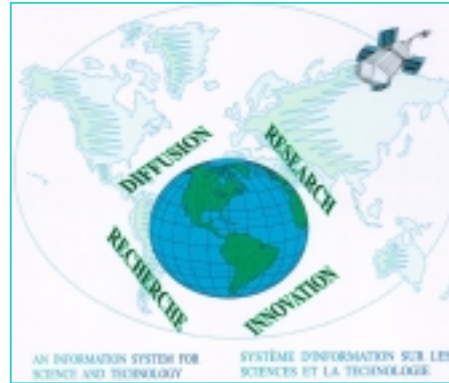


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## Estimates of Total Expenditures on Research and Development in the Health Field in Canada, 1988 to 2000<sup>e</sup>



**ESTIMATES OF TOTAL EXPENDITURES ON RESEARCH AND DEVELOPMENT IN THE  
HEALTH FIELD IN CANADA, 1988 TO 2000<sup>e</sup>**

**88F0006XIE No. 6**

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### Symbols

The following symbols are used in this publication:

- nil or zero  
r revised figures  
.. figures not available

AUCC Association of Universities and Colleges of Canada  
CAUBO Canadian Association of Business Officers  
CIHR Canada Institute for Health Research  
GERD Gross Expenditures on Research and Development  
HERD Higher Education Research and Development  
NSE Natural Sciences and Engineering  
NSERC Natural Science and Engineering Research Council  
OECD Organization for Economic Co-operation and Development  
R&D Research and Development  
S&T Science and Technology  
SIC Standard Industrial Classification  
SIEID Science, Innovation and Electronic Information Division  
SSH Social Sciences and Humanities  
SSHRC Social Sciences and Humanities Research Council

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## Introduction

### Estimates of Health R&D in Canada

R&D is defined as creative work undertaken on a systematic basis to increase the stock of scientific and technical knowledge and to use this knowledge in new applications. Expenditures on R&D are an important indicator of the effort devoted to creative activity in science and technology.

Gross domestic expenditures on research and development (GERD) is a statistical series, constructed by adding together the intramural expenditures on R&D as reported by the performing sectors. As a term used by OECD Member countries, it is defined as "total intramural expenditures on R&D performed on the national territory during a given period. It includes R&D performed within a country and funded from abroad but excludes payments made abroad for R&D".<sup>1</sup> GERD includes R&D expenditures in the Natural Sciences and Engineering (NSE) and the Social Sciences and Humanities (SSH) fields.

Canadian health research is conducted in universities, teaching hospitals, business enterprises, government laboratories and private non-profit organizations. This research is funded from a variety of sources including public, private, domestic and foreign.

This is the second time Science, Innovation and Electronic Information Division (SIEID) of Statistics Canada has published an estimate of health R&D spending in Canada. Health sciences, being part of the NSE, are not identified in our surveys. It is therefore necessary to estimate R&D expenditures in the health field by incorporating all relevant data available to us.

Following an initial study<sup>2</sup> and a positive reaction to its recommendations from a group of professionals in the university and health research fields in September 1999, SIEID created a Working Group and hired a facilitator<sup>3</sup> to examine current Higher Education R&D Expenditures (HERD) and health GERD estimation methods. The Working Group recommended revisions to estimation methods where appropriate, and produced a framework for an improved estimation program. This work was completed in April 2000 and based upon it, SIEID developed a three-year Operational Plan to see to the implementation of as many recommendations as possible, with financial and consultation help from a partnership of interested data users.<sup>4</sup>

This Working Paper, which incorporates the new method for calculating health GERD, is part of the initiative to improve estimates in an area that also includes estimates of higher education R&D expenditures, the number of personnel engaged in higher education R&D, and U.S. and international comparisons.

The previous series of Health R&D expenditures (ST-99-04), included estimates from 1970 to 1999<sup>6</sup>. The new methodology, (affecting the business enterprise and higher education sector's), has only been applied to estimates back as far as 1988.

