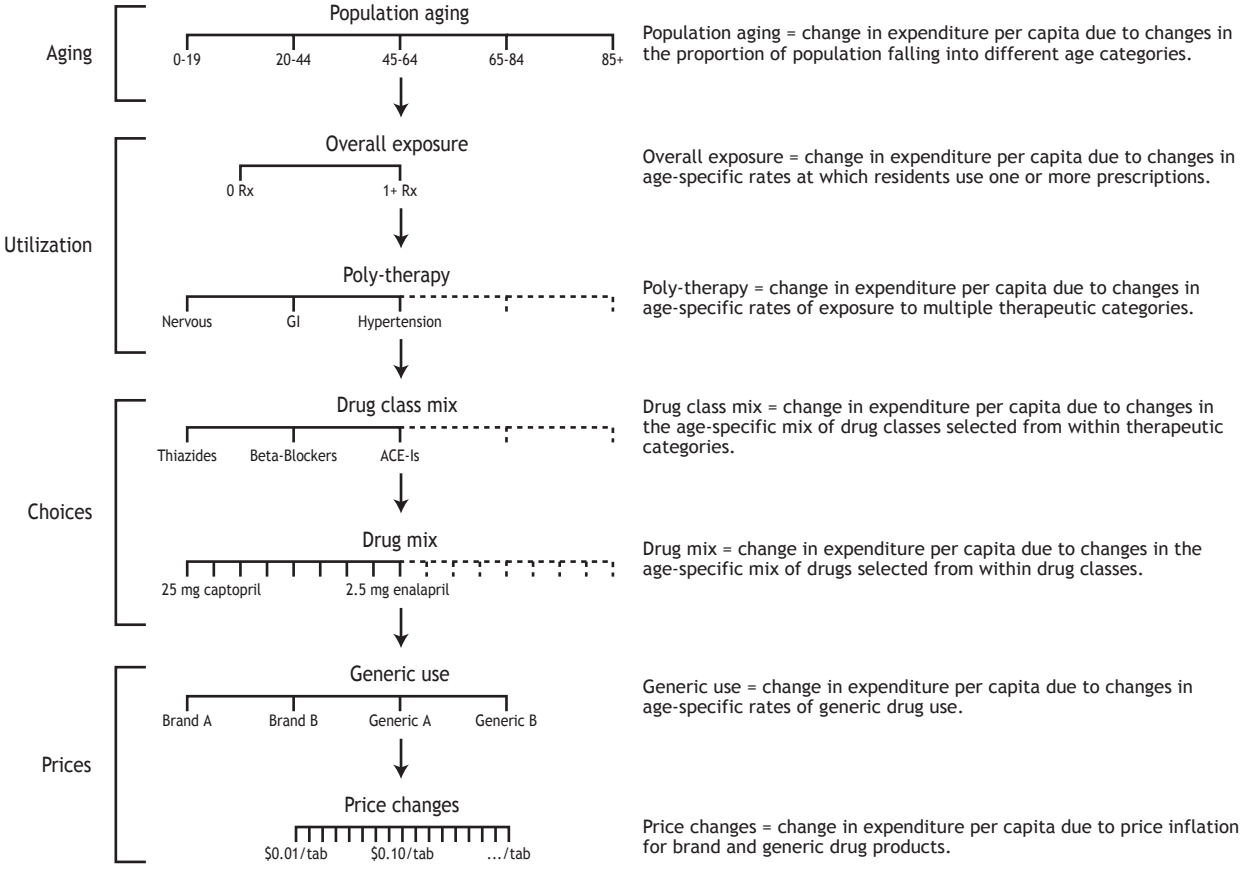
Utilization: the rate and breadth of drug therapy use

Choices: the cost of drugs chosen per course of therapy

Prices: the price of drugs purchased

For methodological details and specific results for the overall provincial population, see: Morgan, SG. Booming Prescription Drug Expenditure. Medical Care 2005; 43(10): 996-1008.

Measured determinants of prescription drug expenditure



How to Use This Atlas

This Atlas describes drug use and related expenditures for 15 therapeutic categories. The eight categories for which diagnostic information could be associated with drug use are described in more detail than the remaining seven categories.

Drugs in this therapeutic category:

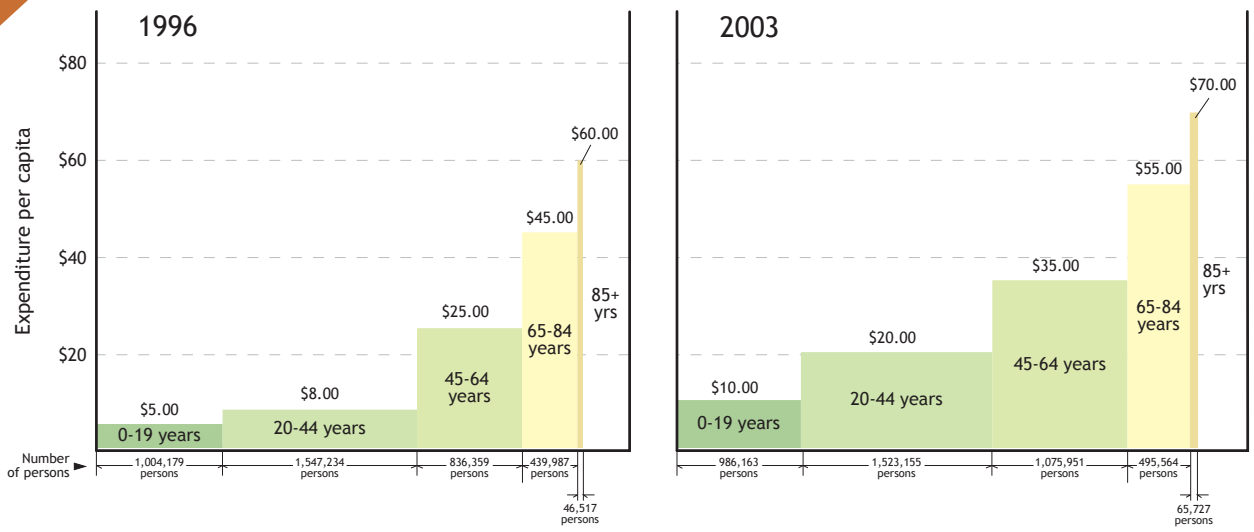
-
-
-

Indications for use:

-
-
-

This chart illustrates drug expenditures over the life-course in 1996 and 2003. The width of each bar represents the relative size of the population in the respective age category. The height of each bar represents the average expenditure per capita in the given age category. Combining this information, the area of each age-specific bar is a measure of the total expenditure of drugs for each age category. Both the change in the population size and the change in cost are thereby represented in these illustrations.

Expenditure per capita over the life-course, province-wide data, 1996 and 2003

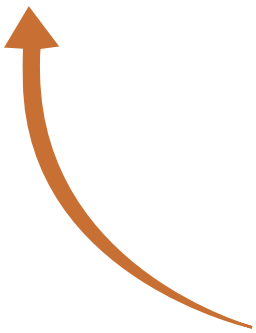


Components of change by health service delivery area (HSDA), 1996-2003

	Expenditure per capita			Determinants of expenditure			
	1996	2003	AAGR*	Aging	Utilization	Choices	Prices
Northwest	$101	$236	12.9%	1.6%	7.1%	5.1%	-1.3%
North Island	$140	$324	12.8%	2.1%	6.5%	4.9%	-1.1%
Northeast	$99	$228	12.6%	2.2%	6.7%	4.8%	-1.5%
Fraser East	$144	$325	12.3%	1.7%	6.6%	4.9%	-1.2%
Okanagan	$123	$274	12.1%	2.0%	6.5%	4.6%	-1.4%
Central Island	$183	$398	11.8%	0.9%	6.8%	5.3%	-1.4%
Kootenay Boundary	$153	$332	11.7%	1.3%	6.1%	5.1%	-1.1%
South Island	$173	$368	11.4%	1.4%	6.0%	4.8%	-1.2%
Fraser North	$154	$321	11.0%	0.8%	5.9%	5.2%	-1.2%
East Kootenay	$195	$402	10.9%	0.5%	6.0%	5.3%	-1.2%
Northern Interior	$162	$333	10.8%	0.5%	6.3%	5.1%	-1.4%
Thompson Cariboo	$147	$292	10.3%	0.7%	5.2%	5.4%	-1.2%
N. Shore/Coast Gar.	$158	$311	10.2%	1.4%	6.1%	4.1%	-1.7%
Fraser South	$156	$306	10.1%	0.7%	5.5%	4.9%	-1.2%
Vancouver	$136	$261	9.7%	1.1%	4.7%	5.0%	-1.3%
Richmond	$152	$286	9.5%	0.5%	4.6%	5.5%	-1.3%

Sources: Authors' calculations based on BC PharmaNet (Claims History) and BCLHD (Population Registry).

* AAGR = average annual growth rate



This chart shows the unadjusted expenditure per capita in each HSDA for 1996 and 2003. It lists the average annual growth rate over the period and the annual growth contributions made by four categories of expenditure determinants. The 16 HSDAs are listed in descending order of average annual growth rate.

How to Use This Atlas

Health service delivery area (HSDA) cartograms and data, 1996 and 2003

Age-adjusted expenditure per capita

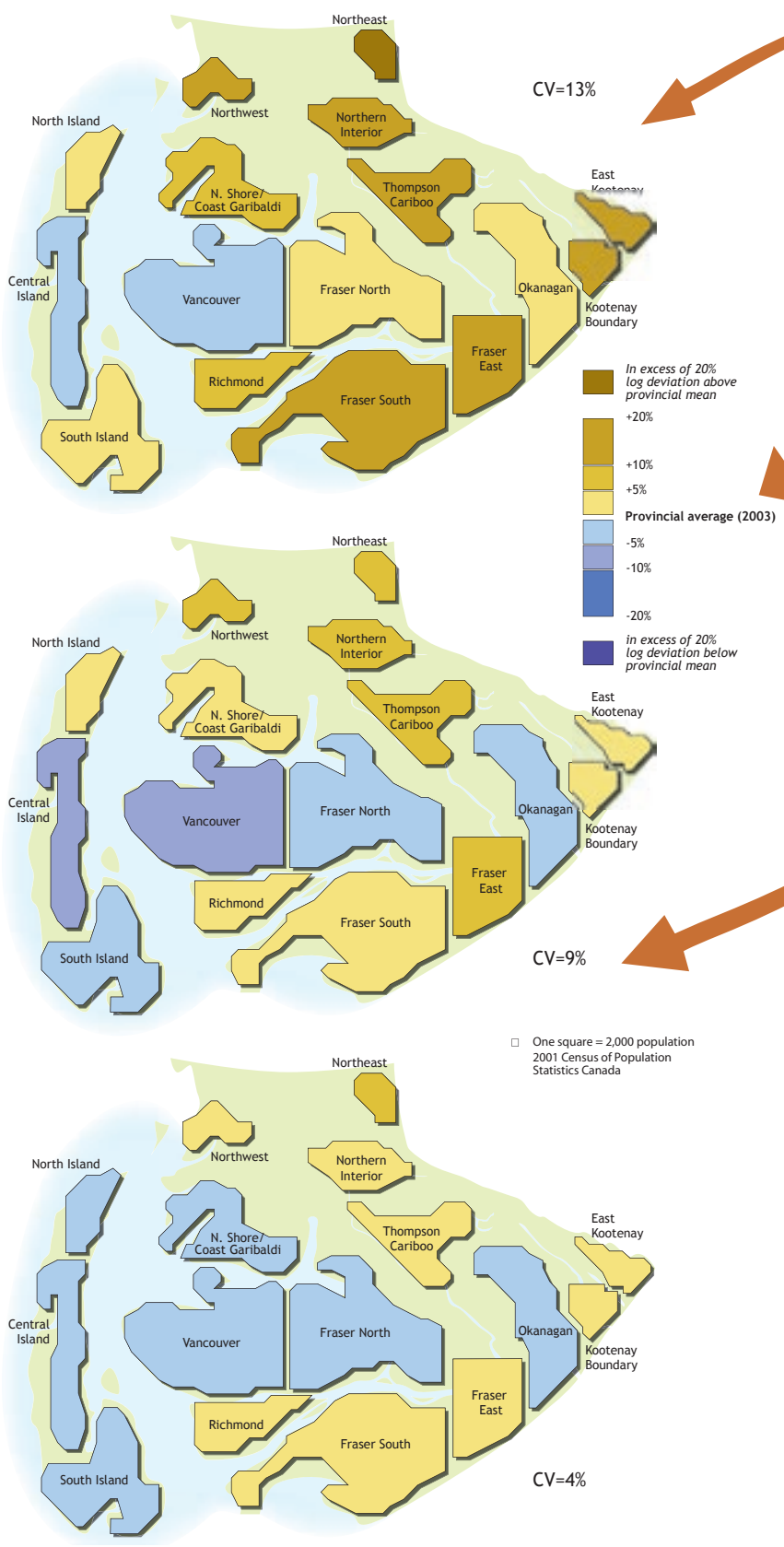
1996	2003	Change	Log Dev 2003	
$23	$56	143%	+0.21	Northeast
$28	$53	89%	+0.15	Northern Interior
$26	$53	104%	+0.15	Northwest
$29	$52	79%	+0.13	Thompson Cariboo
$27	$52	93%	+0.13	Fraser East
$26	$52	100%	+0.13	Kootenay Boundary
$27	$51	89%	+0.11	East Kootenay
$26	$51	96%	+0.11	Fraser South
$24	$49	104%	+0.07	Richmond
$26	$49	88%	+0.07	N. Shore/Coast Gar.
$23	$46	100%	+0.01	North Island
$26	$46	77%	+0.01	Fraser North
$27	$46	70%	+0.01	South Island
$25	$46	84%	+0.01	Okanagan
$23	$45	96%	-0.01	Central Island
$24	$44	83%	-0.03	Vancouver

Age-adjusted users per 1,000 population

1996	2003	Change	Log Dev 2003	
97	147	52%	+0.09	Northeast
103	146	43%	+0.09	Northern Interior
98	145	48%	+0.08	Northwest
91	142	55%	+0.06	Thompson Cariboo
98	142	45%	+0.06	Fraser East
93	137	47%	+0.02	Kootenay Boundary
94	137	46%	+0.02	East Kootenay
94	136	45%	+0.02	Fraser South
91	135	49%	+0.01	Richmond
93	135	44%	+0.01	N. Shore/Coast Gar.
95	134	41%	+0.00	North Island
95	133	40%	-0.01	Fraser North
91	132	45%	-0.01	South Island
93	131	41%	-0.02	Okanagan
87	125	44%	-0.07	Central Island
82	122	49%	-0.09	Vancouver

Cost per user

1996	2003	Change	Log Dev 2003	
$280	$359	28%	+0.05	Northeast
$299	$355	19%	+0.04	Northern Interior
$281	$354	26%	+0.04	Northwest
$277	$353	27%	+0.04	Thompson Cariboo
$260	$351	35%	+0.03	Fraser East
$271	$345	27%	+0.02	Kootenay Boundary
$252	$343	36%	+0.01	East Kootenay
$274	$343	25%	+0.01	Fraser South
$285	$341	19%	+0.00	Richmond
$288	$338	17%	-0.01	N. Shore/Coast Gar.
$251	$336	34%	-0.01	North Island
$261	$335	29%	-0.01	Fraser North
$254	$333	31%	-0.02	South Island
$263	$333	27%	-0.02	Okanagan
$240	$327	36%	-0.04	Central Island
$266	$326	23%	-0.04	Vancouver



How to Use This Atlas

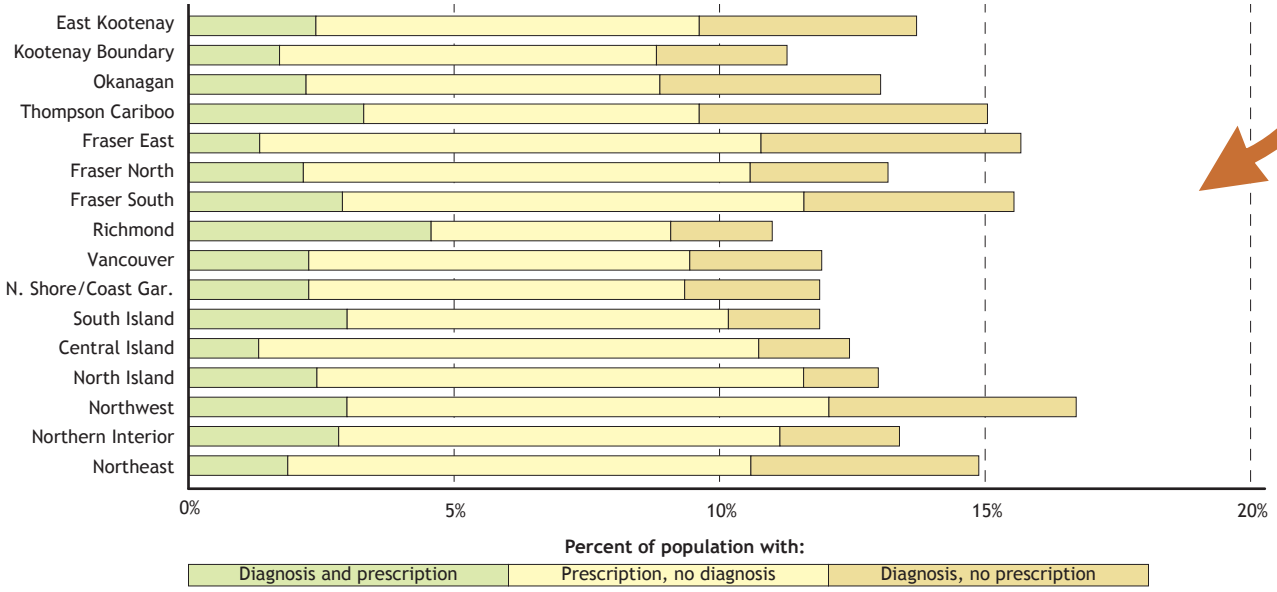
These maps (called cartograms) illustrate the relative size of each HSDA according to its population. The shading illustrates the relative variation of expenditure/capita, prescription drug users/capita, or the cost/drug user in 2003 from the provincial mean.

Regional values were compared to provincial averages using log-deviations: the log of the regional observation divided by the log of the provincial average.

The coefficient of variation (CV) measures the degree of variability across regions. The larger the CV, the greater the relative variation of that measure across the HSDAs.

This chart illustrates the proportion of the provincial population who were dispensed the specific pharmaceutical therapy and who either had or did not have a diagnosis for which such a therapy would be indicated. The proportion for whom a relevant medical diagnosis/condition was recorded, but no relevant prescription therapy was dispensed, are also illustrated. The total lengths of the horizontal bars approximate the potential burden-of-illness of the medical condition in each HSDA.

Age-adjusted rates of prescription and/or related diagnosis, province-wide, 2003



Measure of diagnosis based on "Sample Condition" Expanded Diagnosis Cluster XXX00

Overall Drug Expenditure

Expenditure By Age

Prescription drug expenditure per capita varies significantly with age. In both 1996 and 2003, expenditures per capita more than doubled each step along the age gradient through to the age category 65 to 84.

Residents aged 85 and older had slightly lower drug expenditures per capita than those aged 65 to 84 years, possibly reflecting a "healthy survivor" effect and increased institutionalization in acute care facilities (data reflect only drug use in the community and long-term care facilities).

While the elderly consume high levels of drugs and are growing in number, they remain a relatively small proportion of the population. The baby boomer generation, the cohort aged 45 to 64, accounted for 37% of population-wide expenditures (while those aged 65 to 84 accounted for only 34%).

Expenditure Growth

Per capita expenditures grew at annual rates ranging from 9.5% to 12.9% across HSDAs. At those annual growth rates, expenditures per capita would double within six to eight years.

Northern regions tended to have the most rapid drug expenditure inflation over the study period.

Despite the fact that there is a relatively steep age gradient in prescription drug expenditures per capita, aging contributed less than 2% to the annual rate of expenditure growth in all regions but North Island, Northeast and Okanagan.

In most regions, the major determinant of drug spending was increased utilization. Regions with the most rapid increase in utilization generally had the most rapid overall expenditure growth.

Expenditure per capita over the life-course, province-wide data, 1996 and 2003

Components of change by health service delivery area (HSDA), 1996-2003

	Expenditure per capita			Determinants of expenditure			
	1996	2003	AAGR*	Aging	Utilization	Choices	Prices
Northwest	$101	$236	12.9%	1.6%	7.1%	5.1%	-1.3%
North Island	$140	$324	12.8%	2.1%	6.5%	4.9%	-1.1%
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Kootenay Boundary	$153	$332	11.7%	1.3%	6.1%	5.1%	-1.1%
South Island	$173	$368	11.4%	1.4%	6.0%	4.8%	-1.2%
Fraser North	$154	$321	11.0%	0.8%	5.9%	5.2%	-1.2%
East Kootenay	$195	$402	10.9%	0.5%	6.0%	5.3%	-1.2%
Northern Interior	$162	$333	10.8%	0.5%	6.3%	5.1%	-1.4%
Thompson Cariboo	$147	$292	10.3%	0.7%	5.2%	5.4%	-1.2%
N. Shore/Coast Gar.	$158	$311	10.2%	1.4%	6.1%	4.1%	-1.7%
Fraser South	$156	$306	10.1%	0.7%	5.5%	4.9%	-1.2%
Vancouver	$136	$261	9.7%	1.1%	4.7%	5.0%	-1.3%
Richmond	$152	$286	9.5%	0.5%	4.6%	5.5%	-1.3%

* AAGR = average annual growth rate

Sources: Authors' calculations based on BC PharmaNet (Claims History) and BCLHD (Population Registry).

The impact of choosing higher cost options per course of drug treatment increased expenditure per capita by roughly 5% per year in all regions.

In regions around the greater Vancouver area, where utilization increased by 6% or less, therapeutic choices were as significant a cost-driver as utilization.

Prices fell in all regions, driven by increased use of generic drugs and related price competition between brand and generic alternatives.

Variation in Overall Drug Expenditure, 2003

Variation Across Regions

In contrast to growth in drug expenditures over time, variations in age-adjusted drug expenditures were modest across geographic regions of BC in 2003.

Age-adjusted expenditures within most HSDAs were within 10% of the provincial average of $330 per capita.

Variation in crude expenditure per capita (facing page, CV=18%) was much greater than that of age-adjusted expenditure per capita (illustration below, CV=8%). This is because much of the variation in crude expenditure per capita is explained by differences in the age profile of the regions.

For example, while Northeast and Northwest had crude expenditures per capita that were about 30% below the provincial average, the age of the populations in these regions was sufficiently different from the provincial average to explain most of this difference. Age differences in these regions explained 18.8 and 14.3 percentage points of the more than 28% difference between their per capita spendingand the provincial average.

Sources of Variation

Differences in utilization were also a significant source of variation in overall expenditures on prescription drugs across regions.

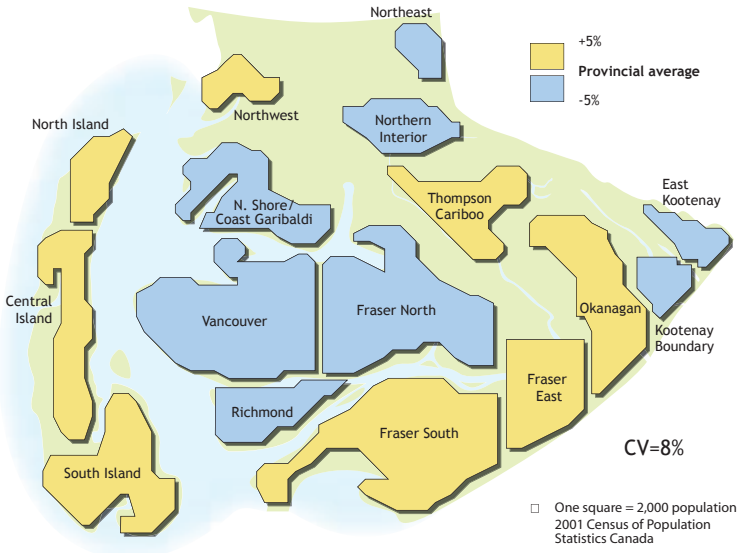
Outliers include Vancouver, Northwest, and Richmond, where lower utilization of medicines, in and of itself, would render expenditures per capita 13%, 16%, and 18% below the provincial average respectively. It is notable that these differences are in addition to age-related differences in the populations of those areas.

Therapeutic choices explained a moderate share of variation across regions. South Island was 3.6% above average in this regard, whereas the eastern regions were below average. As with the effects of differences in

Health service delivery area (HSDA) cartogram and data, 1996 and 2003

Age-adjusted expenditure per capita

1996	2003	Change	Log Dev 2003	
$176	$371	111%	0.02	South Island
$165	$362	120%	0.02	Okanagan
$168	$355	111%	0.01	Fraser East
$168	$347	107%	0.01	Central Island
$158	$339	115%	0.00	Thompson Cariboo
$156	$337	116%	0.00	North Island
$152	$331	118%	0.00	Northwest
$167	$330	98%	0.00	Fraser South
$158	$329	108%	0.00	Northern Interior
$155	$323	109%	0.00	N. Shore/Coast Gar.
$156	$315	102%	-0.01	Fraser North
$162	$310	91%	-0.01	East Kootenay
$147	$309	110%	-0.01	Kootenay Boundary
$135	$303	124%	-0.02	Northeast
$152	$294	94%	-0.02	Vancouver
$144	$271	88%	-0.03	Richmond



Variation in Overall Drug Expenditure, 2003

Components of variation across health service delivery area (HSDA), 2003

	Expenditure per capita			Determinants of expenditure			
	HSDA	BC	Difference	Aging	Utilization	Choices	Prices
South Island	$402	$330	21.7%	11.0%	4.4%	3.6%	1.3%
Okanagan	$398	$330	20.6%	13.4%	6.3%	0.9%	-0.9%
Central Island	$368	$330	11.3%	11.5%	-1.4%	1.1%	0.1%
Fraser East	$333	$330	0.7%	-3.3%	5.6%	-0.6%	-0.8%
Kootenay Boundary	$332	$330	0.5%	9.1%	-6.5%	-3.2%	1.8%
Thompson Cariboo	$325	$330	-1.6%	2.4%	-1.8%	-2.1%	0.0%
North Island	$324	$330	-1.8%	1.1%	-1.7%	-1.4%	0.2%
N. Shore/Coast Gar.	$321	$330	-2.9%	3.1%	-8.0%	1.9%	0.6%
East Kootenay	$311	$330	-6.0%	2.4%	-4.3%	-4.1%	0.0%
South Fraser	$306	$330	-7.5%	-6.3%	0.4%	-1.6%	-0.2%
Fraser North	$292	$330	-11.7%	-6.0%	-7.1%	1.1%	0.0%
Vancouver	$286	$330	-13.5%	-0.8%	-13.0%	0.0%	0.3%
Northern Interior	$274	$330	-17.1%	-12.1%	-4.1%	-2.1%	0.4%
Richmond	$261	$330	-21.1%	-2.5%	-18.1%	-1.5%	0.3%
Northeast	$236	$330	-28.7%	-18.8%	-5.9%	-7.3%	0.6%
Northwest	$228	$330	-31.0%	-14.3%	-16.2%	-1.8%	-2.2%

Sources: Authors' calculations based on BC PharmaNet (Claims History) and BCLHD (Population Registry).

utilization, the impact of therapeutic choices on costs is in addition to the effects of differences in the age of the populations (i.e., that captured by the "Aging" measure).

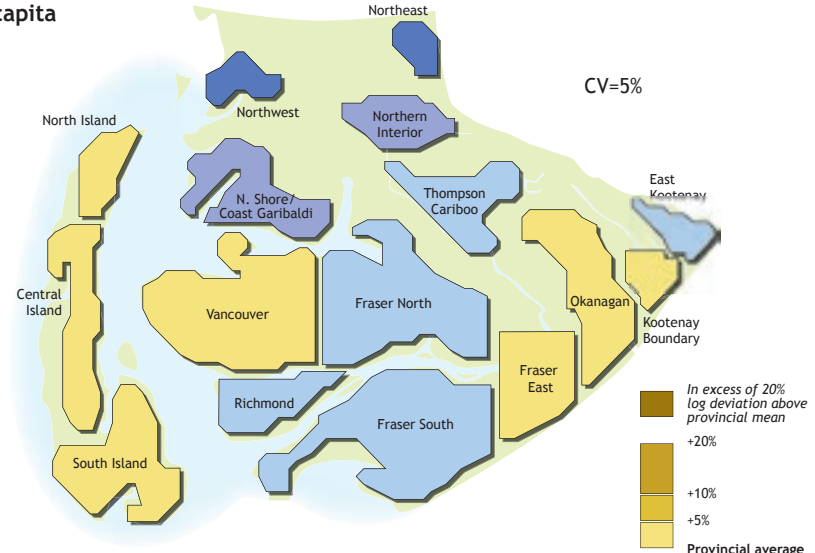
Prices did not vary considerably across regions. The rates at which generic drugs were used were comparable across regions, and the prices of the actual brands and generics selected did not differ significantly. The latter finding is consistent with reimbursement policies based on "actual acquisition costs" (variation in dispensing fees is not considered as a price component in this study).

