

Science Statistics

Estimates of Total
Spending on Research and
Development in the Health
Field in Canada, 1997 to 2008



March 2009 edition



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Statistics Canada
Science, Innovation and Electronic Information Division

Science Statistics

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User information

Symbols

The following standard symbols are used in Statistics Canada publications:

- . not available for any reference period
- .. not available for a specific reference period
- ... not applicable
- 0 true zero or a value rounded to zero
- 0^s value rounded to 0 (zero) where there is a meaningful distinction between true zero and the value that was rounded
- p preliminary
- r revised
- x suppressed to meet the confidentiality requirements of the *Statistics Act*
- E use with caution
- F too unreliable to be published

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Highlights

Estimates of total spending on research and development (R&D) in the health field in Canada, 1997 to 2006 (actual), 2007 to 2008 (intentions)

- Spending intentions on research and development in the health field amounted to \$6.2 billion (current dollars) in 2008, an increase of about \$53 million over the previous year (table 1-1).
- This spending will account for about one-fifth of the anticipated \$29.1 billion in total gross domestic expenditure on R&D (table 1-1).
- The higher education sector continues to lead both the amount of health R&D performed, and the amount of funding. This sector is expected to perform 62% of total health R&D, representing \$3.8 billion, and fund \$1.7 billion, or 27% of total spending (table 1-2).
- Business enterprises are expected to continue in second place, performing \$2.0 billion or one-third of total health R&D, and funding \$1.6 billion, around one-quarter, of the total (table 1-2).

Analysis

Estimates of total spending on research and development (R&D) in the health field in Canada, 1997 to 2006 (actual), 2007 to 2008 (intentions)

National Estimates for 2008

According to intentions spending on health related R&D in 2008 is \$6.2 billion (current dollars), up \$53 million over the previous year (table 1-1).

Health R&D spending is an important component of the gross domestic expenditure on R&D (GERD). In 2008 health R&D is expected to continue to comprise around one-fifth of total R&D spending (table 1-1).

In constant dollars, 2007 expenditures in health R&D is expected to show a moderate decline after registering a 7% decrease between 2005 and 2006 that was attributed primarily to a reduction in pharmaceutical R&D (table 1-1).

Five years ago, per capita spending on research and development in health amounted to about \$191 on average. By 2008, it is anticipated to decline to about \$184, largely reflecting the growth in the population (table 1-1).

Higher education is anticipated to continue to lead performance in health R&D at \$3.8 billion in 2008 followed by business enterprise which is expected to perform \$2.0 billion (table 1-2).

The higher education and business enterprise sectors are collectively expected to comprise 95% of total health R&D performance in 2008 and over half (54%) of total health R&D funding. The federal government maintains third position in performing (4%) and funding (19%) of health R&D (table 1-2).

While relatively minor performers in health R&D in 2008, provincial governments and the private non-profit sector are expected to fund \$342 million and \$515 million respectively (table 1-2).

Funds from the foreign sector are projected at \$781 million or 13% of total health R&D (table 1-2).

Higher Education Performing Sector (2006)

Higher education is Canada's lead health R&D performing sector. Its share of total gross domestic expenditures on R&D in the health field increased from 56% in 2002 to 63% in 2006 (table 1-5).

For health R&D performed within the higher education sector, universities and teaching hospitals were the most significant funding sector at \$1.7 billion followed by the federal government at \$939 million and private non-profit at \$486 million (table 1-3).

The private non-profit sector directed 96% of its funding for health R&D to the higher education performing sector. Provincial governments also selected the higher education performing sector as their funding sector of choice, dedicating \$298 million or almost 90% of total health R&D funding (tables 1-2 and 1-3).

Business enterprise and foreign sectors contributed 22% and 7% of their R&D funding to the higher education performing sector respectively (tables 1-2 and 1-3)

Provincial Distribution of Higher Education Health R&D

Provincial distribution of the health R&D performed by the higher education sector is only available up to 2006 (tables 1-3 and 1-4).

