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Analysis in Brief

The Canadian Research and Development Pharmaceutical Sector, 2022

by Mohammad Huda and Greg Maloney

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Note of appreciation

Canada owes the success of its statistical system to a long-standing partnership between Statistics Canada, the citizens of Canada, its businesses, governments and other institutions. Accurate and timely statistical information could not be produced without their continued co-operation and goodwill.

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The Canadian Research and Development Pharmaceutical Sector, 2022

by **Mohammad Huda** and **Greg Maloney**

Background

This study examines the contribution of Canada's research and development (R&D) pharmaceutical sector to the Canadian economy in 2022. It builds upon the annual reports produced since 2018, funded by Innovative Medicines Canada (IMC) and prepared by the Centre for Innovation, Technology, and Enterprise Statistics (CITES) at Statistics Canada. Innovative Medicines Canada (IMC) is an industry association representing patented medicine enterprises within Canada's R&D pharmaceutical sector.

The design and structure of the study remain consistent with previous iterations. A key component of these studies is the identification of a cohort of businesses within the Canadian pharmaceutical sector, based on the membership list produced by Innovative Medicines Canada (IMC).

The Canadian R&D pharmaceutical sector continued to expand on multiple fronts, achieving a 14.8% increase in value added (gross domestic product), rising from $16.0 billion in 2021 to $18.4 billion in 2022. Approximately half of this contribution was directly attributable to IMC members.

The sector experienced strong growth across key indicators, including operating profits and employment. Operating profits reached $0.3 billion, marking a recovery from the $2.2 billion loss recorded in 2021. Employment grew by 7.9%, rising to 110,817 full-time equivalent (FTE) jobs in 2022, up from 102,717 FTEs in 2021, and surpassing the 2020 level of 107,973 FTEs.

The scope of this study has been expanded to include an analytical time series for the sector, offering deeper insights into how the Canadian economy is shaped by the sector and, where data permit, by IMC members.

1 Introduction

Advancements in medical research and the introduction of new medicines and vaccines not only improve the lives of Canadians but also make a direct contribution to the Canadian economy. The pharmaceutical sector plays a pivotal role in driving these advancements.

This study examines the economic contribution of the Canadian research and development (R&D) pharmaceutical sector on the Canadian economy in 2022. It builds upon findings from previous studies conducted since 2018, with a specific focus on comparisons to 2021.[1] The sector's economic contribution is assessed using key indicators such as government tax revenue, employment and job creation, R&D investments, and international trade.

This study used a list of IMC members linked to several Statistics Canada databases to examine key metrics such as employment, trade, investment, taxation revenues, R&D claims, capital spending, and the economic impacts of direct, indirect, and induced effects. Statistics Canada selected the variables for this analysis based on data availability and quality, ensuring alignment with internationally accepted definitions and consistency across its economic statistics programs.

The R&D pharmaceutical sector primarily consists of three core industries: pharmaceutical and medicine manufacturing, pharmaceutical and pharmacy supplies merchant wholesaling, and R&D in the physical, engineering, and life sciences.

The 2022 study examines 230 enterprises within the R&D pharmaceutical sector, 54 of which are IMC members. These enterprises include most of Canada's largest R&D-based pharmaceutical companies, measured by annual revenues. Businesses primarily engaged in medical devices, generic pharmaceuticals, or veterinary medicines are not included in this study.

1. The term "research and development pharmaceutical sector" used in this report is not an official designation within the North American Industry Classification System (NAICS). The name was chosen based on the companies' reported R&D activities and their classification within pharmaceutical-related NAICS codes identified in this study.

2 The Canadian research and development pharmaceutical sector

2.1 Economic footprint

2.1.1 Value added

Gross value added (GVA) represents the unduplicated monetary contribution a sector makes to a country's economic output, as measured by its gross domestic product (GDP). In this report, it is a metric that measures the contribution of the R&D pharmaceutical sector (including IMC members) to the Canadian economy. It is derived by subtracting intermediate inputs from total output.

Gross value added (GVA) impacts are broken down into three components: direct impacts, which measure the industry's production; indirect impacts, which assess the upstream activities related to the supply of intermediate inputs (current expenditures on goods and services used in production processes) to the industry; and induced impacts, which reflect the economic effects of labour income spending within the industry.

The sector contributed nearly $18.5 billion to the Canadian economy

The pharmaceutical R&D sector contributed a total gross value added (GVA) of $18.4 billion in 2022, representing a 14.8% increase from the $16 billion recorded in 2021. This marks the largest annual increase recorded since 2018. Just over half of the total, 52.0% ($9.6 billion), was attributable to the sector's direct impacts, which rose by 16.4% from the $8.2 billion recorded in 2021. Indirect impacts accounted for 27.2% of the total GVA in 2022, increasing by 9.7% to $5 billion, while induced impacts, comprising 20.9% of the total GVA, grew by 18.0% to $3.8 billion.

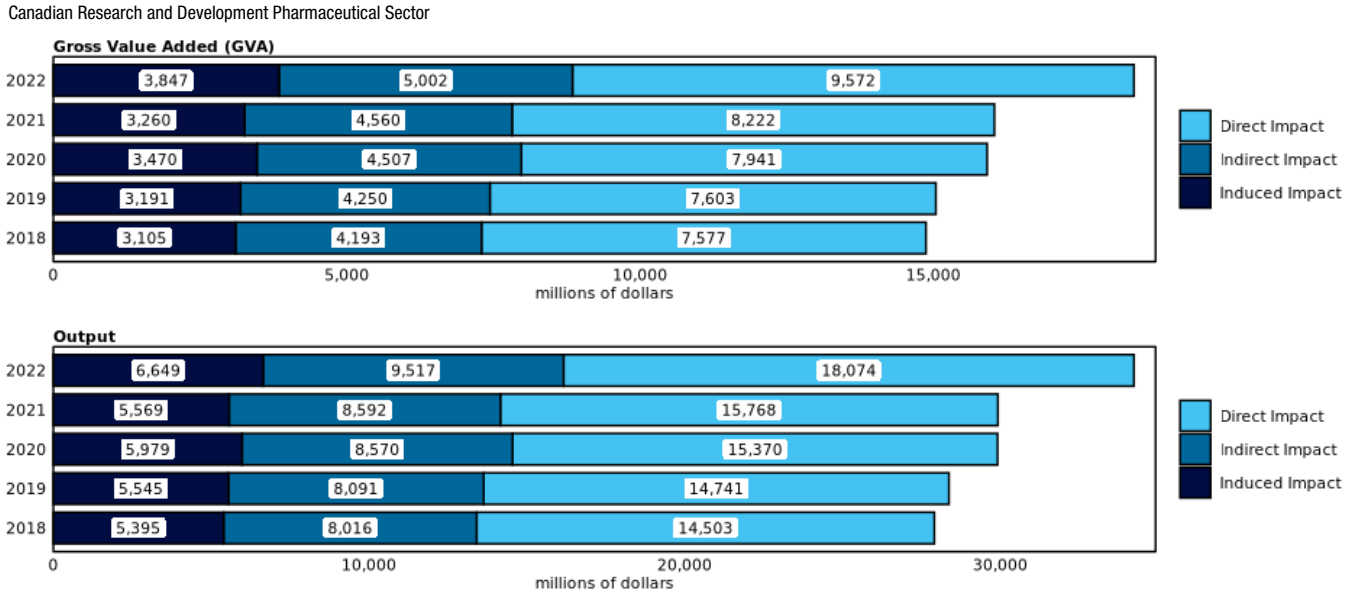
Overall, the R&D pharmaceutical sector accounted for 0.7% of Canada's GDP at basic prices in 2022, remaining unchanged from the previous year.[2]

Most economic activity in the sector took place in Ontario and Quebec

Ontario and Quebec jointly accounted for $15.4 billion (83.8%) of the sector's overall gross value added in 2022. Of this amount, Ontario contributed $9.0 billion and Quebec $6.4 billion. The labour component of GVA accounted for $10.6 billion and was mainly concentrated (83.4%) in the same two provinces - Ontario ($5.1 billion) and Quebec ($3.7 billion). The current findings for these two provinces are also consistent with patterns observed in previous years.

2. Statistics Canada, table 36-10-0221-01. Preliminary estimates. Gross value added (GDP at basic prices) can be calculated from the table as gross domestic product at market prices minus taxes less subsidies on products and imports.

Figure 1
Gross value added (GDP at basic prices) and output (value of goods and services), 2018 to 2022 (x 1,000,000)



Notes: The R&D pharmaceutical sector's total GVA was $14,875 million in 2018, $15,044 million in 2019, $15,918 million in 2020, $16,042 million in 2021, and $18,421 million in 2022. The R&D pharmaceutical sector's total output was $27,915 million in 2018, $28,377 million in 2019, $29,919 million in 2020, $29,929 million in 2021, and $34,240 million in 2022. Due to rounding, components may not add to total.
Source: Statistics Canada, custom tabulation, Industry Accounts Division, reference years 2018 to 2022.

Ontario and Quebec further accounted for 83.6% of the sector's 110,817 full-time equivalent (FTE) jobs, with 53,107 in Ontario and 39,558 in Quebec.

2.1.2 Output

The R&D pharmaceutical sector produced $34.2 billion in output

The output[3] generated by the Canadian R&D pharmaceutical sector rose to $34.2 billion, an increase of $4.3 billion compared with 2021. This growth continues the upward year-over-year trend in total output observed since 2018. Notably, the percentage increase in 2022 was higher than in any of the previous four years.

The direct impact on output, which accounted for over half (52.8%) of the total economic impact, increased by 14.6% from the previous year to reach $18.1 billion. The indirect impact on output rose by 10.8% to $9.5 billion, while induced impacts grew by 19.4% to $6.6 billion.

The sector reported $37.8 billion in operating revenue

In 2022, R&D pharmaceutical businesses in Canada generated $37.8 billion in operating revenues, an increase of 13.0% ($4.4 billion) compared with the previous year. Operating expenses also rose by 5.2% to $37.5 billion; however, this was one-third of the increase recorded in the prior year. Higher expenses in the sector were driven by a 15.9% increase ($837 million) in wages, salaries, and employee benefits, as well as a 1.7% rise ($500 million) in purchased goods, materials, and services.

The sector recorded an operating profit of $0.3 billion in 2022, representing a recovery from the $2.2 billion loss reported in 2021. Consequently, the operating profit margin, which is the ratio of operating profit to operating revenue, was positive (0.8%) in 2022, compared with the negative margin (-6.6%) reported in 2021.

3. The output of a sector differs from the GVA produced in that it includes all intermediate goods purchased as inputs into the production process. GVA, on the other hand, excludes the value of all intermediate inputs. See User Guide: Canadian System of Macroeconomic Accounts 4.2.1 Output, intermediate consumption and related concepts.

2.1.3 Employment

The sector supported over 110,800 full-time equivalent jobs (FTEs) in 2022

The Canadian R&D pharmaceutical sector saw an increase in overall employment, reaching 110,817 FTEs in 2022, representing a 7.9% rise (+8,100 FTEs) from the previous year and marking the highest employment level recorded since 2018.

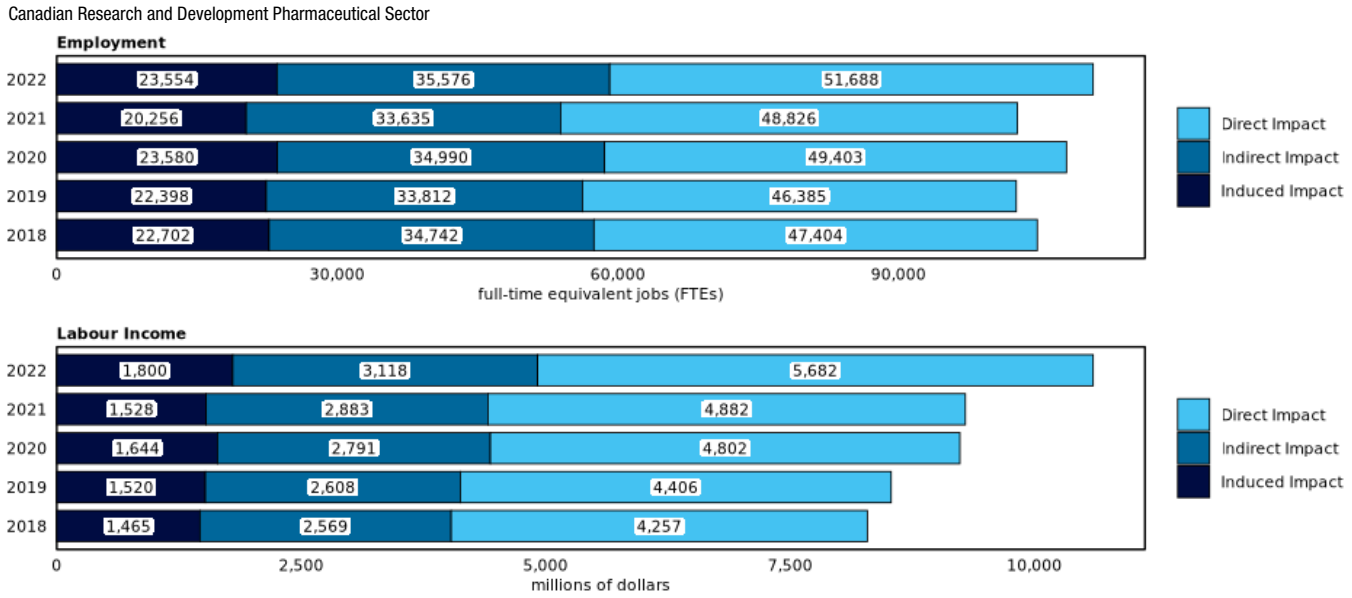
While the overall number of FTEs increased in 2022, the most significant growth was in jobs tied to induced impacts. Specifically, FTEs tied to induced impacts rose by 3,298 to 23,554. FTEs tied to direct impacts followed, increasing by 2,862 to 51,688, while indirect FTEs rose by 1,940 to 35,576.