The following sections contain the definition of health GERD in each of the sectors and also the method used in each sector to prepare these estimates.

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<sup>1</sup> **The measurement of Scientific and Technical Activities - Proposed Standard Practice for Surveys of Research and Experimental Development**, OECD, Paris, 1993, p. 101

<sup>2</sup> Statistics Canada 1999. Review of HERD and Health GERD - Report to Statistics Canada, Mireille Brochu.

<sup>3</sup> Mireille Brochu

<sup>4</sup> CIHR, NSERC, SSHRC, Industry Canada, the Association of Universities and Colleges of Canada (AUCC), and the Canadian Association of Business Officers (CAUBO).

## **Definitions:**

National Health GERD is estimated using data from five different surveys. The definition of Health in each of the sectors is as follows:

### **Federal and Provincial Governments:**

R&D programmes directed towards the protection and improvement of human health. The definition includes R&D on food hygiene and nutrition and also R&D on radiation used for medical purposes, biochemical engineering, medical information, rationalization of treatment and pharmacology (including testing medicines and breeding of laboratory animals for scientific purposes) as well as research relating to epidemiology, prevention of industrial diseases and drug addiction.

### **Business Enterprises:**

R&D performed in the "pharmaceutical and medicines" industry (SIC 3741), "drugs, wholesale" (SIC 5231), "health and social services" industry (SIC 86\*\*), and selected companies in other SIC's (mostly SIC 7759, "other scientific and technical services").

### **Higher Education:**

R&D performed in the health sciences by the "health professions" teaching field.

### **Private Non-Profit Organizations:**

R&D performed in medical sciences, including medicine, dentistry, pharmacy etc.

## **Methodology:**

**Federal government sector:** Federal government R&D expenditures in the health field from 1988 until 2000<sup>e</sup>, are derived from the federal survey of government departments and agencies. Data were collected from responses to a question on health as a socio-economic objective for R&D spending. Federal government data are published in Catalogue No. 88-204 XIB.

**Provincial government :** R&D expenditures in the health field are based on values from provincial science surveys which identify intramural R&D expenditures in the health socio-economic objective field.

**Business enterprise sector <sup>r</sup> :** The pharmaceutical and medicines industry; drugs, wholesale industry; health and social services industry ; and selected companies in other industries (mostly other scientific and technical services), are used for estimating health field R&D in the business enterprise sector (Catalogue No. 88-202-XIB).

**This is the first year that SIC's other than the pharmaceutical and medicines industry have been included in the business enterprise health R&D estimates.**

**The higher education sector <sup>r</sup> :** Health R&D statistics are derived from Statistics Canada's revised higher education R&D estimates (STC Catalogue 88-001 Vol. 24 No. 7) which identify R&D performed in the health field. The revised estimates assumes that the total R&D expenditures are equal to: 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.

**Private non-profit sector:** Values used for estimating health R&D expenditures in the private non-profit sector are those identified as health-related in survey responses. See Volume 24, No. 8 of this publication for further information.

## **Statistical Tables**



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### Gross Domestic Expenditures on R&D (GERD) in the Health Field<sup>1</sup>, 1988<sup>e</sup>

Funding sector	Performing sector					Total
	Federal government	Provincial governments	Business enterprise	Higher education <sup>2</sup>	Private non-profit	
in millions of dollars						
Federal government	41	-	4	192	18	<b>255</b>
Provincial governments	-	17	14	56	8	<b>95</b>
Business enterprise	-	-	160	33	8	<b>201</b>
Higher education <sup>2</sup>	-	-	-	500	-	<b>500</b>
Private non-profit	-	-	-	106	32	<b>138</b>
Foreign	-	-	22	8	6	<b>36</b>
<b>Total</b>	<b>41</b>	<b>17</b>	<b>200</b>	<b>895</b>	<b>72</b>	<b>1,225</b>

<sup>1</sup> As data are not provided specifically by "Health Field", this is STC's best estimate

<sup>2</sup> Includes teaching hospitals.

