

Science Statistics

Estimates of Total
Spending on Research and
Development in the Health
Field in Canada 1998 to 2009



March 2010 Edition



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Published by authority of the Minister responsible for Statistics Canada

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March 2010

Catalogue no. 88-001-X, vol. 34, no. 3

ISSN 1209-1278

Frequency: Irregular

Ottawa

Cette publication est également disponible en français.

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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

Intentions 2008 and 2009, actual 1998 to 2007

Spending intentions on research and development (R&D) in the health field were \$6.4 billion in 2009, virtually unchanged from 2008 in current dollars (table 1-1).

R&D spending on health continues to account for about one-fifth of total gross domestic expenditures on R&D (table 1-1).

Intentions for 2009 cover both the amount of money each sector spent on R&D in health and the amount that it funded such spending. The higher education sector continued to lead both health R&D performance, spending \$4.1 billion, and health R&D funding at \$1.8 billion (table 1-2).

Business enterprises were in second place. They spent \$1.9 billion on R&D in health and provided \$1.5 billion in funding (table 1-2).

The higher education sector accounted for 64% of all health R&D performed in Canada in 2009, up from 55% in 1998. Over the same period, the proportion for the business enterprise sector declined from 38% to 30% (table 1-5).

In 2009, the same two sectors accounted for half of total health R&D funding - higher education (27%) and business enterprise (23%) (table 1-5).

Analysis

Estimates of total spending on research and development (R&D) in the health field in Canada, 1998 to 2007 (actual), 2008 to 2009 (intentions)

National Estimates for 2009

Spending intentions on research and development in the health field were anticipated at \$6.4 billion in 2009, up \$38 million from 2008 in current dollars (table 1-1).

In constant dollars, 2008 expenditures on health research and development (R&D) were anticipated to decline 2.5% from the previous year, the first decline since 2006. The 6% decrease in 2006 was attributed primarily to a reduction in pharmaceutical R&D. The financial market collapse in 2008/2009 likely influenced health R&D spending intentions, as there was minimal change in spending across all sectors over this period. (tables 1-1 and 1-2)

In 2009, per capita spending for health R&D was estimated at \$189 per person, basically unchanged from the per capita value of 191 in 2005 (table 1-1).

The higher education sector was anticipated to continue to lead performance in health R&D with \$4.1 billion in spending for 2009, followed by business enterprises which are expected to perform \$1.9 billion and the federal government with spending intentions of \$274 million (table 1-2).

Since 1998 the higher education sector has been the lead performer of all health R&D, with its share increasing from 55% in 1998 to its highest share of 64% in 2009. The higher education sector has also led health R&D funding since 2005. (tables 1-2 and 1-5)

The second largest health R&D performer, the business enterprise sector, experienced a decrease in its share of total health R&D from 38% in 1998 to 30% in 2009. From 1998 to 2004 business enterprise was the top health R&D funding sector. (table 1-5).

The higher education and business enterprise sectors combined are expected to comprise 94% of total health R&D performance in 2009 and half of total health R&D funding (table 1-5).

The federal government remained in third place for performing (4%) and funding (21%) of health R&D for 2009. The federal government performing and funding sectors have upheld this third position since 1998. (tables 1-2 and 1-5)

The private non-profit sector is the fourth largest performing sector. It is also the fifth largest funding sector after the foreign sector. In 2009 the private non-profit sector was expected to perform \$90 million or 1.4% of total health R&D and finance \$599 million or 9.4% of total health R&D. Foreign sector funding was \$867 million in 2009, almost 14% of total health R&D expenditures. The foreign sector does not perform health R&D in Canada. (tables 1-2 and 1-5)

The provincial government has been the smallest performing and funding sector since 1998. In 2009 it was anticipated to perform \$29 million and fund \$362 million, both less than 1% of total health R&D spending. (tables 1-2 and 1-5)

Higher Education Sector Health R&D and Provincial Distributions (2007)

Health R&D expenditures by province are available to 2007 for the higher education sector only. The higher education sector, composed primarily of universities and teaching hospitals, is the leading health R&D performing sector. (tables 1-3 and 1-4)

In 2007, the higher education sector was the lead financing sector of its health R&D at \$1.7 billion followed by the federal government at \$1.0 billion and private non-profit at \$555.6 million. Business enterprise, provincial government and foreign sectors contributed \$381 million, \$310 million and \$40 million to the higher education sector respectively. (table 1-3)