Labour income showed stronger growth

In 2022, labour income reached $10.6 billion, reflecting a 14.1% increase from $9.3 billion in 2021 and surpassing the totals recorded in 2020 and 2019, which were $9.2 billion and $8.5 billion respectively. This growth continues the upward year-over-year trend in labour income increases observed since 2018.

Of the three types of economic impacts on labour income, the direct impact, which accounted for 53.6% of the total, increased by 16.4% ($800 million). The indirect impact, which accounted for 29.4% of the total, rose by $235 million, while the induced impact, representing 17.0%, grew by $272 million in 2022.

Figure 2
Employment (FTEs) and labour income (millions of dollars), 2018 to 2022



Notes: The R&D pharmaceutical sector's total jobs were 104,848 FTEs in 2018, 102,595 FTEs in 2019, 107,973 FTEs in 2020, 102,717 FTEs in 2021, and 110,817 in 2022. The R&D pharmaceutical sector's total labour income was $8,291 million in 2018, $8,534 million in 2019, $9,236 million in 2020, $9,293 million in 2021, and $10,600 million in 2022. Due to rounding, components may not add to total.
Source: Statistics Canada, custom tabulation, Industry Accounts Division, reference years 2018 to 2022.

2.1.4 Trade

Imports in the sector exceeded $26 billion

In 2022, the Canadian R&D pharmaceutical sector conducted international trade with 101 export and 96 import markets. Most businesses within the sector traded across multiple international markets.

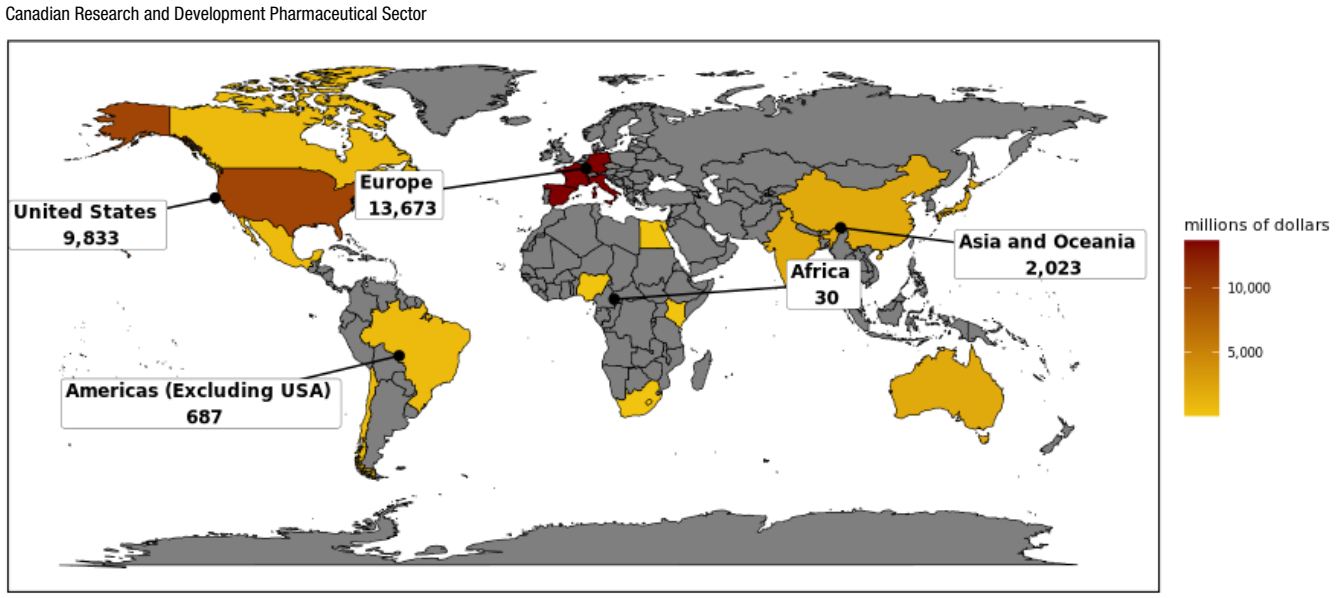
Over half of all imported goods came from Europe

Imports in the sector climbed to $26.2 billion in 2022, representing a 5.9% increase compared to 2021. A total of 162 enterprises imported goods globally, with growth rates varying across different trading regions.

The total value of goods imported from the Asia and Oceania region rose from $1.1 billion to $2.0 billion, a 78.9% increase compared with the previous year. Imports from Africa grew by 57.9%, reaching $30 million compared with $19.0 million in 2021. By contrast, imports from the United States decreased by 9.0%, falling to $9.8 billion in 2022 from $10.8 billion in 2021.

Imports from Europe, which constituted the largest proportion at 52.1% of total imports, increased 12.0% to $13.7 billion in 2022, up from $12.2 billion in 2021. Similarly, imports from the Americas (excluding the United States) rose by 11.2% to $687 million in 2022, up from $618 million in 2021.

Figure 3
Total value (in dollars) of goods imports by region, 2022 (x 1,000,000)



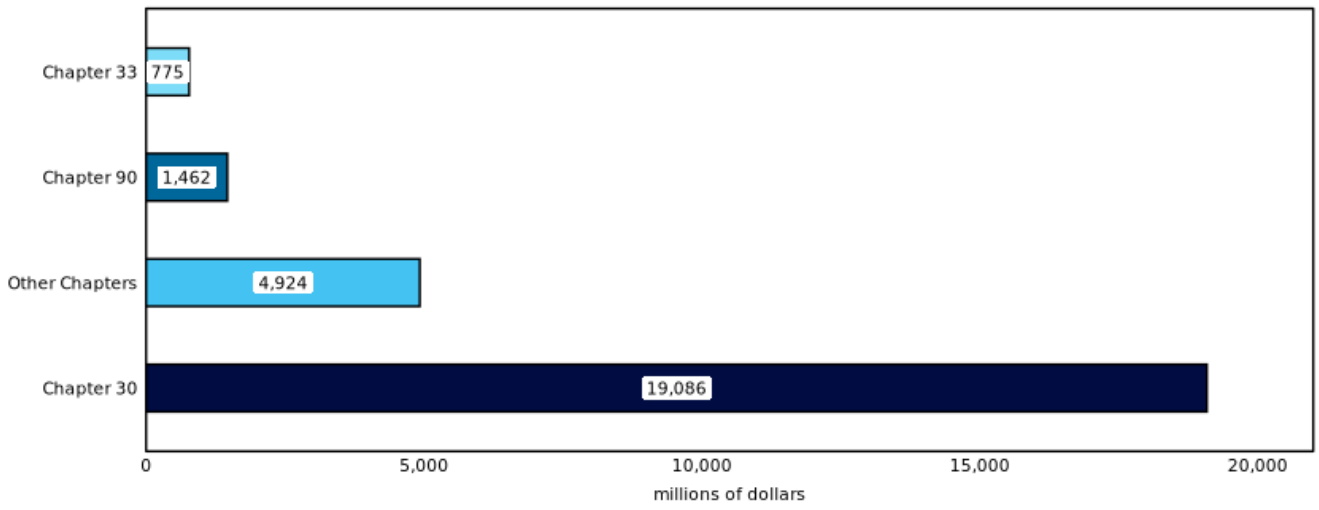
Notes: The value of the R&D pharmaceutical sector's total goods imports in 2022 was $26.2 billion. Due to rounding, components may not add to total.
Source: Statistics Canada, custom tabulation, International Accounts and Trade Division, reference year 2022.

Pharmaceutical products, classified under Chapter 30 of the Harmonized System (HS), represented the largest import category in the sector, accounting for 72.7% ($19.1 billion) of the $26.2 billion spent on imported goods in 2022. This was followed by optical, photographic, cinematographic, measuring, checking, medical, or surgical instruments and apparatus (HS 90), at $1.5 billion, and essential oils and resinoids; perfumery, cosmetic, or toilet preparations (HS 33), at $775 million.

The types of goods and the proportion of dollars spent on imports by the Canadian R&D pharmaceutical sector have remained consistent since 2018. For example, goods classified under HS 30 accounted for 65.0% to 73.0% of all imports between 2018 and 2022.

Figure 4
Total value (in dollars) of goods imports by Harmonized System Chapters, 2022 (x 1,000,000)

Canadian Research and Development Pharmaceutical Sector



Notes: The Harmonized System (HS) Chapter 30 refers to pharmaceutical products, Chapter 90 refers to optical, photographic, cinematographic, measuring, checking, medical or surgical instruments and apparatus; parts and accessories and, the Chapter 33 includes the essential oils and resinoids; perfumery, cosmetic or toilet preparations. The value of the R&D pharmaceutical sector's total goods imports was $26.2 billion in 2022. Due to rounding, components may not add to total.
Source: Statistics Canada, custom tabulation, International Accounts and Trade Division, reference year 2022.

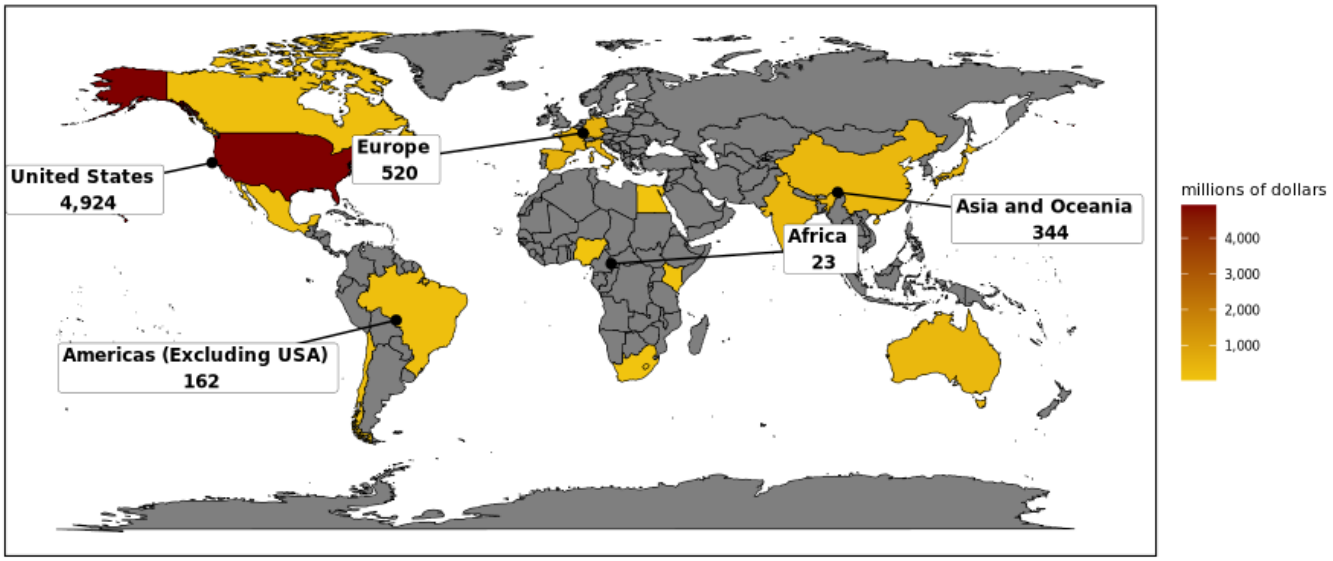
Sector exports rose to nearly $6.0 billion

In 2022, 65 enterprises in the Canadian R&D pharmaceutical sector exported goods abroad. Similar to imports, the sector's exports increased by 16.1%, rising from $5.1 billion in 2021 to $6.0 billion in 2022.

The value of goods exports also increased across all regions. Exports to the Americas (excluding the USA) rose to $162 million from $105 million, exports to Asia and Oceania increased to $344 million from $264 million, exports to Europe grew to $520 million from $327 million, and exports to Africa rose to $23 million from $12 million.

Figure 5
Total value (in dollars) of goods exports by region, 2022 (x 1,000,000)

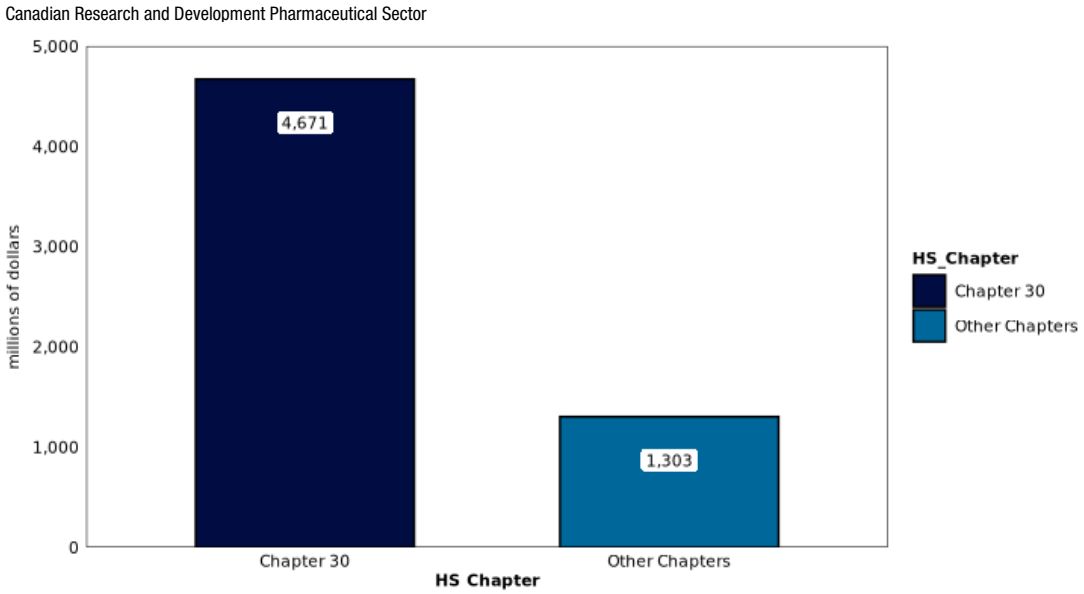
Canadian Research and Development Pharmaceutical Sector



Notes: The value of the R&D pharmaceutical sector's total goods exports was around $6.0 billion in 2022. Due to rounding, components may not add to total.
Source: Statistics Canada, custom tabulation, International Accounts and Trade Division, reference year 2022.