Total Expenditure and Subsidy, 1996

Health service delivery area (HSDA) cartograms and data, 1996

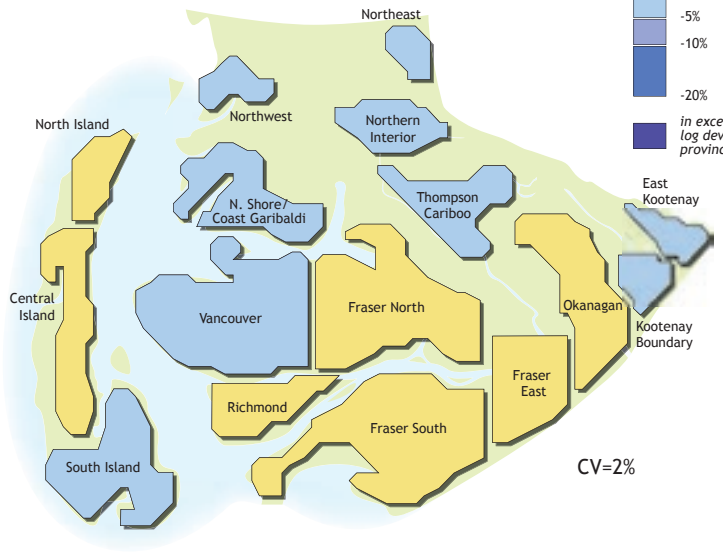
Age-adjusted expenditure and subsidy per capita

Total exp.	Public exp.	Public share	Log Dev 1996	
$168	$94	56%	0.05	Fraser East
$165	$92	56%	0.04	Okanagan
$152	$84	55%	0.03	Vancouver
$168	$92	55%	0.02	Central Island
$156	$85	54%	0.02	North Island
$176	$95	54%	0.01	South Island
$147	$79	54%	0.01	Kootenay Boundary
$167	$89	53%	0.00	Fraser South
$158	$83	53%	-0.01	Thompson Cariboo
$156	$82	53%	-0.01	Fraser North
$144	$73	51%	-0.05	Richmond
$162	$82	51%	-0.05	East Kootenay
$158	$80	51%	-0.05	Northern Interior
$155	$75	49%	-0.09	N. Shore/Coast Gar.
$152	$73	48%	-0.11	Northwest
$135	$65	48%	-0.11	Northeast



Age-adjusted subsidy for seniors

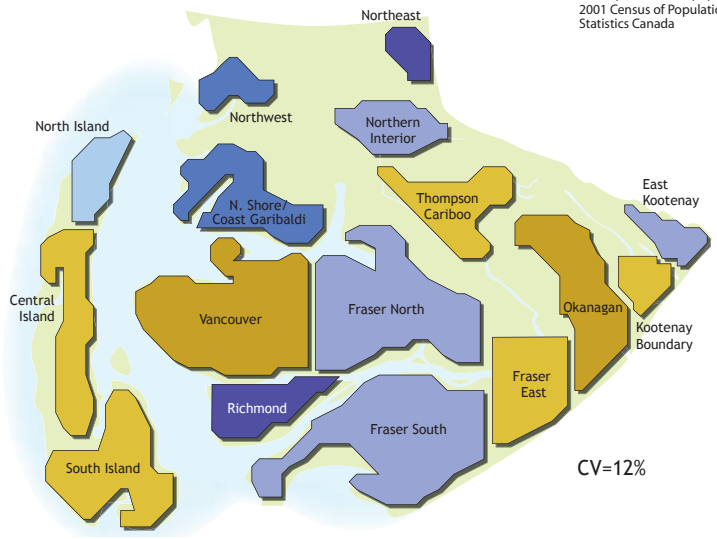
Total exp.	Public exp.	Public share	Log Dev 1996	
$486	$409	84%	0.02	Fraser East
$495	$416	84%	0.02	Fraser South
$469	$392	83%	0.01	North Island
$456	$380	83%	0.01	Fraser North
$455	$379	83%	0.01	Okanagan
$456	$378	83%	0.00	Richmond
$467	$387	83%	0.00	Central Island
$492	$404	82%	-0.01	South Island
$424	$347	82%	-0.01	Vancouver
$414	$337	81%	-0.01	Thompson Cariboo
$413	$336	81%	-0.01	Kootenay Boundary
$443	$358	81%	-0.02	Northern Interior
$429	$345	81%	-0.02	N. Shore/Coast Gar.
$463	$372	80%	-0.03	East Kootenay
$419	$335	80%	-0.03	Northwest
$381	$304	80%	-0.03	Northeast



One square = 2,000 population
2001 Census of Population
Statistics Canada

Age-adjusted subsidy for non-seniors

Total exp.	Public exp.	Public share	Log Dev 1996	
$119	$47	39%	0.12	Okanagan
$109	$42	39%	0.11	Vancouver
$118	$45	38%	0.08	Fraser East
$121	$45	38%	0.08	Central Island
$117	$44	37%	0.07	Thompson Cariboo
$126	$47	37%	0.06	South Island
$106	$39	37%	0.06	Kootenay Boundary
$107	$37	34%	-0.01	North Island
$116	$38	33%	-0.06	Fraser South
$109	$35	33%	-0.07	Fraser North
$113	$37	32%	-0.08	Northern Interior
$115	$37	32%	-0.08	East Kootenay
$112	$33	30%	-0.16	N. Shore/Coast Gar.
$110	$32	29%	-0.19	Northwest
$97	$27	28%	-0.21	Northeast
$95	$25	27%	-0.26	Richmond



Measuring Provincial Subsidy

Public subsidy is an important part of overall financing for prescription drug purchases. The primary source of public subsidy for medicines in the province is the BC PharmaCare program. First Nations, veterans and the Royal Canadian Mounted Police, who are covered by federal drug programs, are excluded from this analysis.

To describe public subsidy for medicines, we combined expenditure on ingredient costs (the prices for the drugs themselves) and the dispensing fees paid to pharmacists.

Furthermore, because there is an age-gradient in both total drug expenditure and public subsidy, data used to measure public share of total costs have been age-adjusted. Consequently, the results in this section of the report will not be exactly equal to data presented in the analysis of causes of variation across regions and trends over time.

Provincial Subsidy for Drug Spending in 1996

The overall share of total expenditures on prescription drugs that was paid for by the provincial government was 53% in 1996.

According to a recent report from the Canadian Institute for Health Information (CIHI)—"Drug Expenditures in Canada 1985-2004"—the BC government paid 47% of total prescription drug costs in 1996. The CIHI statistic differs from that reported here due to the exclusion of medical supplies from this Rx Atlas. However, the CIHI data show that provincial subsidy of prescription drug costs was higher in BC than any other province (range = 21% to 43% ; average = 40%).

Within BC, variation across HSDAs in the age-adjusted share of expenditures paid for by the government was modest in 1996 (CV=5%), ranging from 48% in Northeast and Northwest, to 56% in Okanagan and Fraser East.

Most of the age-adjusted variation in overall public subsidy that occurred in 1996 was the result of age-adjusted variations in the public share of expenditures for non-seniors (CV=12%). Non-seniors' public subsidy ranged from 27% in Richmond to 39% in Okanagan and Vancouver.

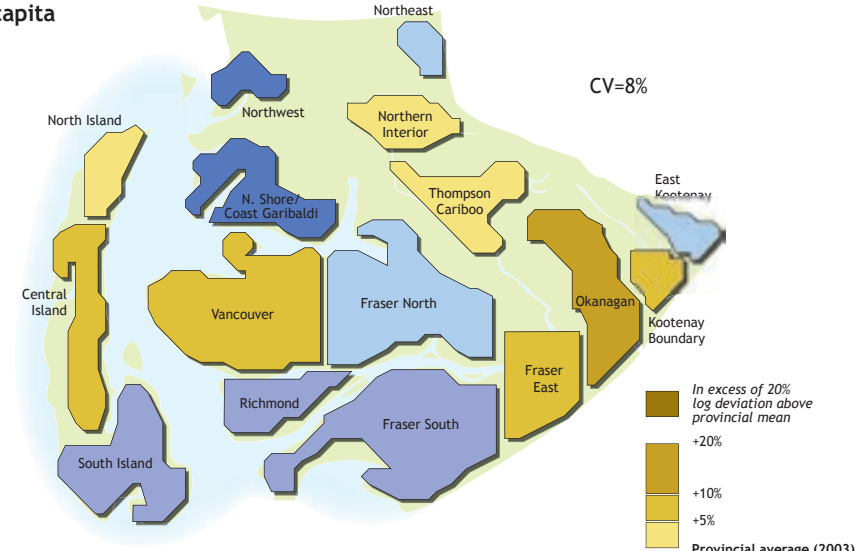
In contrast, the provincial government paid for a relatively even share of seniors' drug expenditures across HSDAs in 1996: the age-adjusted public subsidy for seniors ranged from 80% to 84% (CV=2%). In 1996, seniors were primarily responsible for paying the dispensing fees for their drug purchases; the government covered virtually all ingredient costs.

Total Expenditure and Subsidy, 2003

Health service delivery area (HSDA) cartograms and data, 2003

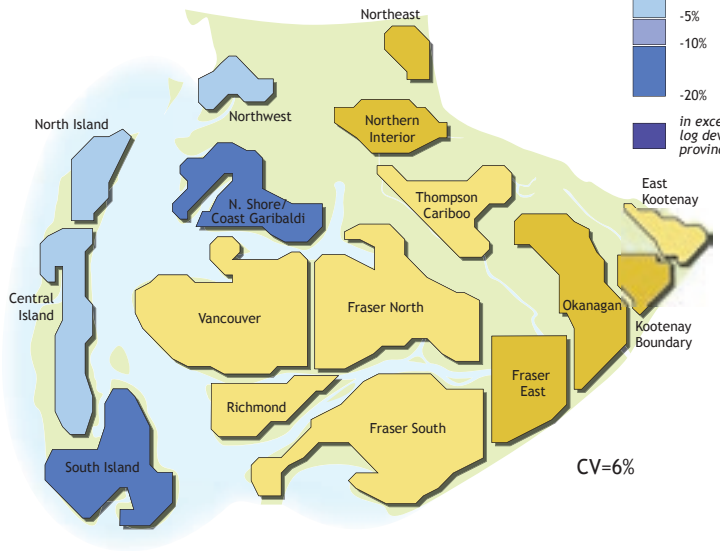
Age-adjusted expenditure and subsidy per capita

Total exp.	Public exp.	Public share	Log Dev 2003	
$362	$183	51%	0.15	Okanagan
$309	$147	47%	0.08	Kootenay Boundary
$294	$139	47%	0.08	Vancouver
$355	$166	47%	0.07	Fraser East
$347	$160	46%	0.06	Central Island
$339	$153	45%	0.04	Thompson Cariboo
$337	$151	45%	0.03	North Island
$329	$144	44%	0.00	Northern Interior
$310	$133	43%	-0.02	East Kootenay
$303	$128	42%	-0.03	Northeast
$315	$132	42%	-0.04	Fraser North
$371	$153	41%	-0.06	South Island
$330	$135	41%	-0.07	Fraser South
$271	$110	41%	-0.07	Richmond
$331	$129	39%	-0.12	Northwest
$323	$120	37%	-0.16	N. Shore/Coast Gar.



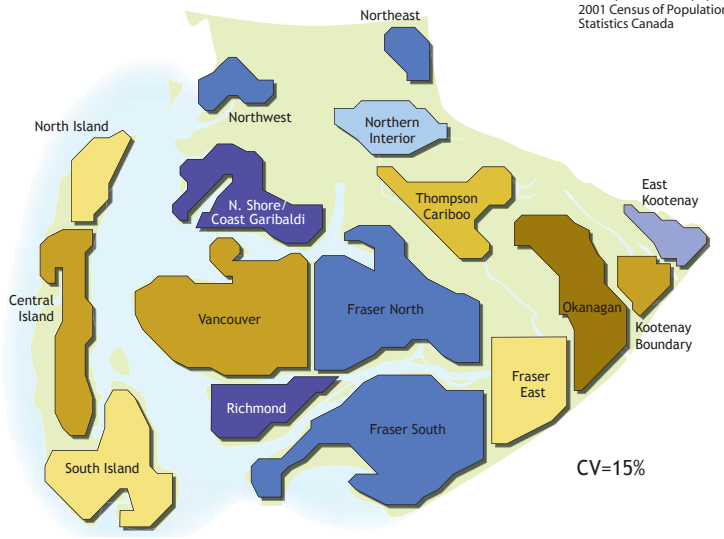
Age-adjusted subsidy for seniors

Total exp.	Public exp.	Public share	Log Dev 2003	
$940	$615	65%	0.09	Fraser East
$800	$510	64%	0.06	Kootenay Boundary
$892	$567	64%	0.06	Okanagan
$836	$526	63%	0.05	Northern Interior
$770	$484	63%	0.05	Northeast
$865	$531	61%	0.03	Thompson Cariboo
$781	$479	61%	0.03	Vancouver
$796	$486	61%	0.02	Richmond
$845	$515	61%	0.02	Fraser North
$876	$527	60%	0.01	Fraser South
$862	$517	60%	0.00	East Kootenay
$929	$554	60%	0.00	North Island
$880	$513	58%	-0.02	Central Island
$837	$487	58%	-0.03	Northwest
$956	$500	52%	-0.13	South Island
$879	$458	52%	-0.14	N. Shore/Coast Gar.



Age-adjusted subsidy for non-seniors

Total exp.	Public exp.	Public share	Log Dev 2003	
$272	$118	43%	0.25	Okanagan
$256	$101	39%	0.16	Central Island
$212	$81	38%	0.13	Vancouver
$226	$85	38%	0.11	Kootenay Boundary
$250	$89	36%	0.06	Thompson Cariboo
$256	$90	35%	0.05	Fraser East
$237	$83	35%	0.04	North Island
$272	$94	34%	0.03	South Island
$243	$79	33%	-0.03	Northern Interior
$217	$67	31%	-0.08	East Kootenay
$223	$67	30%	-0.11	Northeast
$225	$67	30%	-0.12	Fraser North
$238	$68	29%	-0.15	Fraser South
$245	$68	28%	-0.19	Northwest
$228	$62	27%	-0.20	N. Shore/Coast Gar.
$182	$47	26%	-0.27	Richmond



□ One square = 2,000 population
2001 Census of Population
Statistics Canada

Recent Policy Changes

In 2002, the BC government implemented new co-payments under the seniors drug program. Low-income seniors were required to pay $10 toward the total cost (including dispensing fee) of each of the first 20 prescriptions they filled in the year. After the 20th prescription, PharmaCare would pay 100% of costs. All other seniors were required to pay $25 toward the total cost of each of the first 11 prescriptions they filled, after which PharmaCare would pay 100% of costs.

Then, in May 2003, the government eliminated the special drug program for seniors and creating a new drug benefit program, called Fair PharmaCare, for residents of all ages. Deductibles for public coverage under Fair PharmaCare would be a percentage of household income, ranging from zero for households earning $15,000 or less, to 3% for households earning over $30,000.

Provincial Subsidy for Drug Spending in 1996

The changes in BC PharmaCare policy that occurred in 2002 and 2003 reduced the provincial subsidy for drug costs from 52% in 2001 to 48% in 2002, and then to 44% in 2003.

Statistics from the Canadian Institute for Health Information (CIHI)—"Drug Expenditures in Canada 1985-2004"—also indicated that the share of drug spending paid for by the BC government have fallen. CIHI data show that the BC government subsidized 43% of total prescription drug costs in 2003, which is closer to the national average of 40% than had been the case from 1996 to 2001.

Within BC, age-adjusted variation in the public share of expenditures was higher in 2003 than it was in 1996. The age-adjusted public subsidy in 2003 ranged from 37% in North Shore/Coast Garibaldi to 51% in Okanagan (CV=8%).

As in 1996, most of the 2003 variation in age-adjusted public subsidy stemmed from variation in the public share of expenditure for non-seniors.

The age-adjusted provincial subsidy for non-seniors' drug expenditure ranged from 26% in Richmond to 43% in Okanagan (CV=15%).

Variation in public subsidy increased slightly for seniors (CV=6%), who received an average, age-adjusted subsidy ranging from 52% in North Shore/Coast Garibaldi to 65% in Fraser East.

Because the Fair PharmaCare program began in 2003, the changes in regional allocation of provincial subsidy for pharmaceuticals in 2003 likely reflect variations in needs relative to average household incomes.

Hypertension Treatments

Hypertension drugs are the largest therapeutic category in terms of expenditure per capita in BC: $45 per capita in 2003. Most of this expenditure is for the purchase of ACE-inhibitors (43%), calcium channel blockers (27%), and angiotensin receptor blockers (15%). Beta-blockers and diuretics account for only 14% of expenditure in this category because they are a fraction of the cost of top-selling ACE-inhibitors, calcium channel blockers, and angiotensin receptor blockers, eventhough they are used by 47% of the users of antihypertensive drugs in BC.

Among populations aged 45 years and older, expenditure on hypertension therapies increases rapidly with age. Per capita spending among the elderly (over age 65) was nearly $200 in 2003—four times that of residents aged 45 to 64, and 50 times that of residents under age 45.

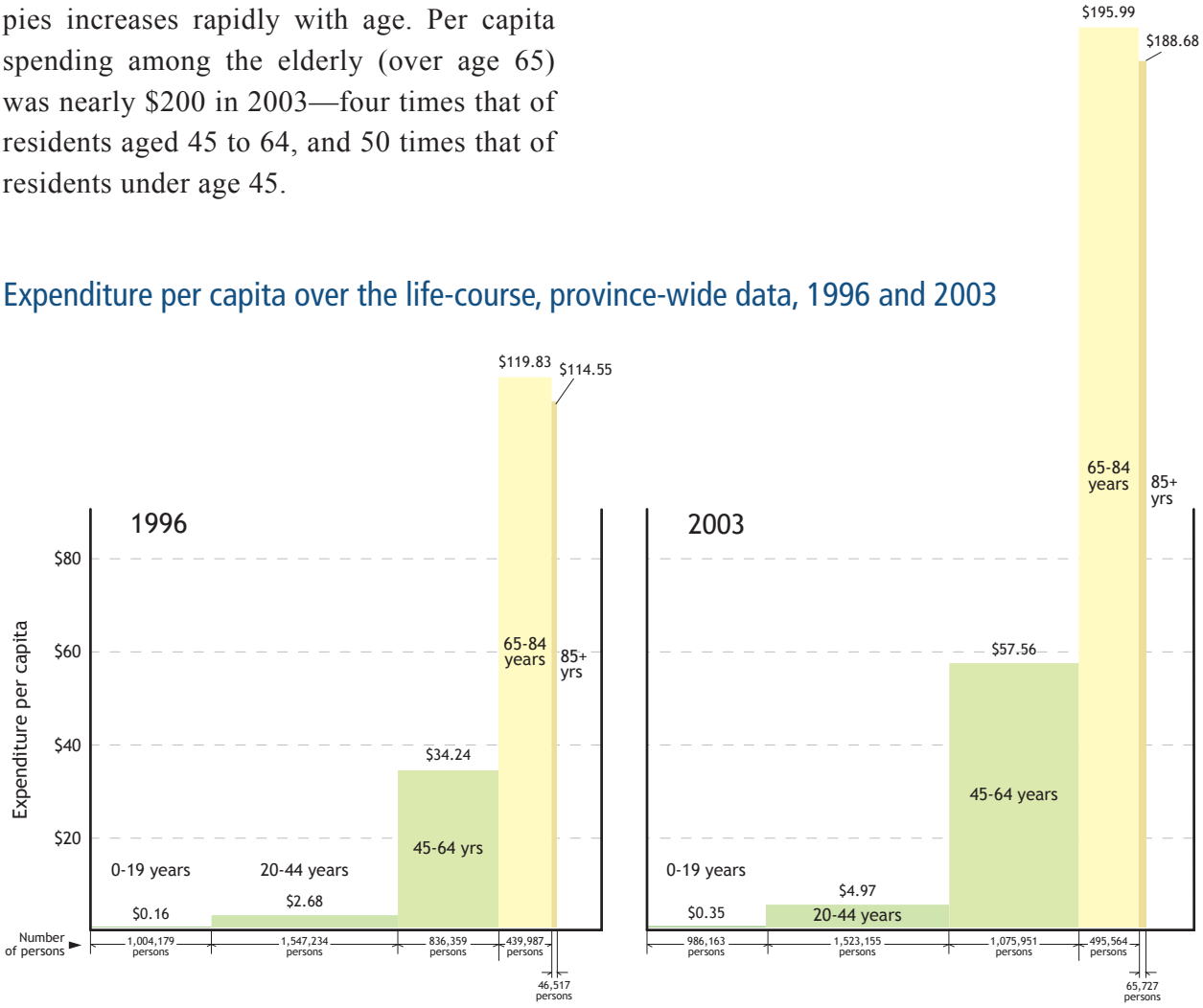
Drugs in this therapeutic category:

- Diuretics (*e.g. hydrocholrothiazide*)
- Beta blocking agents (*e.g. atenolol*)
- Calcium channel blockers (*e.g. nifedipine*)
- Angiotensin converting enzyme inhibitors (*e.g. ramipril*)
- Angiotensin receptor blockers (*e.g. losartan*)

Indications for use:

- Reduction of high blood pressure

Expenditure per capita over the life-course, province-wide data, 1996 and 2003



Components of change by health service delivery area (HSDA), 1996-2003

	Expenditure per capita			Determinants of expenditure			
	1996	2003	AAGR*	Aging	Utilization	Choices	Prices
Northeast	$14.94	$35.12	13.0%	3.0%	6.1%	4.3%	-0.8%
Northwest	$19.13	$43.43	12.4%	4.1%	5.9%	3.2%	-1.1%
Northern Interior	$18.61	$41.30	12.1%	3.6%	5.5%	3.5%	-0.9%
Thompson Cariboo	$21.72	$46.79	11.6%	2.8%	5.7%	3.3%	-0.5%
North Island	$24.59	$49.48	10.5%	3.4%	5.0%	2.4%	-0.5%
N. Shore/Coast Gar.	$21.74	$42.47	10.0%	1.3%	5.1%	4.2%	-0.8%
Central Island	$28.66	$55.93	10.0%	2.1%	5.1%	3.3%	-0.8%
Okanagan	$29.55	$56.76	9.8%	1.4%	5.2%	3.9%	-0.9%
Kootenay Boundary	$26.75	$49.96	9.3%	2.0%	4.6%	3.2%	-0.7%
Richmond	$23.21	$43.20	9.3%	1.8%	4.5%	3.9%	-1.2%
East Kootenay	$26.55	$47.59	8.7%	2.1%	5.1%	2.3%	-1.0%
South Island	$31.06	$54.60	8.4%	0.7%	4.9%	3.4%	-0.7%
Vancouver	$21.97	$38.38	8.3%	0.7%	4.4%	4.0%	-1.0%
Fraser North	$23.27	$40.14	8.1%	1.1%	4.3%	3.4%	-0.9%
Fraser South	$25.10	$43.12	8.0%	1.1%	4.7%	3.0%	-1.0%
Fraser East	$29.84	$50.71	7.9%	0.8%	4.7%	3.3%	-1.0%

* AAGR = average annual growth rate

Sources: Authors' calculations based on BC PharmaNet (Claims History) and BCLHD (Population Registry).

The steep age gradient for hypertension drugs expenditure is reflected in the impact of population aging on expenditure trends in many HSDAs. Hypertension expenditure per capita grew by 8% to 13% per year across HSDAs, with aging explaining over 3% of the annual growth rate in some regions.

Utilization was the most significant driver of expenditure across all the HSDAs, ranging from just over 6% in Northeast to 4.4% in Vancouver.

The increased availability of generic drugs in this therapeutic category resulted in lower average prices, reducing expenditure growth by approximately 1% per year.

Despite increased use of generic versions of older hypertension treatments, gradual trends in choices towards newer, more costly classes of hypertension drugs (ACE-inhibitors, calcium channel blockers, and angiotensin receptor blockers) increased expenditures per capita by 3% to 4% per year in nearly every HSDA.

Combined with steady increases in the age-adjusted use of hypertension treatments, these results indicate more people were receiving more costly treatments for hypertension in all regions of BC in 2003.

Hypertension Treatments

Health service delivery area (HSDA) cartograms and data, 1996 and 2003

Age-adjusted expenditure per capita

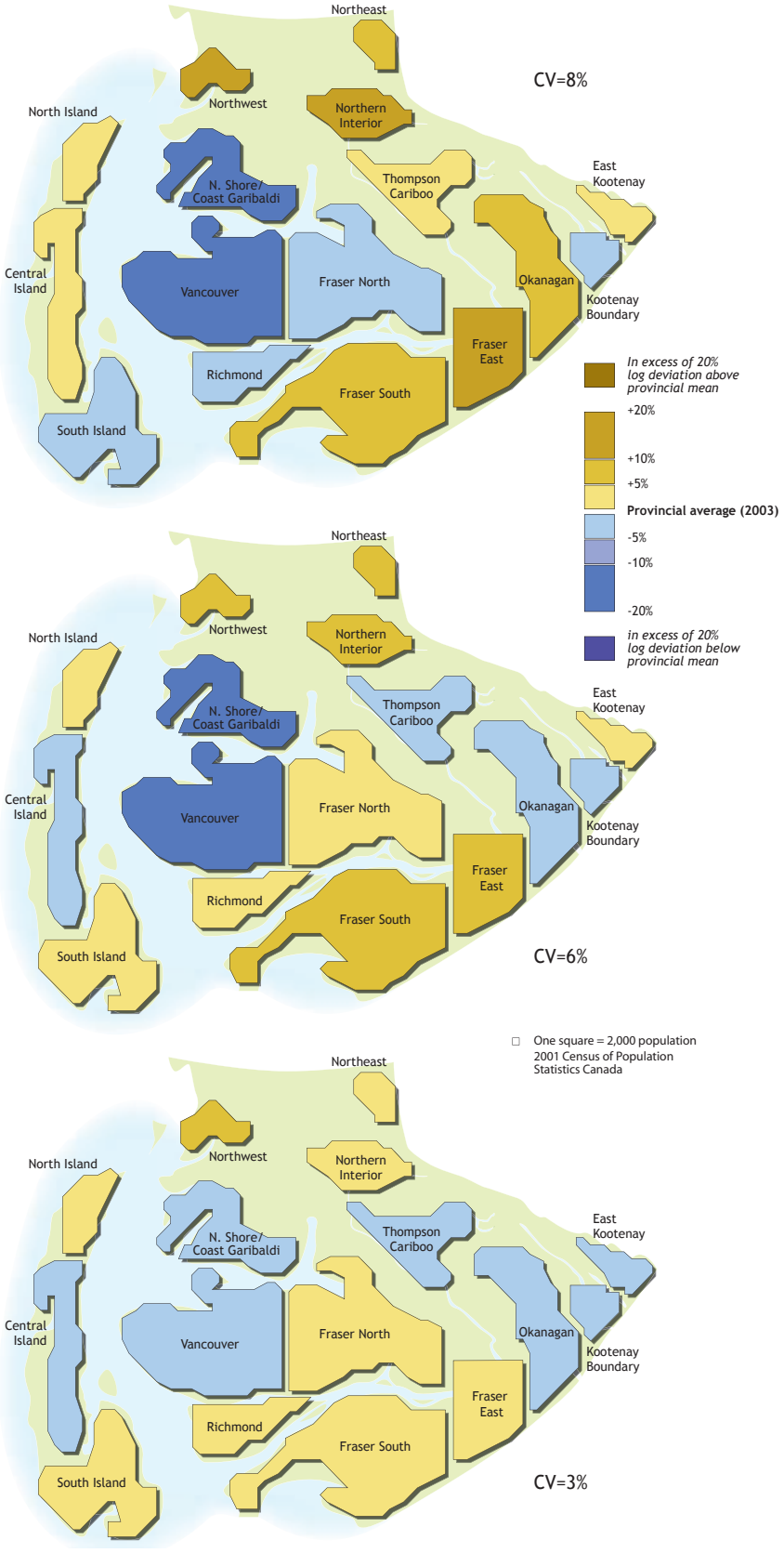
1996	2003	Change	Log Dev 2003	
$28	$53	89%	+0.15	Northwest
$29	$52	78%	+0.13	Fraser East
$27	$51	91%	+0.11	Northern Interior
$24	$49	107%	+0.07	Northeast
$28	$48	74%	+0.06	Fraser South
$27	$48	77%	+0.05	Okanagan
$26	$46	79%	+0.02	East Kootenay
$27	$46	72%	+0.01	Central Island
$25	$46	86%	+0.01	Thompson Cariboo
$26	$46	76%	+0.01	North Island
$24	$45	87%	-0.00	Fraser North
$23	$45	93%	-0.02	South Island
$22	$44	97%	-0.04	Richmond
$24	$44	80%	-0.04	Kootenay Boundary
$22	$41	83%	-0.11	Vancouver
$21	$41	97%	-0.11	N. Shore/Coast Gar.

Age-adjusted users per 1,000 population

1996	2003	Change	Log Dev 2003	
98	147	51%	+0.09	Northwest
103	146	43%	+0.09	Fraser East
99	145	47%	+0.08	Northern Interior
91	142	55%	+0.06	Northeast
99	142	43%	+0.06	Fraser South
94	137	46%	+0.02	North Island
93	136	47%	+0.02	Richmond
93	136	46%	+0.01	East Kootenay
91	135	49%	+0.01	South Island
93	135	44%	+0.01	Fraser North
95	134	41%	-0.00	Central Island
91	133	46%	-0.01	Okanagan
93	131	41%	-0.02	Thompson Cariboo
92	131	42%	-0.02	Kootenay Boundary
87	122	40%	-0.09	Vancouver
83	121	46%	-0.10	N. Shore/Coast Gar.

Cost per user

1996	2003	Change	Log Dev 2003	
$286	$359	25%	+0.05	Northwest
$290	$355	22%	+0.04	North Island
$283	$354	25%	+0.04	Fraser East
$278	$353	27%	+0.04	Richmond
$269	$351	30%	+0.03	Northern Interior
$271	$345	27%	+0.02	South Island
$258	$343	33%	+0.01	Northeast
$274	$343	25%	+0.01	Fraser North
$279	$341	22%	+0.00	Fraser South
$288	$338	17%	-0.01	East Kootenay
$248	$336	35%	-0.01	N. Shore/Coast Gar.
$261	$335	29%	-0.01	Central Island
$255	$333	31%	-0.02	Vancouver
$263	$333	27%	-0.02	Kootenay Boundary
$246	$327	33%	-0.04	Okanagan
$246	$326	33%	-0.04	Thompson Cariboo



Hypertension Treatments

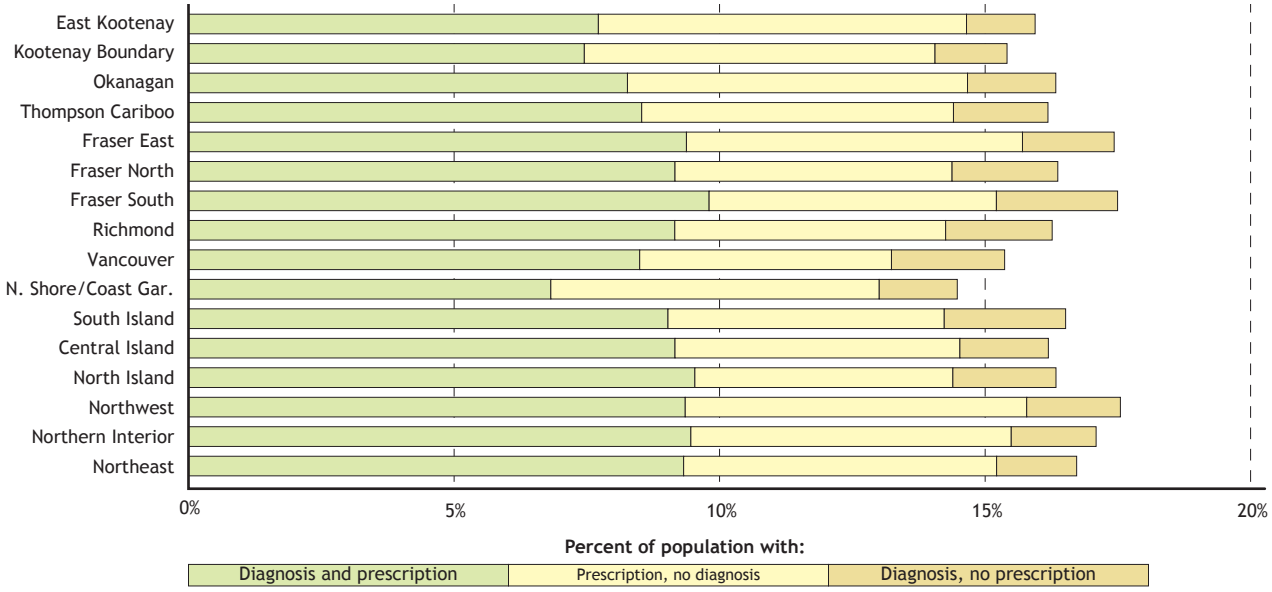
Of the 15 leading therapeutic drug classes, hypertension treatments exhibited the lowest regional variations in age-adjusted expenditure and use; and the second lowest variation in cost per user.