The private non-profit sector dedicated 95% of its health R&D funding to the higher education sector. Provincial and federal governments also emphasized the importance of the higher education sector as the centre for health R&D, as the provincial governments directed 88% and the federal government 78% of their total health R&D funding to the higher education sector. On the other hand, business enterprises and the foreign sector allocated lower proportions, 26% and 5% respectively, of their health R&D funding to the higher education sector. (tables 1-2 and 1-3)

As Ontario holds a large number of universities and teaching hospitals it is not surprising that it accounted for almost half (47%) of total health R&D expenditures by the higher education sector. Quebec also has a significant number of higher education institutions and held one-quarter (25%) of total health R&D expenditures. British Columbia and Alberta followed, collectively comprising almost one-fifth (19%) of total higher education sector health R&D. (table 1-3)

Health R&D spending per capita by universities and teaching hospitals was highest in Ontario at \$147, second highest in Nova Scotia at \$132, followed by Quebec at \$130 and Alberta at \$108. The national average per capita health R&D spending was \$121. (table 1-4)

The higher education sector was the largest funding sector of universities and teaching hospitals in 2007 for all provinces except Prince Edward Island, where the federal government contributed the same amount as the higher education sector. The federal government was the second largest funding sector for higher education in all provinces with the exception of Nova Scotia where it was the business enterprise sector. (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 (GERD), and the Provinces
88-522-X	Science and Technology Activities and Impacts: A Framework for a Statistical Information
88F0006X	Business Special Surveys and Technology Statistics 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 constant dollars ⁴	thousands	dollars	millions of current dollars	millions of 2002 constant dollars ⁴	percent
2005 r	6,164	5,593	32,353	191	28,126	25,523	21.9
2006 r	5,942	5,263	32,692	182	28,599	25,331	20.8
2007	6,271	5,387	33,056	190	29,170	25,060	21.5
2008 e	6,349	5,251	33,463	190	29,487	24,390	21.5
2009 e	6,387	...	33,873	189	29,854	...	21.4

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 1998 to 2009 and by province 2003 to 2007, no. 88-221X, on CANSIM table 358-0001.
4. CANSIM table 384-0036.

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

	Federal government ¹	Provincial governments ²	Business enterprise	Higher education ³	Private non-profit	Foreign	Total
	millions of dollars						
Performing sector							
2005 r	210	26	2,100	3,767	61	...	6,164
2006 r	217	21	1,859	3,782	63	...	5,942
2007	258	29	1,885	4,014	85	...	6,271
2008 e	271	29	1,895	4,066	88	...	6,349
2009 e	274	29	1,888	4,106	90	...	6,387
Funding sector							
2005 r	1,223	328	1,593	1,626	487	907	6,164
2006 r	1,176	332	1,520	1,668	508	738	5,942
2007	1,299	354	1,458	1,712	584	864	6,271
2008 e	1,325	359	1,469	1,734	593	869	6,349
2009 e	1,339	362	1,469	1,751	599	867	6,387

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) New Brunswick and Newfoundland. As of 2000, The Centre for Addiction and Mental Health is reported under the higher education sector.
3. Includes teaching hospitals.

Table 1-3
Gross domestic expenditures on research and development (GERD) in the health field — Higher education sector
by funding sector, 2007

	Federal government	Provincial governments	Business enterprise	Higher education ¹	Private non-profit	Foreign	Total
	millions of dollars						
Canada	1,014.8	310.2	381.4	1,711.9	555.6	39.6	4,013.6
Newfoundland and Labrador	8.6	1.7	7.5	23.1	1.5	0.2	42.6
Prince Edward Island	1.5	0.5	0.0	1.5	0.0	0.0	3.6
Nova Scotia	22.9	2.1	26.4	51.6	20.7	0.0	123.7
New Brunswick	3.8	2.1	0.0	8.7	0.0	0.0	14.7
Quebec	304.3	76.6	75.3	432.6	108.4	7.7	1,004.9
Ontario	446.6	105.3	213.8	825.2	274.4	22.5	1,887.9
Manitoba	26.5	5.8	4.5	43.6	23.2	2.8	106.4
Saskatchewan	13.8	6.7	0.0	33.3	8.3	0.2	62.4
Alberta	75.3	69.2	40.5	153.7	41.2	1.7	381.7
British Columbia	111.4	40.2	13.4	138.4	77.9	4.4	385.7

1. Includes teaching hospitals.

Table 1-4
Gross domestic expenditures on research and development (GERD) in the health field — Higher education sector by provincial population, 2007