Pharmaceutical products (HS 30) represented 78.2% ($4.7 billion) of total exports by the sector, while other exported products totaled $1.3 billion. The types of goods and the proportion of export dollars have remained constant since 2018, with 71.0% to 78.0% of all exports classified under HS 30 from 2018 to 2022.

Figure 6
Total value (in dollars) of goods exports by Harmonized System Chapters, 2022 (x 1,000,000)



Notes: The Harmonized System (HS) Chapter 30 refers to pharmaceutical products. The value of the R&D pharmaceutical sector's total goods exports was around $6.0 billion in 2022. Due to rounding, components may not add to total.
Source: Statistics Canada, custom tabulation, International Accounts and Trade Division, reference year 2022.

In 2022, the sector's trade deficit (with total imports exceeding exports) reached $20.3 billion, marking a 3.6% increase from the previous year. The largest trade deficit, amounting to $13.2 billion, was with Europe, continuing a trend seen over the past several years.

The trade deficit with the United States decreased by 23.0%, falling to $4.9 billion from $6.4 billion in 2021. Other notable changes in the trade deficit occurred with the Asia and Oceania region, where the deficit rose by 93.7% to $1.7 billion from $867 million in 2021. As well, the trade deficit with Europe increased by 10.7% to $13.2 billion from $11.9 billion in 2021, while the trade deficit with the Americas (excluding the USA) saw a 2.3% increase to $525 million from $513 million in 2021. Finally, the trade deficit with Africa remained stable at $7.0 million, the same as the previous year.

2.2 Research and development (R&D)

2.2.1 Total research and development expenditures

The Annual Survey of Research and Development in Canadian Industry (RDCI) captures key information on the R&D activities performed by businesses in Canada. In this survey, businesses report their R&D expenditures in two categories: in-house and outsourced.

In-house R&D refers to research conducted by the business itself, while outsourced R&D involves funding provided by the business for research conducted by other parties, such as businesses, organizations (e.g., universities or hospitals), or individuals, both within and outside Canada. This funding may be provided through grants, fellowships, or contracts.

The research and development pharmaceutical sector had $2.5 billion to $3.2 billion in R&D expenditures in 2022

Statistics Canada does not report R&D expenditures as the sum of in-house and outsourced expenditures. Doing so could lead to double counting, particularly in domestically outsourced expenditures, where one company reports funding the R&D activity while another company reports performing it.

Consequently, total R&D expenditures are estimated as a range: the lower bound represents the sum of total in-house R&D expenditures and total outsourced R&D expenditures outside Canada, while the upper bound is the sum of total in-house R&D expenditures and total outsourced expenditures (inside and outside Canada).

The total R&D expenditures by the sector were estimated to range from $2.5 billion to $3.2 billion in 2022, up from $2.3 billion to $3.0 billion in the previous year.

2.2.2 In-house research and development expenditures

In 2022, businesses in the R&D pharmaceutical sector spent over $1.8 billion on total in-house R&D,[4] a 15.0% increase from 2021. This accounted for 6.0% of all business enterprise expenditures on research and development (BERD) in 2022, compared with 5.7% of BERD in 2021.[5]

Table 1
In-house R&D expenditures, 2018 to 2022 (x1,000,000)

	2018	2019	2020	2021	2022
	millions of dollars				
Total industrial R&D (all industries)[1, 2]	20,855	21,920	23,679	27,783	30,404
Canadian R&D pharmaceutical sector	1,032	1,107	1,274	1,592	1,831
IMC members	623	723	797	911	1,042

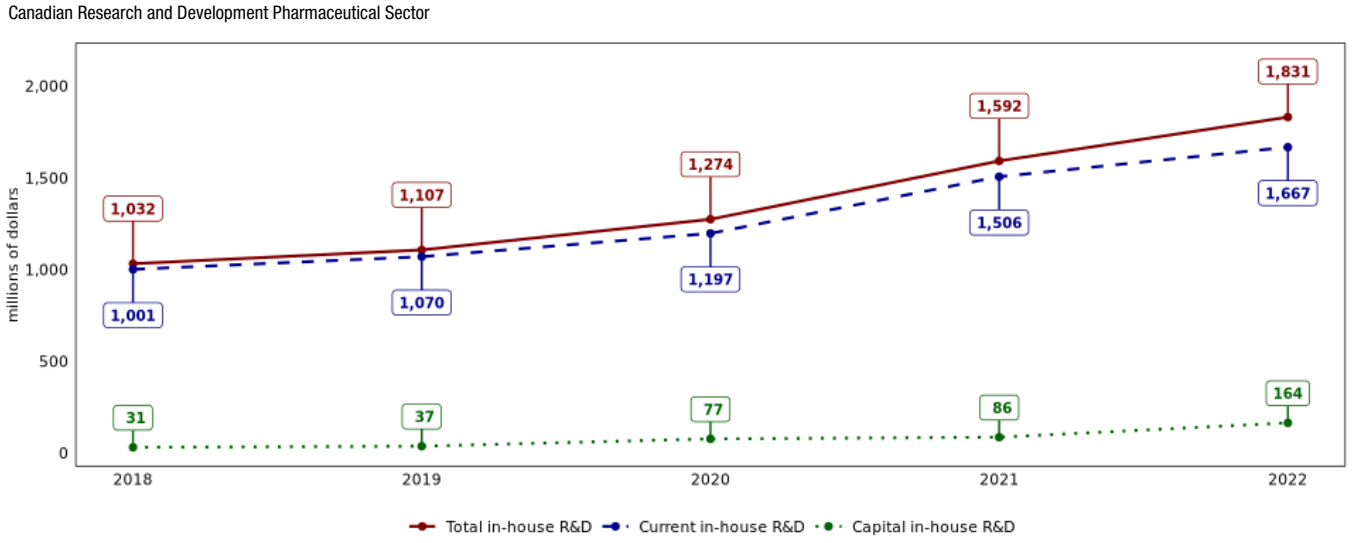
1. Figures from Business enterprise in-house research and development expenditures by industry groups, country of control and expenditure types can be found in Statistics Canada, table 27-10-0333-01.
2. The value for 'Total industrial R&D (all industries)' goes through a preliminary and revision cycle. All values from 2021 and earlier are now considered final and may differ from previous publications. The value for 2022 is still preliminary. Due to rounding, components may not add to total.
Source: Statistics Canada, custom tabulation, Research and Development in Canadian Industry survey, reference year 2018 to 2022.

The sector had $1.7 billion in current in-house R&D expenditures in 2022 and supported 8,817 personnel

The majority (91.0%) of the $1.8 billion spent on total in-house R&D was allocated to current in-house R&D expenditures, reaching $1.7 billion, a 10.7% increase from the previous year. At the same time, in-house capital expenditures (e.g., software, land, buildings, and equipment) rose from $86 million in 2021 to $164 million in 2022. Spending on current in-house R&D has consistently represented over 90.0% of total in-house R&D since 2018.

4. Total in-house R&D expenditures are made up of current in-house R&D expenditures (including wages and salary, services to support R&D and R&D materials) and capital in-house R&D expenditures (including land, building, software and equipment and machinery).
5. Business enterprise in-house research and development (BERD) expenditures by industry groups, country of control and expenditure types can be found in Statistics Canada, table 27-10-0333-01.

Figure 7
In-house R&D expenditures, 2018 to 2022 (x 1,000,000)



Note: Due to rounding, components may not add to total.
Source: Statistics Canada, custom tabulation, Research and Development in Canadian Industry survey, reference years 2018 to 2022.

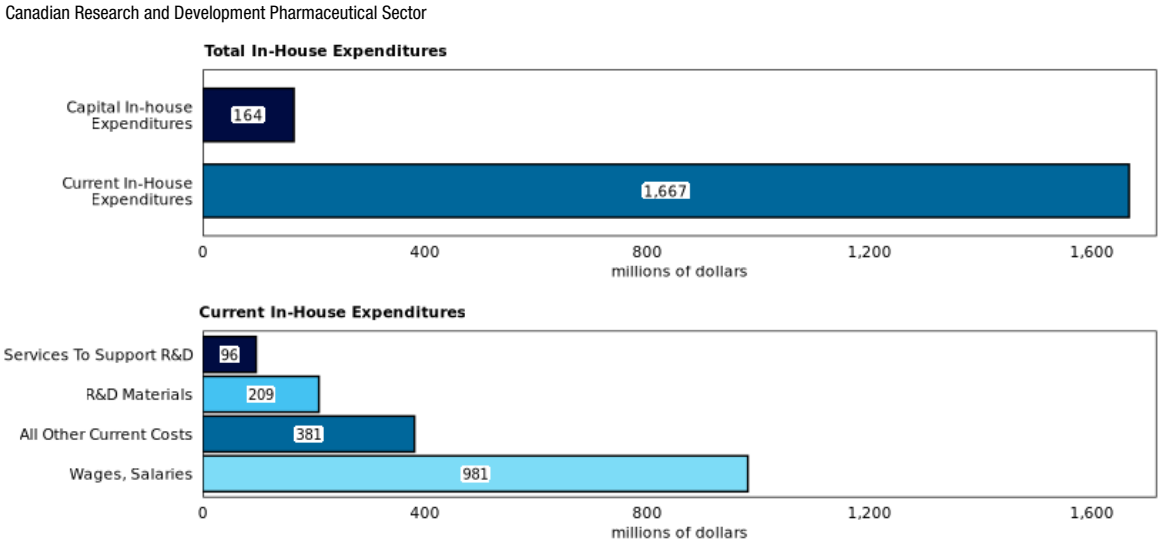
Wages and salaries[6] constituted the largest single expenditure (58.8%) within current in-house R&D, totalling $981 million and representing an 11.2% increase from 2021. R&D materials ($209 million), services to support R&D ($96 million) and all other current costs ($381 million) comprised the remainder of current expenditures on in-house R&D.

The sector also supported 8,817 FTE in-house R&D personnel, an increase of 3.4% from 2021. This contrasted with the total FTEs employed by the sector, which decreased from 2021 to 2022.

The growth in research FTEs in 2022 was attributed to increases in Ontario (18.6%) and the rest of Canada (23.6%). Unlike the previous year, Quebec experienced a 9.7% decrease in 2022. However, Quebec still accounted for about half of the total share (49.5%), with Ontario representing the second-largest share of FTEs in Canada at 31.8%, and the rest of Canada accounting for the remaining 18.7%.

6. Wages, salaries of permanent, temporary and casual R&D employees include benefits and fringe benefits of employees engaged in R&D activities. Benefits and fringe benefits include bonus payments, holiday or vacation pay, pension fund contributions, other social security payments, payroll taxes, etc.

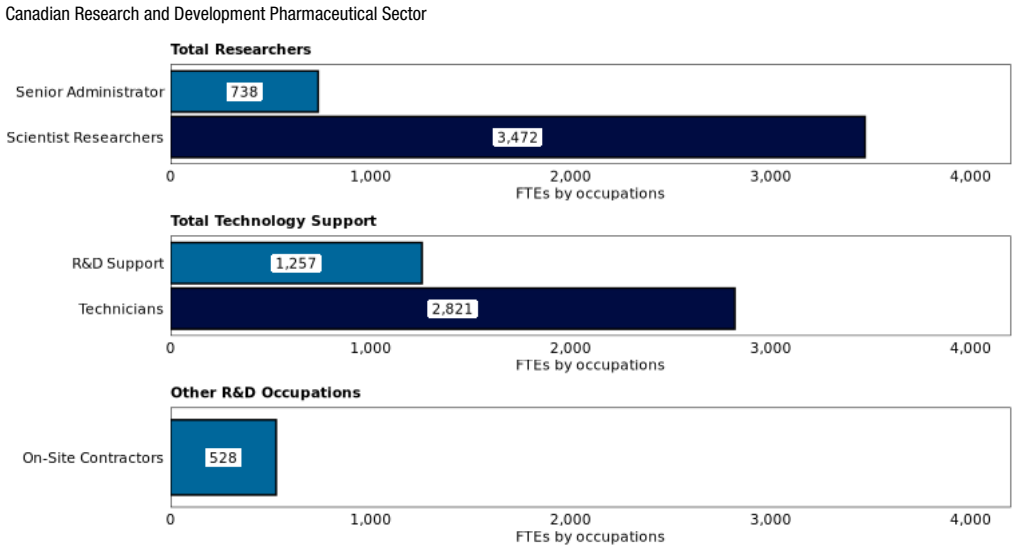
Figure 8
In-house R&D expenditures by type of expenditure, 2022 (x 1,000,000)



Notes: The R&D pharmaceutical sector's total in-house R&D expenditures was $1,831 million in 2022. Due to rounding, components may not add to total.
Source: Statistics Canada, custom tabulation, Research and Development in Canadian Industry survey, reference year 2022.