Age-adjusted expenditure per capita on hypertension treatments in 2003 was highest in Northwest, Fraser East, and Northern Interior. North Shore/Coast Garibaldi and Vancouver had the lowest cost per capita.

As with expenditure per capita, use of hypertension treatments was highest in Northwest, Fraser East, and Northern Interior; and lowest in North Shore/Coast Garibaldi and Vancouver. Costs per user deviated by less than 5%.

Nearly 15% of the provincial population (age-adjusted) filled a prescription for antihypertensive medication. Approximately two-thirds of these people also had medical records indicating a diagnosis of hypertension in 2003. Between 15% and 20% of those diagnosed with hypertension did not fill a prescription for a hypertension drug.

Age-adjusted rates of prescription and/or related diagnosis, province-wide, 2003



Measure of diagnosis based on "Hypertension" Expanded Diagnosis Cluster CAR02

Psychoanaleptics

Per capita expenditure on psychoanaleptics in BC more than doubled from $13 in 1996 to $32 in 2003. Almost all (91%) of the expenditure in this therapeutic category is on antidepressants, and over half (55%) is on selective serotonin reuptake inhibitors.

Expenditure on psychoanaleptics was relatively evenly distributed across adult age categories: nearly three-quarters (72%) of the 2003 expenditure was accounted for by populations aged 20 to 64.

Although the age-gradient in expenditures per capita is not steep for this therapeutic category, growth in psychoanaleptics expenditure was highest among the elderly.

Particularly notable is the growth in expenditures per resident over age 85, which increased from approximately $20 in 1996 to $73 in 2003.

Drugs in this therapeutic category:

- Antidepressants: selective serotonin reumtake inhibitors (*e.g. paroxetine)*
- Antidepressants: other (*e.g. venlafaxine)*
- Antidepressants:: nonselective monoamine reuptake inhibitors (*e.g. amitriptyline)*
- Psychostimulants (*e.g. methylphenidate*)
- Antidementia drugs (*e.g. donepezil)*

Indications for use:

- Antidepressants: treatment of depression and anxiety
- Pyschostimulants: treatment of Attention Deficit Hyperactivity Disorder (ADHD)
- Antidementia drugs: symptomatic treatment of dementia caused by diseases such as Alzheimer's

Expenditure per capita over the life-course, province-wide data, 1996 and 2003

Components of change by health service delivery area (HSDA), 1996-2003

	Expenditure per capita			Determinants of expenditure			
	1996	2003	AAGR*	Aging	Utilization	Choices	Prices
Northwest ⚠	$9.59	$29.14	17.2%	0.9%	11.6%	7.2%	-2.9%
North Island	$11.31	$33.16	16.6%	0.9%	10.0%	7.5%	-2.2%
Northeast ⚠	$8.01	$22.63	16.0%	0.7%	10.0%	7.7%	-2.7%
Fraser East	$12.42	$34.47	15.7%	0.1%	9.2%	8.4%	-2.4%
Okanagan	$14.78	$40.37	15.4%	0.5%	9.6%	7.3%	-2.3%
Central Island	$14.25	$38.34	15.2%	0.5%	9.2%	7.5%	-2.4%
Kootenay Boundary	$11.52	$30.49	14.9%	0.6%	9.4%	6.6%	-2.0%
South Island	$17.21	$43.61	14.2%	-0.1%	8.5%	7.8%	-2.3%
Fraser North	$10.93	$27.62	14.2%	0.1%	8.1%	7.8%	-2.2%
East Kootenay	$11.97	$29.81	13.9%	0.5%	8.8%	7.0%	-2.7%
Northern Interior	$12.22	$30.18	13.8%	1.1%	8.5%	6.4%	-2.5%
Thompson Cariboo	$14.04	$34.21	13.6%	0.3%	8.5%	6.8%	-2.3%
N. Shore/Coast Gar.	$14.42	$34.17	13.1%	0.1%	8.6%	6.4%	-2.3%
Fraser South	$12.56	$29.73	13.1%	0.3%	7.7%	7.2%	-2.3%
Vancouver	$12.91	$26.83	11.0%	0.1%	6.8%	6.5%	-2.5%
Richmond	$9.62	$19.87	10.9%	0.4%	6.2%	6.7%	-2.4%

Sources: Authors' calculations based on BC PharmaNet (Claims History) and BCLHD (Population Registry).

* AAGR = average annual growth rate

⚠ Data stability warning: one or more population cells with less than 100 individuals

Across HSDAs, annual growth in per capita psychoanaleptics expenditure ranged from 10.9% to 17.2%. The modest impact of population aging on expenditures reflects the relatively flat age-gradient.

Prices paid for psychoanaleptic drugs fell due to use of generic medicines. But this was more than offset by trends toward the selection of more expensive classes of drug and more expensive drugs from within such classes. These choices increased psychoanaleptics expenditure by about 7% per year in most HSDAs.

Increased utilization of psychoanaleptics contributed significantly to expenditure trends. Accounting for between 6% and 11% growth per year, variations in the trend toward greater (age-adjusted) use of psychoanaleptics explained most of the variation in expenditure growth rates across HSDAs.

Psychoanaleptics

Health service delivery area (HSDA) cartograms and data, 1996 and 2003

Age-adjusted expenditure per capita

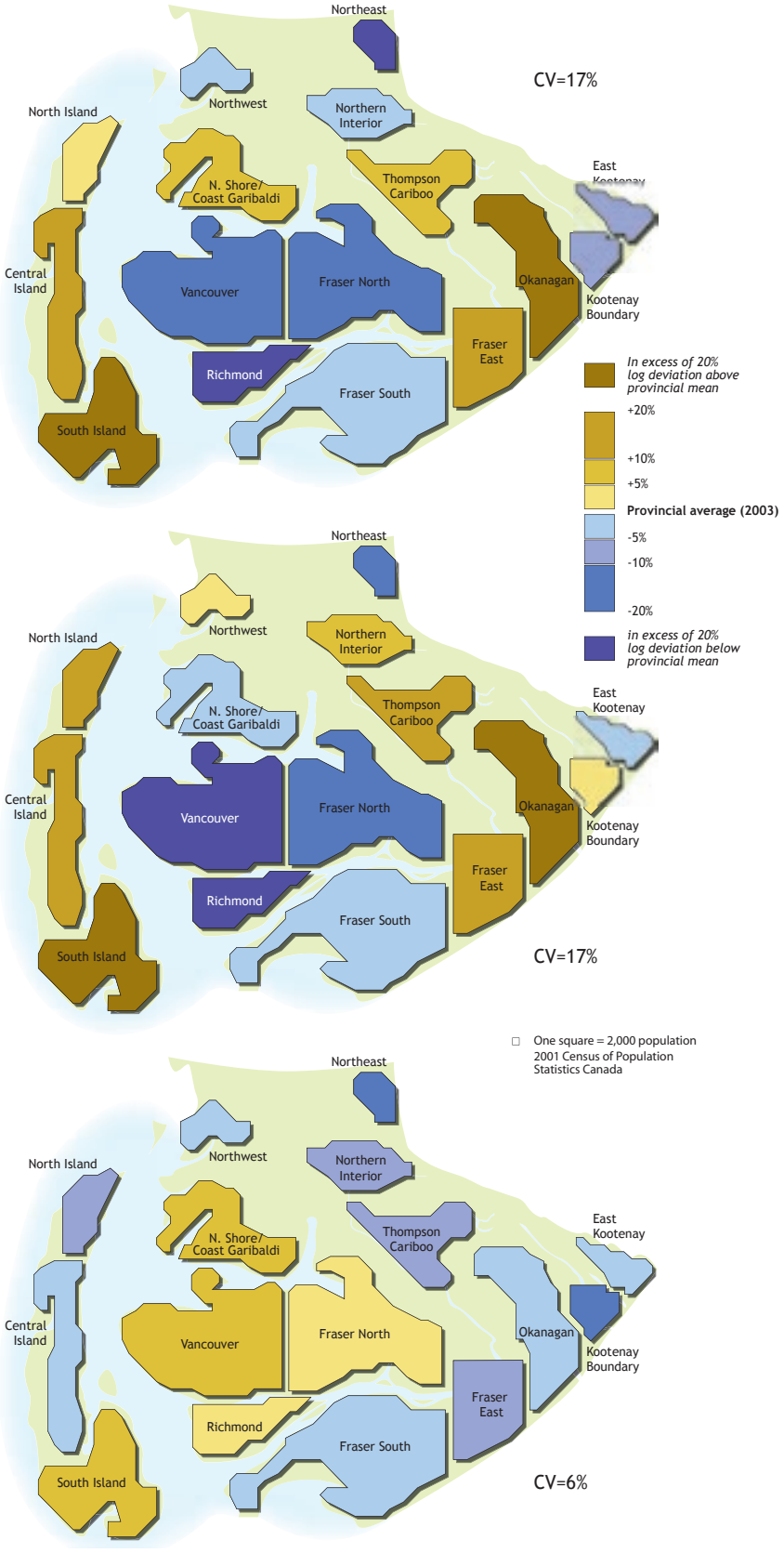
1996	2003	Change	Log Dev 2003	
$17	$41	148%	+0.26	South Island
$15	$39	170%	+0.21	Okanagan
$14	$37	160%	+0.14	Central Island
$13	$36	181%	+0.13	Fraser East
$14	$34	140%	+0.06	Thompson Cariboo
$14	$33	138%	+0.05	N. Shore/Coast Gar.
$12	$33	185%	+0.04	North Island
$13	$32	140%	-0.01	Northern Interior
$13	$31	141%	-0.01	Fraser South
$10	$31	198%	-0.04	Northwest
$12	$30	143%	-0.07	East Kootenay
$12	$29	154%	-0.08	Kootenay Boundary
$11	$28	159%	-0.11	Fraser North
$12	$26	114%	-0.19	Vancouver
$9	$25	180%	-0.25	Northeast
$10	$20	107%	-0.46	Richmond

Age-adjusted users per 1,000 population

1996	2003	Change	Log Dev 2003	
67	117	74%	+0.22	Okanagan
71	116	63%	+0.20	South Island
69	114	65%	+0.18	Fraser East
65	110	70%	+0.15	Central Island
67	109	61%	+0.14	Thompson Cariboo
59	108	83%	+0.13	North Island
64	102	60%	+0.08	Northern Interior
56	98	74%	+0.03	Kootenay Boundary
49	95	97%	+0.01	Northwest
61	94	54%	-0.00	Fraser South
57	93	63%	-0.02	East Kootenay
56	92	64%	-0.03	N. Shore/Coast Gar.
47	84	80%	-0.12	Northeast
52	83	58%	-0.14	Fraser North
50	74	47%	-0.24	Vancouver
42	60	42%	-0.46	Richmond

Cost per user

1996	2003	Change	Log Dev 2003	
$249	$363	46%	+0.08	N. Shore/Coast Gar.
$234	$356	52%	+0.06	South Island
$244	$353	45%	+0.05	Vancouver
$210	$345	64%	+0.03	Fraser North
$230	$336	46%	+0.00	Richmond
$216	$335	55%	-0.00	Okanagan
$218	$335	53%	-0.00	Central Island
$212	$332	57%	-0.01	Fraser South
$212	$321	52%	-0.05	Northwest
$214	$319	49%	-0.05	East Kootenay
$187	$318	71%	-0.05	Fraser East
$209	$311	49%	-0.08	Thompson Cariboo
$206	$308	50%	-0.08	Northern Interior
$197	$308	56%	-0.09	North Island
$205	$300	46%	-0.11	Kootenay Boundary
$188	$294	56%	-0.13	Northeast



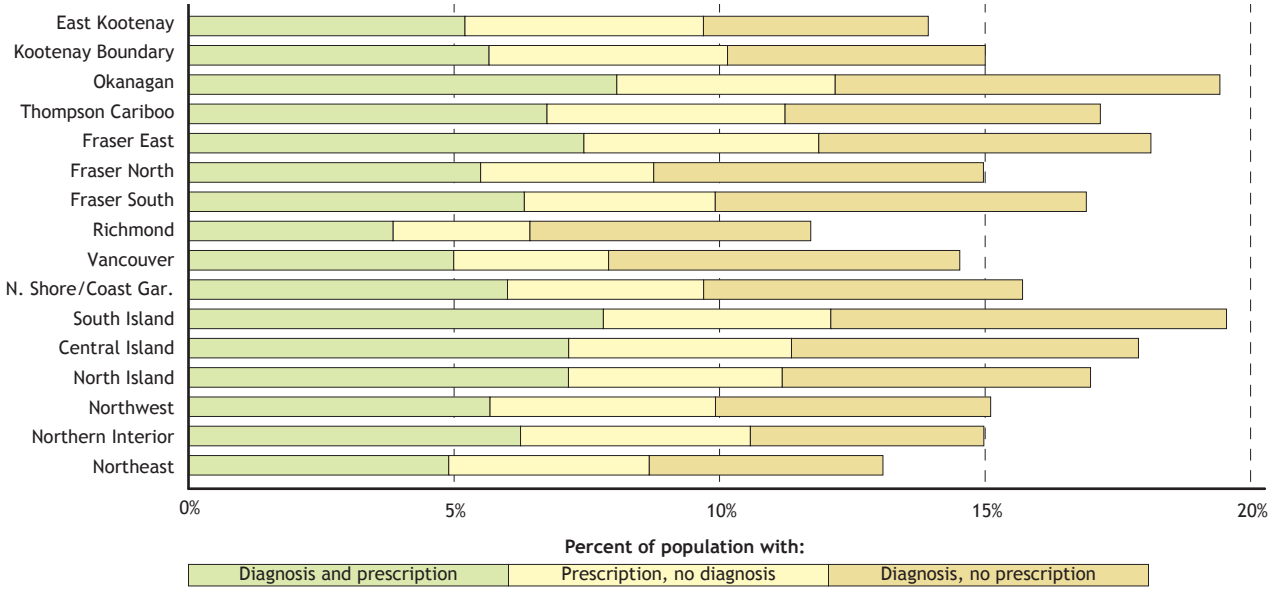
Age-adjusted expenditure per capita on psychoanaleptics varied moderately across HSDAs (CV=17%). Expenditure per capita in 2003 ranged from approximately $20 in Richmond to approximately $40 in South Vancouver Island and Okanagan.

Virtually all of the expenditure variation stemmed from variation in utilization (CV=17%). The number of users per 1,000 population ranged from approximately 60 in Richmond to nearly 117 in South Vancouver Island and Okanagan.

The proportion of the population diagnosed with depression ranged from 9% to 15% across HSDAs. About half of these residents purchased psychoanaleptic prescriptions in all HSDAs except Richmond and Vancouver (~43%).

Approximately one-third of residents who filled psychoanaleptic prescriptions did not have a recorded diagnosis of depression in 2003.

Age-adjusted rates of prescription and/or related diagnosis, province-wide, 2003



Measure of diagnosis based on "Depression, Anxiety, Neuroses" Expanded Diagnosis Cluster PSY01

Serum Lipid Reducing Agents

Between 1996 and 2003, per capita expenditure on serum lipid reducing agents (cholesterol drugs) more than tripled from $9 to $29. Almost all of the expenditure in this therapeutic category is for HMG-CoA reductase inhibitors (statins, 94%) and fibrates (5%).

Residents aged 45 and older accounted for virtually all expenditure in this category.

In 2003, $44 was spent on cholesterol drugs per resident aged 45 to 64, accounting for 40% of total expenditures on this therapeutic category. However, an even greater share (53%) of expenditures were concentrated among residents aged 65 to 84, for whom $123 per capita was spent on cholesterol drugs.

Expenditure growth was most rapid among residents over the age of 85. Cholesterol drug expenditure among residents in this age group increased nearly ten-fold (from under $4 to $41).

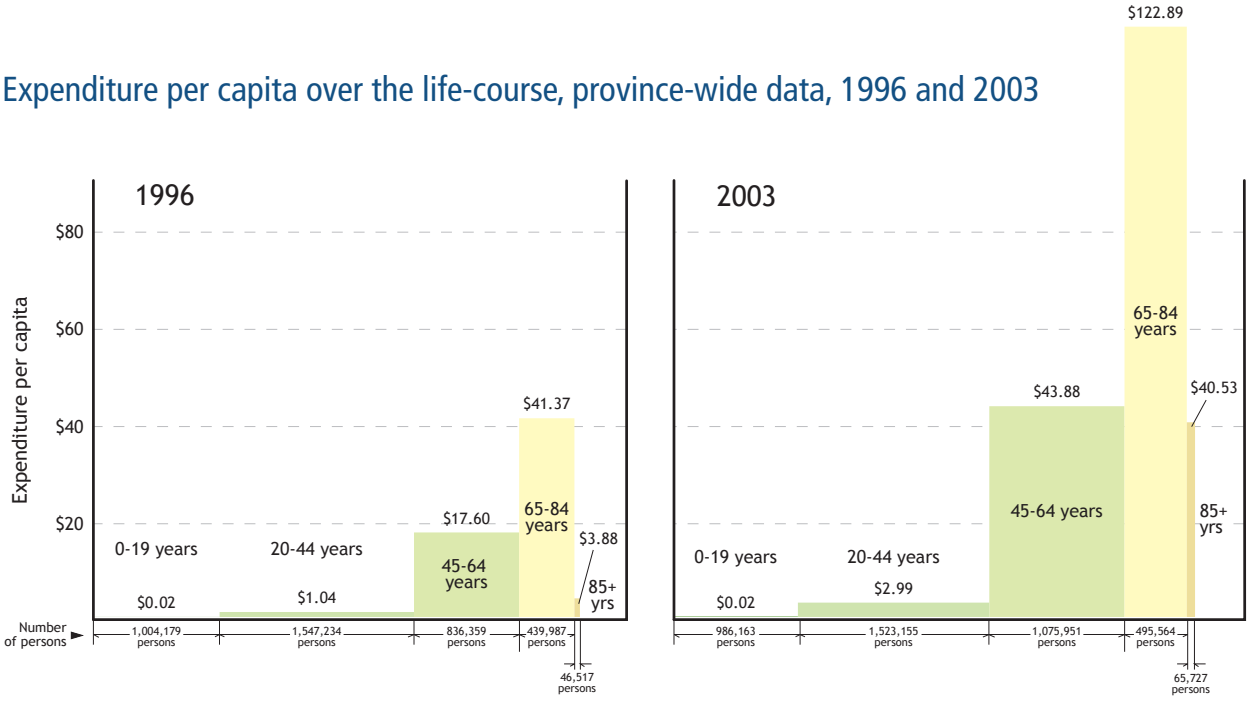
Drugs in this therapeutic category:

- HMG-CoA reductase inhibitors (*e.g. atorvastatin*)
- Fibrates (*e.g. gemfibrozil*)
- Bile acid sequestrants (*e.g. colestyramine*)
- Nicotinic acid and derivatives (*e.g. niacin)*

Indications for use:

- Reduction of serum lipid levels (treatment of high cholesterol)

Expenditure per capita over the life-course, province-wide data, 1996 and 2003



Components of change by health service delivery area (HSDA), 1996-2003

	Expenditure per capita			Determinants of expenditure			
	1996	2003	AAGR*	Aging	Utilization	Choices	Prices
Northeast ⚠	$3.69	$18.93	26.3%	2.3%	24.9%	1.2%	-2.3%
Northwest ⚠	$4.22	$21.11	25.9%	1.4%	24.9%	2.4%	-3.0%
Northern Interior ⚠	$6.73	$28.01	22.6%	3.2%	20.8%	0.9%	-2.6%
Kootenay Boundary ⚠	$6.26	$24.45	21.5%	0.0%	22.3%	2.8%	-3.3%
North Island ⚠	$8.19	$31.48	21.2%	1.3%	21.1%	2.2%	-3.3%
Thompson Cariboo ⚠	$8.67	$30.69	19.8%	2.2%	18.5%	2.2%	-3.2%
N. Shore/Coast Gar. ⚠	$7.86	$27.26	19.5%	-0.1%	20.0%	1.9%	-2.3%
Fraser North	$8.51	$26.54	17.6%	0.7%	17.9%	1.6%	-2.5%
Fraser East ⚠	$11.17	$34.70	17.6%	-0.9%	20.0%	1.8%	-2.9%
East Kootenay ⚠	$8.03	$24.54	17.3%	1.4%	18.2%	1.6%	-3.6%
Central Island ⚠	$12.06	$36.39	17.1%	1.3%	17.2%	1.6%	-2.9%
Fraser South	$9.86	$29.52	17.0%	0.6%	17.3%	1.6%	-2.5%
Vancouver	$7.79	$23.16	16.9%	0.2%	17.7%	1.9%	-2.8%
Richmond ⚠	$9.46	$27.43	16.4%	0.9%	16.3%	1.5%	-2.2%
South Island	$12.79	$35.11	15.5%	-0.8%	17.7%	1.8%	-2.9%
Okanagan	$12.39	$33.98	15.5%	0.0%	17.6%	1.7%	-3.5%

Sources: Authors' calculations based on BC PharmaNet (Claims History) and BCLHD (Population Registry).

* AAGR = average annual growth rate

⚠ Data stability warning: one or more population cells with less than 100 individuals

The average annual growth in expenditures on cholesterol drugs ranged from 15.5% to 26.3% across HSDAs (rates at which expenditure doubles every three to five years).

Because utilization of cholesterol drugs is very low among young adults and children, the cell sizes (e.g. users by HSDA/age/year) were less than 100 for certain expenditure determinant calculations (see cautions). Nevertheless, the consistent finding across HSDAs is that utilization drove expenditure in this therapeutic category.

Increased use of generic drugs generated price savings that were nearly offset by trends toward the choice of more costly drug types. Trends in choices reflected a decline in the share of lipid lowering drug users that received fibrates and an increase in the share receiving statins.

Serum Lipid Reducing Agents

Health service delivery area (HSDA) cartograms and data, 1996 and 2003

Age-adjusted expenditure per capita

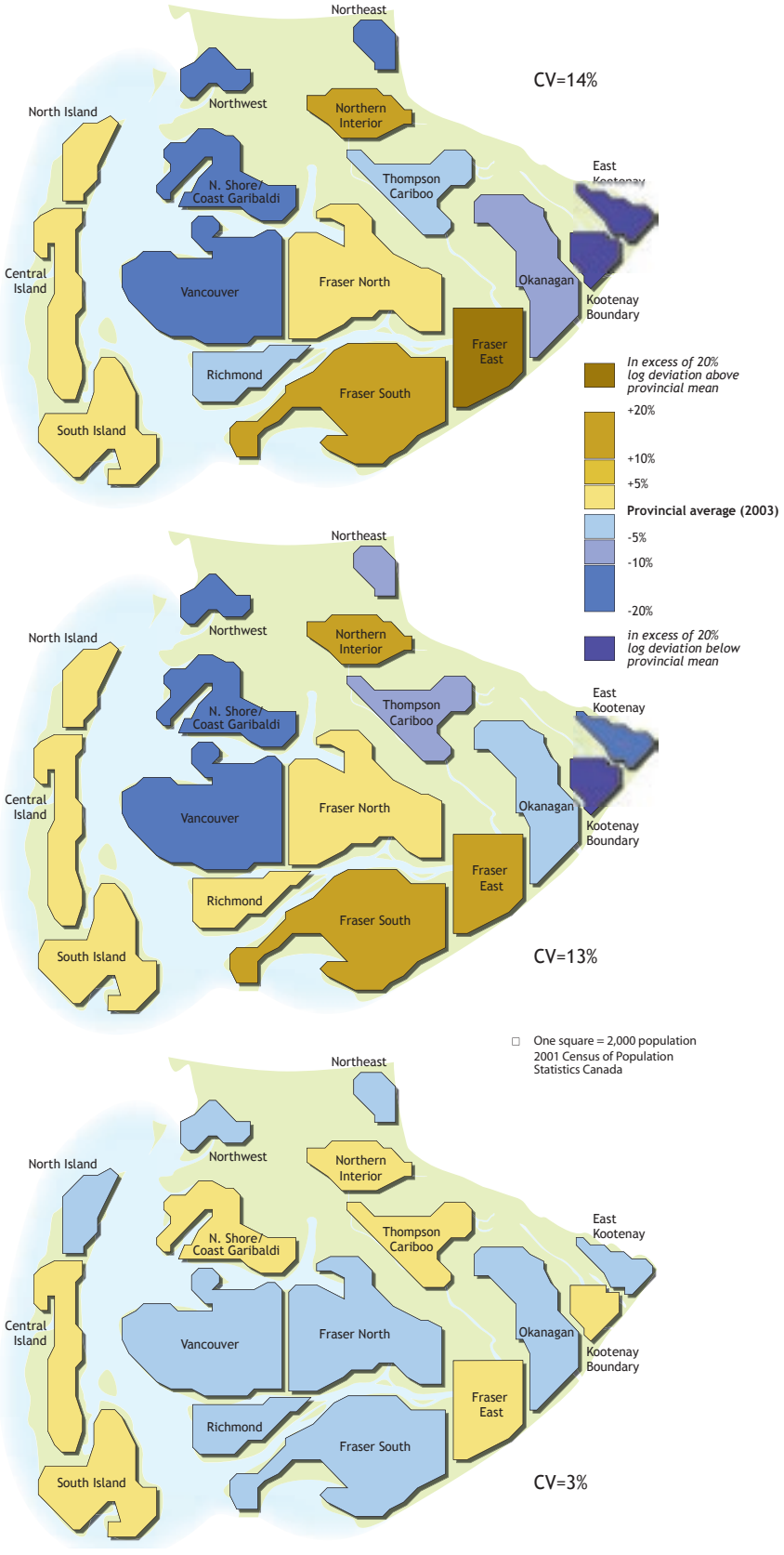
1996	2003	Change	Log Dev 2003	
$11	$36	221%	+0.21	Fraser East
$9	$33	266%	+0.14	Northern Interior
$11	$33	206%	+0.12	Fraser South
$11	$30	183%	+0.04	South Island
$9	$30	218%	+0.03	Fraser North
$9	$30	244%	+0.03	North Island
$10	$30	188%	+0.02	Central Island
$10	$29	186%	-0.00	Richmond
$9	$28	229%	-0.02	Thompson Cariboo
$10	$27	173%	-0.06	Okanagan
$7	$26	252%	-0.11	N. Shore/Coast Gar.
$5	$26	386%	-0.12	Northeast
$8	$25	211%	-0.16	Vancouver
$6	$24	339%	-0.17	Northwest
$8	$23	195%	-0.21	East Kootenay
$6	$21	275%	-0.30	Kootenay Boundary

Age-adjusted users per 1,000 population

1996	2003	Change	Log Dev 2003	
23	73	220%	+0.19	Fraser East
22	69	210%	+0.13	Fraser South
18	68	276%	+0.13	Northern Interior
18	63	246%	+0.04	North Island
20	63	213%	+0.04	Fraser North
21	61	189%	+0.01	South Island
22	61	177%	+0.01	Richmond
21	60	192%	+0.00	Central Island
20	57	186%	-0.05	Okanagan
17	56	223%	-0.06	Thompson Cariboo
11	55	403%	-0.09	Northeast
18	53	201%	-0.12	Vancouver
12	52	330%	-0.14	Northwest
15	51	235%	-0.16	N. Shore/Coast Gar.
15	49	222%	-0.19	East Kootenay
12	44	263%	-0.31	Kootenay Boundary

Cost per user

1996	2003	Change	Log Dev 2003	
$483	$507	5%	+0.05	N. Shore/Coast Gar.
$494	$502	2%	+0.04	Thompson Cariboo
$510	$500	-2%	+0.03	South Island
$491	$493	0%	+0.02	Fraser East
$499	$491	-2%	+0.02	Central Island
$502	$488	-3%	+0.01	Northern Interior
$472	$488	3%	+0.01	Kootenay Boundary
$471	$478	2%	-0.01	Fraser North
$484	$478	-1%	-0.01	Fraser South
$461	$477	3%	-0.01	Richmond
$478	$476	0%	-0.01	North Island
$497	$474	-5%	-0.02	Okanagan
$517	$474	-8%	-0.02	East Kootenay
$487	$470	-3%	-0.03	Northeast
$459	$469	2%	-0.03	Northwest
$452	$466	3%	-0.04	Vancouver



Serum Lipid Reducing Agents

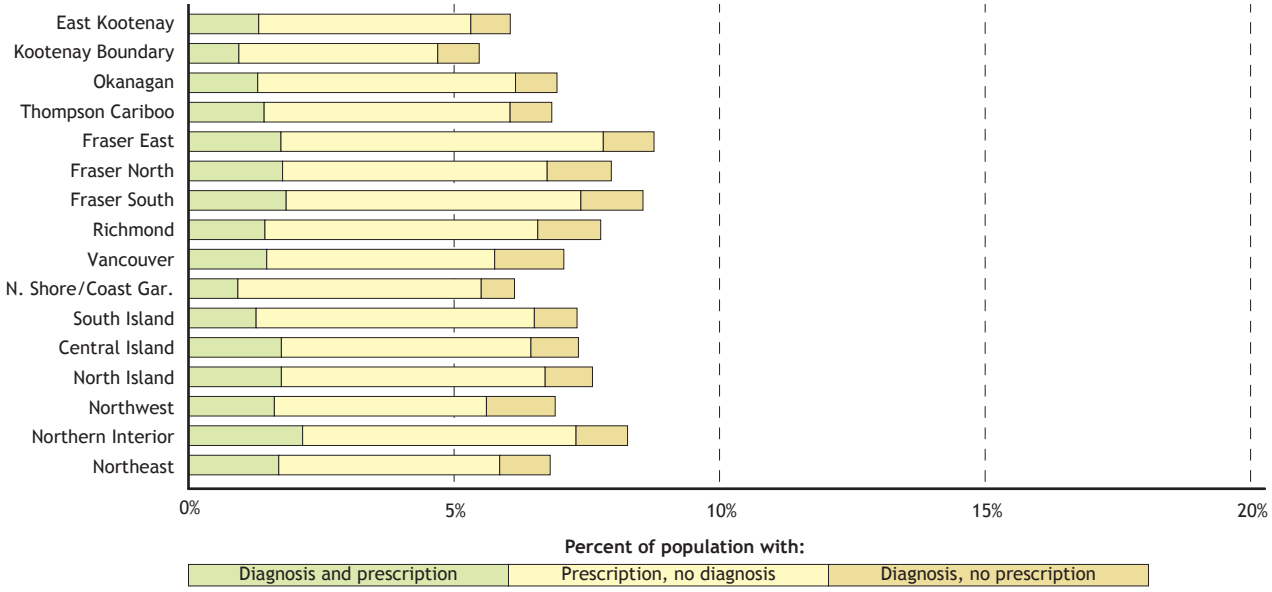
Age-adjusted expenditure per capita on serum lipid reducing agents varied modestly across HSDAs (CV=14%) in 2003. Kootenay Boundary was an outlier at roughly $21 per capita, compared to a $29 provincial average.