In 2006, Ontario accounted for almost half (46%) of total health R&D funding in the higher education sector, followed by Quebec at just over one-quarter (26%), and Alberta at one-tenth (10%) (table 1-3).

Health R&D spending per capita by the higher education sector was highest in Ontario at \$137 and second highest in Nova Scotia at \$136. Spending by universities and teaching hospitals for this sector placed third in Quebec at \$129 per capita followed by Alberta at \$109 (table 1-4).

In all provinces except Prince Edward Island, the higher education sector is the largest funding sector of universities and teaching hospitals. The federal government is the second largest funding sector for higher education in all provinces with the exception of Newfoundland and Labrador (table 1-3).

Related products

Selected publications from Statistics Canada

88-202-X	Industrial Research and Development: Intentions
88-204-X	Federal Scientific Activities
88-221-X	Gross Domestic Expenditures on Research and Development in Canada and the Provinces
88-522-X	Science and Technology Activities and Impacts: A Framework for a Statistical Information
88F0006X	Science, Innovation and Electronic Information Division Working Papers
88F0017M	Science, Innovation and Electronic Information Division Research Papers

Selected CANSIM tables from Statistics Canada

358-0001	Gross domestic expenditures on research and development, by science type and by funder and performer sector, annual
358-0024	Business enterprise research and development (BERD) characteristics, by industry group based on the North American Industry Classification System (NAICS), annual
358-0026	Intellectual property management, by federal departments and agencies indicators, annual

Selected surveys from Statistics Canada

4201	Research and Development in Canadian Industry
4204	Research and Development of Canadian Private Non-Profit Organizations
4208	Provincial Research Organizations (PRO)
4209	Provincial Government Activities in the Natural Sciences
4210	Provincial Government Activities in the Social Sciences
4212	Federal Science Expenditures and Personnel, Activities in the Social Sciences and Natural Sciences
5109	Higher Education Research and Development Estimates

Selected summary tables from Statistics Canada

- *Research and development performed by the business enterprise sector*
- *Domestic spending on research and development (GERD), funding sector, by province*
- *Domestic spending on research and development (GERD), performing sector, by province*
- *Domestic spending on research and development (GERD)*

Statistical tables

Table 1-1
Gross domestic expenditures on research and development (GERD) in the health field — Compared to total gross expenditures on research and development

	Health research and development ¹	Population ²	Health research and development per capita	Gross domestic expenditures on research and development ³	Health research and development by gross domestic expenditures on research and development		
	millions of current dollars	millions of 2002 current dollars ⁴	thousands	millions of current dollars	millions of 2002 constant dollars ⁴	percent	
2004 r	6,127	5,748	32,038	191	26,833	25,172	22.8
2005 r	6,298	5,715	32,353	195	28,142	25,537	22.4
2006 r	6,022	5,334	32,688	184	28,715	25,434	21.0
2007 e	6,109	5,248	33,047	185	28,881	24,812	21.2
2008 e	6,162		33,441	184	29,071		21.2

1. As of 2004, there are no longer estimates for Saskatchewan included in the total health research and development.

2. CANSIM table 051-0005.

3. Estimates of Canadian Research and Development Expenditures (GERD), Canada 1996 to 2007 and by province 1996 to 2005, no. 88F0006XIE2006009, on CANSIM table 358-0001.

4. CANSIM table 384-0036.

Note(s): Due to rounding, components may not add to the totals.