	Population ¹	Health research and development	Health research and development per capita
	thousands	millions of dollars	dollars
Canada²	33,056	4,014	121
Newfoundland and Labrador	507	43	85
Prince Edward Island	139	4	29
Nova Scotia	936	124	132
New Brunswick	746	15	20
Quebec	7,707	1,005	130
Ontario	12,843	1,888	147
Manitoba	1,197	106	89
Saskatchewan	1,005	62	62
Alberta	3,533	382	108
British Columbia	4,334	386	89

1. CANSIM table 051-0005.

2. Includes the population of Yukon territory, northwest Territories and Nunavut.

**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 education ¹	Private non-profit	
	millions of dollars					
Funding sector						
2009 e						
Total ²	274	29	1,888	4,106	90	6,387
Federal government	274	0	4	1,038	23	1,339
Provincial governments	0	29	0	317	16	362
Business enterprise	0	0	1,067	390	12	1,469
Higher education ¹	0	0	0	1,751	0	1,751
Private non-profit	0	0	0	569	30	599
Foreign	0	0	817	41	9	867
2008 e						
Total ²	271	29	1,895	4,066	88	6,349
Federal government	271	0	4	1,028	22	1,325
Provincial governments	0	29	0	314	16	359
Business enterprise	0	0	1,071	386	12	1,469
Higher education ¹	0	0	0	1,734	0	1,734
Private non-profit	0	0	0	563	30	593
Foreign	0	0	820	41	8	869
2007 r						
Total ²	258	29	1,885	4,014	85	6,271
Federal government	258	0	4	1,015	22	1,299
Provincial governments	0	29	0	310	15	354
Business enterprise	0	0	1,065	381	12	1,458
Higher education ¹	0	0	0	1,712	0	1,712
Private non-profit	0	0	0	556	28	584
Foreign	0	0	816	40	8	864
2006 r						
Total ²	217	21	1,859	3,782	63	5,942
Federal government	217	0	8	939	12	1,176
Provincial governments	0	21	2	298	11	332
Business enterprise	0	0	1,168	341	11	1,520
Higher education ¹	0	0	0	1,668	0	1,668
Private non-profit	0	0	0	486	22	508
Foreign	0	0	681	50	7	738

See notes 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 education ¹	Private non-profit	
	millions of dollars					
Funding sector						
2005 r						
Total ²	210	26	2,100	3,767	61	6,164
Federal government	210	0	13	990	10	1,223
Provincial governments	0	26	1	292	9	328
Business enterprise	0	0	1,234	348	11	1,593
Higher education ¹	0	0	0	1,626	0	1,626
Private non-profit	0	0	1	464	22	487
Foreign	0	0	851	47	9	907
2004 r						
Total ²	203	31	2,188	3,585	62	6,069
Federal government	203	0	7	875	8	1,093
Provincial governments	0	31	1	312	9	353
Business enterprise	0	0	1,307	326	8	1,641
Higher education ¹	0	0	0	1,606	0	1,606
Private non-profit	0	0	1	428	29	458
Foreign	0	0	872	38	8	918
2003 r						
Total ²	196	29	1,939	3,087	58	5,309
Federal government	196	0	12	814	9	1,031
Provincial governments	0	29	2	306	11	348
Business enterprise	0	0	1,208	267	9	1,484
Higher education ¹	0	0	0	1,301	0	1,301
Private non-profit	0	0	0	369	24	393
Foreign	0	0	717	30	5	752
2002						
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	261	9	1,589
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

See notes 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 education ¹	Private non-profit	
	millions of dollars					
Funding sector						
2001						
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	1,023	0	1,023
Private non-profit	0	0	0	312	21	333
Foreign	0	0	590	34	1	625
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	1,280	1,823	48	3,285
Federal government	103	0	7	362	6	478
Provincial governments	0	31	7	145	12	195
Business enterprise	0	0	861	167	5	1,033
Higher education ¹	0	0	0	907	0	907
Private non-profit	0	0	0	219	23	242
Foreign	0	0	405	23	2	430
1998						
Total ²	87	36	1,136	1,628	67	2,954
Federal government	87	0	10	275	10	382
Provincial governments	0	36	9	111	16	172
Business enterprise	0	0	787	145	8	940
Higher education ¹	0	0	0	864	0	864
Private non-profit	0	0	0	213	31	244
Foreign	0	0	330	20	2	352

1. Includes teaching hospitals.

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

Methodology

Estimates of total spending on research and development (R&D) in the health field in Canada, 1998 to 2007 (actual), 2008 to 2009 (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 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. 88-204X.

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.

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) 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.