As with trends over time, variations in cholesterol drug expenditure across regions are explained by utilization. The age-adjusted number of cholesterol drug users per 1,000 population ranged from 44 to 73 (CV=13%) in 2003. In contrast, costs per user varied less in this category than did costs per user in any other leading therapeutic category (CV=3%).

The proportions of the population that filled one or more prescriptions for a cholesterol drug in 2003 ranged from 4.7% to 7.8% across HSDAs.

Drug use was, on average, more than twice as prevalent as the primary related diagnosis. For instance, the age-adjusted rates of diagnosed disorders of lipid metabolism ranged from only 1.6% to 3.1%. Across all HSDAs, between 70% and 83% of residents who filled a prescription for cholesterol drugs did not have any record of a diagnosed lipid disorder.

Age-adjusted rates of prescription and/or related diagnosis, province-wide, 2003



Measure of diagnosis based on "Disorders of Lipid Metabolism" Expanded Diagnosis Cluster CAR11

Drugs for Alimentary Acid Related Disorders

Expenditure on antacids per capita grew by nearly 150% from $8 in 1996 to $20 in 2003. Expenditure in this therapeutic category was predominantly for proton pump inhibitors (87%) and H2-receptor antagonists (11%), both of which are used to treat heartburn and ulcers.

While expenditure in each age group more than doubled, expenditure for those aged 19 and under nearly tripled from $0.20 to $0.58.

There is a steady age-gradient in antacid expenditures. Expenditure per capita roughly doubled across each step of the age profile from children through to those aged 65 to 84. Expenditures among residents aged 85 and older were slightly higher than among residents aged 65 to 84. Because of the age gradient, elderly residents accounted for nearly half (48%) of total expenditure on antacids in BC.

Per capita expenditure on antacids grew by more than 10% per year in all HSDAs—by 19.1% per year in Northwest. At these growth rates, expenditure per capita would double every four to six years.

Unlike other leading categories of treatment, therapeutic choices were the predominant determinants of expenditure trends for antacids across all HSDAs. This included the selection of more costly drug classes from within this

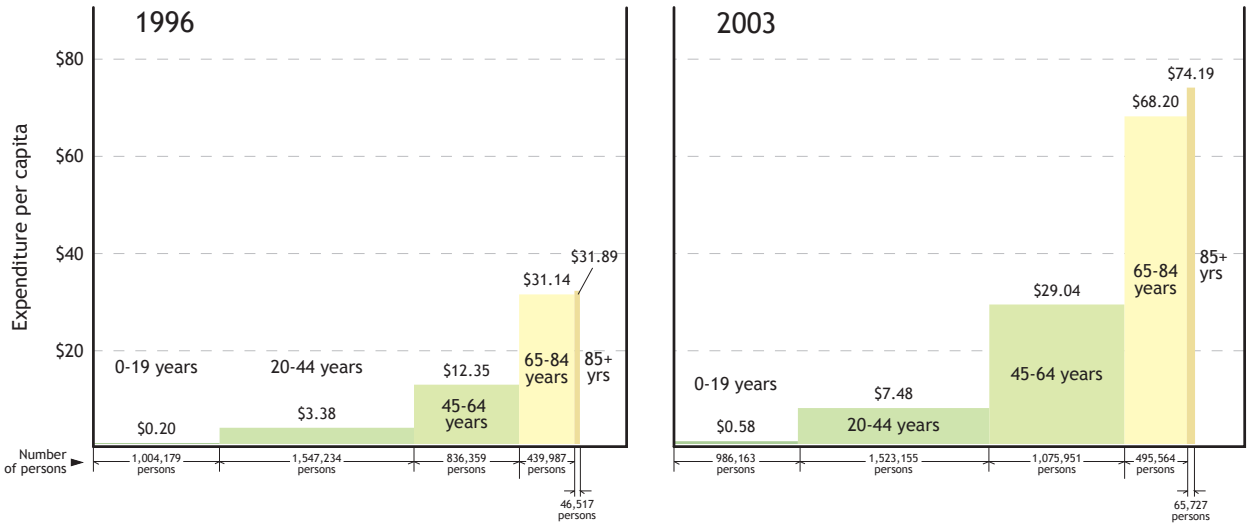
Drugs in this therapeutic category:

- Antacids (e.g. *aluminum hydroxide*)
- Proton pump inhibitors (e.g. *omeprazole)*
- H2-receptor antagonists (e.g. *cimetadine*)

Indications for use:

- Reduction of stomach acidity
- Treatment of ulcer and gastro-esophageal reflux disease

Expenditure per capita over the life-course, province-wide data, 1996 and 2003



Drugs for Alimentary Acid Related Disorders

Components of change by health service delivery area (HSDA), 1996-2003

	Expenditure per capita			Determinants of expenditure			
	1996	2003	AAGR*	Aging	Utilization	Choices	Prices
Northwest	$5.66	$19.29	19.1%	3.0%	4.4%	11.5%	-0.7%
North Island	$8.13	$24.16	16.8%	2.7%	4.0%	9.4%	0.1%
Northeast	$5.67	$16.36	16.3%	2.0%	4.2%	9.9%	-0.4%
Northern Interior	$6.23	$17.52	15.9%	2.7%	3.7%	9.2%	-0.4%
Kootenay Boundary	$8.14	$22.77	15.8%	1.6%	4.0%	9.8%	-0.1%
Fraser East	$7.95	$21.77	15.5%	0.8%	3.3%	11.3%	-0.4%
East Kootenay	$8.52	$23.15	15.4%	1.8%	3.5%	10.4%	-0.8%
Thompson Cariboo	$8.73	$23.39	15.1%	2.2%	3.3%	9.4%	-0.3%
Okanagan	$10.41	$27.60	14.9%	1.2%	3.4%	10.2%	-0.3%
N. Shore/Coast Gar.	$7.92	$20.49	14.6%	1.1%	2.9%	10.3%	-0.2%
Central Island	$11.33	$29.12	14.4%	1.9%	3.3%	8.9%	-0.2%
Fraser South	$7.47	$18.22	13.6%	1.0%	2.9%	9.6%	-0.2%
Richmond	$5.91	$14.35	13.5%	1.6%	1.5%	10.5%	-0.4%
Fraser North	$7.32	$17.61	13.4%	1.0%	2.2%	10.1%	-0.2%
South Island	$12.45	$28.06	12.3%	0.6%	3.6%	8.2%	-0.3%
Vancouver	$7.40	$15.18	10.8%	0.7%	0.5%	9.9%	-0.4%

* AAGR = average annual growth rate

Sources: Authors' calculations based on BC PharmaNet (Claims History) and BCLHD (Population Registry).

therapeutic category—increased use of proton pump inhibitors and reduced use of H2-receptor antagonists—and the choice of more expensive drugs within those drug classes.

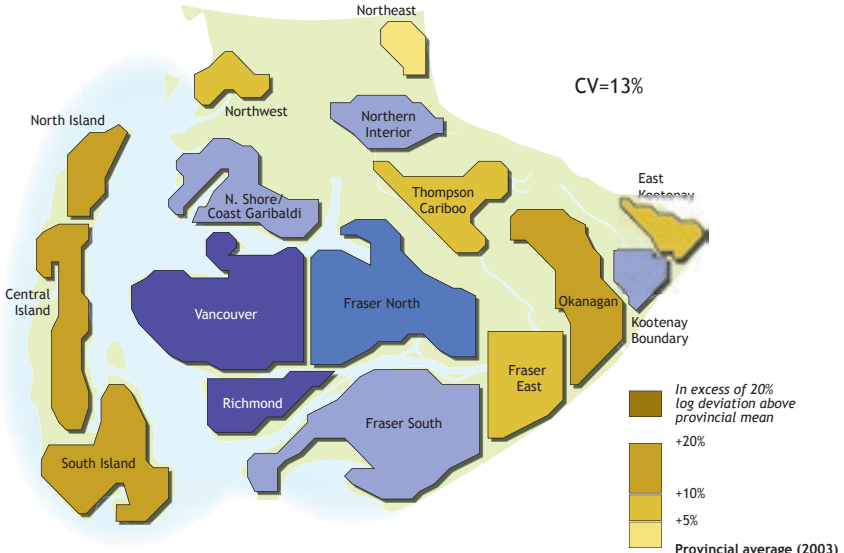
Increased utilization contributed to growing antacid drug expenditures across the province. Although prices fell due to generic competition, the total cost of treatment rose due to the increasingly costly therapeutic choices.

Drugs for Alimentary Acid Related Disorders

Health service delivery area (HSDA) cartograms and data, 1996 and 2003

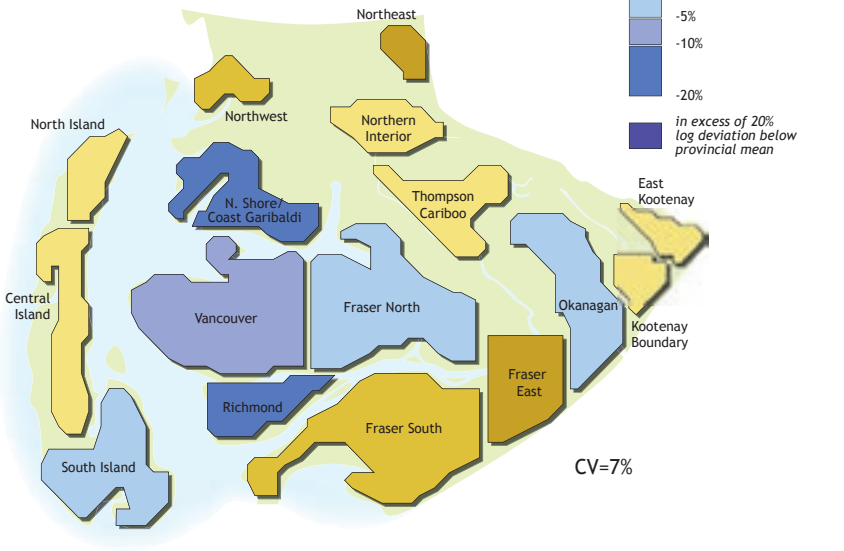
Age-adjusted expenditure per capita

1996	2003	Change	Log Dev 2003	
$10	$25	147%	+0.18	Central Island
$10	$24	136%	+0.17	South Island
$9	$23	166%	+0.13	North Island
$9	$23	167%	+0.12	Okanagan
$8	$23	183%	+0.09	Fraser East
$9	$22	162%	+0.09	East Kootenay
$9	$22	150%	+0.08	Thompson Cariboo
$7	$22	192%	+0.05	Northwest
$8	$21	163%	+0.01	Northeast
$8	$21	169%	-0.00	Kootenay Boundary
$8	$20	152%	-0.01	Northern Interior
$8	$20	147%	-0.03	Fraser South
$8	$20	161%	-0.04	N. Shore/Coast Gar.
$8	$19	144%	-0.06	Fraser North
$7	$16	114%	-0.28	Vancouver
$6	$15	138%	-0.31	Richmond



Age-adjusted users per 1,000 population

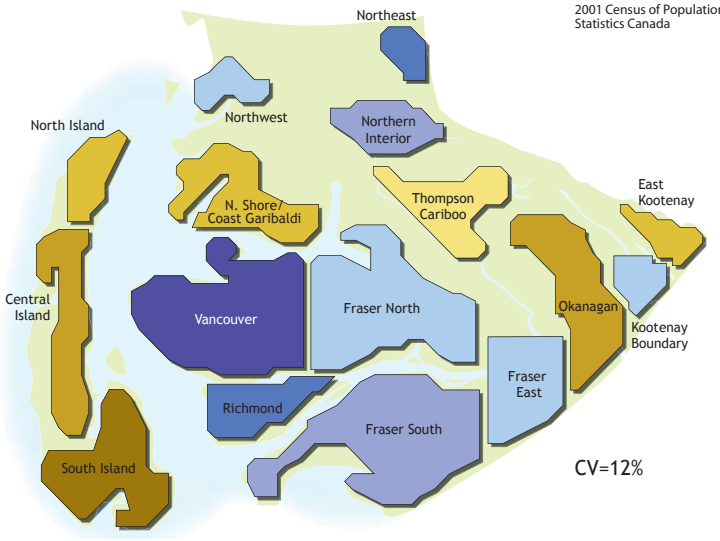
1996	2003	Change	Log Dev 2003	
70	81	15%	+0.14	Fraser East
62	80	29%	+0.12	Northeast
62	75	22%	+0.07	Northwest
65	74	14%	+0.05	Fraser South
67	74	10%	+0.05	Thompson Cariboo
64	74	15%	+0.04	North Island
63	73	16%	+0.04	Northern Interior
66	73	10%	+0.04	East Kootenay
59	73	23%	+0.03	Kootenay Boundary
65	72	12%	+0.02	Central Island
63	70	11%	-0.01	Okanagan
58	68	18%	-0.03	South Island
62	68	9%	-0.04	Fraser North
66	65	0%	-0.07	Vancouver
57	64	12%	-0.10	N. Shore/Coast Gar.
60	63	5%	-0.12	Richmond



One square = 2,000 population
2001 Census of Population
Statistics Canada

Cost per user

1996	2003	Change	Log Dev 2003	
$178	$357	101%	+0.20	South Island
$155	$341	121%	+0.16	Central Island
$138	$331	140%	+0.13	Okanagan
$138	$319	131%	+0.09	North Island
$133	$309	132%	+0.06	N. Shore/Coast Gar.
$129	$307	137%	+0.05	East Kootenay
$132	$300	127%	+0.03	Thompson Cariboo
$121	$288	139%	-0.01	Northwest
$128	$285	123%	-0.02	Fraser North
$128	$281	120%	-0.04	Kootenay Boundary
$113	$279	146%	-0.05	Fraser East
$127	$276	117%	-0.05	Northern Interior
$124	$268	117%	-0.08	Fraser South
$127	$260	104%	-0.12	Northeast
$107	$242	126%	-0.19	Richmond
$111	$238	115%	-0.20	Vancouver



Drugs for Alimentary Acid Related Disorders

Variation in age-adjusted expenditure per capita across the HSDAs in this category of drugs was relatively low (CV = 13%) in 2003. Expenditure per capita ranged from $15 in Richmond to $25 in Central Vancouver Island.

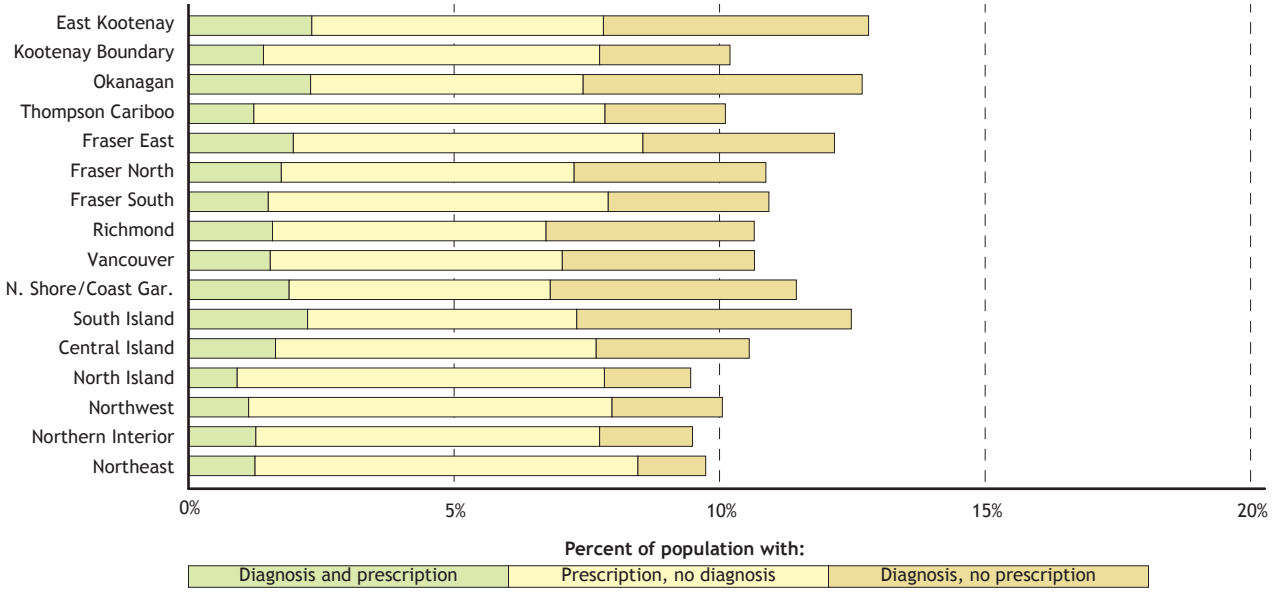
In contrast to most of the other drug classes, expenditure variation was better explained by the variation of cost per user rather than utilization.

Users living in South Vancouver Island paid $357 for prescription antacids; users in Vancouver paid $238 (CV=12%). The age-adjusted number of users per 1,000 population did not vary greatly across regions (CV=7%).

Approximately 8% of the population purchased prescription drugs for the treatment of acid-related gastric symptoms. Of these, about three-quarters had no associated diagnosis. Age-adjusted rates of recorded diagnosis ranged more broadly across HSDAs (2.5% to 7.5%) than did rates of prescription use (6.7% to 8.5%).

Across the HSDAs, between 30% and 50% of those diagnosed with gastrointestinal symptoms filled a related prescription.

Age-adjusted rates of prescription and/or related diagnosis, province-wide, 2003



Measure of diagnosis based on "Gastrointestinal Signs and Symptoms" Expanded Diagnosis Cluster GAS01

Psycholeptics

Expenditure on psycholeptics per British Columbian grew from under $6 in 1996 to over $16 in 2003. In 1996, over half (52%) of expenditure in this category was for anxiolytics, hypnotics, and sedatives; by 2003 nearly 80% of the expenditure in this category was for antipsychotics.

Per capita expenditures were more evenly distributed across age categories for psycholeptic drugs than for other leading therapeutic categories.

While low in absolute value, expenditure per child increased most rapidly—from approximately $0.35 to $2.40.

Expenditure per capita was roughly $20 in 2003 for residents ages 20 to 84, and then spiked to $33 for residents over 85.

Because of the relatively flat age-gradient, adults aged 20 to 64 accounted for over 75% of overall expenditure in this category.

Drugs in this therapeutic category:

- Antipsychotics (e.g. *olanzapine*)
- Anxiolytics (e.g. *lorazepam*)
- Hypnotics and sedatives (e.g. *zopiclone*)

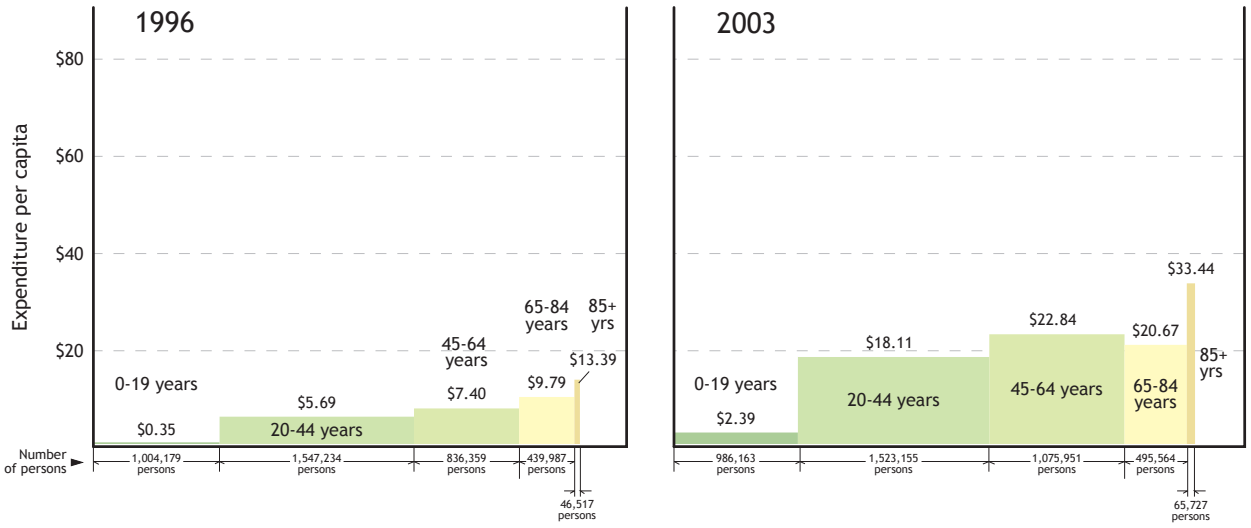
Indications for use:

- Antipsychotics: treatment of psychosis, such as schizophrenia
- Anxiolytics: treatment of anxiety
- Hypnotics and sedatives: symptomatic relief of insomnia

Expenditure per capita on psycholeptics grew at widely varying rates across HSDAs—from 13.5% per year in North Shore/Coast Garibaldi to 23.9% per year in Northeast.

Consistent with the flat age-gradient in expenditures, population aging had little effect on psycholeptic expenditure trends. The expenditure-impact of changes in utilization

Expenditure per capita over the life-course, province-wide data, 1996 and 2003



Components of change by health service delivery area (HSDA), 1996-2003

	Expenditure per capita			Determinants of expenditure			
	1996	2003	AAGR*	Aging	Utilization	Choices	Prices
Northeast	$2.67	$11.94	23.9%	0.0%	7.4%	17.0%	-1.4%
Northern Interior	$3.64	$14.16	21.4%	-3.1%	6.3%	19.6%	-1.4%
North Island	$3.27	$12.70	21.4%	0.5%	4.7%	16.6%	-1.1%
Vancouver	$6.65	$22.83	19.3%	0.3%	-0.3%	20.4%	-1.0%
Fraser North	$4.71	$16.02	19.1%	-0.2%	1.0%	19.6%	-1.1%
Northwest	$3.60	$11.30	17.7%	-0.1%	4.8%	14.0%	-1.3%
South Island	$6.56	$20.28	17.5%	-0.8%	2.6%	16.2%	-0.7%
Central Island	$5.38	$16.56	17.4%	0.0%	3.3%	14.4%	-0.6%
Kootenay Boundary	$4.91	$15.05	17.4%	0.5%	2.3%	15.0%	-0.7%
Okanagan	$7.17	$21.47	17.0%	-0.5%	4.7%	13.4%	-1.1%
Thompson Cariboo	$4.71	$13.68	16.5%	-1.0%	4.8%	13.3%	-0.9%
Fraser East	$5.23	$14.25	15.4%	-0.1%	1.4%	15.3%	-1.2%
East Kootenay	$4.01	$10.81	15.2%	0.3%	4.7%	11.4%	-1.5%
Fraser South	$4.91	$13.04	15.0%	0.0%	1.2%	14.6%	-0.9%
Richmond	$3.99	$10.54	14.9%	0.1%	-0.4%	16.5%	-1.0%
N. Shore/Coast Gar.	$5.50	$13.35	13.5%	0.1%	1.3%	13.2%	-1.1%

* AAGR = average annual growth rate

Sources: Authors' calculations based on BC PharmaNet (Claims History) and BCLHD (Population Registry).

ranged from slightly negative in Vancouver and Richmond to significantly positive (7.4% per year) in Northeast.

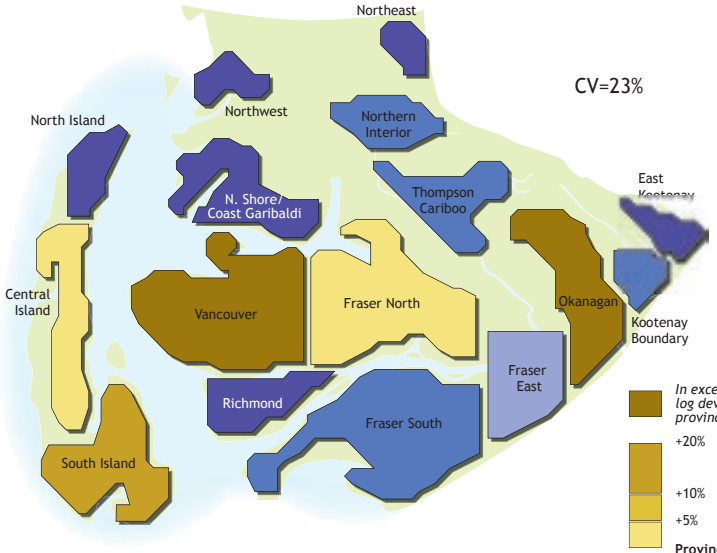
Increasingly costly choices explained most of the increase in psycholeptic expenditure across all HSDAs. In particular, trends in this category were dominated by the increased use of, and expenditure on, relatively costly antipsychotic drugs. The use of anxiolytics, hypnotics, and sedatives remained relatively stable.

In all HSDAs, the prices of drugs fell as a result of generic competition.

Health service delivery area (HSDA) cartograms and data, 1996 and 2003

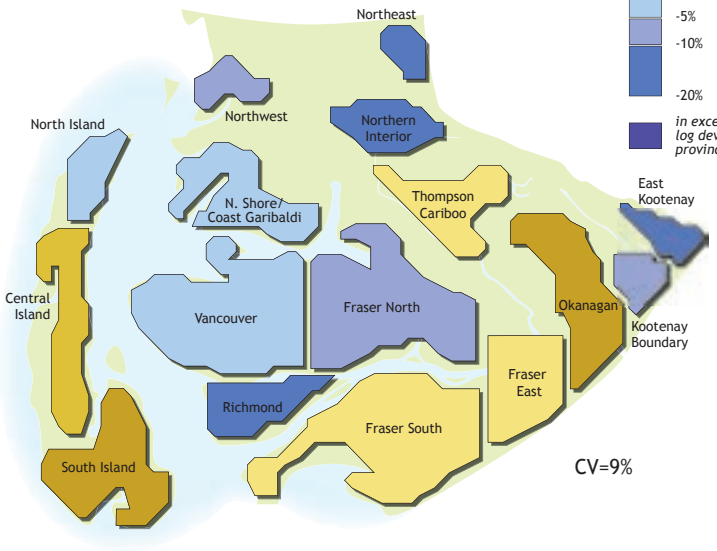
Age-adjusted expenditure per capita

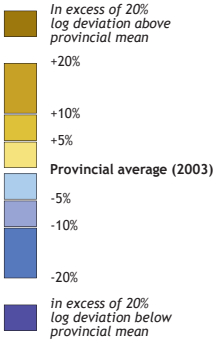
1996	2003	Change	Log Dev 2003	
$6	$22	251%	+0.31	Vancouver
$7	$21	210%	+0.27	Okanagan
$6	$20	217%	+0.18	South Island
$5	$16	211%	+0.00	Central Island
$5	$16	240%	+0.00	Fraser North
$5	$15	178%	-0.08	Fraser East
$5	$15	202%	-0.10	Kootenay Boundary
$4	$15	245%	-0.12	Northern Interior
$5	$14	187%	-0.17	Thompson Cariboo
$5	$14	165%	-0.17	Fraser South
$5	$13	145%	-0.21	N. Shore/Coast Gar.
$3	$13	323%	-0.23	Northeast
$3	$13	270%	-0.24	North Island
$4	$12	216%	-0.32	Northwest
$4	$11	165%	-0.41	East Kootenay
$4	$11	157%	-0.43	Richmond

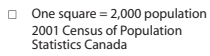


Age-adjusted users per 1,000 population

1996	2003	Change	Log Dev 2003	
93	106	14%	+0.13	South Island
82	106	29%	+0.13	Okanagan
86	104	20%	+0.10	Central Island
89	97	8%	+0.03	Fraser South
87	95	10%	+0.01	Fraser East
77	95	24%	+0.01	Thompson Cariboo
85	94	10%	+0.00	N. Shore/Coast Gar.
74	93	26%	-0.01	North Island
89	91	2%	-0.03	Vancouver
67	87	29%	-0.08	Northwest
74	87	17%	-0.08	Kootenay Boundary
82	86	5%	-0.09	Fraser North
66	85	29%	-0.10	East Kootenay
57	83	45%	-0.13	Northeast
70	82	17%	-0.14	Northern Interior
79	79	0%	-0.17	Richmond

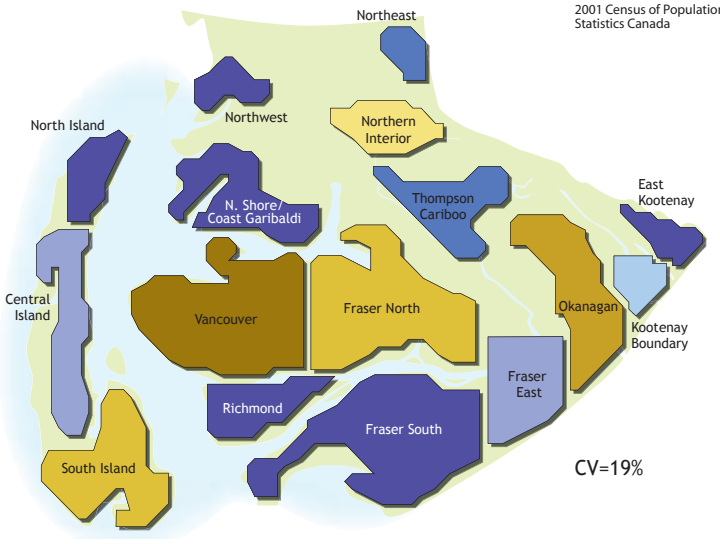






Cost per user

1996	2003	Change	Log Dev 2003	
$71	$244	245%	0.34	Vancouver
$84	$201	140%	0.15	Okanagan
$59	$190	224%	0.09	Fraser North
$66	$183	178%	0.05	South Island
$60	$178	196%	0.02	Northern Interior
$66	$170	158%	-0.02	Kootenay Boundary
$61	$158	159%	-0.10	Central Island
$62	$158	153%	-0.10	Fraser East
$54	$157	193%	-0.10	Northeast
$63	$144	131%	-0.19	Thompson Cariboo
$58	$142	144%	-0.20	Fraser South
$63	$141	122%	-0.21	N. Shore/Coast Gar.
$47	$138	194%	-0.23	North Island
$56	$136	145%	-0.24	Northwest
$52	$134	158%	-0.26	Richmond
$62	$127	106%	-0.31	East Kootenay



Age-adjusted expenditure per capita on psycholeptics ranged from a low of $11 in Richmond to a high of $22 in Vancouver (CV=23%) in 2003.