Table 1-2
Gross domestic expenditures on research and development (GERD) in the health field — Performing sector and funding sector

	Federal ¹ government	Provincial ² governments	Business enterprise	Higher ³ education	Private non-profit	Foreign	Total
	millions of dollars						
Performing sector							
2004 r	203	31	2,248	3,585	60	...	6,127
2005 r	210	26	2,235	3,767	60	...	6,298
2006 r	217	21	1,937	3,784	63	...	6,022
2007 e	217	28	1,999	3,801	64	...	6,109
2008 e	224	26	2,008	3,839	65		6,162
Funding sector							
2004 r	1,093	353	1,667	1,606	458	952	6,127
2005 r	1,230	330	1,639	1,626	481	991	6,298
2006 r	1,180	333	1,579	1,670	507	755	6,022
2007 e	1,185	341	1,619	1,677	509	777	6,109
2008 e	1,201	342	1,628	1,694	515	781	6,162

1. Non-program costs (indirect costs) are excluded.

2. The provincial totals represent the following surveyed provinces: Alberta, British Columbia, Manitoba, Ontario, Quebec (a survey of only research and development statistics is conducted by the Institut de la Statistique du Québec and shared with Statistics Canada) and Newfoundland and Labrador. As of 2000, The Centre for Addiction and Mental Health is reported under the higher education sector.

3. Includes teaching hospitals.

Note(s): Due to rounding, components may not add to the totals.

Table 1-3
Gross domestic expenditures on research and development (GERD) in the health field — Higher education sector
by funding sector, 2006

	Federal government	Provincial governments	Business enterprise	Higher ¹ education	Private non-profit	Foreign	Total
millions of dollars							
Canada	938.7	297.8	341.5	1,669.6	485.6	50.3	3,783.6
Newfoundland and Labrador	9.2	0.7	9.4	23.5	0.8	1.6	45.2
Prince Edward Island	2.2	0.5	0.0	2.2	0.0	0.0	4.8
Nova Scotia	28.6	1.6	24.5	55.9	16.0	0.3	126.8
New Brunswick	3.7	1.5	0.0	7.8	0.0	0.0	13.0
Quebec	283.2	68.8	79.2	443.0	104.5	11.1	989.8
Ontario	383.8	126.4	173.2	779.5	245.3	27.7	1,736.0
Manitoba	24.4	5.7	4.7	43.1	24.2	1.6	103.7
Saskatchewan	11.4	8.7	0.0	32.2	7.4	0.2	59.9
Alberta	84.6	51.9	36.8	162.2	37.7	2.5	375.8
British Columbia	107.5	32.0	13.8	120.3	49.8	5.3	328.6

1. Includes teaching hospitals.

Note(s): Due to rounding, components may not add to the totals.

Table 1-4
Gross domestic expenditures on research and development (GERD) in the health field — Higher education sector by provincial population, 2006

	Population ¹	Health research and development	Health research and development per capita
	thousands	millions of dollars	dollars
Canada²	32,688	3,784	116
Newfoundland and Labrador	509	45	88
Prince Edward Island	138	5	36
Nova Scotia	937	127	136
New Brunswick	745	13	17
Quebec	7,650	990	129
Ontario	12,708	1,736	137
Manitoba	1,185	104	88
Saskatchewan	993	60	60
Alberta	3,452	376	109
British Columbia	4,264	329	77

1. CANSIM table 051-0005.

2. Includes the population of Yukon, Northwest Territories and Nunavut.

Note(s): Due to rounding, components may not add to the totals.

**Table 1-5
Gross domestic expenditures on research and development (GERD) in the health field — Historical**

	Performing sector					Total ²
	Federal government	Provincial governments	Business enterprise	Higher ¹ education	Private non-profit	
	millions of dollars					
Funding sector						
2008 e						
Total ²	224	26	2,008	3,839	65	6,162
Federal government	224	0	8	952	17	1,201
Provincial governments	0	26	2	302	12	342
Business enterprise	0	0	1,272	347	9	1,628
Higher education ¹	0	0	0	1,694	0	1,694
Private non-profit	0	0	0	493	22	515
Foreign	0	0	725	51	5	781
2007 e						
Total ²	217	28	1,999	3,801	64	6,109
Federal government	217	0	8	943	17	1,185
Provincial governments	0	28	2	299	12	341
Business enterprise	0	0	1,267	343	9	1,619
Higher education ¹	0	0	0	1,677	0	1,677
Private non-profit	0	0	0	488	21	509
Foreign	0	0	722	50	5	777
2006 r						
Total ²	217	21	1,937	3,784	63	6,022
Federal government	217	0	8	939	16	1,180
Provincial governments	0	21	2	298	12	333
Business enterprise	0	0	1,228	342	9	1,579
Higher education ¹	0	0	0	1,670	0	1,670
Private non-profit	0	0	0	486	21	507
Foreign	0	0	700	50	5	755
2005 r						
Total ²	210	26	2,235	3,767	60	6,298
Federal government	210	0	13	990	17	1,230
Provincial governments	0	26	1	292	11	330
Business enterprise	0	0	1,283	348	8	1,639
Higher education ¹	0	0	0	1,626	0	1,626
Private non-profit	0	0	0	464	17	481
Foreign	0	0	937	47	7	991