### Gross Domestic Expenditures on R&D (GERD) in the Health Field<sup>1</sup>, 1989<sup>e</sup>

Funding sector	Performing sector					Total
	Federal government	Provincial governments	Business enterprise	Higher education <sup>2</sup>	Private non-profit	
in millions of dollars						
Federal government	50	-	4	210	18	<b>282</b>
Provincial governments	-	22	16	83	8	<b>129</b>
Business enterprise	-	-	203	46	6	<b>255</b>
Higher education <sup>2</sup>	-	-	1	532	-	<b>533</b>
Private non-profit	-	-	-	102	41	<b>143</b>
Foreign	-	-	14	7	7	<b>28</b>
<b>Total</b>	<b>50</b>	<b>22</b>	<b>238</b>	<b>980</b>	<b>80</b>	<b>1,370</b>

<sup>1</sup> As data are not provided specifically by "Health Field", this is STC's best estimate

<sup>2</sup> Includes teaching hospitals.

### Gross Domestic Expenditures on R&D (GERD) in the Health Field<sup>1</sup>, 1990<sup>e</sup>

Funding sector	Performing sector					Total
	Federal government	Provincial governments	Business enterprise	Higher education <sup>2</sup>	Private non-profit	
	in millions of dollars					
Federal government	64	-	10	241	20	<b>335</b>
Provincial governments	-	26	22	85	12	<b>145</b>
Business enterprise	-	-	277	50	10	<b>337</b>
Higher education <sup>2</sup>	-	-	-	558	-	<b>558</b>
Private non-profit	-	-	-	110	42	<b>152</b>
Foreign	-	-	17	5	7	<b>29</b>
<b>Total</b>	<b>64</b>	<b>26</b>	<b>326</b>	<b>1,049</b>	<b>91</b>	<b>1,556</b>

<sup>1</sup> As data are not provided specifically by "Health Field", this is STC's best estimate

<sup>2</sup> Includes teaching hospitals.

### Gross Domestic Expenditures on R&D (GERD) in the Health Field<sup>1</sup>, 1991<sup>e</sup>

Funding sector	Performing sector					Total
	Federal government	Provincial governments	Business enterprise	Higher education <sup>2</sup>	Private non-profit	
	in millions of dollars					
Federal government	55	-	9	236	22	<b>322</b>
Provincial governments	-	29	17	87	13	<b>146</b>
Business enterprise	-	-	271	87	11	<b>369</b>
Higher education <sup>2</sup>	-	-	1	620	-	<b>621</b>
Private non-profit	-	-	-	126	47	<b>173</b>
Foreign	-	-	29	4	8	<b>41</b>
<b>Total</b>	<b>55</b>	<b>29</b>	<b>327</b>	<b>1,160</b>	<b>101</b>	<b>1,672</b>

<sup>1</sup> As data are not provided specifically by "Health Field", this is STC's best estimate

<sup>2</sup> Includes teaching hospitals.

## Gross Domestic Expenditures on R&D (GERD) in the Health Field<sup>1</sup>, 1992<sup>e</sup>

Funding sector	Performing sector					Total
	Federal government	Provincial governments	Business enterprise	Higher education <sup>2</sup>	Private non-profit	
in millions of dollars						
Federal government	56	-	10	243	20	<b>329</b>
Provincial governments	-	33	17	88	14	<b>152</b>
Business enterprise	-	-	323	107	24	<b>454</b>
Higher education <sup>2</sup>	-	-	1	689	-	<b>690</b>
Private non-profit	-	-	-	113	49	<b>162</b>
Foreign	-	-	54	8	7	<b>69</b>
<b>Total</b>	<b>56</b>	<b>33</b>	<b>405</b>	<b>1,248</b>	<b>114</b>	<b>1,856</b>

<sup>1</sup> As data are not provided specifically by "Health Field", this is STC's best estimate

<sup>2</sup> Includes teaching hospitals.