From an occupation standpoint, the increase in FTEs was primarily driven by a 45.7% rise in R&D support roles, followed by a 2.7% increase in scientist-researcher personnel. By contrast, the number of technicians decreased by 5.1%, senior administrators declined by 3.1%, and on-site contractors fell by 4.2% compared with the previous year. The growth in R&D support roles and decrease in technicians in 2022 are a reversal from 2021 levels where R&D support roles experienced a sharp decline (-37.1%) and technicians saw the largest increase (48.5%).

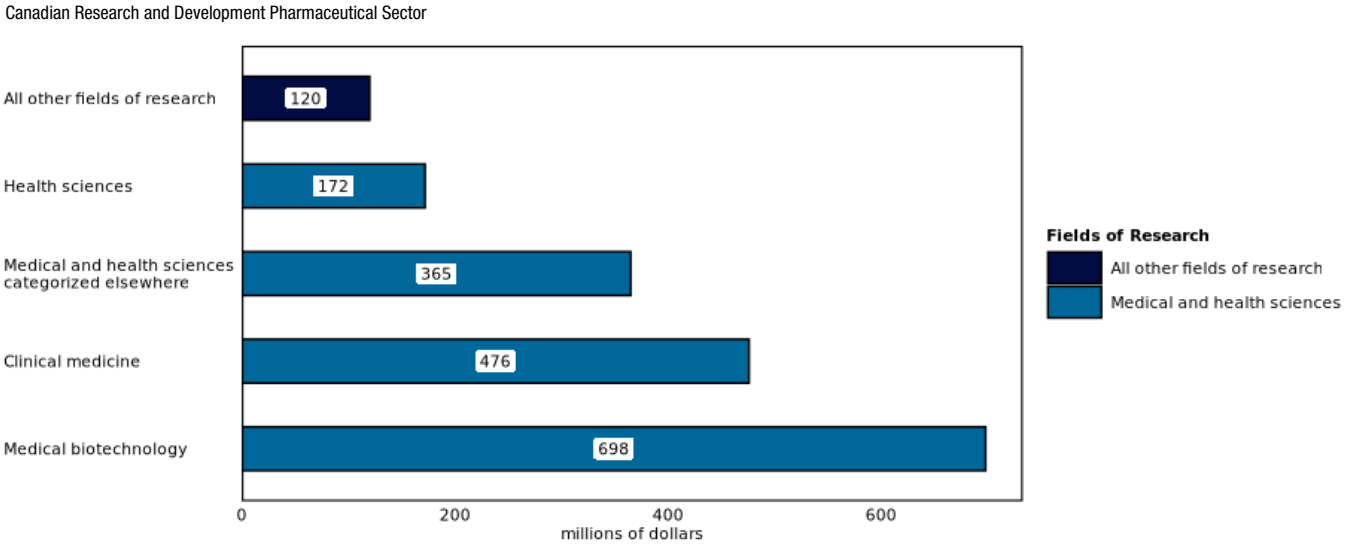
Figure 9
Full-time equivalent jobs (FTEs) in R&D personnel by occupation, 2022



Notes: The R&D pharmaceutical sector's total jobs in R&D personnel were 8,817 in 2022. Due to rounding, components may not add to total.
Source: Statistics Canada, custom tabulation, Research and Development in Canadian Industry survey, reference year 2022.

In 2022, most of the money spent on in-house R&D by the sector continued to be in medical and health sciences-related fields (93.4%). Specifically, in-house R&D expenditures on projects related to medical biotechnology reached $698 million, a 36.1% increase from the previous year, while spending on clinical medicine-related projects increased by 7.2% to $476 million. Likewise, spending on health sciences saw a 9.6% increase to $172 million, and all other fields of research increased by 4.3% to $120 million.

Figure 10
In-house R&D expenditures by field of research, 2022 (x 1,000,000)

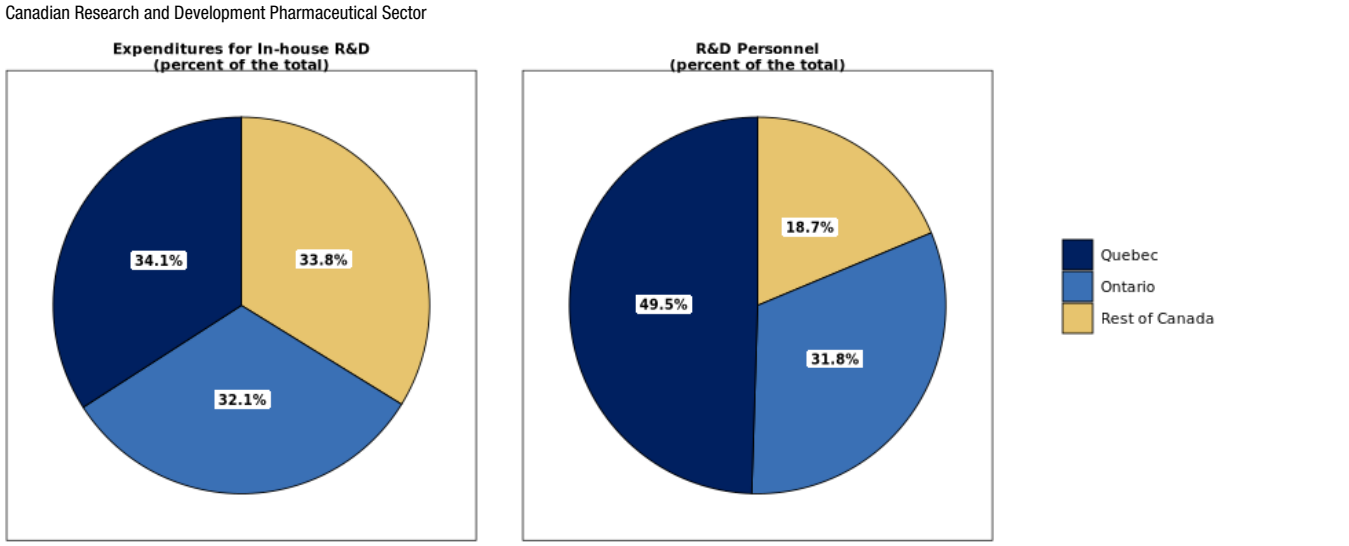


Notes: The R&D pharmaceutical sector's total in-house R&D expenditures was $1,831 million in 2022. Due to rounding, components may not add to total.
Source: Statistics Canada, custom tabulation, Research and Development in Canadian Industry survey, reference year 2022.

Most in-house research and development expenditures occurred in Ontario and Quebec

The majority of in-house R&D work was conducted in Quebec (34.1%) and Ontario (32.1%), as in previous years. In-house expenditures reached $588 million in Ontario, a 32.1% increase from 2021, while Quebec saw a 15.1% decrease to $625 million. The rest of Canada accounted for $618 million, representing a 63.9% increase from 2021.

Figure 11
Share of in-house R&D expenditures and full-time equivalent jobs (FTEs) in R&D personnel by region, 2022



Notes: The R&D pharmaceutical sector's total in-house R&D expenditures was $1,831 million and total jobs in R&D personnel were 8,817 FTEs in 2022. Due to rounding, components may not add to total.
Source: Statistics Canada, custom tabulation, Research and Development in Canadian Industry survey, reference year 2022.

Canadian-funded in-house R&D expenditures rose to nearly half of total spending

Canadian-funded in-house R&D expenditures increased by 28.0% in 2022, reaching $891 million, up from $696 million in 2021. This accounted for 48.7% of total funding. Funding from foreign sources also rose, rising 4.9% in 2022 to reach $940 million. Most of the sector's total in-house R&D expenditures continued to be funded by foreign sources (51.3%). However, this was a slight decrease from the 56.3% in 2021, as funding from Canadian sources advanced from 43.7% in 2021 to 48.7% in 2022.

The nature of the R&D work done by the Canadian R&D pharmaceutical sector continues to differ from that of other industries

Research efforts carried out by businesses can also be examined based on the nature of the R&D performed, particularly the types of outcomes guiding the R&D. International statistical standards distinguish research activities from experimental development activities.[7] Research can be conducted either to acquire knowledge (basic research) or to generate new knowledge aimed at a practical purpose (applied research). Experimental development builds on existing knowledge to develop or improve products or processes.

The R&D pharmaceutical sector spent over half (54.5%) of its total in-house R&D funding ($997 million out of $1.8 billion) in 2022 on research endeavors aimed at generating novel knowledge, while the remaining $834 million (45.5% of the total) was allocated to experimental development to enhance or create products. In comparison, businesses in all other industries generally allocate a greater proportion of their in-house R&D budgets towards experimental development. For 2022, this resulted in companies across all other industries spending 87.7% of their in-house R&D budget ($25.1 billion) on experimental development, with a fraction ($3.5 billion) dedicated to basic and applied research activities.[8]

7. OECD (2015), Frascati Manual 2015: Guidelines for Collecting and Reporting Data on Research and Experimental Development, The Measurement of Scientific, Technological and Innovation Activities, OECD Publishing, Paris.
8. Business enterprise in-house research and development expenditures by industry groups, country of control and nature of research and development can be found in Statistics Canada, table 27-10-0344-01.

Table 2
Nature of research and development, Canadian R&D pharmaceutical sector, 2022 (x 1,000,000)

	Canadian R&D Pharmaceutical Sector	Percentage of All Industries	All Other Industries[1]
	millions	percent	millions
Total in-house research and development expenditures in Canada	1,831	5.83	28,573
Total Research	997	22.45	3,515
Experimental development	834	3.16	25,058

1. The total expenditures for all industries in Canada, excluding expenditures by the Canadian R&D Pharmaceutical Sector.
Source: Statistics Canada. Business enterprise in-house research and development expenditures, by industry group, country of control and nature of research and development (x 1,000,000), Table 27-10-0344-01. Due to rounding, components may not add to total.

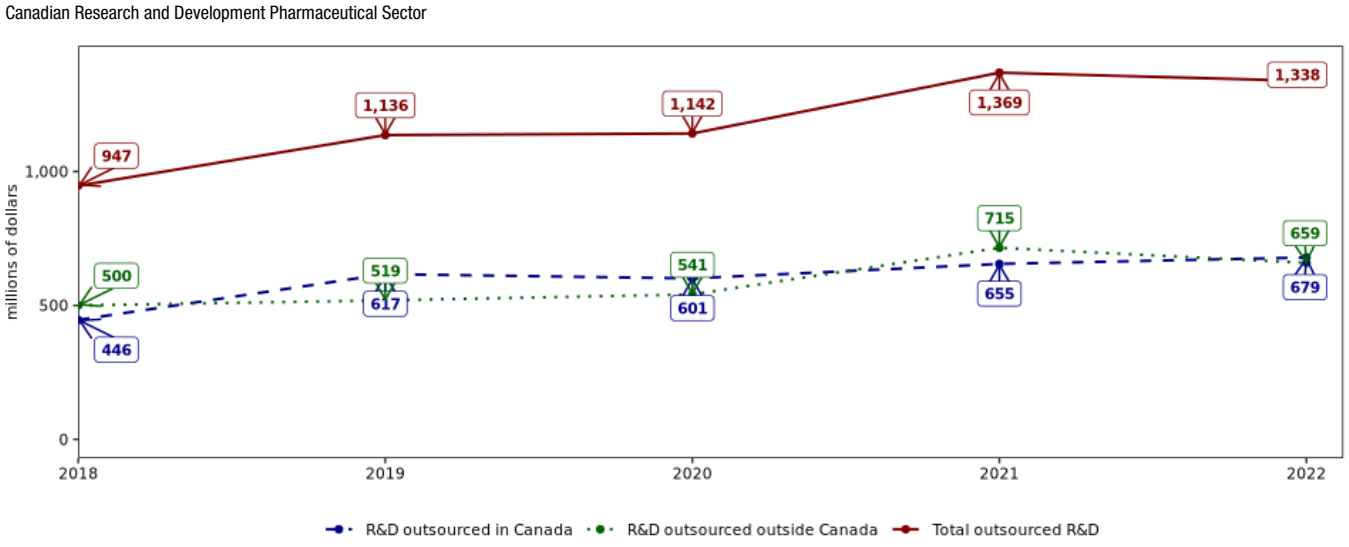
2.2.3 Outsourced research and development expenditures

Half of outsourced R&D spending went to Canadian companies

In 2022, the R&D pharmaceutical sector spent $1.3 billion on outsourced R&D expenditures, which was slightly less than total spending on in-house R&D ($1.8 billion). This contrasted with the ratio seen across all other industries, where total in-house spending ($28.6 billion) was nearly six times greater than spending on outsourced R&D ($4.5 billion).[9]

Total outsourced R&D expenditures by the sector decreased 2.3% (-$31 million) from 2021. This overall decline was primarily attributed to a decrease (-7.8%) in R&D outsourced to performers outside Canada, which fell to $659 million from $715 million in 2021. In contrast, R&D outsourced to performers within Canada increased by 3.7%, reaching $679 million.