See footnotes at the end of the table.

Table 1-5 – continued

Gross domestic expenditures on research and development (GERD) in the health field — Historical

	Performing sector					Total ²
	Federal government	Provincial governments	Business enterprise	Higher ¹ education	Private non-profit	
	millions of dollars					
Funding sector						
2004 r						
Total ²	203	31	2,248	3,585	60	6,127
Federal government	203	0	8	875	7	1,093
Provincial governments	0	31	1	312	9	353
Business enterprise	0	0	1,334	326	7	1,667
Higher education ¹	0	0	0	1,606	0	1,606
Private non-profit	0	0	1	428	29	458
Foreign	0	0	906	38	8	952
2003 r						
Total ²	196	29	1,991	3,087	58	5,361
Federal government	196	0	12	814	10	1,032
Provincial governments	0	29	2	305	11	347
Business enterprise	0	0	1,239	267	9	1,515
Higher education ¹	0	0	0	1,301	0	1,301
Private non-profit	0	0	0	369	23	392
Foreign	0	0	738	30	5	773
2002 r						
Total ²	186	30	2,052	2,956	49	5,273
Federal government	186	0	15	752	5	958
Provincial governments	0	30	2	249	16	297
Business enterprise	0	0	1,319	260	9	1,588
Higher education ¹	0	0	0	1,283	0	1,283
Private non-profit	0	0	0	371	18	389
Foreign	0	0	716	40	1	757
2001 r						
Total ²	152	29	1,768	2,383	51	4,383
Federal government	152	0	13	564	5	734
Provincial governments	0	29	5	214	16	264
Business enterprise	0	0	1,160	236	8	1,404
Higher education ¹	0	0	0	1,024	0	1,024
Private non-profit	0	0	0	312	21	333
Foreign	0	0	590	34	1	625

See footnotes at the end of the table.

Table 1-5 – continued

Gross domestic expenditures on research and development (GERD) in the health field — Historical

	Performing sector					Total ²
	Federal government	Provincial governments	Business enterprise	Higher ¹ education	Private non-profit	
	millions of dollars					
Funding sector						
2000						
Total ²	116	26	1,406	2,104	44	3,696
Federal government	116	0	8	433	3	560
Provincial governments	0	26	4	176	12	218
Business enterprise	0	0	938	211	8	1,157
Higher education ¹	0	0	0	1,000	0	1,000
Private non-profit	0	0	0	264	20	284
Foreign	0	0	456	20	1	477
1999						
Total ²	103	31	1,241	1,823	48	3,246
Federal government	103	0	7	363	6	479
Provincial governments	0	31	7	145	12	195
Business enterprise	0	0	850	167	5	1,022
Higher education ¹	0	0	0	907	0	907
Private non-profit	0	0	0	219	23	242
Foreign	0	0	377	23	2	402
1998						
Total ²	87	36	1,112	1,628	67	2,930
Federal government	87	0	10	275	10	382
Provincial governments	0	36	9	112	16	173
Business enterprise	0	0	777	145	8	930
Higher education ¹	0	0	0	864	0	864
Private non-profit	0	0	0	213	31	244
Foreign	0	0	316	20	2	338
1997						
Total ²	78	32	946	1,516	72	2,644
Federal government	78	0	9	261	6	354
Provincial governments	0	32	7	111	18	168
Business enterprise	0	0	674	134	10	818
Higher education ¹	0	0	0	786	0	786
Private non-profit	0	0	0	208	37	245
Foreign	0	0	256	16	1	273

1. Includes teaching hospitals.

2. Statistics Canada estimate (due to unavailability of data by specific "Health Field").

Note(s): Due to rounding, components may not add to the totals.