Psycholeptics was one of only three leading therapeutic categories for which variation in expenditure per capita across the province was not driven by variation in age-adjusted utilization rates (CV=9%).

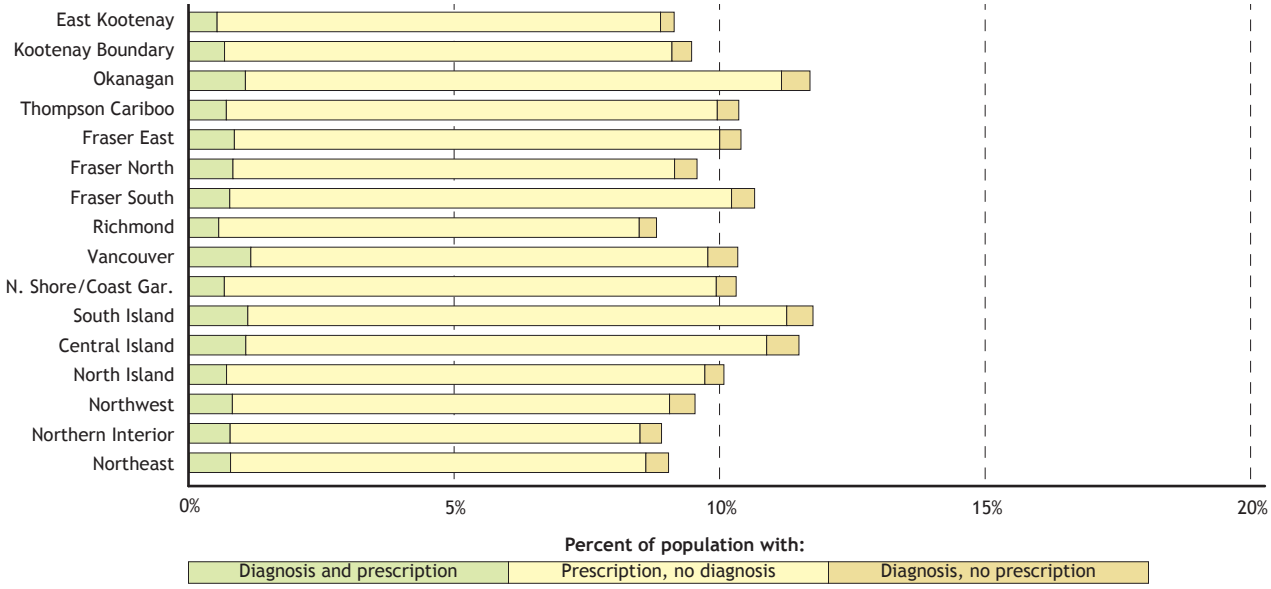
The pattern of psycholeptic expenditure across HSDAs closely mirrored the pattern of average costs per user. Cost per user ranged from $127 to $244 (CV=19%).

Age-adjusted rates of diagnosed psychosis varied from 0.8% to 1.7%.

Across all HSDAs, roughly two-thirds (63% to 69%) of residents with a diagnosis of psychosis filled at least one prescription for a psycholeptic.

Approximately 90% of users of psycholeptics (88% to 94% across HSDAs) did not have a recorded diagnosis of psychosis. These patients may have been treating less severe conditions such as anxiety or insomnia.

Age-adjusted rates of prescription and/or related diagnosis, province-wide, 2003



Measure of diagnosis based on "Schizophrenia and Affective Psychosis" Expanded Diagnosis Cluster PSY07

Drugs for Obstructive Airway Diseases

Per capita expenditure on drugs used for the treatment of obstructive airway diseases increased by nearly 50% between 1996 and 2003—from roughly $8 to $12. Spending in this category was dominated by inhaled anti-asthmatic drugs; however, the fastest growing segment of this category was in drugs for systemic use (e.g. montelukast).

Expenditure per capita on drugs for obstructive airway diseases was relatively high for those aged 19 and under (more than $4 per capita) in 2003, making this the third-largest therapeutic category in terms of expenditures on children and adolescents.

Following steady growth across age categories, expenditures in this category increased sharply at age 65. Despite this increase in expenditures at age 65, the elderly still accounted for less than half (48%) of total expenditures on this category of drugs.

Drugs in this therapeutic category:

- Inhaled adrenergics (*e.g. salbutamol)*
- Inhaled glucocorticoids (*e.g. fluticasone)*
- Inhaled anticholinergics (*e.g. ipratropium)*
- Systemic drugs for obstructive airway disease (*e.g. montelukast)*

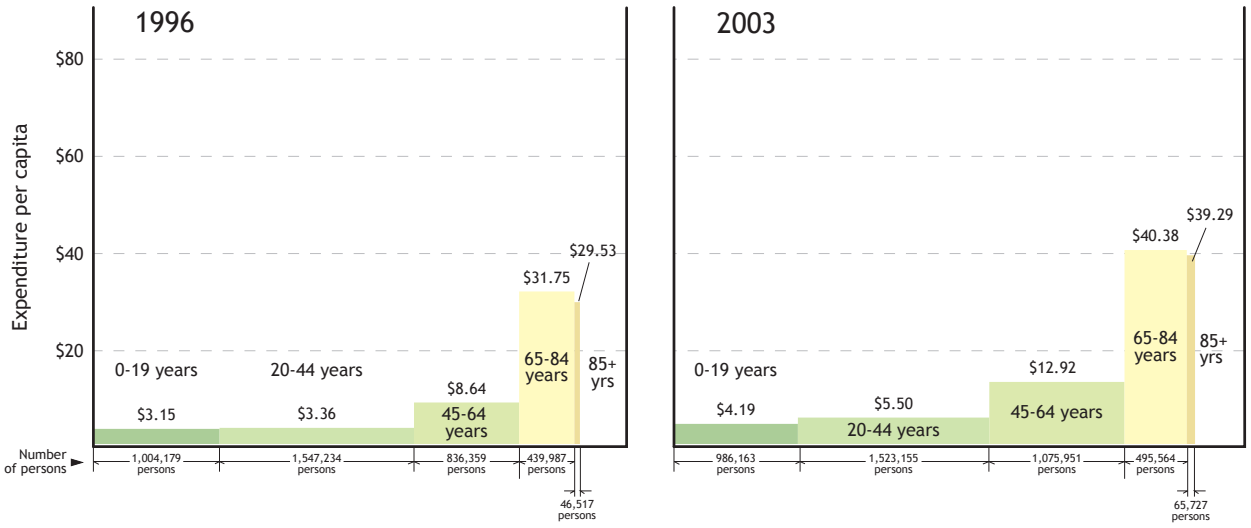
Indications for use:

- Treatment of obstructive pulmonary diseases, such as asthma, chronic bronchitis, emphysema

The annual growth rate across HSDAs ranged from 4.3% to 9.4%.

The impact of population aging on expenditures per capita varied across the province from approximately 0% to 2.2% per year. Similarly, changes in utilization caused expenditures per

Expenditure per capita over the life-course, province-wide data, 1996 and 2003



Components of change by health service delivery area (HSDA), 1996-2003

	Expenditure per user			Determinants of expenditure			
	1996	2003	AAGR*	Aging	Utilization	Choices	Prices
Northwest ⚠	$5.91	$11.10	9.4%	2.2%	3.4%	5.2%	-1.6%
Northern Interior	$6.99	$12.11	8.2%	1.7%	1.6%	6.2%	-1.5%
Kootenay Boundary	$8.77	$14.61	7.6%	1.1%	2.6%	4.4%	-0.7%
Okanagan	$10.55	$17.12	7.2%	0.8%	1.7%	5.0%	-0.5%
Fraser East	$8.40	$13.29	6.8%	0.3%	0.9%	6.6%	-1.0%
Northeast ⚠	$6.80	$10.50	6.4%	1.5%	2.5%	2.7%	-0.4%
East Kootenay	$8.92	$13.54	6.1%	1.1%	2.2%	4.3%	-1.5%
Thompson Cariboo	$10.27	$15.51	6.1%	1.8%	1.4%	3.8%	-1.1%
North Island	$9.62	$14.35	5.9%	2.0%	0.9%	2.8%	0.0%
Fraser North	$6.94	$10.22	5.7%	0.5%	-0.2%	5.9%	-0.5%
N. Shore/Coast Gar.	$7.66	$11.20	5.6%	0.6%	0.0%	5.3%	-0.4%
Fraser South	$7.88	$11.47	5.5%	0.5%	0.3%	5.1%	-0.4%
South Island	$9.90	$14.28	5.4%	0.0%	1.2%	4.6%	-0.4%
Central Island	$11.18	$15.38	4.7%	1.3%	1.0%	2.7%	-0.4%
Richmond	$5.98	$8.05	4.3%	0.8%	-1.3%	4.9%	-0.1%
Vancouver	$7.20	$9.69	4.3%	0.2%	-0.4%	5.1%	-0.6%

Sources: Authors' calculations based on BC PharmaNet (Claims History) and BCLHD (Population Registry).

* AAGR = average annual growth rate

⚠ Data stability warning: one or more population cells with less than 100 individuals

capita to fall slightly in some regions and rise moderately (>2% per year) in others.

Expenditure inflation was largely driven by therapeutic choices—particularly the rising cost per patient treated with relatively new drug classes within the therapeutic category.

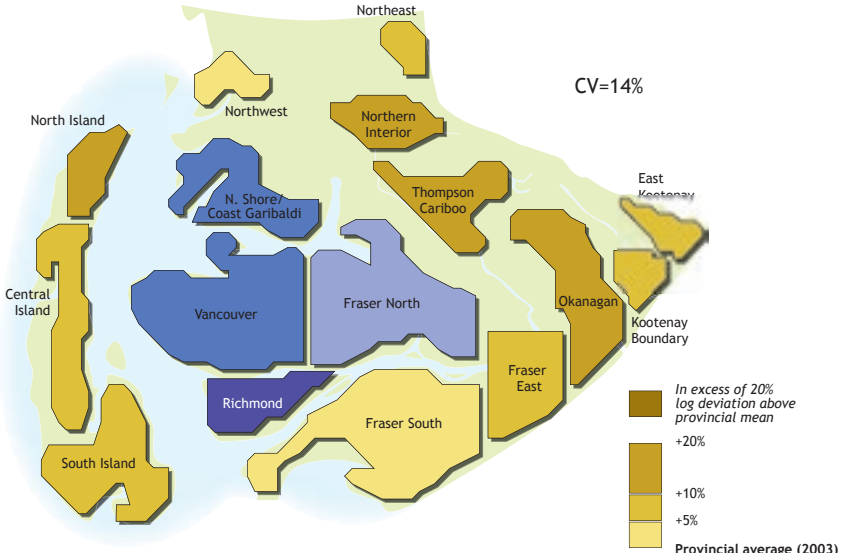
Generic competition caused prices to fall across all regions.

Drugs for Obstructive Airway Diseases

Health service delivery area (HSDA) cartograms and data, 1996 and 2003

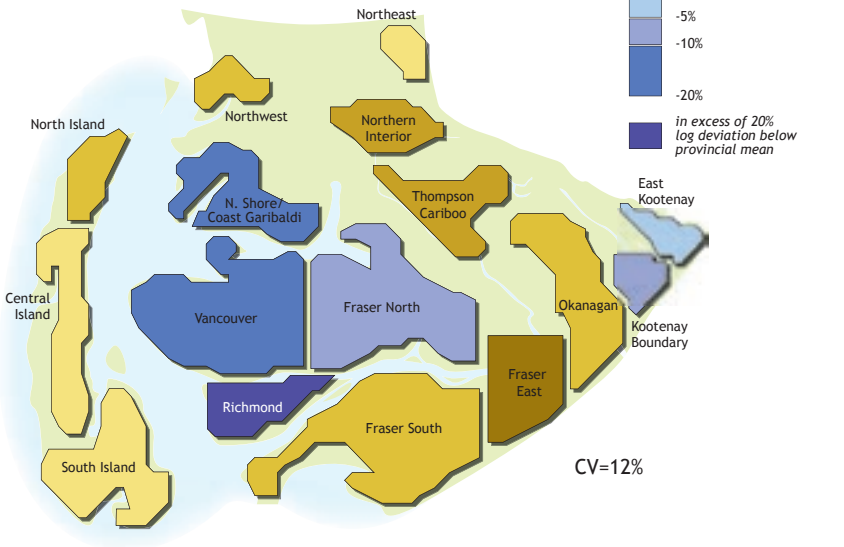
Age-adjusted expenditure per capita

1996	2003	Change	Log Dev 2003	
$11	$15	41%	+0.19	Thompson Cariboo
$9	$14	63%	+0.16	Okanagan
$10	$14	37%	+0.14	North Island
$9	$14	53%	+0.13	Northern Interior
$8	$13	64%	+0.10	Fraser East
$10	$13	38%	+0.10	Northeast
$10	$13	34%	+0.09	Central Island
$8	$13	63%	+0.08	Kootenay Boundary
$9	$13	47%	+0.08	East Kootenay
$8	$13	53%	+0.05	South Island
$8	$13	60%	+0.04	Northwest
$8	$12	47%	+0.01	Fraser South
$7	$11	49%	-0.09	Fraser North
$7	$11	47%	-0.12	N. Shore/Coast Gar.
$7	$10	37%	-0.20	Vancouver
$7	$8	30%	-0.36	Richmond



Age-adjusted users per 1,000 population

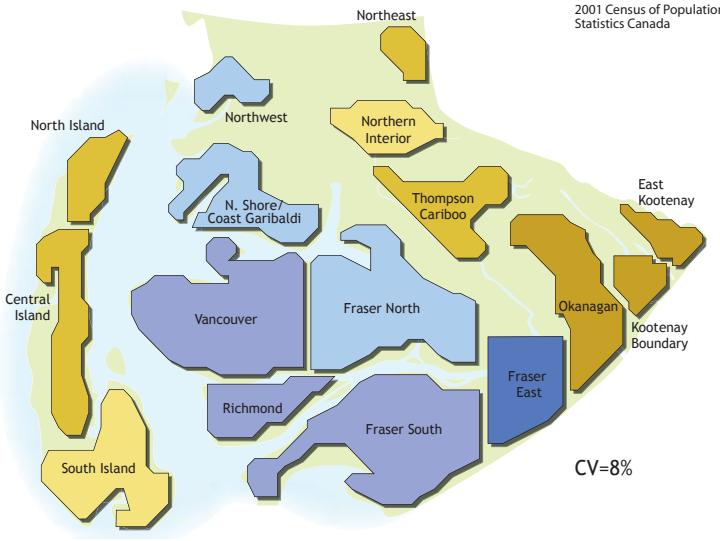
1996	2003	Change	Log Dev 2003	
74	79	6%	+0.21	Fraser East
65	72	10%	+0.12	Thompson Cariboo
61	71	16%	+0.11	Northern Interior
67	69	2%	+0.08	Fraser South
68	69	2%	+0.07	North Island
51	68	34%	+0.07	Northwest
62	67	10%	+0.06	Okanagan
62	66	5%	+0.03	Central Island
60	65	8%	+0.02	South Island
52	64	23%	+0.00	Northeast
52	61	18%	-0.05	East Kootenay
49	60	22%	-0.05	Kootenay Boundary
61	59	-3%	-0.08	Fraser North
57	57	0%	-0.11	N. Shore/Coast Gar.
59	57	-5%	-0.12	Vancouver
53	48	-10%	-0.28	Richmond



One square = 2,000 population
2001 Census of Population
Statistics Canada

Cost per user

1996	2003	Change	Log Dev 2003	
$165	$220	33%	+0.14	Kootenay Boundary
$174	$217	25%	+0.12	East Kootenay
$143	$214	49%	+0.11	Okanagan
$189	$211	11%	+0.09	Northeast
$162	$206	27%	+0.07	Thompson Cariboo
$153	$206	34%	+0.07	North Island
$159	$203	28%	+0.06	Central Island
$140	$197	41%	+0.03	South Island
$149	$196	32%	+0.02	Northern Interior
$130	$191	47%	-0.00	N. Shore/Coast Gar.
$124	$190	53%	-0.01	Fraser North
$156	$186	19%	-0.03	Northwest
$125	$179	43%	-0.07	Fraser South
$122	$177	45%	-0.08	Richmond
$123	$177	44%	-0.08	Vancouver
$110	$171	55%	-0.12	Fraser East



Drugs for Obstructive Airway Diseases

Age-adjusted expenditures on obstructive airway drugs varied modestly across HSDAs (CV=14%) in 2003. These ranged from $8 (Richmond) to $15 (Thompson Cariboo).

Variation in age-adjusted utilization rates (CV=12%) explained most of the variation in expenditures across the province.

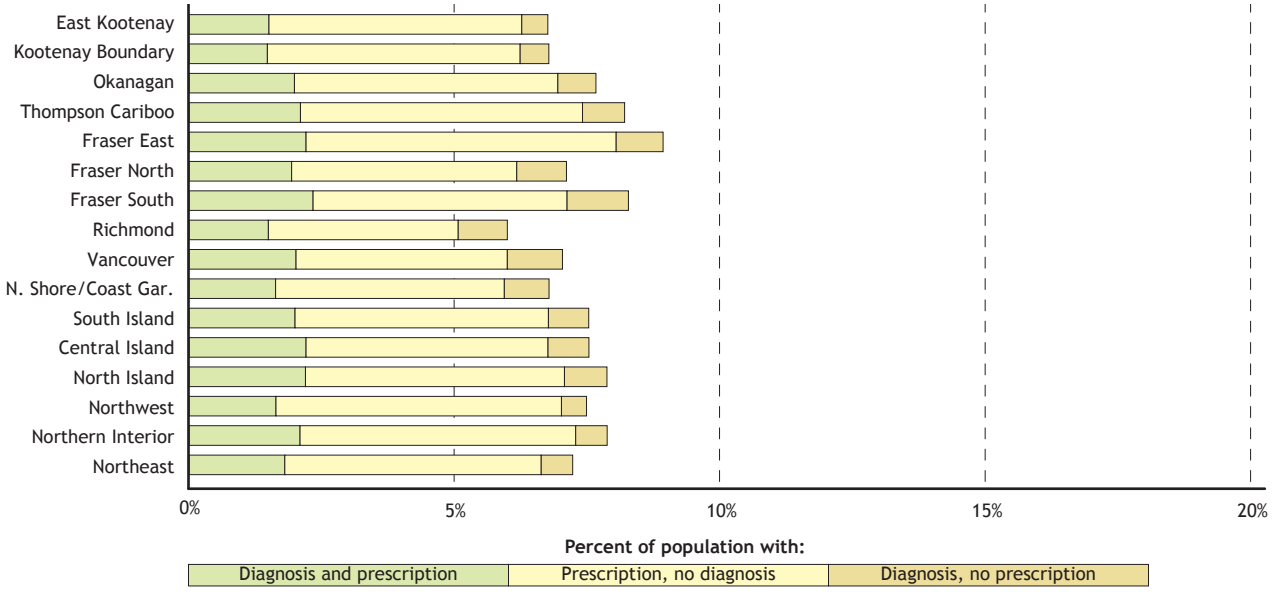
Although variation in the cost per user was relatively low (CV=8%), areas displaying higher utilization tended to have lower costs per user. For example, Fraser East simultaneously had the highest utilization rate and lowest cost per user.

The proportion of the population who filled one or more prescriptions from this therapeutic category ranged from 5% to 8% across HSDAs. Over two-thirds (66% to 77% across HSDAs) of residents who filled an obstructive airway prescription had no record of a primary diagnosis of asthma.

In contrast, approximately two-thirds (62% to 71% across HSDAs) of residents who had diagnosed asthma filled a prescription for an obstructive airway drug.

Many patients using medications in this class may have been treating other respiratory diseases such as emphysema.

Age-adjusted rates of prescription and/or related diagnosis, province-wide, 2003



Measure of diagnosis based on "Asthma" Expanded Diagnosis Cluster ALL02

Drugs Used in Diabetes

Per capita expenditure on drugs used in the treatment of diabetes more than doubled from $3.75 in 1996 to $8.30 in 2003. Whereas insulins accounted for 52% of expenditure in this therapeutic category in 1996, they accounted for only 39% of expenditure in 2003, owing to the increasing use and cost of oral blood glucose lowering drugs.

Diabetes drug expenditure doubled along the age-gradient, with each successive age cohort spending twice as much per capita as the prior cohort. Expenditures per capita in 2003 peaked at $25 among adults between age 65 and 84.

Despite the age-gradient, it was the expenditure per baby boomer (age 45 to 64) that accounted for most of the spending on blood glucose lowering drugs (44%). Moreover, expenditure per baby boomer increased by 118% (from about $6 to $14), the largest rate of increase among all age groups.

Drugs in this therapeutic category:

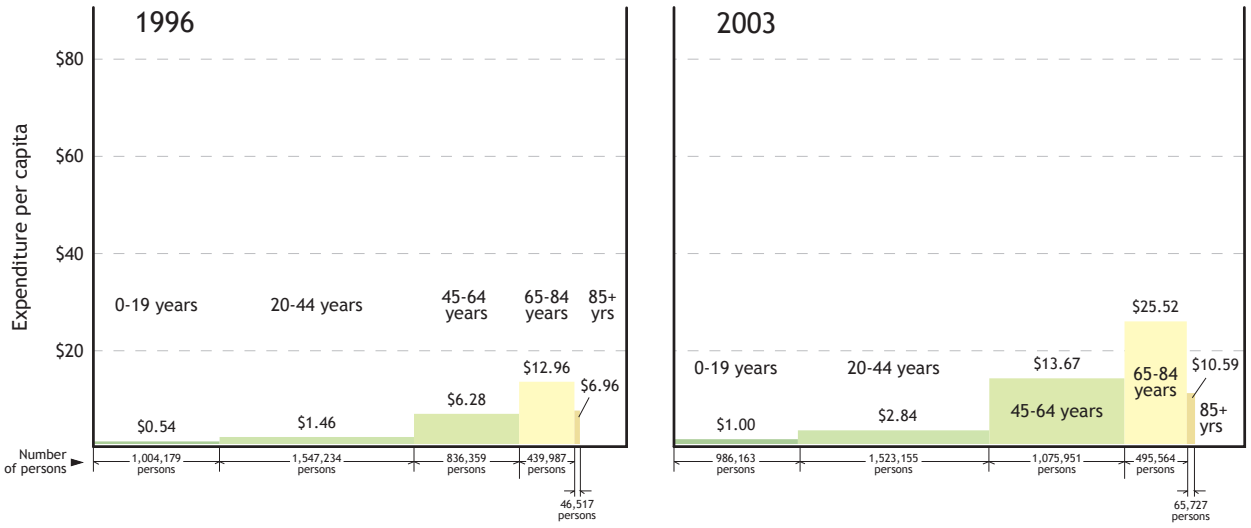
- Insulins and analogues (e.g. *insulin aspart*)
- Oral blood glucose lowering drugs (e.g. *glyburide*)

Indications for use:

- Insulin: control of blood glucose levels for patients with type 1 diabetes, or severe type 2 diabetes
- Oral blood glucose lowering agents: control of insulin levels for patients with type 2 diabetes

Across HSDAs, the rate of growth in expenditures on blood glucose lowering drugs varied from 10% per year (Vancouver) to 15% per year (Northeast).

Expenditure per capita over the life-course, province-wide data, 1996 and 2003



Components of change by health service delivery area (HSDA), 1996-2003

	Expenditure per capita			Determinants of expenditure			
	1996	2003	AAGR*	Aging	Utilization	Choices	Prices
Northeast ⚠	$2.77	$7.41	15.1%	2.1%	6.9%	7.3%	-1.8%
Northern Interior	$3.30	$8.54	14.5%	2.6%	6.4%	7.2%	-2.1%
Thompson Cariboo	$3.67	$9.35	14.3%	2.0%	5.5%	8.0%	-1.7%
Central Island	$4.03	$10.13	14.1%	1.6%	6.4%	7.4%	-1.8%
Okanagan	$3.89	$9.09	12.9%	1.1%	5.4%	8.0%	-1.9%
East Kootenay	$3.39	$7.84	12.7%	1.3%	6.3%	7.1%	-2.3%
N. Shore/Coast Gar.	$2.78	$6.38	12.6%	0.8%	5.5%	8.1%	-2.0%
North Island	$3.88	$8.90	12.6%	2.5%	5.1%	6.4%	-1.8%
Northwest ⚠	$3.76	$8.46	12.3%	3.0%	6.5%	5.1%	-2.5%
South Island	$4.43	$9.85	12.1%	0.5%	5.9%	7.6%	-2.1%
Fraser South	$3.74	$8.32	12.1%	0.8%	5.8%	7.4%	-2.1%
Fraser East	$4.49	$9.58	11.4%	0.7%	5.6%	7.0%	-2.0%
Richmond	$3.80	$7.71	10.6%	1.3%	5.0%	6.5%	-2.3%
Fraser North	$3.78	$7.67	10.6%	0.9%	4.8%	6.9%	-2.2%
Kootenay Boundary	$4.05	$8.13	10.5%	1.7%	4.8%	4.9%	-1.2%
Vancouver	$3.56	$7.06	10.3%	0.7%	4.8%	6.8%	-2.1%

Sources: Authors' calculations based on BC PharmaNet (Claims History) and BCLHD (Population Registry).

* AAGR = average annual growth rate

⚠ Data stability warning: one or more population cells with less than 100 individuals

Growth in expenditure on diabetes drugs was driven both by the choice of more expensive drugs from within this therapeutic category and by increased utilization. Both of these dynamics reflect the trend toward oral blood glucose lowering agents for the management of type 2 diabetes.

Increasingly costly therapeutic choices were the most significant cost-driver in all HSDAs but Northwest.

Population aging had a modest impact, ranging from 0.5% to 3% per year across HSDAs.

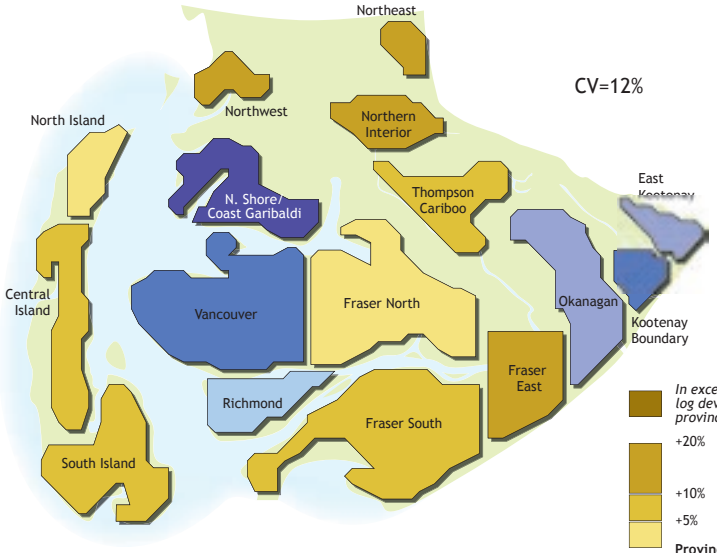
Prices fell in this therapeutic category, due in part to savings generated by generic drug use.

Drugs Used in Diabetes

Health service delivery area (HSDA) cartograms and data, 1996 and 2003

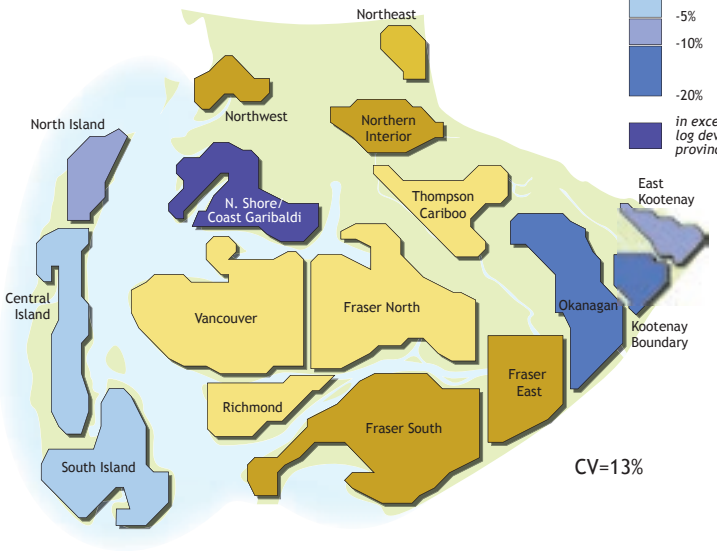
Age-adjusted expenditure per capita

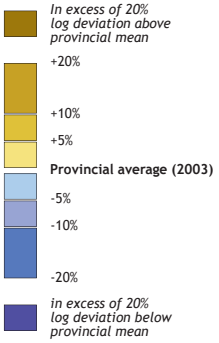
1996	2003	Change	Log Dev 2003	
$5	$10	121%	+0.19	Fraser East
$4	$10	132%	+0.16	Northern Interior
$5	$10	98%	+0.14	Northwest
$4	$9	145%	+0.11	Northeast
$4	$9	125%	+0.08	Fraser South
$4	$9	131%	+0.07	South Island
$4	$9	137%	+0.06	Thompson Cariboo
$4	$9	141%	+0.05	Central Island
$4	$9	108%	+0.03	North Island
$4	$8	104%	+0.01	Fraser North
$4	$8	96%	-0.04	Richmond
$3	$8	134%	-0.06	Okanagan
$3	$8	124%	-0.09	East Kootenay
$4	$7	107%	-0.11	Vancouver
$4	$7	94%	-0.12	Kootenay Boundary
$3	$6	131%	-0.30	N. Shore/Coast Gar.