Figure 12
Outsourced R&D expenditures by recipient, 2018 to 2022 (x 1,000,000)

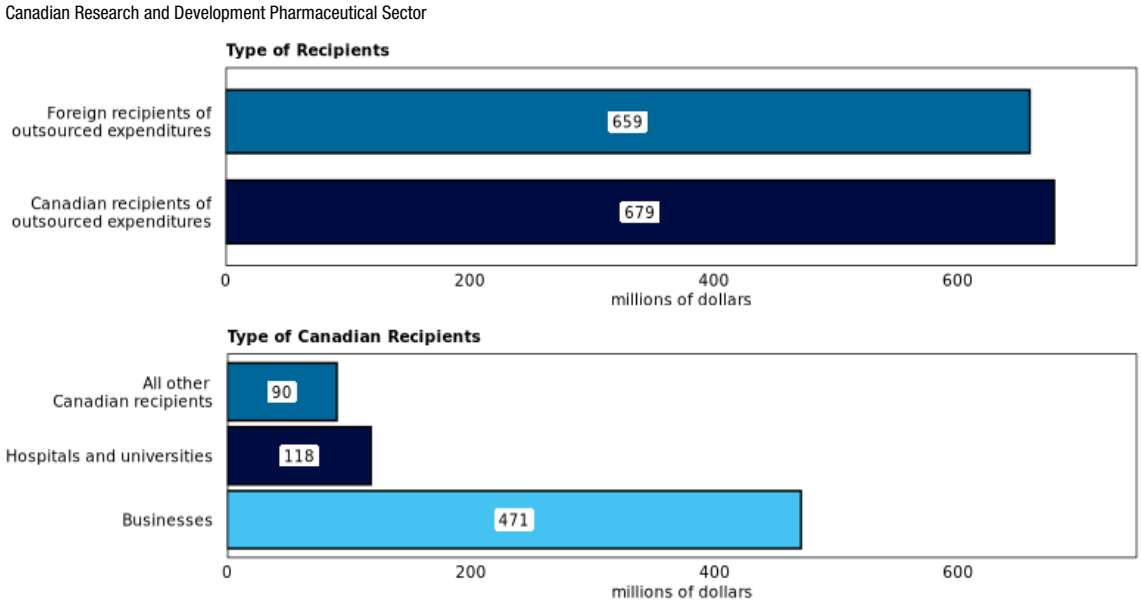


Note: Due to rounding, components may not add to total.
Source: Statistics Canada, custom tabulation, Research and Development in Canadian Industry survey, reference years 2018 to 2022.

In terms of R&D expenditures outsourced within Canada, the pharmaceutical sector paid $471 million (35.2%) to other businesses for R&D, followed by $118 million (8.8%) to hospitals and universities, and $90 million (6.7%) to other Canadian recipients. Compared with the previous year, the sector outsourced an additional $82 million to Canadian businesses. However, funding to hospitals and universities declined by $32 million, while funding to all other Canadian recipient sectors decreased by $26 million in 2022.

9. Calculations based on Statistics Canada, table 27-10-0342-01 and table 27-10-0346-01.

Figure 13
Outsourced R&D expenditures by sector, 2022 (x 1,000,000)



Notes: The R&D pharmaceutical sector's total outsourced R&D expenditures was $1,338 million in 2022. Due to rounding, components may not add to total.
Source: Statistics Canada, custom tabulation, Research and Development in Canadian Industry survey, reference year 2022.

2.2.4 Research and development expenditures eligible for the Scientific Research and Experimental Development Program

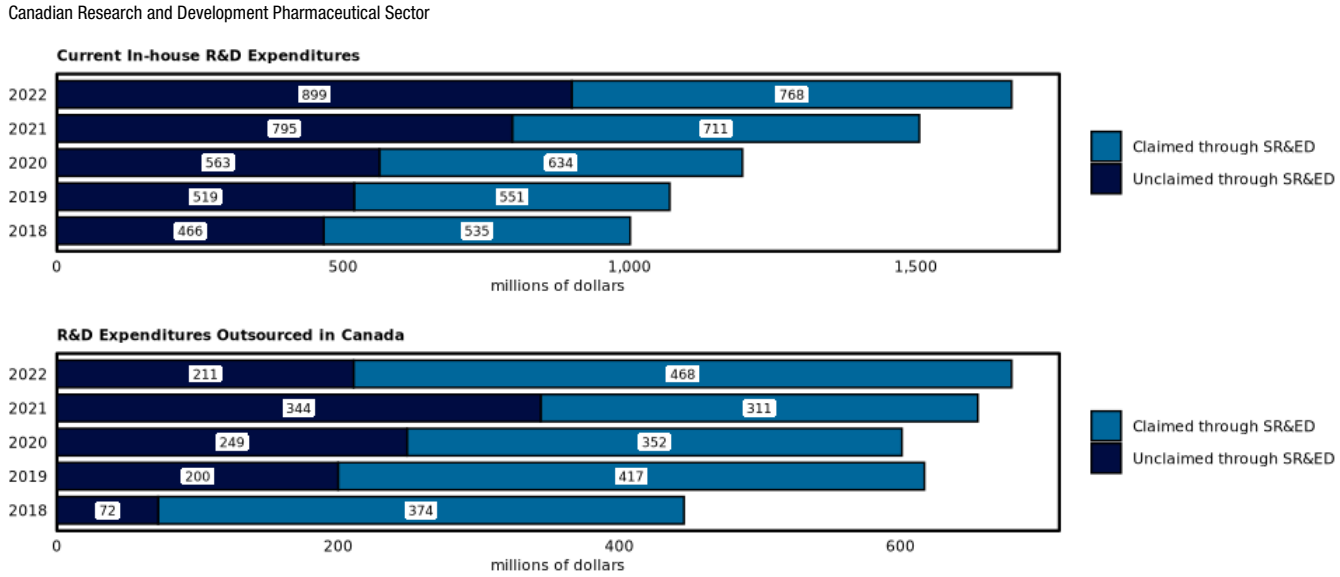
The Scientific Research and Experimental Development (SR&ED) Program is a tax incentive initiative designed to encourage R&D activities across businesses of all sizes and sectors. Eligible businesses can benefit from either a tax deduction or an investment tax credit ranging from 15.0% to 35.0%, depending on their size and classification.[10] However, certain expenses, such as capital expenditures and R&D projects outsourced outside Canada, are not eligible for the program.

The research and development pharmaceutical sector claimed over $1.2 billion in Scientific Research and Experimental Development Program tax credits

The businesses in the R&D pharmaceutical sector claimed $1.2 billion in expenditures under the SR&ED Program in 2022. Of this amount, 62.2% was spent on in-house R&D, while the remaining 37.8% was allocated to R&D outsourced within Canada. As in previous years, SR&ED Program claims for in-house expenditures accounted for nearly half (46.1%) of total current in-house R&D expenditures.

10. Canada Revenue Agency (2023, December 1). What are SR&ED tax incentives: Scientific Research and Experimental Development (SR&ED) tax incentives.

Figure 14
R&D expenditures claimed through SR&ED version total R&D expenditures, 2018 to 2022 (x 1,000,000)



Notes: The R&D pharmaceutical sector's total current in-house R&D was $1,001 million in 2018, $1,070 million in 2019, $1,197 million in 2020, $1,506 million in 2021, and $1,667 million in 2022. The sector's total outsourced in Canada R&D expenditures was $446 million in 2018, $617 million in 2019, $601 million in 2020, $655 million in 2021, and $679 million in 2022. Due to rounding, components may not add to total.
Source: Statistics Canada, custom tabulation, Research and Development in Canadian Industry survey, reference year 2018 to 2022.

Canadian-controlled companies made most of the Scientific Research and Experimental Development Program (SR&ED) claims on in-house expenditures

Within the pharmaceutical R&D sector, 66 of the 95 businesses (69.5%) that received SR&ED Program support in 2022 were Canadian-controlled, while the remaining 29 (30.5%) were foreign-controlled. Among the foreign-controlled companies that received support, 34.5% had a U.S. parent, while 65.5% were controlled by parent companies based in other countries.

Foreign-controlled entities, despite filing fewer claims, accounted for 72.5% ($557 million) of the $768 million in total in-house SR&ED Program support claimed by the sector in 2022. Canadian-controlled firms received $211 million (27.5% of total sector claims), which represented a 27.9% increase from 2021. Among foreign-controlled firms, those with U.S. parents accounted for 63.9% ($356 million) of the $557 million in total payouts to non-Canadian firms, representing a 3.2% increase from the previous year. Other foreign-controlled firms received $201 million in SR&ED Program support, unchanged from 2021.

SR&ED Program claims for outsourced R&D expenditures increased to $468 million in 2022, up $157 million from $311 million in 2021. This growth was largely driven by a 57.0% increase ($131 million) in claims by foreign-controlled companies. In contrast, Canadian-controlled firms claimed $107 million, representing a 32.1% increase ($26 million) from the previous year.

3 Innovative Medicines Canada (IMC) Members

3.1 Economic footprint

3.1.1 Value added

In 2022, Innovative Medicines Canada members contributed $9.0 billion to the Canadian economy

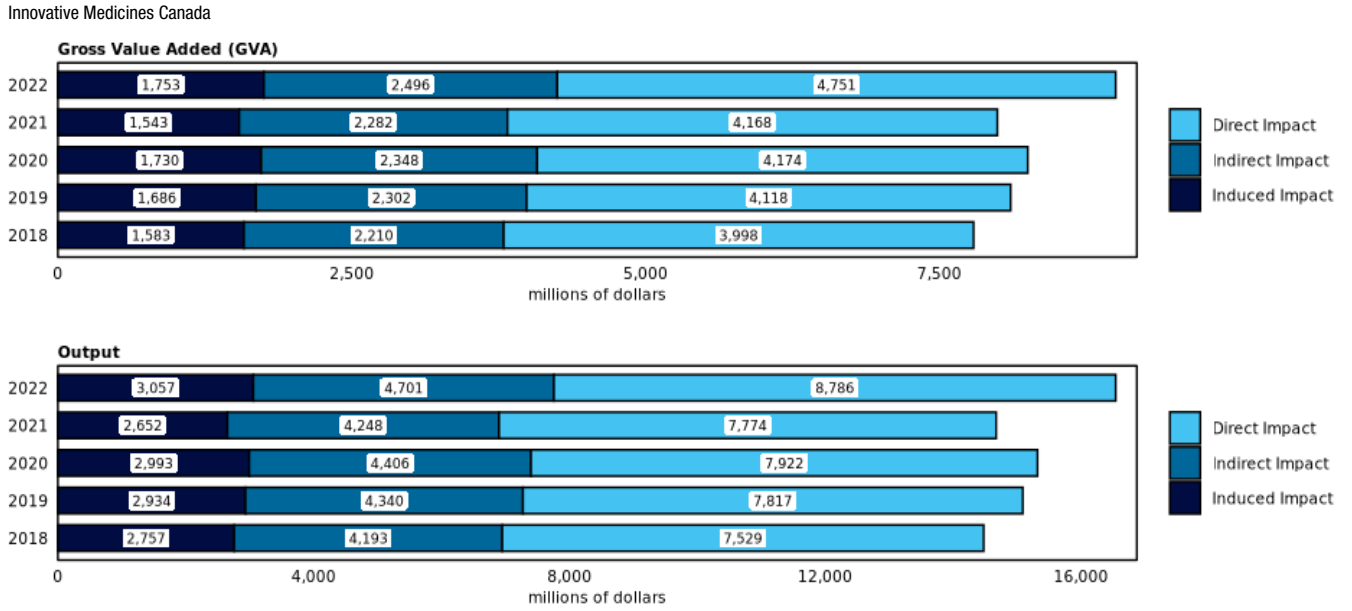
Innovative Medicines Canada (IMC) is an industry association representing members of the Canadian R&D pharmaceutical sector, including both start-ups and established organizations.

IMC members contributed $9.0 billion in GVA to the Canadian economy in 2022, accounting for nearly half (48.9%) of the total contribution from the R&D pharmaceutical sector ($18.4 billion). Compared with the previous year, the GVA of IMC members increased by 12.6% ($1.0 billion). Meanwhile, non-IMC members contributed $9.4 billion in GVA, a 17.0% ($1.4 billion) increase from the previous year.

In 2022, over half of the total GVA generated by IMC members ($4.8 billion) was tied to direct impacts, representing a 14.0% increase compared with 2021. Of the remainder, members contributed $2.5 billion in indirect impacts and $1.8 billion in induced impacts, representing increases of 9.4% and 13.6%, respectively, from 2021.

IMC members accounted for 0.34% of Canada's GDP at basic prices, an increase of 0.1% from 2021. The rest of the R&D pharmaceutical sector accounted for 0.35%.[11]

Figure 15
Gross value added (GDP at basic prices) and output (value of goods and services), 2018 to 2022 (x 1,000,000)



Notes: IMC members' total GVA was $7,791 million in 2018, $8,106 million in 2019, $8,252 million in 2020, $7,993 million in 2021, and $9,000 million in 2022. IMC members' total output was $14,479 million in 2018, $15,091 million in 2019, $15,321 million in 2020, $14,674 million in 2021, and $16,544 million in 2022. Due to rounding, components may not add to total.
Source: Statistics Canada, custom tabulation, Industry Accounts Division, reference years 2018 to 2022.

Innovative Medicines Canada members continued to concentrate their activities in Ontario and Quebec

IMC members contributed a larger proportion of their GVA in Ontario and Quebec, totaling 92.1%, compared with 75.9% for non-IMC members.

Of the $9.0 billion in GVA that IMC members contributed to the Canadian economy, $4.3 billion was generated in Ontario, $3.9 billion in Quebec, and $710 million in other regions of Canada. Similarly, of the $5.0 billion in labour

11. Statistics Canada, table 36-10-0221-01. Preliminary estimates. Gross value added (GDP at basic prices) can be calculated from the table as (gross domestic product at market prices) minus (taxes less subsidies on products and imports).

income, 92.9% originated in these two provinces, with $2.4 billion tied to Ontario, $2.2 billion to Quebec, and $356 million to other regions of Canada.