Methodology

Estimates of total spending on research and development (R&D) in the health field in Canada, 1997 to 2006 (actual), 2007 to 2008 (intentions)

Expenditure on research and development (R&D) is used as a measure of a country's economic prosperity. Increasing interest has been expressed by policy makers and the general public on health research. Questions of interest include: How much R&D is Canada performing in the health field and who is funding this research? A methodology has been devised to estimate how much of the gross domestic expenditures on research and development (GERD) are relevant to the health field. This section outlines the definitions, general methodology, and data sources.

Definitions

Research and development

Research and experimental development comprise creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications.

The central characteristic of R&D is an appreciable element of novelty and of uncertainty. New knowledge, products or processes are sought. New knowledge involves the integration of newly acquired information into existing hypotheses, the formulation and testing of new hypotheses or the re-evaluation of existing observations.

An R&D project generally has three characteristics:

- substantial element of uncertainty, novelty and innovation;
- well-defined project design;
- report on the procedures and results of the projects.

Gross Domestic Expenditures on Research and Development (GERD)

GERD represent all R&D performed in a country's national territory during a given year. The GERD includes R&D performed within a country and funded from abroad but excludes payments sent abroad for R&D performed in other countries.

Methodology

Federal government sector: The health GERD figures include scientific activities aimed at protecting, promoting and restoring human health, broadly interpreted to include health aspects of nutrition and food hygiene. They range from preventative medicine, including all aspects of medical and surgical treatment both for individuals and groups, and the provision of hospital and home care, to social medicine and paediatric and geriatric research.

Federal government R&D expenditures in the health field from 1997 until 2008^e are derived from the survey of Federal Science Expenditures and Personnel. Data were collected from responses to a question on health as a socio-economic objective for Federal R&D spending. Federal government data are published in Catalogue No. 88-204-X.

Provincial government: R&D expenditures in the health field are based on values from provincial science surveys which identify their intramural R&D expenditures in the health socio-economic objective field. Provincial government and provincial research organizations data are published in Catalogue No. 88-001-X Vol. 32, No. 6.

Business enterprise sector: The pharmaceutical and medicine manufacturing industry *North American Industry Classification System* (NAICS) 325410 is the most significant source of health R&D in the business enterprise sector. Other NAICS industries which are prevalent in health R&D include: pharmaceuticals and pharmacy supplies wholesale - distributors (414510), testing laboratories (541380), research and development in the physical, engineering and life sciences (541710) and health care and social assistance (NAICS 62) industries. Data originate from the R&D in Canadian industry survey conducted by Statistics Canada. Business enterprise data are published in "Industrial research and development: Intentions", Catalogue No. 88-202-X.

The higher education sector: Health R&D statistics are derived from Statistics Canada's revised higher education R&D estimates (STC Catalogue 88-001-X Vol. 32, No. 4) which identify R&D performed in the health field. The revised estimates are based on the assumption that the total R&D expenditures are equal to the sum of: a) sponsored research expenditures (including all teaching hospitals); b) indirect expenditures on sponsored research; c) a value for the fraction of faculty members' time assumed to be devoted to sponsored and non-sponsored research; and d) indirect expenditures related to faculty members' time on research. Statistics Canada uses Canadian Association of University Business Officers (CAUBO) and Centre for Education Statistics data in order to compile the estimates.

Due to the nature of the estimation system for higher education research and development (HERD) statistics, higher education is the only sector of performance where a regional breakdown of health R&D is available.

Private non-profit sector: Values used for estimating health R&D expenditures in the private non-profit (PNP) sector are those identified as health-related in survey responses.