## Gross Domestic Expenditures on R&D (GERD) in the Health Field<sup>1</sup>, 1993<sup>e</sup>

Funding sector	Performing sector					Total
	Federal government	Provincial governments	Business enterprise	Higher education <sup>2</sup>	Private non-profit	
in millions of dollars						
Federal government	53	-	7	282	22	<b>364</b>
Provincial governments	-	29	9	94	16	<b>148</b>
Business enterprise	-	-	404	117	25	<b>546</b>
Higher education <sup>2</sup>	-	-	-	687	-	<b>687</b>
Private non-profit	-	-	-	153	50	<b>203</b>
Foreign	-	-	71	8	7	<b>86</b>
<b>Total</b>	<b>53</b>	<b>29</b>	<b>491</b>	<b>1,341</b>	<b>120</b>	<b>2,034</b>

<sup>1</sup> As data are not provided specifically by "Health Field", this is STC's best estimate

<sup>2</sup> Includes teaching hospitals.

## Gross Domestic Expenditures on R&D (GERD) in the Health Field<sup>1</sup>, 1994<sup>e</sup>

Funding sector	Performing sector					Total
	Federal government	Provincial governments	Business enterprise	Higher education <sup>2</sup>	Private non-profit	
	in millions of dollars					
Federal government	57	-	6	283	22	<b>368</b>
Provincial governments	-	31	8	94	19	<b>152</b>
Business enterprise	-	-	459	109	25	<b>593</b>
Higher education <sup>2</sup>	-	-	1	689	-	<b>690</b>
Private non-profit	-	-	-	166	65	<b>231</b>
Foreign	-	-	87	9	8	<b>104</b>
<b>Total</b>	<b>57</b>	<b>31</b>	<b>561</b>	<b>1,350</b>	<b>139</b>	<b>2,138</b>

<sup>1</sup> As data are not provided specifically by "Health Field", this is STC's best estimate

<sup>2</sup> Includes teaching hospitals.

## Gross Domestic Expenditures on R&D (GERD) in the Health Field<sup>1</sup>, 1995<sup>e</sup>

Funding sector	Performing sector					Total
	Federal government	Provincial governments	Business enterprise	Higher education <sup>2</sup>	Private non-profit	
	in millions of dollars					
Federal government	63	-	9	294	22	<b>388</b>
Provincial governments	-	33	9	97	20	<b>159</b>
Business enterprise	-	-	548	105	25	<b>678</b>
Higher education <sup>2</sup>	-	-	-	762	-	<b>762</b>
Private non-profit	-	-	-	169	65	<b>234</b>
Foreign	-	-	156	10	8	<b>174</b>
<b>Total</b>	<b>63</b>	<b>33</b>	<b>722</b>	<b>1,437</b>	<b>140</b>	<b>2,395</b>

<sup>1</sup> As data are not provided specifically by "Health Field", this is STC's best estimate

<sup>2</sup> Includes teaching hospitals.

### Gross Domestic Expenditures on R&D (GERD) in the Health Field<sup>1</sup>, 1996<sup>e</sup>

Funding sector	Performing sector					Total
	Federal government	Provincial governments	Business enterprise	Higher education <sup>2</sup>	Private non-profit	
in millions of dollars						
Federal government	76	-	10	255	23	<b>364</b>
Provincial governments	-	32	7	89	21	<b>149</b>
Business enterprise	-	-	615	118	18	<b>751</b>
Higher education <sup>2</sup>	-	-	1	776	-	<b>777</b>
Private non-profit	-	-	-	200	68	<b>268</b>
Foreign	-	-	240	14	11	<b>265</b>
<b>Total</b>	<b>76</b>	<b>32</b>	<b>873</b>	<b>1,452</b>	<b>141</b>	<b>2,574</b>

<sup>1</sup> As data are not provided specifically by "Health Field", this is STC's best estimate

<sup>2</sup> Includes teaching hospitals.