Non-IMC members in the sector also generated the majority of their GVA in Ontario ($2.7 billion) and Quebec ($1.5 billion). They had a slightly larger share of their GVA in Ontario compared with IMC members (48.5% vs. 47.8%). However, non-IMC members' share of GVA generated in Quebec was lower than that of IMC members (26.5% vs. 45.0%). In addition, non-IMC members' activities were more widely distributed across the country, with 24.9% of GVA in other regions of Canada compared with 7.1% for IMC members.

3.1.2 Output

Innovative Medicines Canada members' output reached $16.5 billion

In 2022, IMC members contributed $16.5 billion to Canada's economic output, an increase of $1.9 billion (12.7%) compared with 2021. This marked a rebound from the 4.2% decline recorded in 2021. Similarly, the output of non-IMC members rose to $17.7 billion, reflecting a 16.0% increase from 2021.

The increase for IMC members was tied to gains across all three types of impacts measured. Direct impacts, which accounted for over half (53.1%) of their total impact, rose by 13.0% to $8.8 billion in 2022. Indirect impacts increased by 10.7% to $4.7 billion, while induced impacts saw the largest increase, rising by 15.3% to $3.1 billion.

Innovative Medicines Canada members registered $154 million of operating profits in 2022

IMC members generated $22.8 billion in operating revenue (60.4% of the overall sector) in 2022, an increase of 21.5% from the previous year. Operating expenses for IMC members also rose, increasing 22.8% to $22.7 billion in 2022. Given the variance between operating revenue and expenses, operating profits declined by 53.9% to $154 million in 2022. Additionally, the operating profit margin, calculated by dividing operating profit by operating revenue, declined from 1.8% in 2021 to 0.7% in 2022.

Similar to IMC members, non-IMC members recorded a positive operating profit of $148 million, bringing the total operating profit of the R&D pharmaceutical sector to $302 million in 2022.

3.1.3 Employment

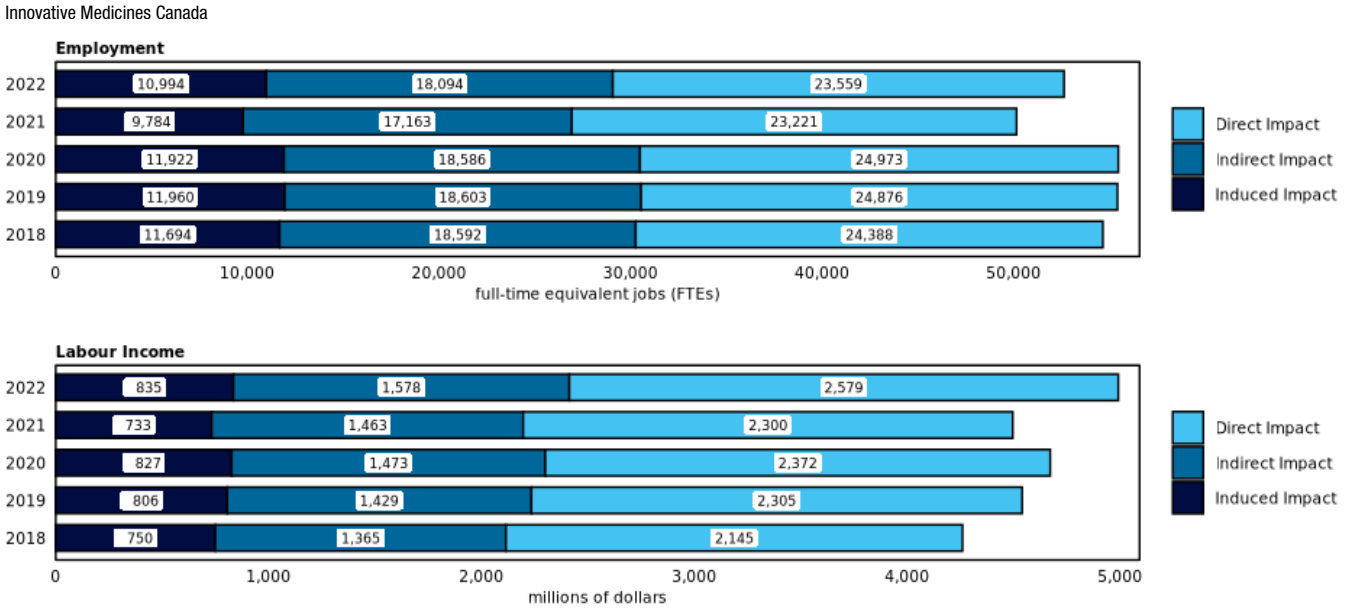
Innovative Medicines Canada members were responsible for nearly half of the jobs supported by the sector

IMC members accounted for 52,647 FTE jobs in 2022, representing a 4.9% increase compared with 2021. FTE jobs associated with direct, indirect, and induced impacts increased by 1.5% (338 FTEs), 5.4% (931 FTEs), and 12.4% (1,211 FTEs), respectively, compared with 2021. By comparison, non-IMC members accounted for over half of the total jobs in the R&D pharmaceutical sector, with 58,170 FTEs in 2022.

Labour income for Innovative Medicines Canada members reached $5.0 billion

Labour income associated with IMC member companies increased 11.0% to $5.0 billion in 2022, while non-IMC members registered a 16.9% increase as their labour income rose to $5.6 billion. Direct, indirect, and induced impacts on labour income for IMC members increased by 12.1% ($279 million), 7.9% ($115 million), and 13.9% ($102 million), respectively, compared with 2021.

Figure 16
Employment (FTEs) and labour income (millions of dollars), 2018 to 2022



Notes: IMC members' total jobs were 54,674 FTEs in 2018, 55,439 FTEs in 2019, 55,481 FTEs in 2020, 50,168 FTEs in 2021, and 52,647 FTEs in 2022. IMC members' total labour income was $4,260 million in 2018, $4,540 million in 2019, $4,672 million in 2020, $4,496 million in 2021, and $4,992 million in 2022. Due to rounding, components may not add to total.
Source: Statistics Canada, custom tabulation, Industry Accounts Division, reference years 2018 to 2022.

3.1.4 Trade

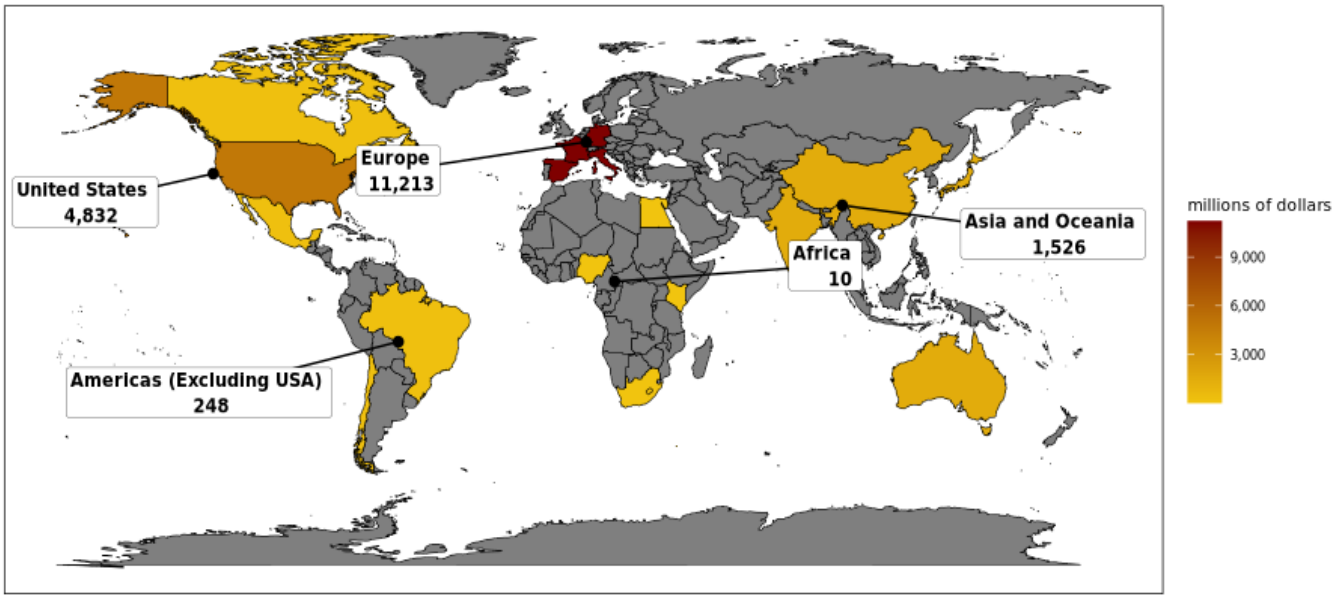
Innovative Medicines Canada members led in imports

In 2022, two-thirds of the $26.2 billion in goods imported by the R&D pharmaceutical sector were imported by IMC members ($17.8 billion), representing a 7.1% increase from the previous year. By comparison, non-IMC members imported $8.4 billion, a 3.4% increase from 2021. As in previous years, IMC members imported most of their goods (62.9%) from Europe in 2022, marking an 18.4% increase ($1.7 billion) compared with 2021.

Goods from the United States accounted for 27.1% ($4.8 billion) of total imports by IMC members, representing a 21.8% decrease compared with 2021. As in previous years, IMC members relied less heavily on the United States compared with non-IMC members (59.4%).

Figure 17
Total value (in dollars) of goods imports by region, 2022 (x 1,000,000)

Innovative Medicines Canada



Notes: The value of IMC members' total goods imports was $17.8 billion in 2022. Due to rounding, components may not add to total.
Source: Statistics Canada, custom tabulation, International Accounts and Trade Division, reference year 2022.

In 2022, IMC members exported approximately $1.1 billion in goods, accounting for 17.9% of the R&D pharmaceutical sector's total exports. Goods destined for the United States represented 42.5% of total exports by IMC members. Unlike the previous year, exports to the United States increased by 6.3% to $453 million in 2022. Similar to imports, the share of exports to the United States was lower for IMC members compared with non-IMC members. Of the $4.9 billion exported by non-IMC members, 91.1% ($4.5 billion) was destined for the United States in 2022.

Figure 18
Total value (in dollars) of goods exports by region, 2022 (x 1,000,000)

Innovative Medicines Canada

x indicates datapoint suppressed to meet the confidentiality requirements of the *Statistics Act*
Notes: The value of the IMC members' total goods exports was $1.1 billion in 2022. Due to rounding, components may not add to total.
Source: Statistics Canada, custom tabulation, International Accounts and Trade Division, reference year 2022.

3.2 Research and development

3.2.1 Total research and development expenditures

To prevent double counting, in-house and outsourced R&D expenditures are reported separately rather than as a combined total, as previously mentioned. Considering this, IMC members' total R&D expenditures ranged from $1.2 billion to $1.7 billion in 2022, unchanged from the previous year.

3.2.2 In-house research and development expenditures

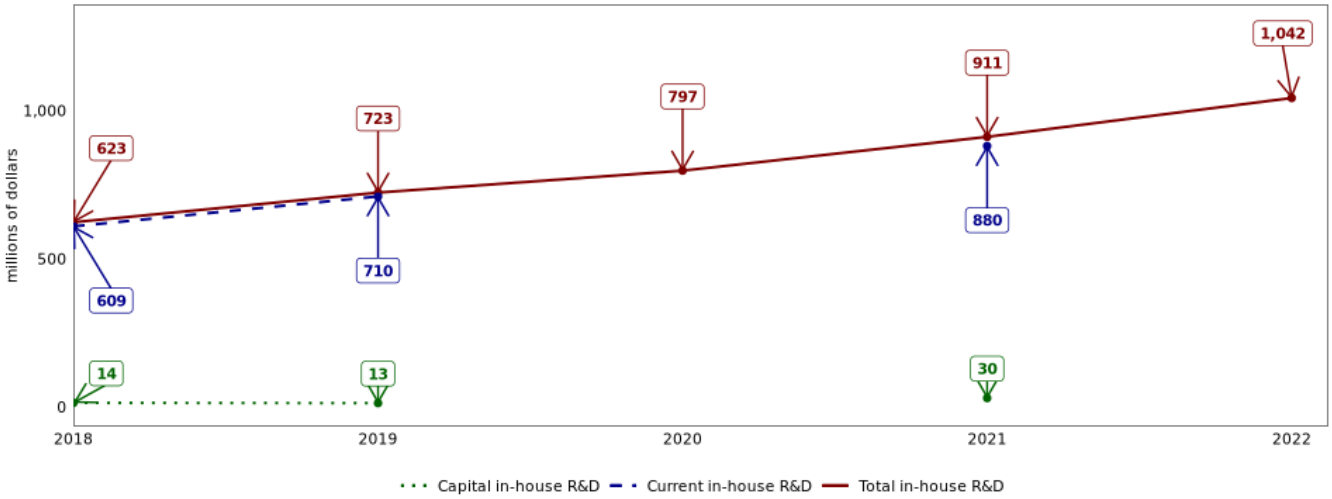
In-house research and development spending supported nearly 65% of all FTE personnel in the R&D pharmaceutical sector

In-house expenditures by IMC members increased 14.4% from 2021, reaching $1.0 billion in 2022. Compared with the entire R&D pharmaceutical sector, IMC members' spending accounted for more than half of the sector's total (56.9%) and 3.4% of all BERD[12] in Canada. The remaining 43.1% ($789 million) of total in-house spending ($1.8 billion) in the R&D pharmaceutical sector was from non-IMC members.