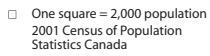


Age-adjusted users per 1,000 population

1996	2003	Change	Log Dev 2003	
23	38	64%	+0.20	Northwest
23	36	60%	+0.16	Fraser East
22	35	63%	+0.14	Northern Interior
22	35	64%	+0.14	Fraser South
20	33	66%	+0.08	Northeast
21	32	51%	+0.04	Richmond
21	32	53%	+0.04	Fraser North
19	31	61%	+0.01	Thompson Cariboo
20	31	51%	+0.00	Vancouver
18	30	68%	-0.02	Central Island
17	29	69%	-0.05	South Island
18	29	67%	-0.05	East Kootenay
19	29	55%	-0.07	North Island
17	27	57%	-0.14	Okanagan
18	27	52%	-0.14	Kootenay Boundary
14	22	59%	-0.33	N. Shore/Coast Gar.

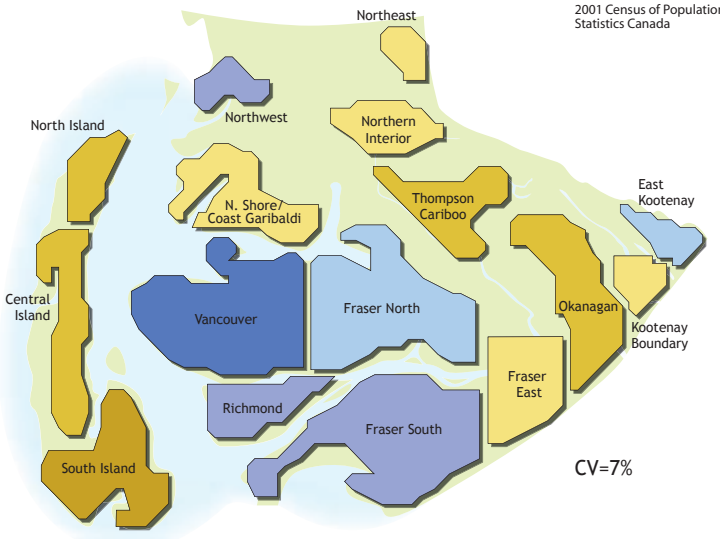






Cost per user

1996	2003	Change	Log Dev 2003	
$223	$304	37%	+0.12	South Island
$220	$297	35%	+0.10	North Island
$196	$291	49%	+0.08	Okanagan
$200	$288	44%	+0.07	Central Island
$192	$283	47%	+0.05	Thompson Cariboo
$189	$279	47%	+0.04	Northeast
$201	$278	38%	+0.03	Fraser East
$190	$277	46%	+0.03	N. Shore/Coast Gar.
$215	$275	28%	+0.02	Kootenay Boundary
$192	$274	43%	+0.02	Northern Interior
$194	$261	34%	-0.03	East Kootenay
$195	$260	33%	-0.03	Fraser North
$211	$255	21%	-0.06	Northwest
$185	$255	37%	-0.06	Fraser South
$191	$247	30%	-0.08	Richmond
$175	$240	37%	-0.11	Vancouver

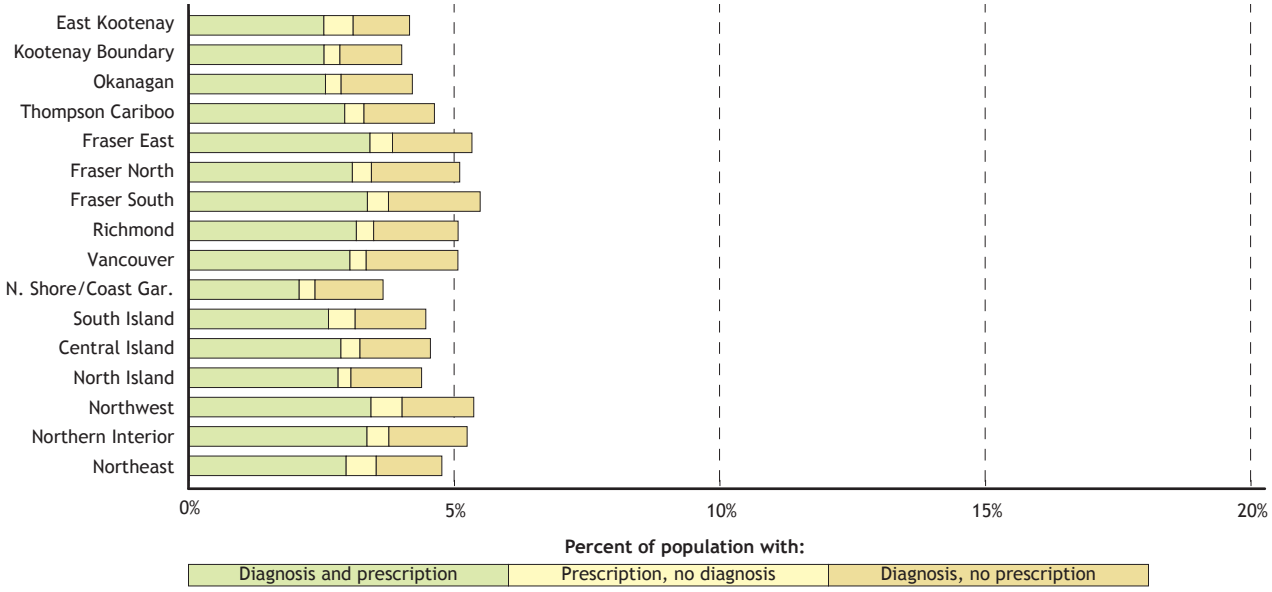


Variation in age-adjusted expenditure per capita was moderately low for diabetes drugs (CV=12%) in 2003. Yet despite this, North Shore/Coast Garibaldi residents spent an age-adjusted $6.14 per resident on diabetes drugs, a result well below the provincial average of $8.30.

Age-adjusted utilization (CV=13%) explained most of the variation in expenditure. Indeed, this was the only leading class of drug where variation in utilization was larger than variation in expenditure. The variation in cost per user (CV=7%) was such that areas with relatively high utilization rates had relatively low costs per user (e.g. Northwest and Fraser South), and vice versa (e.g. North Shore/ Coast Garibaldi).

The age-adjusted proportion of the population diagnosed with diabetes ranged from about 3% to 5%. Approximately two-thirds of those diagnosed also filled a prescription for drugs to treat diabetes. The remaining population with a diabetes diagnosis are likely being treated through diet and lifestyle modifications. Over 80% of those who filled prescriptions had a record of diagnosed diabetes. This is the highest correlation between prescription use and diagnosis among the leading drug classes.

Age-adjusted rates of prescription and/or related diagnosis, province-wide, 2003



Measure of diagnosis based on "Diabetes Mellitus" Expanded Diagnosis Cluster END01

Antiinflammatory and Antirheumatics

Expenditure per capita for antiinflammatory and antirheumatic products roughly doubled from about $4 to $8 between 1996 and 2003. Launched in 1999, cox-2 inhibitor drugs (e.g. celicoxib and rofecoxib) accounted for 61% of expenditure in this category by 2003.

Expenditure on antiinflammatory drugs is virtually zero among those aged 19 and under. Among adults over 45, expenditure is relatively high and rises modestly with age.

Expenditure among the baby boomers—those between age 45 and 64—grew more rapidly than among the rest of the population. Moreover, this age cohort accounted for nearly half (46%) of the total spending in the province during 2003.

The rate of growth in spending on antiinflammatory and antirheumatic products varied considerably across regions. Northwest had the highest annual growth rate (15.8%) while Vancouver had the lowest (7%).

Drugs in this therapeutic category:

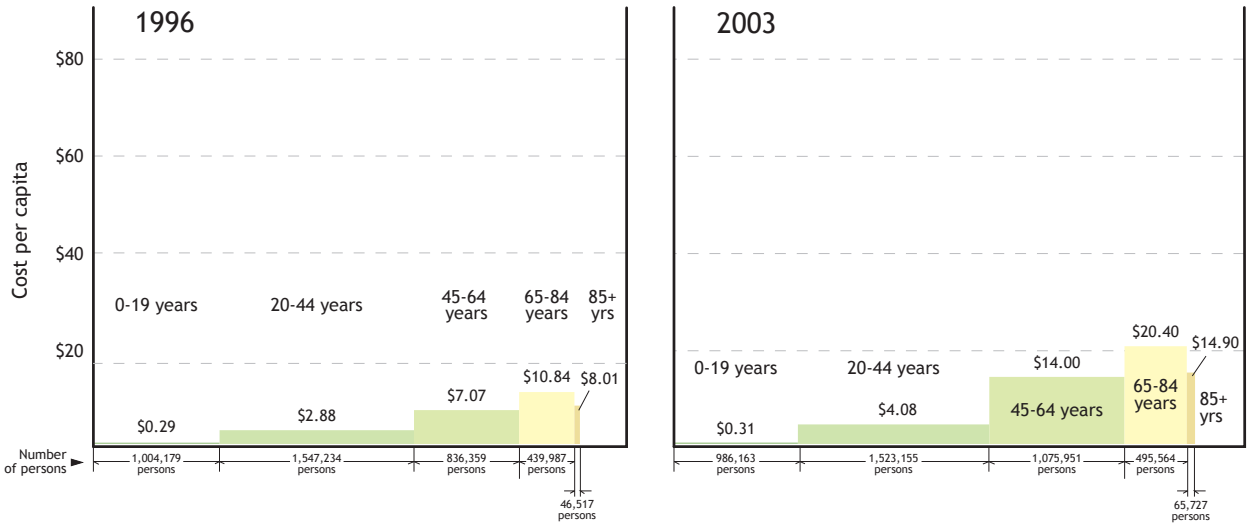
- Antiinflammatory and antirheumatic products, non-steroids (*e.g. celicoxib*)
- Specific antirheumatic agents (*e.g. auranofin*)

Indications for use:

- Relief of muscle or joint pain

As with several other leading therapeutic categories, increased expenditure on antiinflammatory and antirheumatic products was predominantly explained by increasingly costly product choices, which caused expenditures to grow by between 5.1% to 10.5% across HSDAs. Most of this is the result of the rapid increase in the use of cox-2 inhibitor drugs, approximately two-thirds of which was offset by the reduced use of other medicines in this category.

Expenditure per capita over the life-course, province-wide data, 1996 and 2003



Antiinflammatory and Antirheumatics

Components of change by health service delivery area (HSDA), 1996-2003

	Expenditure per capita			Determinants of expenditure			
	1996	2003	AAGR*	Aging	Utilization	Choices	Prices
Northwest	$3.60	$10.05	15.8%	2.3%	5.0%	9.7%	-1.7%
North Island	$3.95	$9.65	13.6%	1.8%	2.2%	10.2%	-0.9%
South Island	$4.55	$10.52	12.7%	0.5%	2.9%	10.2%	-1.0%
N. Shore/Coast Gar.	$3.74	$8.19	11.9%	0.4%	1.9%	10.5%	-1.0%
Thompson Cariboo	$4.70	$10.24	11.8%	1.6%	1.9%	9.1%	-1.0%
Central Island	$4.28	$9.29	11.7%	1.1%	1.7%	9.5%	-0.8%
Kootenay Boundary	$3.59	$7.20	10.4%	1.4%	1.9%	7.8%	-0.8%
Okanagan	$4.56	$9.07	10.3%	0.9%	0.9%	9.5%	-1.0%
Northeast ⚠	$3.25	$6.34	10.0%	1.7%	3.2%	6.3%	-1.5%
Fraser East	$4.52	$8.64	9.7%	0.5%	1.6%	8.8%	-1.3%
Fraser South	$4.51	$8.29	9.1%	0.7%	1.0%	8.5%	-1.2%
Fraser North	$4.09	$7.40	8.8%	0.7%	0.6%	8.6%	-1.1%
Richmond	$3.33	$5.94	8.6%	0.9%	0.5%	8.4%	-1.1%
East Kootenay	$5.26	$8.87	7.7%	1.3%	1.2%	7.1%	-1.8%
Northern Interior	$4.36	$7.24	7.5%	1.8%	1.1%	5.1%	-0.6%
Vancouver	$3.72	$5.97	7.0%	0.3%	0.2%	7.6%	-1.1%

Sources: Authors' calculations based on BC PharmaNet (Claims History) and BCLHD (Population Registry).

* AAGR = average annual growth rate

⚠ Data stability warning: one or more population cells with less than 100 individuals

Aging and increased utilization played a less significant role in the growth rate. The impact of utilization was an increase of spending from 0.2% to 5% per year. Aging increased spending by 0.3% to 2.3% per year.

Prices fell, largely due to the use of generic drug versions of older medicines in this category.

Antiinflammatory and Antirheumatics

Health service delivery area (HSDA) cartograms and data, 1996 and 2003

Expenditure per capita

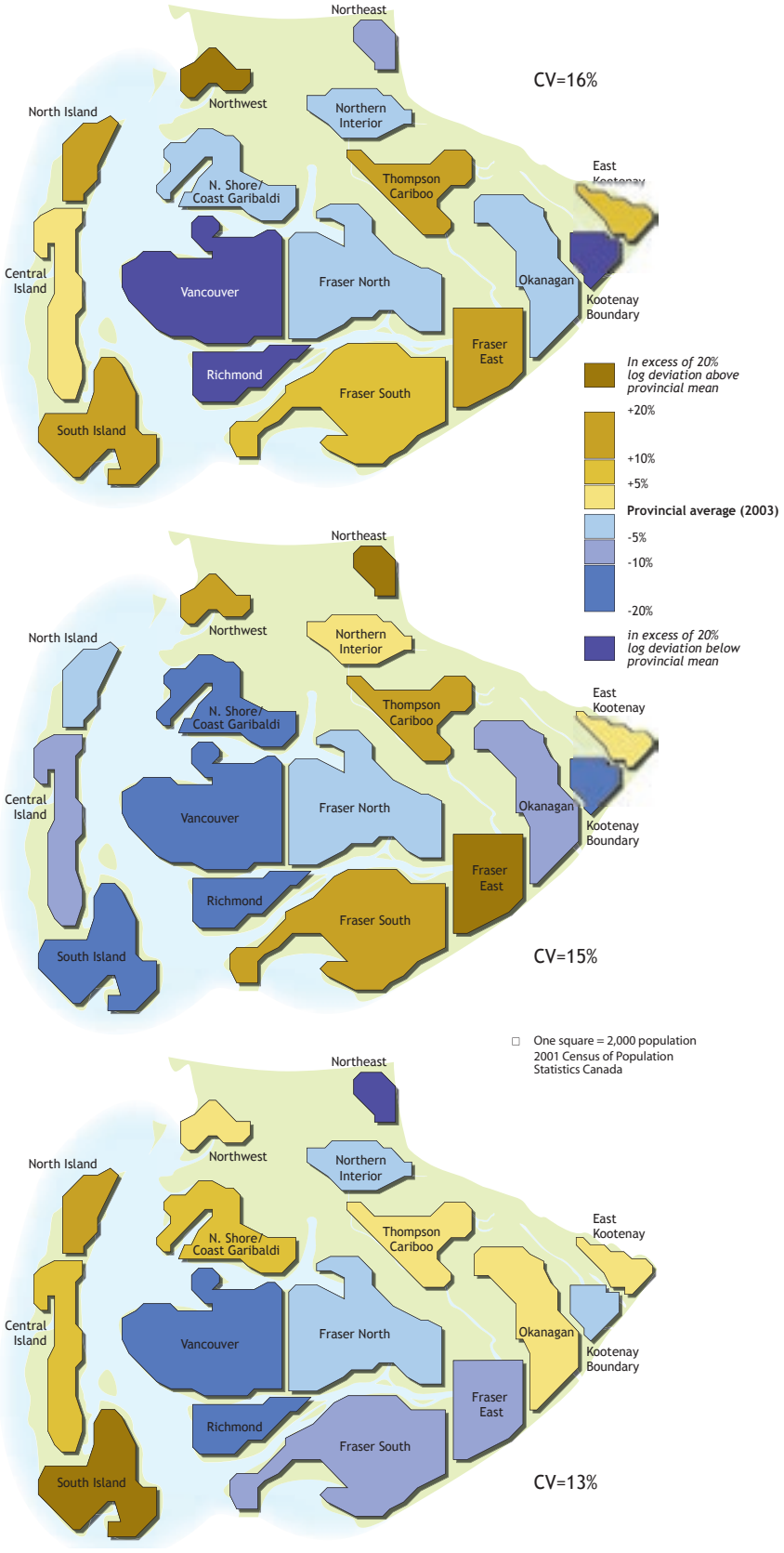
1996	2003	Change	Log Dev 2003	
$4	$11	150%	+0.31	Northwest
$5	$10	105%	+0.18	Thompson Cariboo
$4	$9	135%	+0.15	South Island
$4	$9	125%	+0.14	North Island
$5	$9	96%	+0.12	Fraser East
$5	$9	87%	+0.10	Fraser South
$5	$9	62%	+0.06	East Kootenay
$4	$8	105%	+0.00	Central Island
$5	$8	57%	-0.00	Northern Interior
$4	$8	98%	-0.01	Okanagan
$4	$8	85%	-0.02	Fraser North
$4	$8	119%	-0.03	N. Shore/Coast Gar.
$4	$8	86%	-0.05	Northeast
$3	$7	91%	-0.20	Kootenay Boundary
$4	$6	67%	-0.29	Vancouver
$3	$6	75%	-0.29	Richmond

Age-adjusted users per 1,000 population

1996	2003	Change	Log Dev 2003	
107	147	37%	+0.27	Northwest
127	138	9%	+0.21	Fraser East
104	133	28%	+0.17	Northeast
128	133	4%	+0.17	Fraser South
120	129	7%	+0.14	Thompson Cariboo
113	118	4%	+0.05	East Kootenay
112	114	2%	+0.02	Northern Interior
110	112	2%	-0.00	Fraser North
107	111	3%	-0.01	North Island
107	106	-1%	-0.05	Okanagan
101	103	2%	-0.08	Central Island
95	101	6%	-0.11	N. Shore/Coast Gar.
100	100	0%	-0.11	Vancouver
86	96	12%	-0.15	South Island
94	95	1%	-0.17	Richmond
84	94	12%	-0.18	Kootenay Boundary

Cost per user

1996	2003	Change	Log Dev 2003	
$47	$98	109%	+0.31	South Island
$38	$84	118%	+0.15	North Island
$39	$79	101%	+0.09	Central Island
$38	$78	107%	+0.08	N. Shore/Coast Gar.
$40	$76	91%	+0.05	Thompson Cariboo
$38	$75	100%	+0.04	Okanagan
$41	$75	82%	+0.04	Northwest
$47	$73	56%	+0.01	East Kootenay
$39	$71	81%	-0.02	Fraser North
$46	$71	54%	-0.02	Northern Interior
$41	$70	70%	-0.03	Kootenay Boundary
$37	$67	80%	-0.07	Fraser South
$37	$66	80%	-0.09	Fraser East
$37	$64	73%	-0.12	Richmond
$36	$61	67%	-0.18	Vancouver
$40	$58	45%	-0.23	Northeast



Antiinflammatory and Antirheumatics

Variation in expenditure per capita on antiinflammatory and antirheumatic products was moderate across HSDAs (CV=16%). Age-adjusted expenditure per capita ranged from $6 (Richmond) to $11 (Northwest) in 2003.

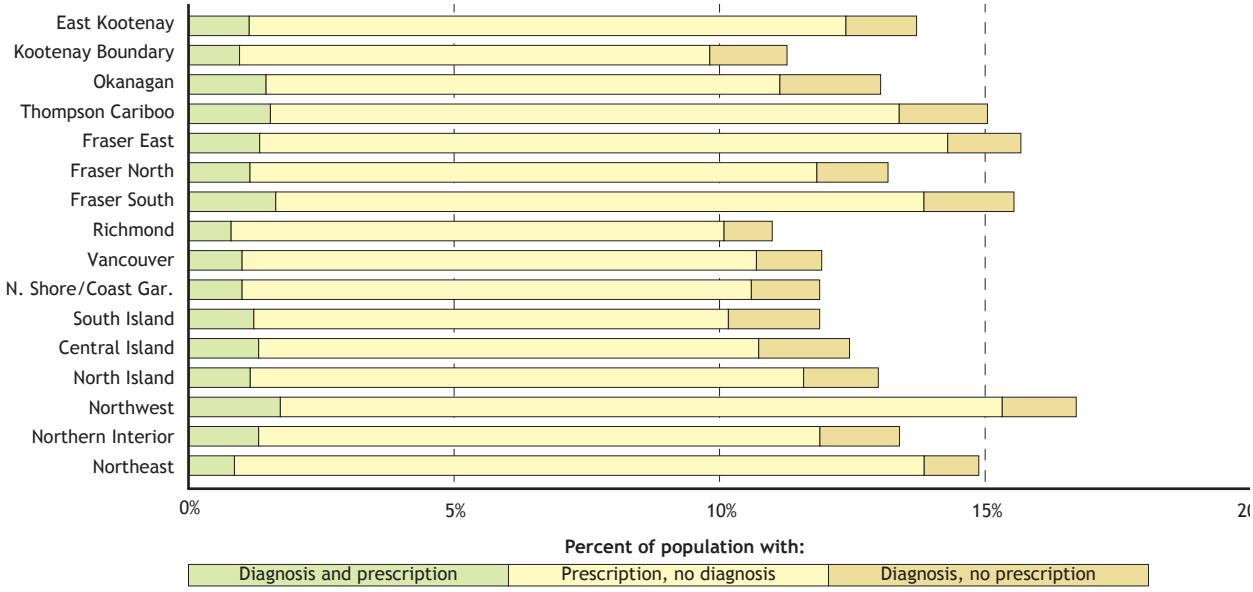
Variation in expenditure across regions was the result of moderate to high variation in both utilization (CV=15%) and costs per user (CV=13%). Several regions that had the lowest utilization rates (e.g. Vancouver Island HSDAs and North Shore/Coast Garibaldi) had the highest costs per user. Similarly, areas with higher than average utilization had lower than average costs per user (e.g. Fraser East and Northeast).

Age-adjusted rates of antiinflammatory and antirheumatic product use ranged from 9% to 15%. Approximately 90% of these users had no record of the predominant diagnosis of arthritis.

Moreover, less than half (41% to 49% across HSDAs) of those with a diagnosis of arthritis filled a prescription for antiinflammatory and antirheumatic products.

The lack of concordance between drug use and arthritis diagnosis may be explained by the use of this therapeutic class in the treatment of muscle pain and the use of over-the-counter medicines to manage arthritis.

Age-adjusted rates of prescription and/or related diagnosis, province-wide, 2003



Measure of diagnosis based on "Degenerative Joint Disease" Expanded Diagnosis Cluster MUS03

Analgesics

Expenditure per capita on analgesics nearly doubled between 1996 and 2003. While growth in expenditure was most rapid among the most elderly (those over 85), individuals between the ages of 45 and 64 accounted for over half of total spending on these medicines in 2003.

Among the drug categories examined, analgesics had the highest variation in age-adjusted expenditure per capita across HSDAs (CV=25%) in 2003. Age-adjusted utilization and costs per user varied significantly.

Across most regions, utilization remained stable or decreased, while cost per user increased substantially from 1996 to 2003.

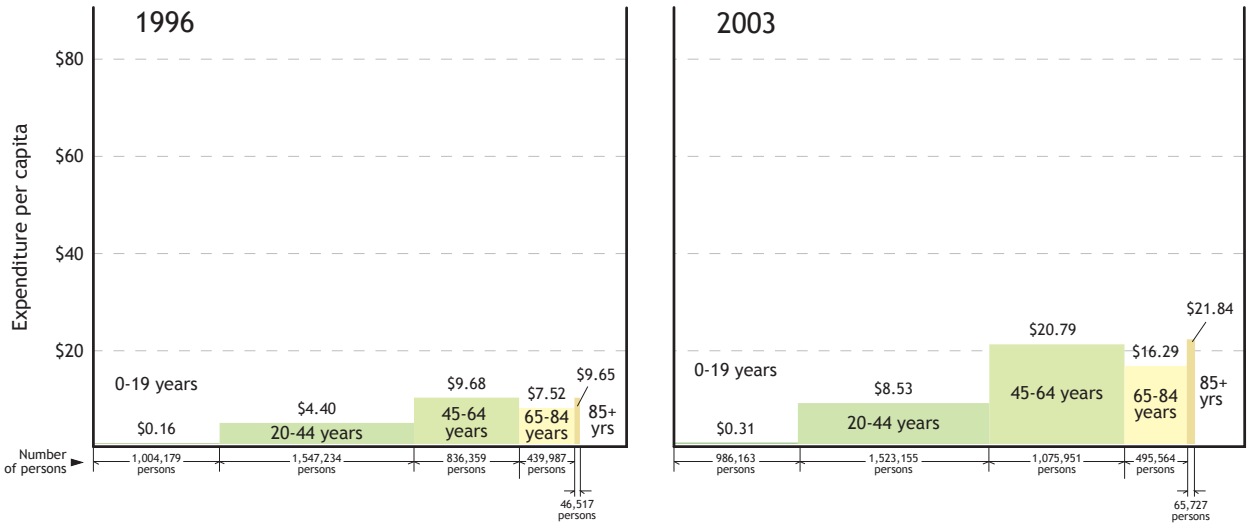
Drugs in this therapeutic category:

- Opioids (*e.g. morphine*)
- Antimigraine preparations (*e.g. sumatriptan*)

Indications for use:

- Opioids: relief of pain
- Antimigraine preparations: treatment of migraines

Expenditure per capita over the life-course, province-wide data, 1996 and 2003



Health service delivery area (HSDA) cartograms and data, 1996 and 2003

Age-adjusted expenditure per capita

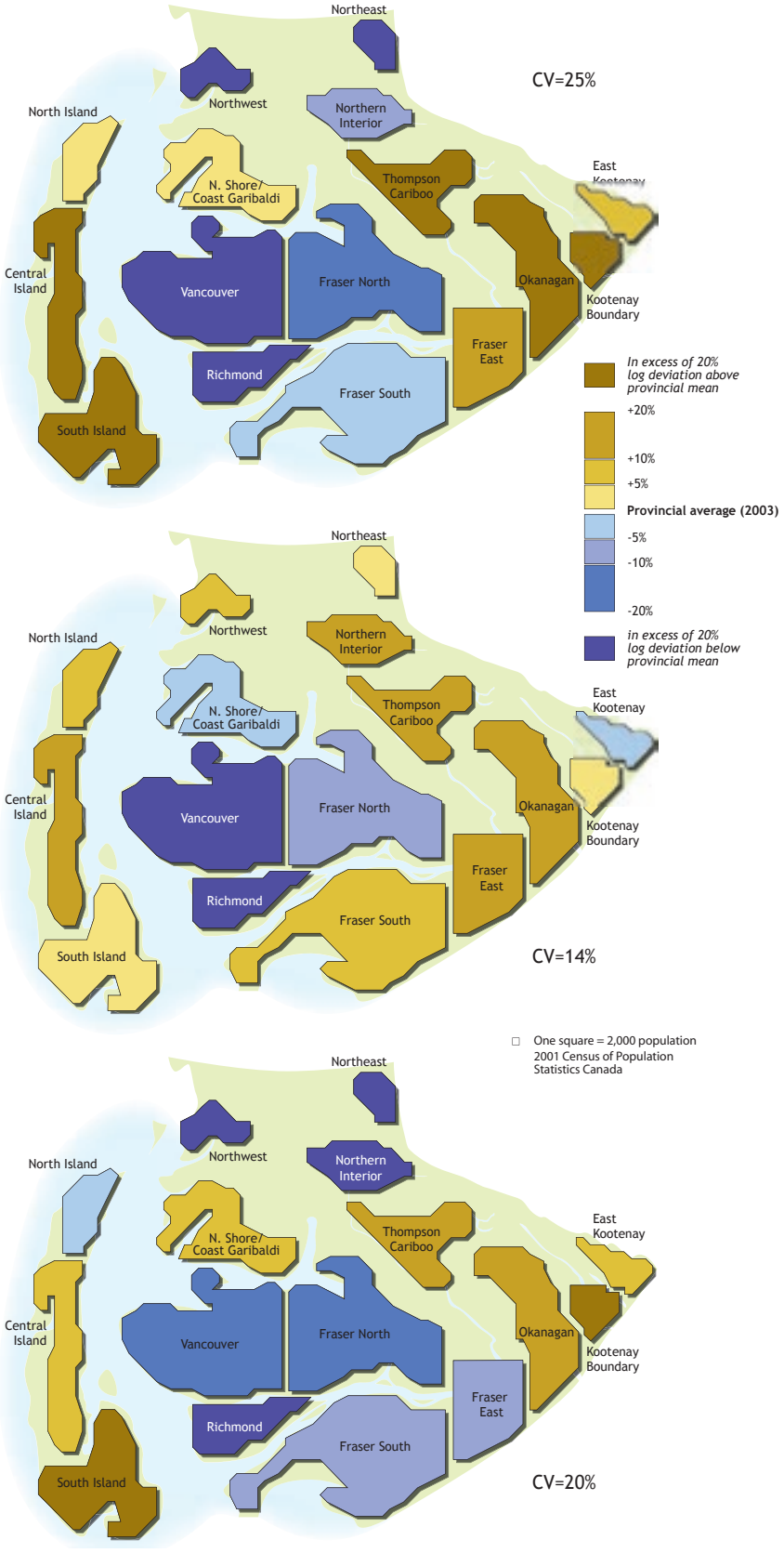
1996	2003	Change	Log Dev 2003	
$6	$15	142%	+0.32	South Island
$6	$15	162%	+0.30	Kootenay Boundary
$6	$14	136%	+0.24	Okanagan
$5	$14	188%	+0.24	Thompson Cariboo
$6	$14	125%	+0.23	Central Island
$5	$13	130%	+0.13	Fraser East
$6	$12	98%	+0.05	East Kootenay
$5	$12	123%	+0.05	N. Shore/Coast Gar.
$4	$12	192%	+0.05	North Island
$5	$11	113%	-0.02	Fraser South
$4	$10	125%	-0.10	Northern Interior
$5	$9	100%	-0.19	Fraser North
$3	$9	193%	-0.22	Northeast
$4	$8	109%	-0.34	Vancouver
$4	$8	107%	-0.36	Northwest
$3	$6	75%	-0.63	Richmond

Age-adjusted users per 1,000 population

1996	2003	Change	Log Dev 2003	
157	157	0%	+0.20	Fraser East
141	148	5%	+0.14	Thompson Cariboo
146	147	1%	+0.13	Central Island
136	147	8%	+0.13	Okanagan
139	145	4%	+0.11	Northern Interior
140	141	1%	+0.09	Northwest
140	139	-1%	+0.08	North Island
147	139	-5%	+0.07	Fraser South
116	135	16%	+0.05	Northeast
123	135	10%	+0.04	Kootenay Boundary
130	131	1%	+0.02	South Island
127	127	1%	-0.01	East Kootenay
127	127	0%	-0.02	N. Shore/Coast Gar.
133	120	-10%	-0.07	Fraser North
118	103	-13%	-0.23	Vancouver
101	86	-15%	-0.40	Richmond

Cost per user

1996	2003	Change	Log Dev 2003	
$49	$117	141%	+0.31	South Island
$47	$112	139%	+0.26	Kootenay Boundary
$44	$97	119%	+0.11	Okanagan
$35	$96	176%	+0.10	Thompson Cariboo
$42	$95	124%	+0.09	Central Island
$41	$92	122%	+0.06	N. Shore/Coast Gar.
$47	$92	97%	+0.06	East Kootenay
$28	$84	194%	-0.03	North Island
$35	$80	130%	-0.07	Fraser East
$35	$79	125%	-0.09	Fraser South
$32	$77	140%	-0.12	Vancouver
$34	$76	122%	-0.12	Fraser North
$32	$70	116%	-0.21	Northern Interior
$33	$69	106%	-0.23	Richmond
$26	$66	152%	-0.26	Northeast
$27	$55	105%	-0.45	Northwest



Antibacterials for Systemic Use

Growth in expenditure on antibacterials was lowest among the categories studied. Between 1996 and 2003, expenditure per capita increased by only 30%: ~$8 to ~$10.