### Gross Domestic Expenditures on R&D (GERD) in the Health Field<sup>1</sup>, 1997<sup>e</sup>

Funding sector	Performing sector					Total
	Federal government	Provincial governments	Business enterprise	Higher education <sup>2</sup>	Private non-profit	
in millions of dollars						
Federal government	78	-	11	261	25	<b>375</b>
Provincial governments	-	32	7	111	22	<b>172</b>
Business enterprise	-	-	694	134	21	<b>849</b>
Higher education <sup>2</sup>	-	-	3	846	-	<b>849</b>
Private non-profit	-	-	-	209	79	<b>288</b>
Foreign	-	-	260	16	10	<b>286</b>
<b>Total</b>	<b>78</b>	<b>32</b>	<b>975</b>	<b>1,577</b>	<b>157</b>	<b>2,819</b>

<sup>1</sup> As data are not provided specifically by "Health Field", this is STC's best estimate

<sup>2</sup> Includes teaching hospitals.

### Gross Domestic Expenditures on R&D (GERD) in the Health Field<sup>1</sup>, 1998<sup>e</sup>

Funding sector	Performing sector					Total
	Federal government	Provincial governments	Business enterprise	Higher education <sup>2</sup>	Private non-profit	
in millions of dollars						
Federal government	84	-	16	275	28	<b>403</b>
Provincial governments	-	36	9	111	22	<b>178</b>
Business enterprise	-	-	763	145	25	<b>933</b>
Higher education <sup>2</sup>	-	-	1	802	-	<b>803</b>
Private non-profit	-	-	-	213	82	<b>295</b>
Foreign	-	-	296	20	12	<b>328</b>
<b>Total</b>	<b>84</b>	<b>36</b>	<b>1,085</b>	<b>1,566</b>	<b>169</b>	<b>2,940</b>

<sup>1</sup> As data are not provided specifically by "Health Field", this is STC's best estimate

<sup>2</sup> Includes teaching hospitals.

### Gross Domestic Expenditures on R&D (GERD) in the Health Field<sup>1</sup>, 1999<sup>e</sup>

Funding sector	Performing sector					Total
	Federal government	Provincial governments	Business enterprise	Higher education <sup>2</sup>	Private non-profit	
in millions of dollars						
Federal government	91	-	17	286	27	<b>421</b>
Provincial governments	-	29	10	116	18	<b>173</b>
Business enterprise	-	-	809	151	19	<b>979</b>
Higher education <sup>2</sup>	-	-	1	834	-	<b>835</b>
Private non-profit	-	-	-	222	85	<b>307</b>
Foreign	-	-	314	21	11	<b>346</b>
<b>Total</b>	<b>91</b>	<b>29</b>	<b>1,151</b>	<b>1,630</b>	<b>160</b>	<b>3,061</b>

<sup>1</sup> As data are not provided specifically by "Health Field", this is STC's best estimate

<sup>2</sup> Includes teaching hospitals.

## Gross Domestic Expenditures on R&D (GERD) in the Health Field<sup>1</sup>, 2000<sup>e</sup>

Funding sector	Performing sector					Total
	Federal government	Provincial governments	Business enterprise	Higher education <sup>2</sup>	Private non-profit	
	in millions of dollars					
Federal government	94	-	19	305	28	<b>446</b>
Provincial governments	-	31	11	123	18	<b>183</b>
Business enterprise	-	-	903	161	19	<b>1,083</b>
Higher education <sup>2</sup>	-	-	1	888	-	<b>889</b>
Private non-profit	-	-	-	236	87	<b>323</b>
Foreign	-	-	350	22	11	<b>383</b>
<b>Total</b>	<b>94</b>	<b>31</b>	<b>1,284</b>	<b>1,735</b>	<b>163</b>	<b>3,307</b>

<sup>1</sup> As data are not provided specifically by "Health Field", this is STC's best estimate

<sup>2</sup> Includes teaching hospitals.



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