12. Business enterprise in-house research and development expenditures (BERD), by industry group based on the North American Industry Classification System (NAICS). Table: 27-10-0333-01 (formerly CANSIM 358-0510).

Figure 19
In-house R&D expenditures, 2018 to 2022 (x 1,000,000)

Innovative Medicines Canada



Notes: Missing data indicate that the data point was suppressed to meet the confidentiality requirements of the *Statistics Act*. Due to rounding, components may not add to total.
Source: Statistics Canada, custom tabulation, Research and Development in Canadian Industry survey, reference years 2018 to 2022.

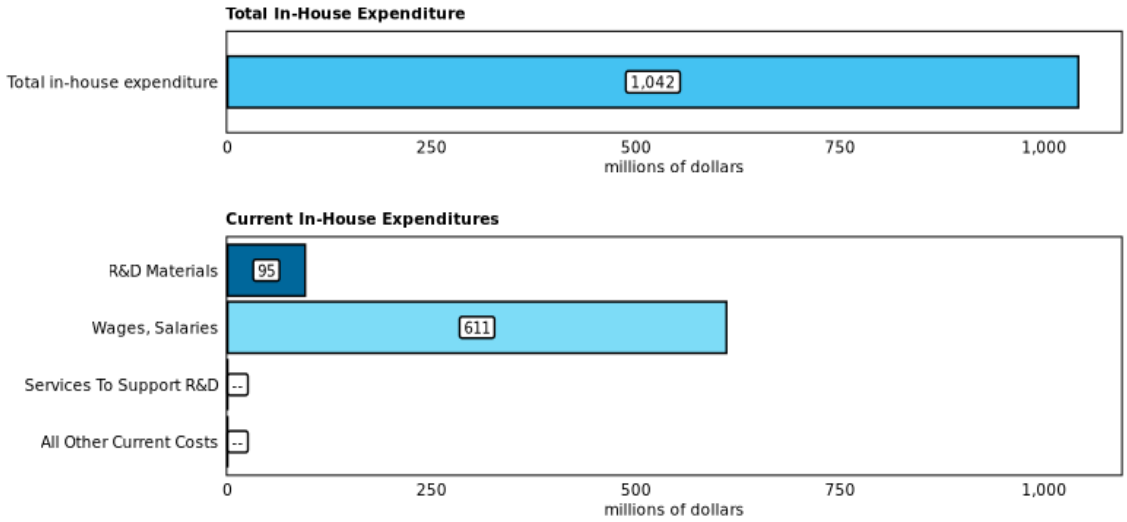
The majority of research and development expenditures were allocated to wage and salaries

In 2022, wages and salaries[13] constituted the largest R&D expenditure, representing 58.6% ($611 million) of total in-house expenditures by IMC members and registering a 13.6% increase from 2021. This was followed by R&D materials which accounted for 9.1% ($95 million) of total in-house expenditures by IMC members.

As for non-IMC members, wages and salaries accounted for 46.9% while R&D materials represented 14.4% of total R&D expenditures. Both categories saw a slight decrease in their shares compared with the previous year.

Figure 20
In-house R&D expenditures by type of expenditure, 2022 (x 1,000,000)

Innovative Medicines Canada



Notes: IMC members' total in-house R&D expenditures was $1,042 million in 2022. Missing data indicate that the data point was suppressed to meet the confidentiality requirements of the *Statistics Act*. Due to rounding, components may not add to total.
Source: Statistics Canada, custom tabulation, Research and Development in Canadian Industry survey, reference year 2022.

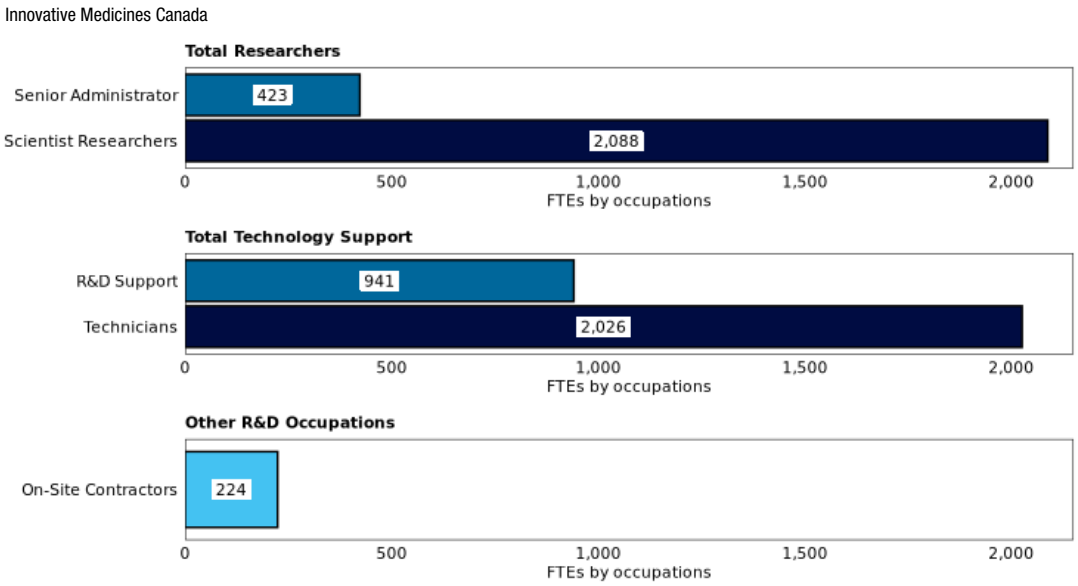
13. Wages, salaries of permanent, temporary and casual R&D employees include benefits and fringe benefits of employees engaged in R&D activities. Benefits and fringe benefits include bonus payments, holiday or vacation pay, pension fund contributions, other social security payments, payroll taxes, etc.

Despite being fewer in number than non-IMC members, IMC members supported 5,701 of the 8,817 FTE R&D personnel in the sector in 2022. IMC members also supported 7.7% more R&D FTE positions, while non-IMC members supported 3.6% fewer positions compared with the previous year.

Similar to 2021, technical, administrative, and support staff accounted for over half (52.0%) of IMC members' R&D personnel in 2022, totalling 2,967 FTEs, while researchers and research managers comprised 44.0% (2,511 FTEs). By contrast, non-IMC members' R&D personnel had a larger proportion of researchers and research managers (54.5%, or 1,699 FTEs) than technical, administrative, and support staff (35.7%, or 1,111 FTEs) in 2022.

IMC members added 147 new FTE positions in 2022 surrounding technical, administrative, and support staff, and 380 FTE positions for researchers and research managers. Comparatively, non-IMC members added 96 new FTE positions in 2022 for technical, administrative, and support staff, while the number of researchers and research managers fell by 313 FTEs.

Figure 21
Full-time equivalent jobs (FTEs) in R&D personnel by occupation, 2022

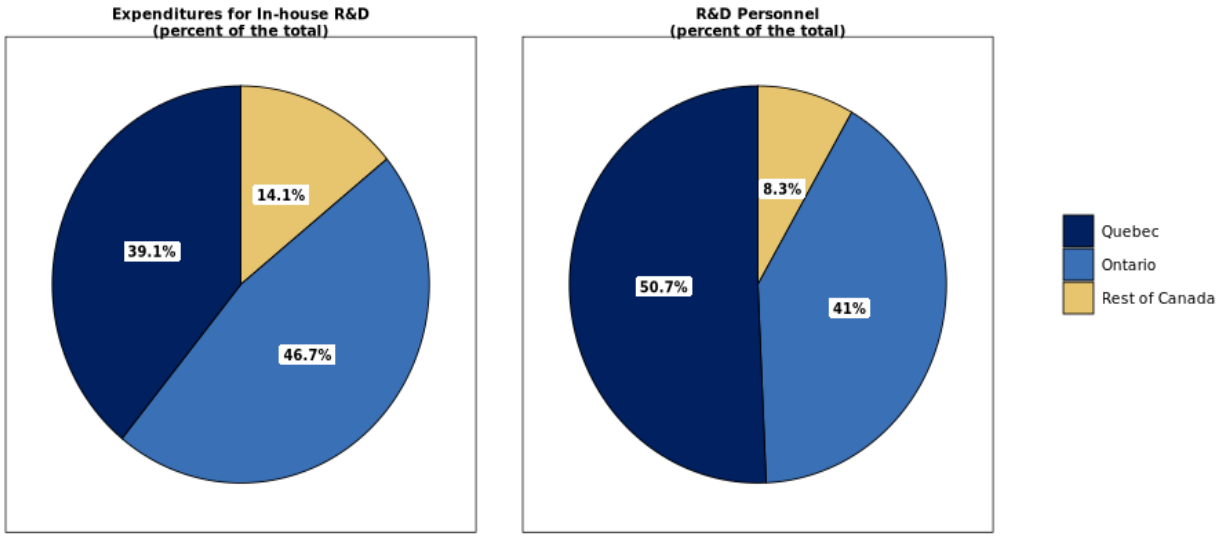


Notes: IMC members' total jobs in R&D personnel were 5,701, in 2022. Due to rounding, components may not add to total.
Source: Statistics Canada, custom tabulation, Research and Development in Canadian Industry survey, reference year 2022.

In 2022, 50.7% of IMC members' R&D FTE personnel were concentrated in Quebec (2,889 FTEs), followed by 41.0% in Ontario (2,337 FTEs). The remaining 8.3% were in the rest of Canada. Unlike the previous year, Quebec's R&D FTE personnel decreased by 3.1%, while Ontario and the rest of Canada saw increases of 20.8% and 24.5%, respectively.

Figure 22
Share of full-time equivalent jobs (FTEs) in R&D personnel by region, 2022

Innovative Medicines Canada

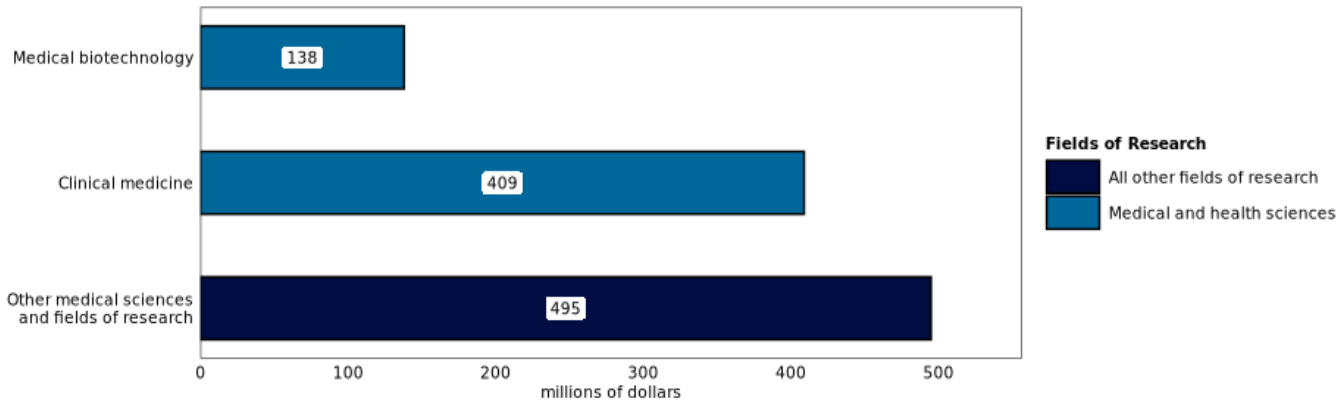


Notes: IMC members' total jobs in R&D personnel were 5,701, in 2022. IMC members' total in-house R&D expenditures was $1,042 million in 2022. Due to rounding, components may not add to total.
Source: Statistics Canada, custom tabulation, Research and Development in Canadian Industry survey, reference year 2022.

In 2022, 39.3% of in-house R&D expenditures among IMC members were directed toward clinical medicine R&D projects, representing a 3.3% increase to $409 million. Additionally, $138 million was allocated to medical biotechnology, a 170.6% increase compared with the previous year.

Figure 23
In-house R&D expenditures by field of research, 2022 (x 1,000,000)

Innovative Medicines Canada



Notes: IMC members' total in-house R&D expenditures was $1,042 million in 2022. Due to rounding, components may not add to total.
Source: Statistics Canada, custom tabulation, Research and Development in Canadian Industry survey, reference year 2022.

Increase in Canadian-funded in-house research and development by Innovative Medicines Canada members

Following an increase in the previous year, Canadian-funded in-house R&D by IMC members rose 18.6% from $312 million in 2021 to $370 million in 2022. In comparison, non-IMC members reported a 35.7% increase, with

spending rising from $384 million in 2021 to $521 million in 2022. Overall, total in-house expenditures by IMC members grew by 14.4%, while those by non-IMC members increased by 15.9% in 2022.

Foreign-funded R&D by IMC members increased by 12.2% ($73 million) from the previous year to reach $672 million in 2022. By contrast, non-IMC members saw a 9.8% decrease in foreign-funded R&D, falling from $297 million to $268 million in 2022. Over one-third (35.5%) of all in-house R&D expenditures by IMC members were funded by Canadian sources, while non-IMC members relied more heavily on Canadian sources, with 66.0% of their total in-house R&D expenditures funded domestically.

The nature of research and development differs between Innovative Medicines Canada members and non-members (members spent more on research than on experimental development)

As previously noted, research and experimental development activities are distinct: research aims to acquire or generate knowledge, while experimental development focuses on improving products or processes using existing knowledge. In 2022, 71.9% of all in-house R&D expenditures by IMC members were devoted to research, totaling $749 million, a 47.7% increase from the previous year. The remaining 28.1% of expenditures were directed toward experimental development, amounting to $293 million in 2022, a decrease of 27.5%.