Per capita expenditure on antibacterials is relatively even across the age profile, with those aged 19 and under accounting for a greater share of spending than any other drug category studied.

Variation in age-adjusted expenditure on antibacterials was low (CV=11%), due to only minor variations in utilization and costs per user (CV ~ 6%). Low-utilization regions also had low costs per user (e.g. Richmond and the Kootenays HSDAs).

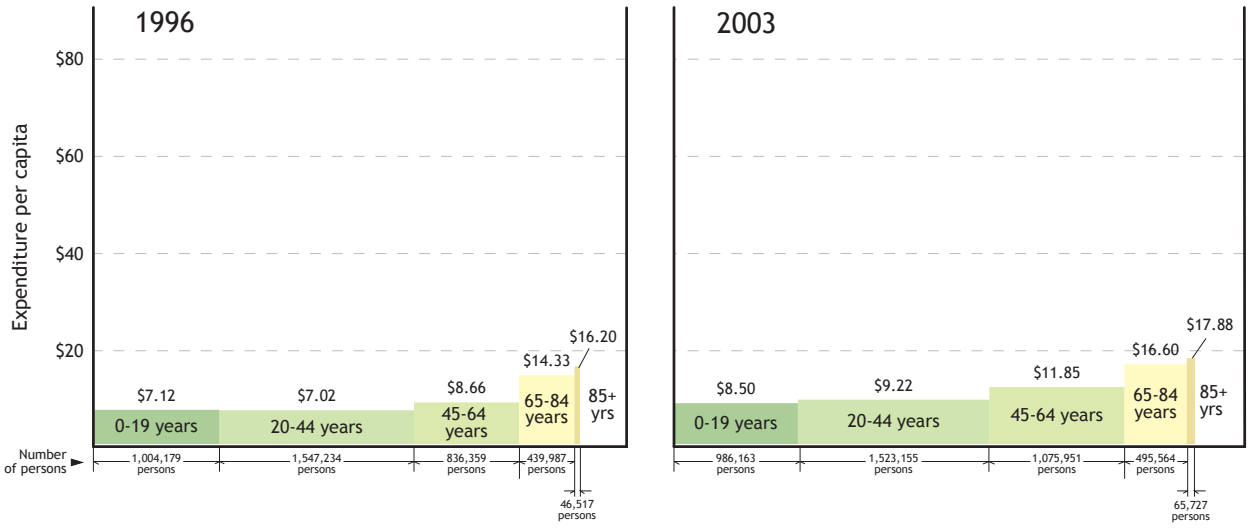
Drugs in this therapeutic category:

- Beta-lactams (e.g. *amoxicillin*)
- Sulfonamides (e.g. *trimethoprim and sulfamethoxasole*)
- Macrolides (e.g. *clarithromycin*)
- Quinolones (e.g. *ciprofloxacin*)

Indications for use:

- Treatment of infectious diseases caused by bacteria

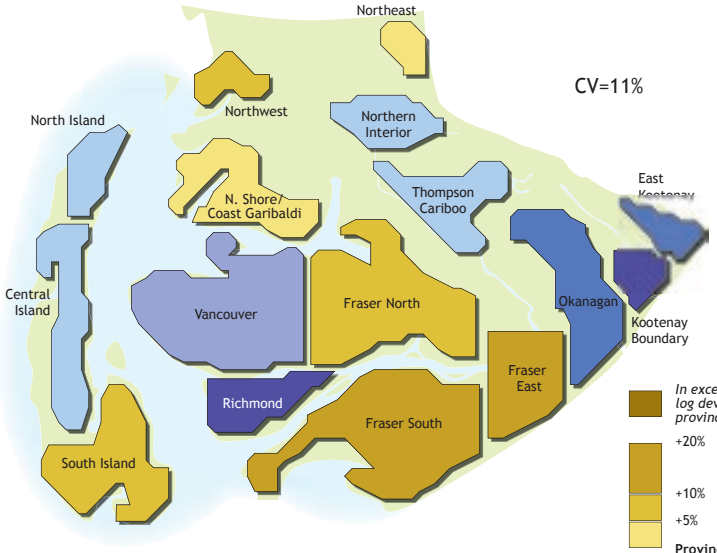
Expenditure per capita over the life-course, province-wide data, 1996 and 2003



Health service delivery area (HSDA) cartograms and data, 1996 and 2003

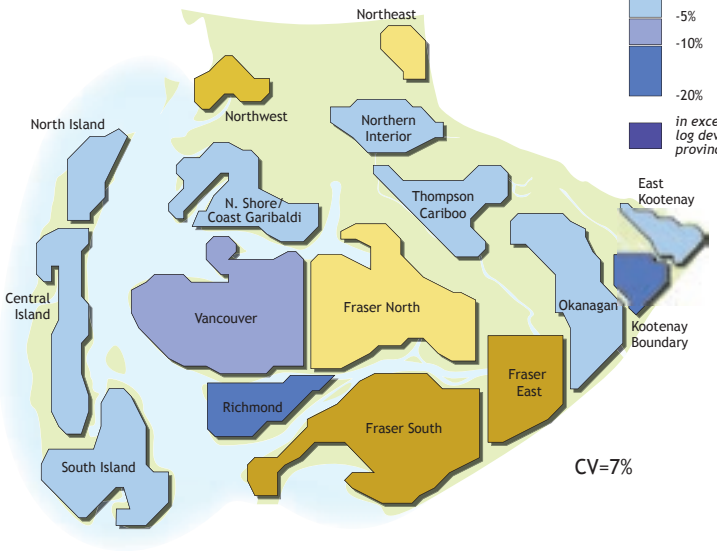
Age-adjusted expenditure per capita

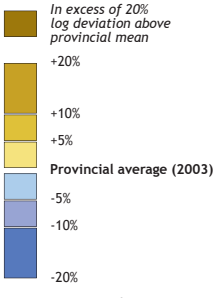
1996	2003	Change	Log Dev 2003	
$9	$12	45%	+0.14	Fraser East
$9	$12	32%	+0.13	Fraser South
$9	$12	30%	+0.07	Northwest
$8	$12	53%	+0.06	South Island
$9	$11	34%	+0.05	Fraser North
$7	$11	62%	+0.05	Northeast
$8	$11	36%	+0.00	N. Shore/Coast Gar.
$9	$11	25%	-0.01	Thompson Cariboo
$10	$11	7%	-0.01	Northern Interior
$7	$10	41%	-0.04	North Island
$8	$10	30%	-0.05	Central Island
$9	$10	11%	-0.09	Vancouver
$8	$10	25%	-0.11	Okanagan
$9	$9	2%	-0.16	East Kootenay
$8	$9	7%	-0.22	Richmond
$6	$8	43%	-0.25	Kootenay Boundary



Age-adjusted users per 1,000 population

1996	2003	Change	Log Dev 2003	
393	354	-10%	+0.10	Fraser East
403	353	-12%	+0.10	Fraser South
374	347	-7%	+0.08	Northwest
346	325	-6%	+0.02	Northeast
390	323	-17%	+0.01	Fraser North
368	317	-14%	-0.01	Thompson Cariboo
369	317	-14%	-0.01	N. Shore/Coast Gar.
369	316	-15%	-0.01	Okanagan
383	315	-18%	-0.01	Northern Interior
364	314	-14%	-0.02	Central Island
343	310	-10%	-0.03	South Island
363	309	-15%	-0.03	North Island
379	306	-19%	-0.04	East Kootenay
373	298	-20%	-0.07	Vancouver
366	283	-23%	-0.12	Richmond
322	276	-14%	-0.14	Kootenay Boundary

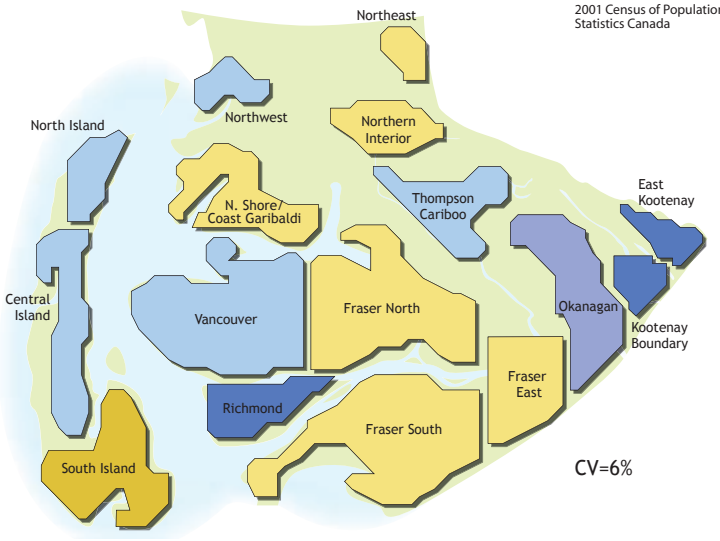




One square = 2,000 population
2001 Census of Population
Statistics Canada

Cost per user

1996	2003	Change	Log Dev 2003	
$22	$37	69%	+0.09	South Island
$22	$35	61%	+0.04	Fraser North
$22	$35	61%	+0.03	Fraser East
$20	$35	72%	+0.03	Northeast
$23	$35	51%	+0.03	Fraser South
$22	$34	59%	+0.01	N. Shore/Coast Gar.
$26	$34	31%	+0.00	Northern Interior
$23	$34	45%	-0.00	Thompson Cariboo
$20	$34	66%	-0.01	North Island
$24	$34	41%	-0.01	Northwest
$24	$33	39%	-0.02	Vancouver
$22	$33	51%	-0.03	Central Island
$21	$31	46%	-0.10	Okanagan
$22	$31	38%	-0.10	Richmond
$18	$30	67%	-0.11	Kootenay Boundary
$24	$30	27%	-0.11	East Kootenay



Sex Hormones

Per capita expenditure on sex hormones increased by 17% between 1996 and 2003.

Sex hormone expenditure is highest among residents aged 20 to 44. Increased expenditure for this age cohort and for residents under age 20 explained all of the increase in overall expenditure in BC.

Variation in age-adjusted expenditure per capita was moderate across HSDAs (CV=13%) in 2003. Variation in age-adjusted utilization (CV=12%) was greater than variation in cost per user (CV=9%).

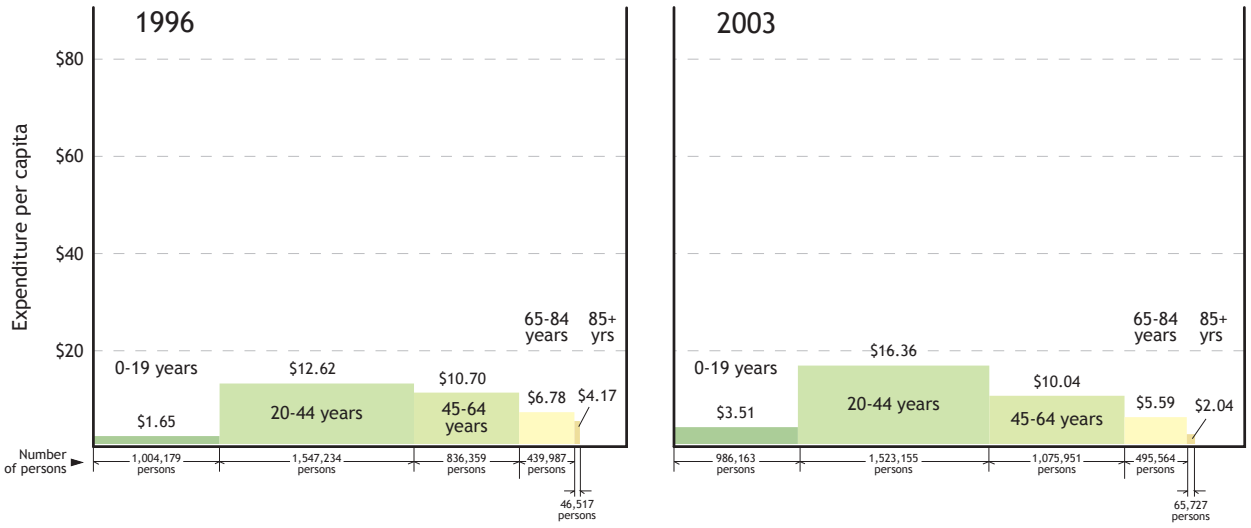
Drugs in this therapeutic category:

- Hormonal contraceptives (*e.g. progestogen and estrogen combinations*)
- Androgens, estrogens and progestogens, either by themselves or in combination
- Gonadotropins and other ovulation stimulants (*e.g. clomiphene*)
- Antiandrogens (*e.g. cypoterone*)
- Other sex hormones (*e.g. raloxifene*)

Indications for use:

- Contraceptives: birth control
- Androgens: treatment of testosterone deficiency
- Estrogen replacement/in combination with other sex hormones: prevention of osteoporosis and/or the relief of menopausal symptoms
- Gonadotropins: treatment of infertility caused by gonadotropin deficiency
- Antiandrogens: treatment of prostate cancer

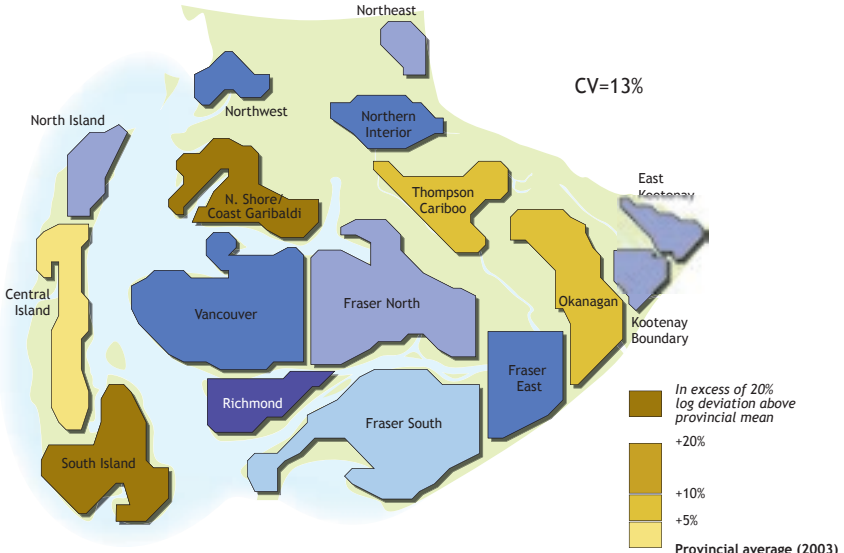
Expenditure per capita over the life-course, province-wide data, 1996 and 2003



Health service delivery area (HSDA) cartograms and data, 1996 and 2003

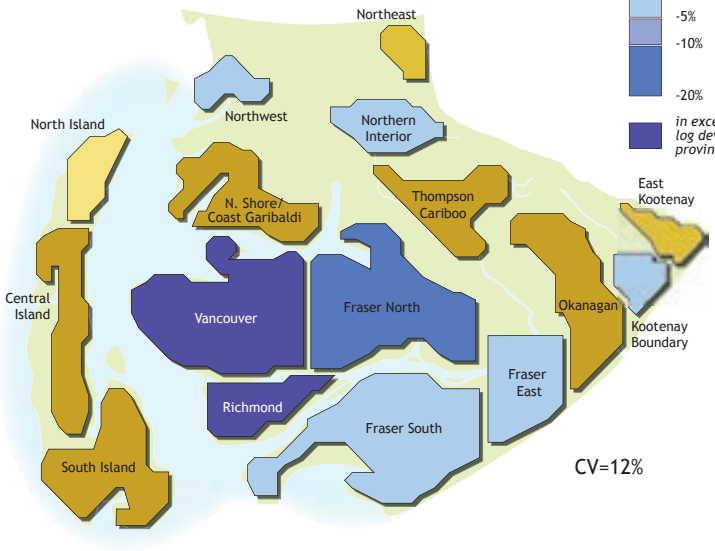
Age-adjusted expenditure per capita

1996	2003	Change	Log Dev 2003	
$11	$13	17%	+0.25	N. Shore/Coast Gar.
$9	$12	30%	+0.21	South Island
$9	$11	22%	+0.10	Okanagan
$9	$11	25%	+0.07	Thompson Cariboo
$9	$10	11%	+0.01	Central Island
$9	$10	15%	-0.02	Fraser South
$9	$9	8%	-0.07	East Kootenay
$8	$9	13%	-0.07	Fraser North
$8	$9	23%	-0.08	North Island
$8	$9	20%	-0.09	Kootenay Boundary
$8	$9	13%	-0.09	Northeast
$8	$9	7%	-0.10	Northern Interior
$7	$9	23%	-0.11	Vancouver
$8	$9	11%	-0.11	Fraser East
$8	$9	3%	-0.13	Northwest
$7	$8	11%	-0.20	Richmond



Age-adjusted users per 1,000 population

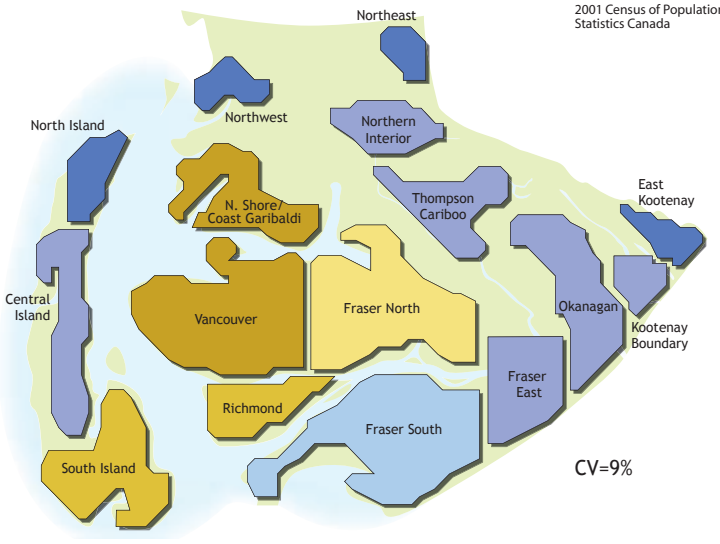
1996	2003	Change	Log Dev 2003	
97	104	7%	+0.17	Okanagan
96	101	6%	+0.15	South Island
89	100	13%	+0.14	Thompson Cariboo
99	100	1%	+0.13	N. Shore/Coast Gar.
94	97	4%	+0.11	Central Island
83	95	15%	+0.09	East Kootenay
87	93	6%	+0.06	Northeast
82	89	8%	+0.02	North Island
82	87	5%	-0.01	Northwest
84	86	3%	-0.01	Fraser South
84	86	3%	-0.01	Northern Interior
73	84	15%	-0.03	Kootenay Boundary
84	84	1%	-0.03	Fraser East
80	79	-1%	-0.10	Fraser North
70	70	0%	-0.22	Vancouver
71	67	-5%	-0.26	Richmond



One square = 2,000 population
2001 Census of Population
Statistics Canada

Cost per user

1996	2003	Change	Log Dev 2003	
$111	$129	16%	0.12	N. Shore/Coast Gar.
$104	$128	23%	0.11	Vancouver
$99	$122	23%	0.06	South Island
$104	$121	17%	0.05	Richmond
$103	$118	14%	0.03	Fraser North
$102	$114	12%	-0.01	Fraser South
$104	$108	4%	-0.06	Kootenay Boundary
$97	$107	11%	-0.07	Thompson Cariboo
$93	$106	14%	-0.07	Okanagan
$96	$106	10%	-0.08	Fraser East
$101	$105	4%	-0.09	Northern Interior
$98	$105	6%	-0.09	Central Island
$91	$103	13%	-0.11	North Island
$103	$101	-2%	-0.12	Northwest
$93	$98	6%	-0.15	Northeast
$105	$98	-6%	-0.16	East Kootenay



Antiepileptics

Between 1996 and 2003, expenditure per capita for antiepileptics tripled from just over $2 to approximately $7. Expenditure per resident aged over 85 increased nearly six-fold.

Despite rapid growth in spending among the elderly, adults between 20 and 64 accounted for approximately 76% of total spending on antiepileptics.

Variation in age-adjusted expenditure per capita was relatively high (CV=16%). This is largely explained by variation in utilization (CV=13%), rather than in cost per user (CV=8%). High use regions tended to have above average costs per user.

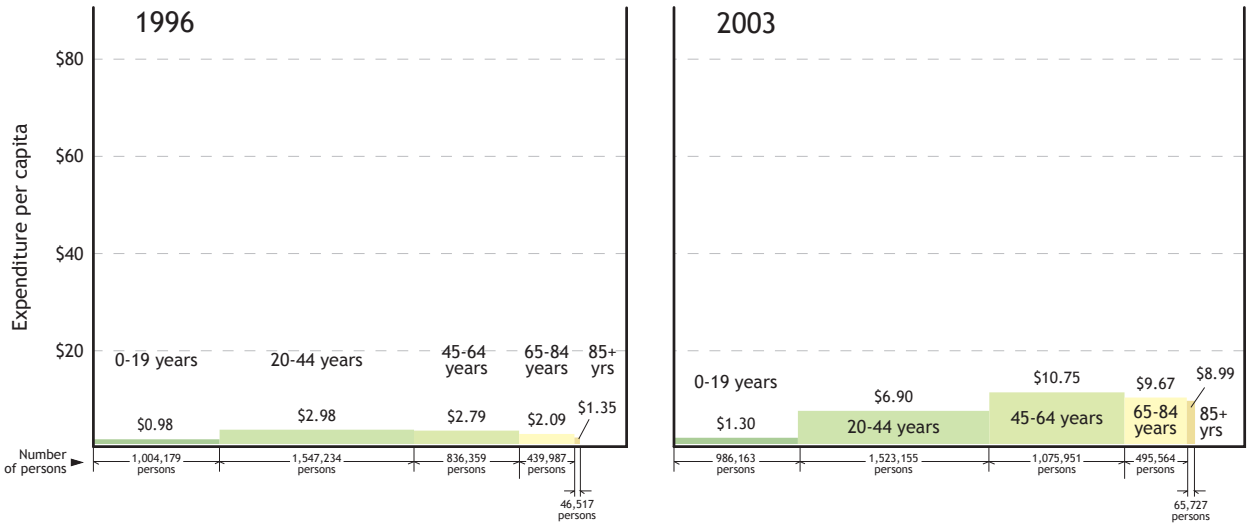
Drugs in this therapeutic category:

- Barbiturates (*e.g. phenobarbital*)
- Benzodiazepine derivatives (*e.g. clonazepam*)
- Hydatoin (*e.g. phenytoin*)
- Fatty acid derivatives (*e.g. valproic acid*)
- Other antiepileptics

Indications for use:

- Treatment of epilepsy

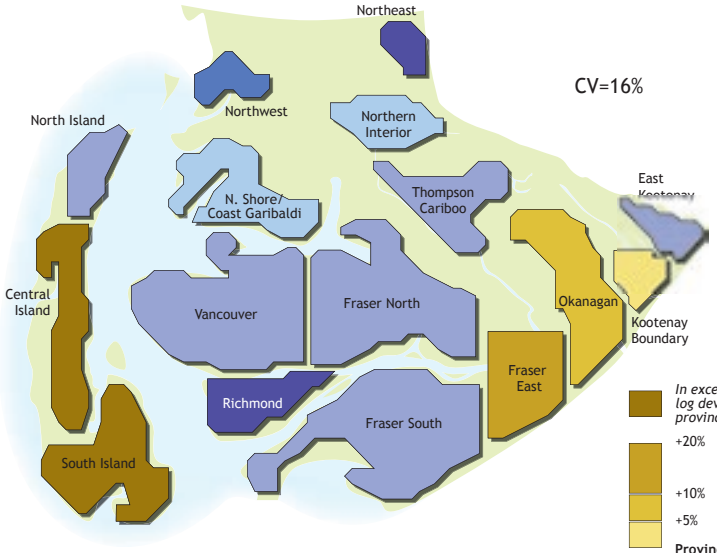
Expenditure per capita over the life-course, province-wide data, 1996 and 2003



Health service delivery area (HSDA) cartograms and data, 1996 and 2003

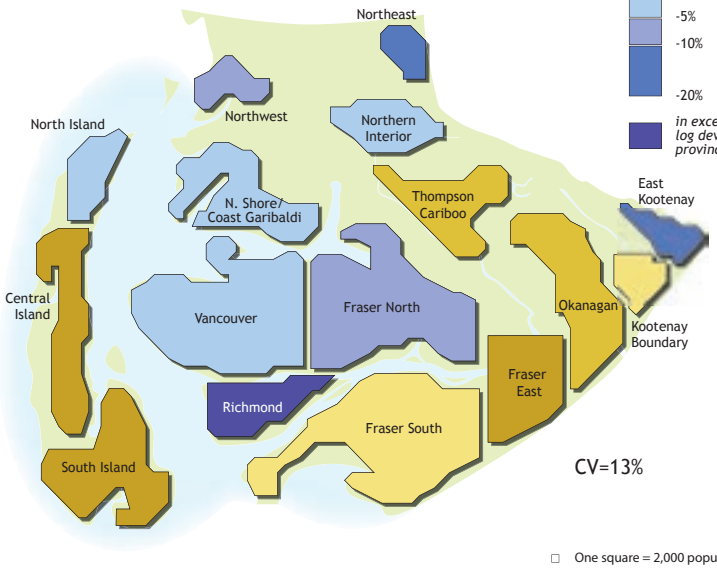
Age-adjusted expenditure per capita

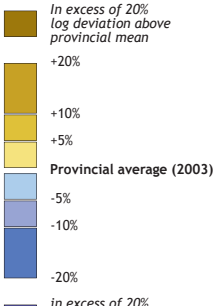
1996	2003	Change	Log Dev 2003	
$3	$9	234%	+0.28	South Island
$2	$9	269%	+0.23	Central Island
$2	$8	258%	+0.17	Fraser East
$3	$8	196%	+0.08	Okanagan
$3	$7	163%	+0.02	Kootenay Boundary
$2	$7	191%	-0.00	N. Shore/Coast Gar.
$2	$7	194%	-0.05	Northern Interior
$2	$7	195%	-0.05	Fraser South
$2	$7	203%	-0.07	Fraser North
$3	$6	148%	-0.08	East Kootenay
$2	$6	240%	-0.09	North Island
$2	$6	161%	-0.09	Thompson Cariboo
$2	$6	197%	-0.09	Vancouver
$2	$6	175%	-0.12	Northwest
$2	$5	220%	-0.25	Northeast
$2	$5	182%	-0.33	Richmond



Age-adjusted users per 1,000 population

1996	2003	Change	Log Dev 2003	
15	31	108%	+0.14	South Island
14	30	116%	+0.12	Fraser East
12	30	144%	+0.12	Central Island
17	30	76%	+0.10	Thompson Cariboo
15	29	98%	+0.09	Okanagan
14	27	100%	+0.02	Kootenay Boundary
14	27	90%	+0.02	Fraser South
12	27	128%	-0.00	Northern Interior
15	26	79%	-0.02	N. Shore/Coast Gar.
16	26	68%	-0.03	Vancouver
13	26	104%	-0.03	North Island
12	25	106%	-0.08	Northwest
13	25	92%	-0.09	Fraser North
13	23	78%	-0.18	Northeast
11	22	97%	-0.19	East Kootenay
11	19	66%	-0.36	Richmond

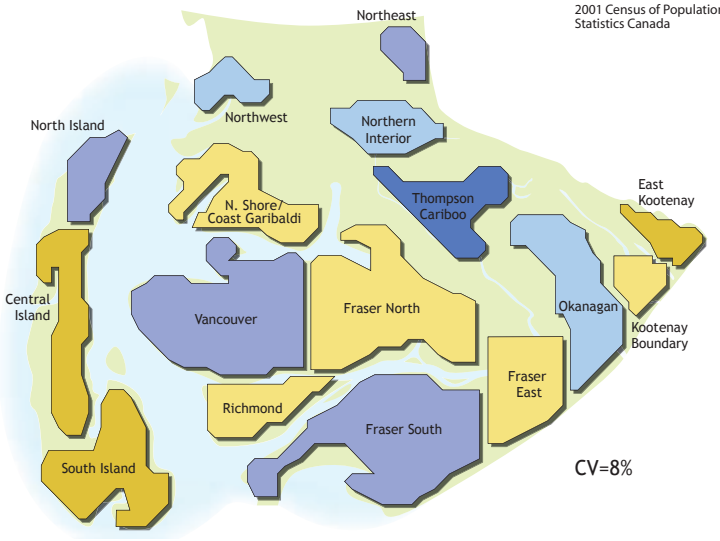




One square = 2,000 population
2001 Census of Population
Statistics Canada

Cost per user

1996	2003	Change	Log Dev 2003	
$188	$301	60%	+0.15	South Island
$231	$291	26%	+0.11	East Kootenay
$192	$290	51%	+0.11	Central Island
$165	$273	66%	+0.05	Fraser East
$158	$268	70%	+0.03	Richmond
$168	$266	58%	+0.02	Fraser North
$163	$264	62%	+0.02	N. Shore/Coast Gar.
$199	$261	31%	+0.00	Kootenay Boundary
$172	$258	50%	-0.01	Okanagan
$187	$250	33%	-0.04	Northwest
$193	$248	29%	-0.04	Northern Interior
$148	$247	67%	-0.05	North Island
$138	$244	77%	-0.06	Vancouver
$135	$243	80%	-0.07	Northeast
$157	$243	55%	-0.07	Fraser South
$145	$215	48%	-0.19	Thompson Cariboo



Immunosuppressive Agents

Expenditure on immunosuppressive agents increased twenty-fold over the period studied, from $0.30 in 1996 to over $6 in 2003.

Immunosuppressive drug expenditures are highest among adults aged 45 to 84. However, over 28% of overall expenditure on these drugs is for patients aged 20 to 44.

Age-adjusted expenditure per capita on immunosuppressive agents varied substantially across HSDAs (CV=23%). This variation was driven by variation in age-adjusted utilization (CV=16%) and by variation in cost per user (which ranged from roughly $2,500 to $4,600; CV=16%).

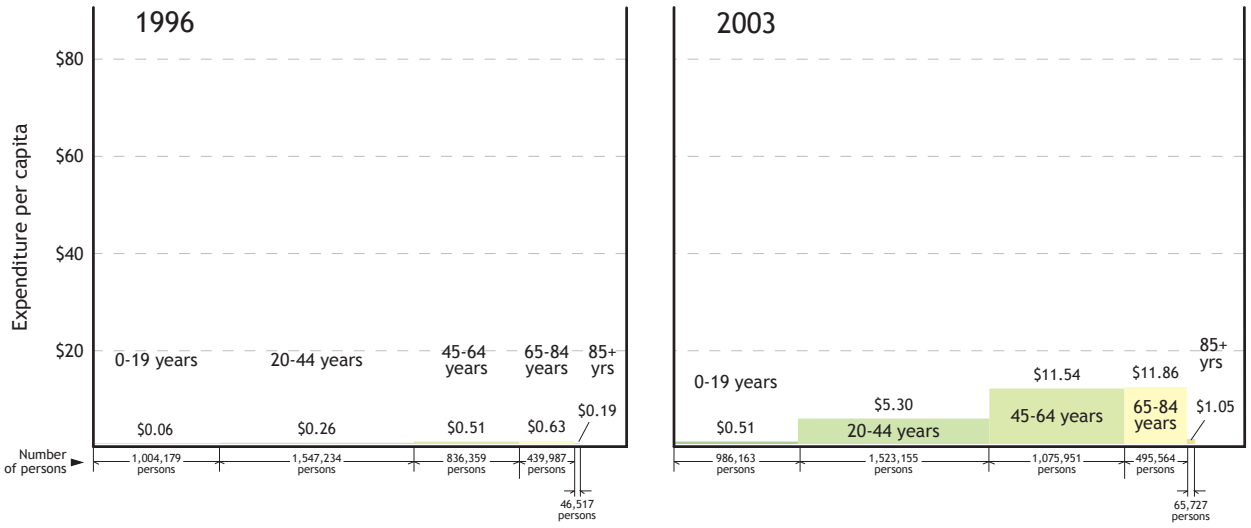
Drugs in this therapeutic category:

- Selective immunosuppressive agents excluding corticosteroids (*e.g. cyclosporine*)
- Other immunosuppressive agents, excluding corticosteroids (*e.g. methotrexate*)

Indications for use:

- Reduction of risk of rejection in organ transplantation
- Treatment of autoimmune disease

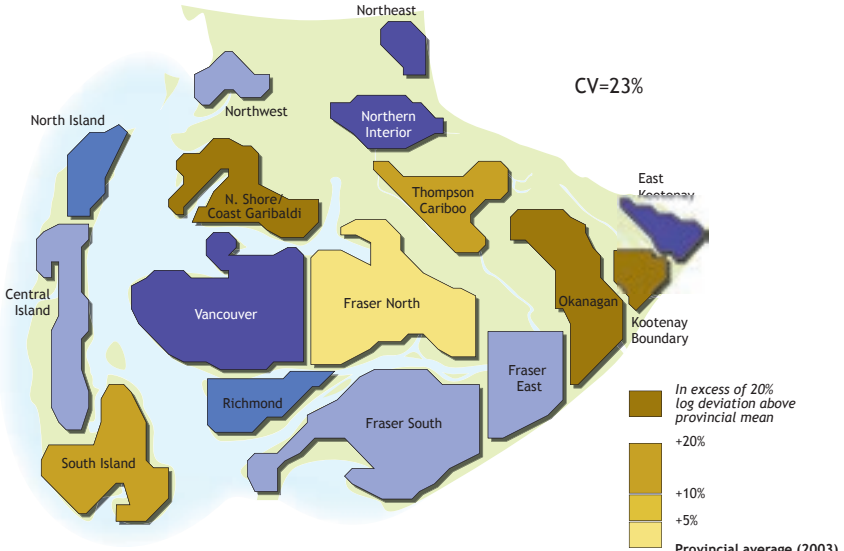
Expenditure per capita over the life-course, province-wide data, 1996 and 2003



Health service delivery area (HSDA) cartograms and data, 1996 and 2003

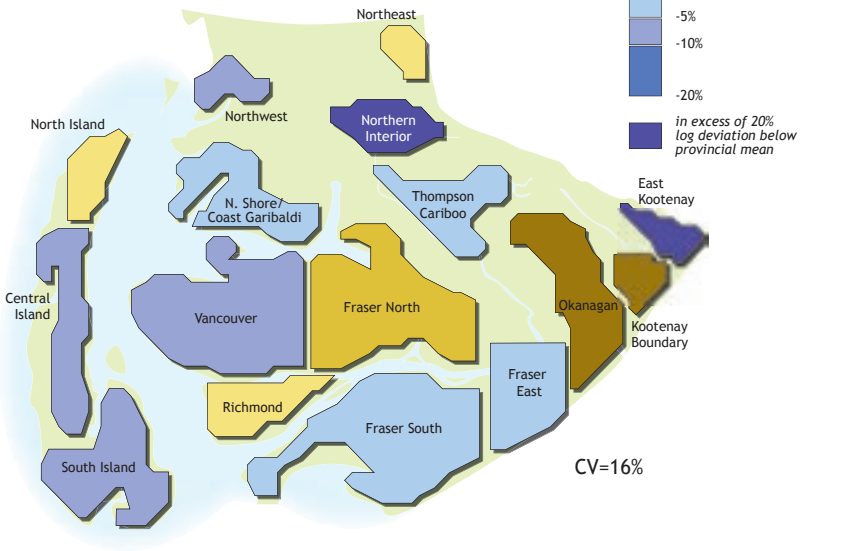
Age-adjusted expenditure per capita

1996	2003	Change	Log Dev 2003	
$0	$10	1996%	+0.42	Kootenay Boundary
$0	$9	1935%	+0.27	Okanagan
$0	$8	2251%	+0.21	N. Shore/Coast Gar.
$0	$7	3242%	+0.13	Thompson Cariboo
$0	$7	3158%	+0.12	South Island
$0	$7	1805%	+0.05	Fraser North
$0	$6	2944%	-0.05	Central Island
$0	$6	1439%	-0.06	Fraser East
$0	$6	2013%	-0.07	Fraser South
$0	$6	2179%	-0.08	Northwest
$0	$6	1888%	-0.13	Richmond
$0	$6	2011%	-0.18	North Island
$0	$5	1627%	-0.23	Vancouver
$0	$5	3384%	-0.27	Northern Interior
$0	$5	1560%	-0.34	East Kootenay
$0	$5	1705%	-0.38	Northeast



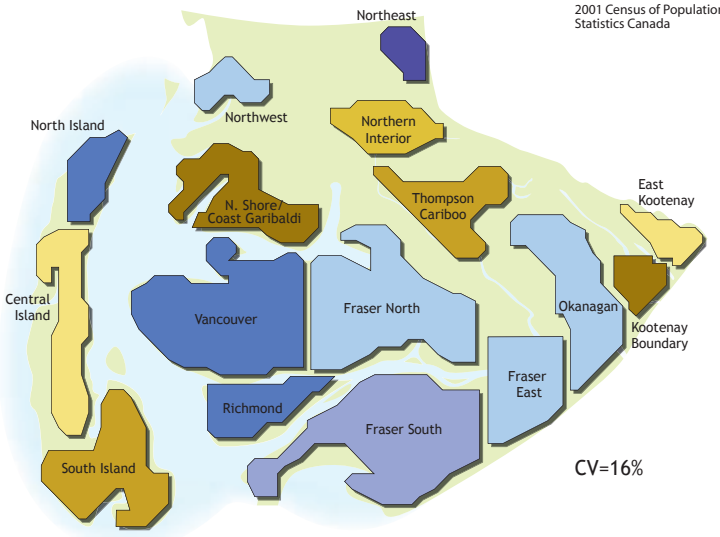
Age-adjusted users per 1,000 population

1996	2003	Change	Log Dev 2003	
0.4	1.0	213%	+0.29	Okanagan
0.1	0.7	179%	+0.21	Kootenay Boundary
0.1	0.6	193%	+0.07	Fraser North
0.1	0.6	172%	+0.03	Northeast
0.1	0.6	218%	+0.02	Richmond
0.1	0.5	233%	+0.01	North Island
0.1	0.5	278%	-0.00	North Shore/Coast Gar.
0.2	0.5	235%	-0.00	Thompson Cariboo
0.1	0.5	224%	-0.01	Fraser South
0.1	0.5	247%	-0.05	Fraser East
0.1	0.5	158%	-0.06	Northwest
0.1	0.5	285%	-0.07	South Island
0.0	0.5	251%	-0.08	Vancouver
0.2	0.4	296%	-0.10	Central Island
0.2	0.4	202%	-0.34	East Kootenay
0.2	0.4	193%	-0.35	Northern Interior



Cost per user

1996	2003	Change	Log Dev 2003	
$738	$4,596	523%	+0.21	N. Shore/Coast Gar.
$610	$4,587	652%	+0.21	Kootenay Boundary
$529	$4,474	746%	+0.19	South Island
$422	$4,211	898%	+0.13	Thompson Cariboo
$342	$4,056	1087%	+0.09	Northern Interior
$506	$3,892	669%	+0.05	Central Island
$679	$3,728	449%	+0.00	East Kootenay
$831	$3,692	344%	-0.01	Fraser East
$561	$3,645	550%	-0.02	Fraser North
$559	$3,636	550%	-0.02	Okanagan
$412	$3,635	783%	-0.02	Northwest
$537	$3,501	552%	-0.06	Fraser South
$513	$3,207	525%	-0.15	Richmond
$646	$3,183	392%	-0.15	Vancouver
$485	$3,075	534%	-0.19	North Island
$372	$2,468	564%	-0.41	Northeast



Immunostimulants

Expenditure per capita on immunostimulants increased ten-fold from $0.60 in 1996 to over $6 in 2003. Adults aged 20 to 64 account for virtually all (95%) of the expenditure in this therapeutic category.

While per capita spending on immunostimulants is relatively small, expenditure per user in BC exceeded $10,000 in 2003.

Variation in age-adjusted expenditure per capita is high for this therapeutic category (CV=22%). This is due almost entirely to significant variation in age-adjusted utilization (CV=28%).

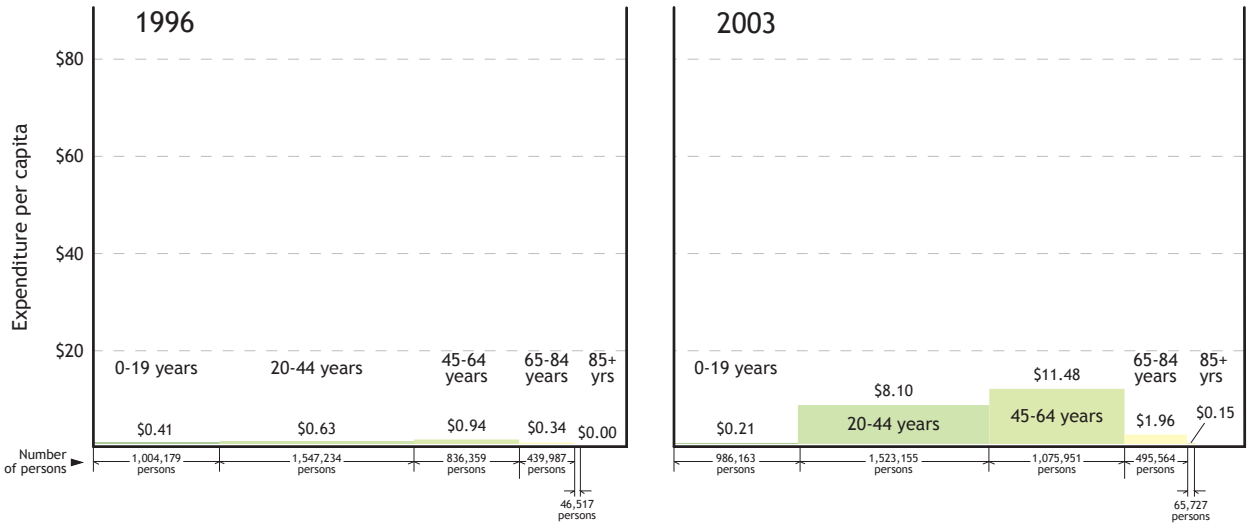
Drugs in this therapeutic category:

- Colony stimulating factors (*e.g. filgrastim*)
- Interferons (*e.g. interferon alfa-2a*)

Indications for use:

- To decrease the incidence of infection due to febrile neutropenia
- Treatment of chronic hepatitis
- Treatment of patients with cancers such as chronic myelogenous leukemia, or multiple myeloma
- Treatment of patients with multiple sclerosis

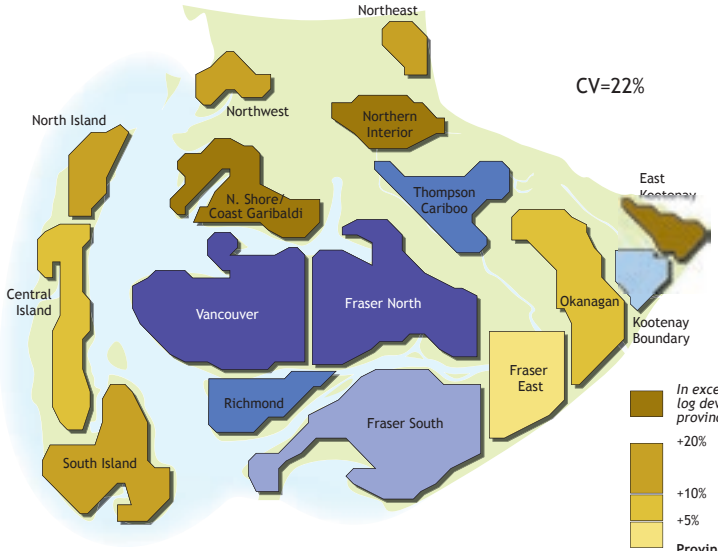
Expenditure per capita over the life-course, province-wide data, 1996 and 2003



Health service delivery area (HSDA) cartograms and data, 1996 and 2003

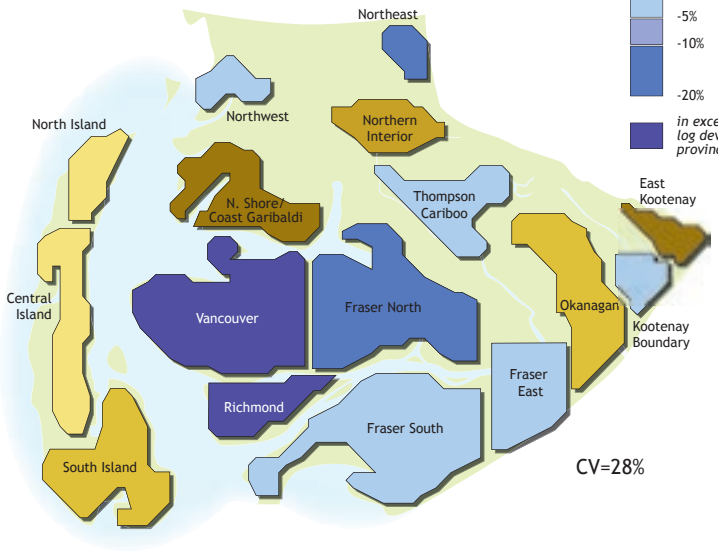
Age-adjusted expenditure per capita

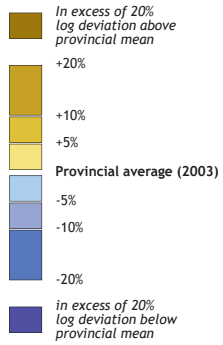
1996	2003	Change	Log Dev 2003	
$2	$10	549%	+0.45	N. Shore/Coast Gar.
$0	$9	2834%	+0.37	East Kootenay
$0	$9	2046%	+0.36	Northern Interior
$1	$8	1274%	+0.20	North Island
$0	$8	2959%	+0.19	Northeast
$1	$8	706%	+0.19	Northwest
$1	$7	1229%	+0.10	South Island
$1	$7	946%	+0.09	Okanagan
$0	$7	2049%	+0.07	Central Island
$0	$6	1471%	+0.03	Fraser East
$0	$6	1178%	-0.04	Kootenay Boundary
$0	$6	1117%	-0.09	Fraser South
$1	$6	999%	-0.11	Thompson Cariboo
$0	$5	933%	-0.20	Richmond
$1	$5	692%	-0.21	Fraser North
$1	$5	608%	-0.30	Vancouver



Age-adjusted users per 1,000 population

1996	2003	Change	Log Dev 2003	
0.4	1.0	156%	+0.68	N. Shore/Coast Gar.
0.1	0.7	823%	+0.34	East Kootenay
0.1	0.6	876%	+0.19	Northern Interior
0.1	0.6	406%	+0.09	South Island
0.1	0.6	446%	+0.09	Okanagan
0.1	0.5	322%	+0.03	North Island
0.1	0.5	317%	+0.03	Central Island
0.2	0.5	225%	-0.01	Northwest
0.1	0.5	496%	-0.02	Kootenay Boundary
0.1	0.5	456%	-0.05	Fraser East
0.1	0.5	326%	-0.08	Thompson Cariboo
0.1	0.5	325%	-0.09	Fraser South
0.0	0.5	1011%	-0.11	Northeast
0.2	0.4	166%	-0.19	Fraser North
0.2	0.4	136%	-0.22	Richmond
0.2	0.4	113%	-0.31	Vancouver

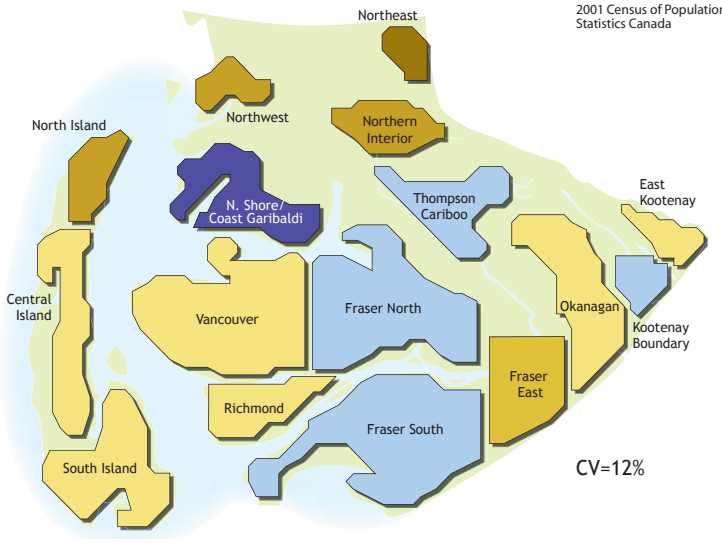




One square = 2,000 population
2001 Census of Population
Statistics Canada

Cost per user

1996	2003	Change	Log Dev 2003	
$5,731	$15,780	175%	+0.30	Northeast
$5,729	$14,213	148%	+0.19	Northwest
$6,353	$13,969	120%	+0.18	Northern Interior
$4,247	$13,833	226%	+0.17	North Island
$4,513	$12,740	182%	+0.08	Fraser East
$2,363	$12,180	415%	+0.04	Central Island
$3,814	$12,120	218%	+0.03	East Kootenay
$2,742	$12,000	338%	+0.02	Richmond
$3,571	$11,881	233%	+0.01	Vancouver
$4,511	$11,842	163%	+0.01	South Island
$6,170	$11,828	92%	+0.01	Okanagan
$4,075	$11,669	186%	-0.00	Fraser South
$3,862	$11,512	198%	-0.02	Fraser North
$5,359	$11,494	114%	-0.02	Kootenay Boundary
$4,407	$11,377	158%	-0.03	Thompson Cariboo
$3,666	$9,283	153%	-0.23	N. Shore/Coast Gar.



Urologicals

Per capita expenditure on urological drugs in British Columbia nearly tripled from $1.32 in 1996 to $5.13 in 2003.

Per capita expenditure in this category increases across the age profile and then falls for residents over age 85. Approximately 85% of total spending on urological drugs in BC is for adults aged 45 to 84.

There was modest variation in age-adjusted expenditure per capita across HSDAs (CV=12%). Both utilization and costs per user varied slightly (CV=9% in both cases).

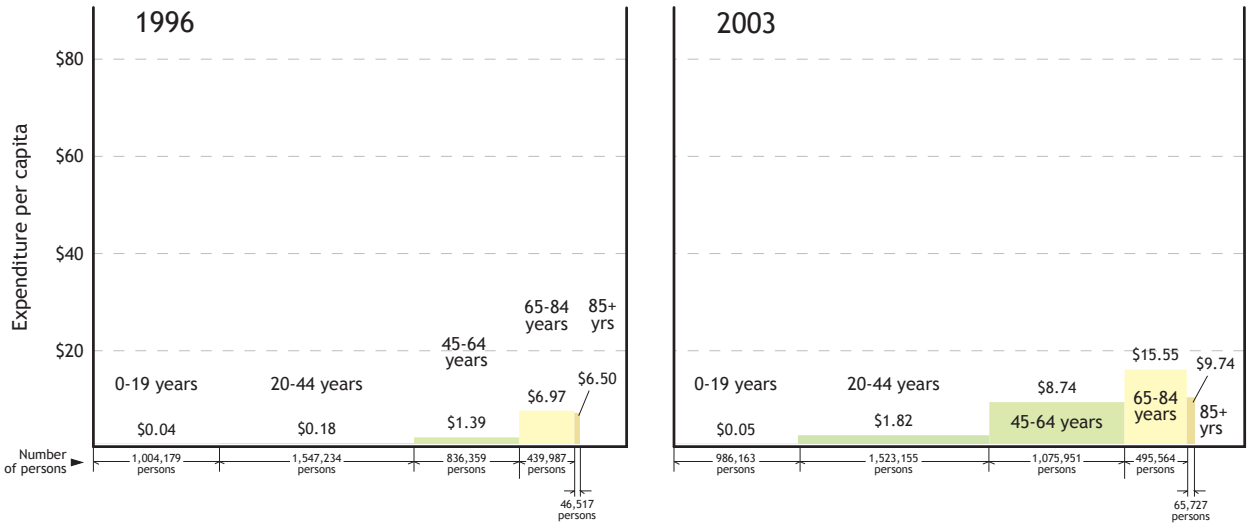
Drugs in this therapeutic category:

- Urinary antispasmodic (e.g. *oxybutynin*)
- Drugs used to treat erectile dysfunction (e.g. *sildenafil*)
- Drugs used in benign prostatic hypertrophy (e.g. *finasteride*)

Indications for use:

- Antispasmodic: symptomatic management of overactive bladder
- Treatment of erectile dysfunction
- Treatment of benign prostatic hyperplasia

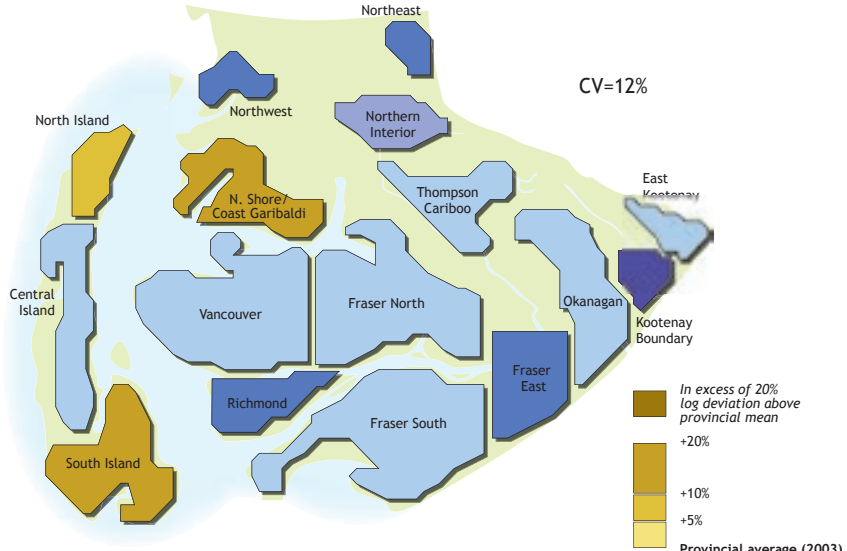
Expenditure per capita over the life-course, province-wide data, 1996 and 2003



Health service delivery area (HSDA) cartograms and data, 1996 and 2003

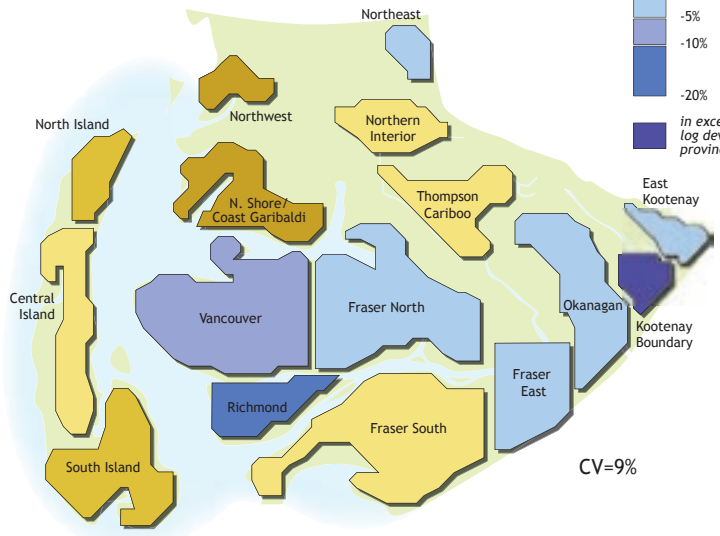
Age-adjusted expenditure per capita

1996	2003	Change	Log Dev 2003	
$2	$6	248%	+0.17	South Island
$1	$6	498%	+0.15	N. Shore/Coast Gar.
$2	$5	202%	+0.07	North Island
$1	$5	329%	-0.00	Vancouver
$1	$5	245%	-0.01	Central Island
$1	$5	323%	-0.02	Thompson Cariboo
$1	$5	244%	-0.02	Fraser South
$1	$5	361%	-0.03	Fraser North
$1	$5	282%	-0.03	Okanagan
$2	$5	152%	-0.05	East Kootenay
$1	$5	288%	-0.06	Northern Interior
$1	$5	352%	-0.11	Northwest
$1	$4	288%	-0.14	Fraser East
$1	$4	195%	-0.16	Richmond
$1	$4	282%	-0.19	Northeast
$1	$4	343%	-0.27	Kootenay Boundary



Age-adjusted users per 1,000 population

1996	2003	Change	Log Dev 2003	
13	36	170%	+0.13	Northwest
12	35	198%	+0.11	N. Shore/Coast Gar.
14	33	137%	+0.05	South Island
14	33	132%	+0.05	North Island
11	33	191%	+0.04	Thompson Cariboo
12	32	174%	+0.04	Central Island
12	32	161%	+0.02	Fraser South
11	32	176%	+0.02	Northern Interior
12	31	166%	-0.01	Okanagan
12	31	164%	-0.02	Fraser East
11	30	185%	-0.03	Fraser North
12	30	142%	-0.05	Northeast
11	30	167%	-0.05	East Kootenay
10	29	182%	-0.07	Vancouver
12	26	114%	-0.19	Richmond
8	25	205%	-0.22	Kootenay Boundary



One square = 2,000 population
2001 Census of Population
Statistics Canada

Cost per user

1996	2003	Change	Log Dev 2003	
$126	$185	47%	+0.11	South Island
$116	$176	52%	+0.07	Vancouver
$86	$172	101%	+0.04	N. Shore/Coast Gar.
$123	$170	38%	+0.03	Richmond
$128	$168	31%	+0.02	North Island
$102	$166	62%	+0.01	Fraser North
$175	$165	-6%	+0.00	East Kootenay
$112	$161	43%	-0.03	Okanagan
$120	$158	32%	-0.04	Fraser South
$125	$157	26%	-0.05	Central Island
$108	$157	45%	-0.05	Kootenay Boundary
$106	$155	46%	-0.07	Thompson Cariboo
$109	$153	40%	-0.08	Northern Interior
$100	$147	47%	-0.12	Fraser East
$91	$143	58%	-0.14	Northeast
$77	$129	68%	-0.24	Northwest