In contrast, over two-thirds (68.6%) of non-IMC members' spending was on experimental development, while the remaining 31.4% was on research. Of the $789 million spent on in-house R&D by non-IMC members, $248 million was directed toward research and $541 million toward experimental development in 2022.

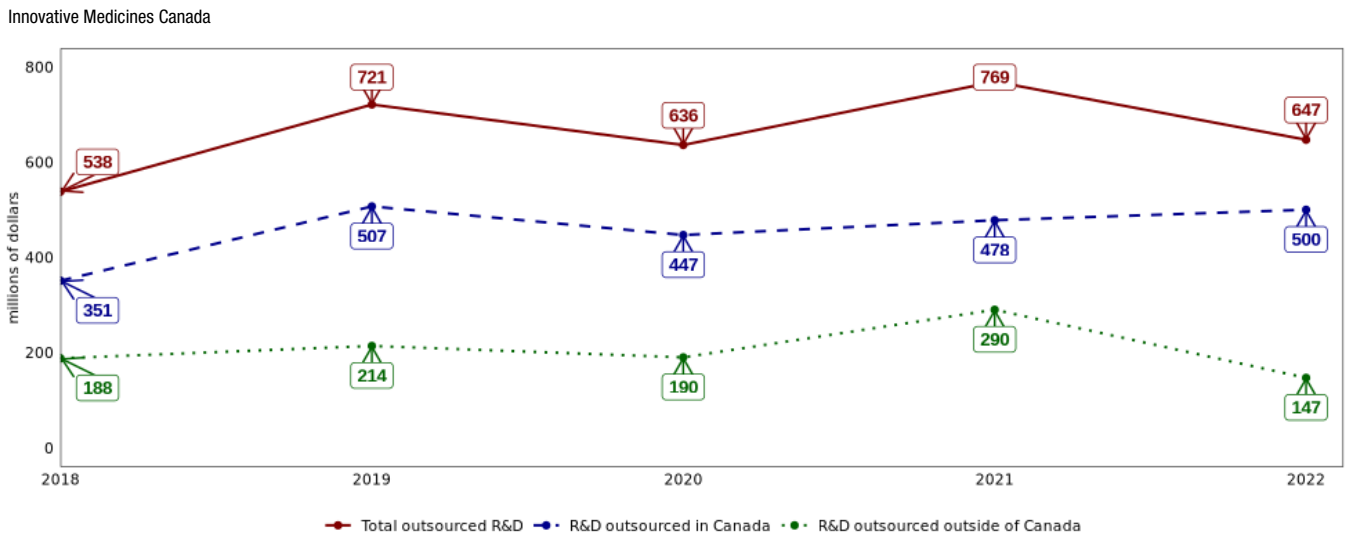
3.2.3 Outsourced research and development expenditures

Most of all outsourced research and development spending went to Canadian companies

In 2022, IMC members outsourced $647 million in R&D expenditures, representing nearly half (48.4%) of total outsourced spending in the R&D pharmaceutical sector ($1.3 billion). Of the outsourced spending by IMC members, 77.3% ($500 million) went to entities within Canada, while 22.7% ($147 million) went to entities outside Canada.

Total outsourced R&D expenditures by IMC members decreased by 15.9% in 2022, while those by non-IMC members increased by 15.2% compared with the previous year.

Figure 24
Outsourced R&D expenditures by recipient, 2018 to 2022 (x 1,000,000)

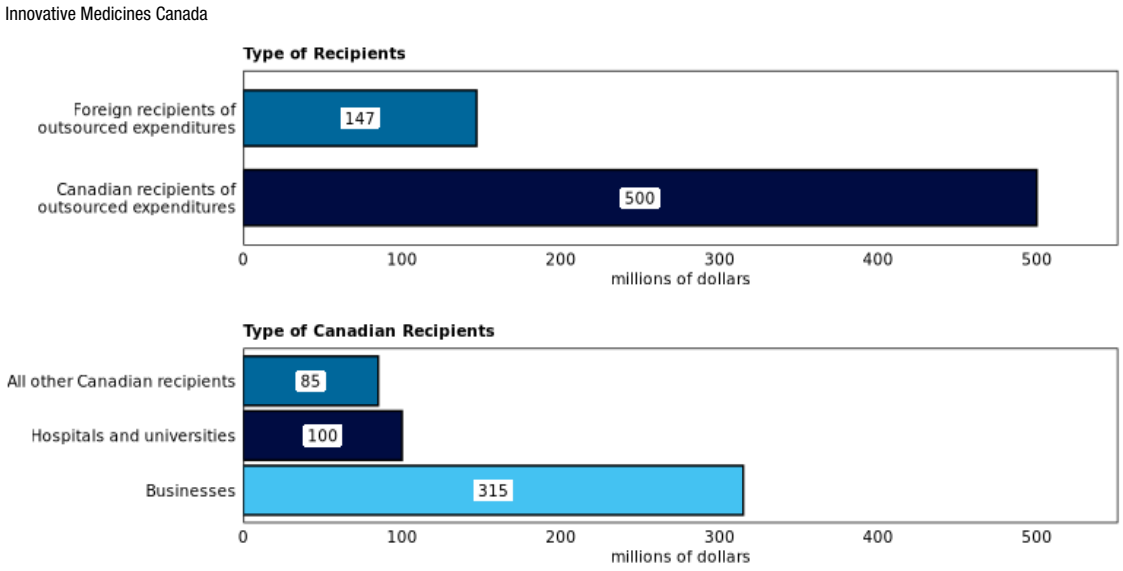


Note: Due to rounding, components may not add to total.
Source: Statistics Canada, custom tabulation, Research and Development in Canadian Industry survey, reference years 2018 to 2022.

Among the Canadian recipients, $315 million (63.0%) went to businesses, $100 million (20.0%) to hospitals and universities, and the remaining $85 million to all other Canadian recipients in 2022.

By contrast, non-IMC members outsourced $691 million in R&D expenditures in 2022. Of this total, 74.1% ($512 million) went to entities outside Canada, while 25.9% ($179 million) went to entities within Canada. Among the Canadian recipients, $156 million (87.2%) went to businesses, $18 million (10.1%) to hospitals and universities, and the remaining $5 million to all other Canadian recipients in 2022.

Figure 25
Outsourced R&D expenditures by sector, 2022 (x 1,000,000)



Notes: IMC members' total outsourced R&D expenditures was $647 million in 2022. Due to rounding, components may not add to total.
Source: Statistics Canada, custom tabulation, Research and Development in Canadian Industry survey, reference year 2022.

3.2.4 Research and development expenditures eligible for the Scientific Research and Experimental Development Program

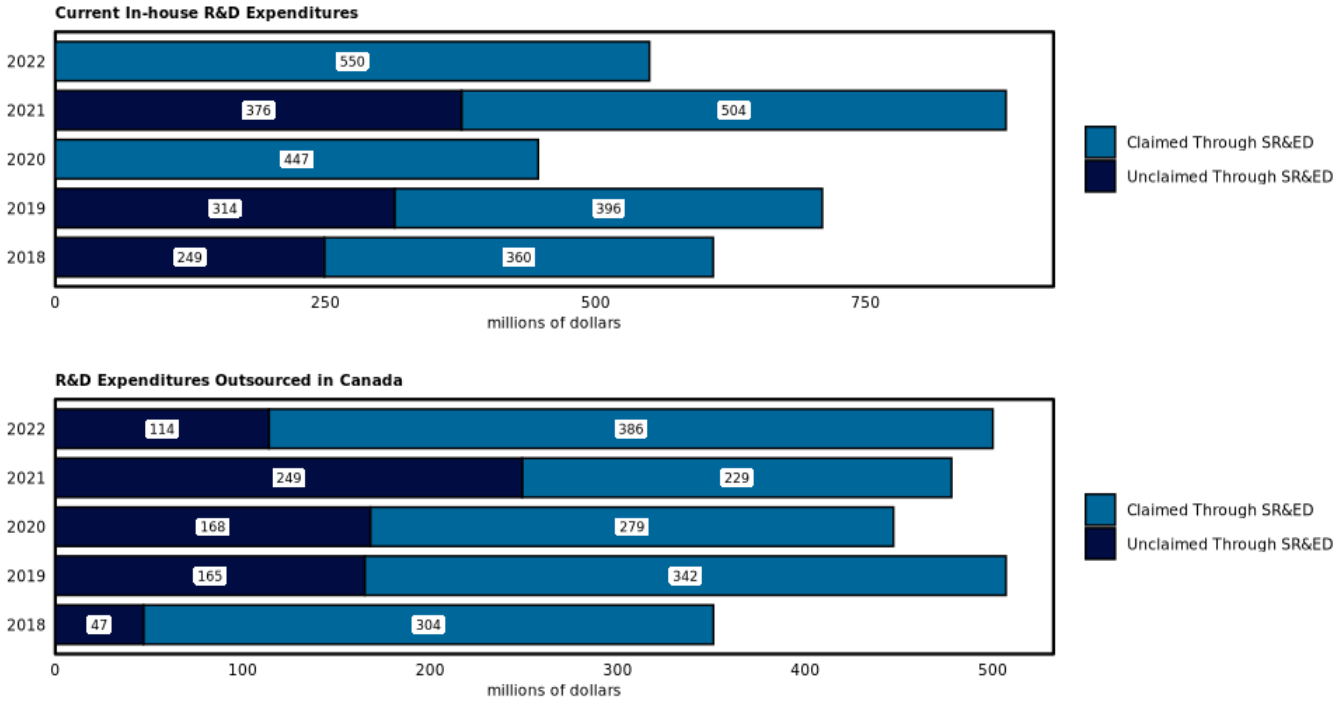
Innovative Medicines Canada members accounted for the majority of Scientific Research and Experimental Development Program support for the R&D pharmaceutical sector

In 2022, IMC members accounted for 75.8% ($936 million) of all Scientific Research and Experimental Development (SR&ED) Program claims made by the Canadian R&D pharmaceutical sector, representing a 27.7% increase from 2021. Non-IMC members accounted for the remaining 24.2%, amounting to $299 million in 2022.

Of the claims made by IMC members, $550 million (58.8%) were for in-house R&D expenditures, up 9.1% from 2021. Meanwhile, outsourced R&D accounted for the remaining $386 million (41.2%), an increase of 68.6% compared with the previous year. Under the program, capital expenditures, which represent the remainder of total in-house R&D expenditures, cannot be claimed.

Figure 26
R&D expenditures claimed through SR&ED version total R&D expenditures, 2018 to 2022 (x 1,000,000)

Innovative Medicines Canada



Notes: The amount of eligible current in-house R&D expenses that were unclaimed through the SR&ED program in 2020 and 2022 cannot be calculated since IMC's total current in-house expenditures and total capital expenditures for 2020 and 2022 have been suppressed for reasons of confidentiality. IMC members' total current in-house R&D was $609 million in 2018, $710 million in 2019 and $880 million in 2021. IMC members' total outsourced in Canada R&D expenditures was $351 million in 2018, $507 million in 2019, $447 million in 2020, $478 million in 2021, and $500 million in 2022. Due to rounding, components may not add to total. Missing data indicate that the data point was suppressed to meet the confidentiality requirements of the *Statistics Act*.
Source: Statistics Canada, custom tabulation, Research and Development in Canadian Industry survey, reference year 2018 to 2022.

4 Limitations

This analysis evaluates the economic contribution of the R&D pharmaceutical sector on the Canadian economy in 2022, drawing from multiple data sources such as trade, R&D investment, employment, and financial performance. While the report offers an extensive review of the sector, a deeper historical context would enhance our understanding of this key sector, which plays an important role in addressing public health issues. It is important to clarify that the term "R&D pharmaceutical sector," as used in this report, does not correspond to an official classification under the North American Industry Classification System (NAICS). This term was chosen based on the R&D activities reported by the companies in the study and their classification within pharmaceutical-related industries. While this term aligns with the core activities of the firms included, it may also encompass some non-pharmaceutical activities of these companies.

5 Appendix

5.1 Glossary

The **Annual Survey of Research and Development in Canadian Industry (RDCI)** is an annual survey that collects R&D expenditures and personnel data used to monitor science and technology related activities of business and industrial non-profit organizations in Canada.

Applied research is original investigation undertaken in order to acquire new knowledge. It is, however, directed primarily towards a specific, practical aim or objective. See also basic *research; experimental development.*

Basic price is the amount a producer receives from a purchaser for a unit of a good or service produced as output minus any tax payable and plus any subsidy receivable as a result of its production or sale.

Basic research is experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundations of phenomena and observable facts, without any particular application or use in view. See also applied research; experimental development.

Business Enterprise Research and Development (BERD) is all research and development performed in Canada by the business enterprise sector, as measured by the Annual Survey of Research and Development in Canadian Industry performed by Statistics Canada.

Capital R&D expenditures are the annual gross amount paid for the acquisition of fixed assets that are used repeatedly or continuously in the performance of R&D for more than one year. They should be reported in full for the period when they took place, whether acquired or developed in-house, and should not be registered as an element of depreciation.

Country of control is the country of residence of the ultimate controlling parent corporation, family, trust, estate or related group. Each subsidiary within the global enterprise is assigned the same country of control as its parent. Country of control data are derived from ownership questionnaires filed annually with Statistics Canada by corporations subject to the *Corporations Returns Act*, and from information obtained from the Canada Revenue Agency's administrative records.

Current R&D expenditures are composed of labour costs and other current costs (including for external R&D personnel) used in R&D. Services and items (including equipment) used and consumed within one year are current expenditures. Annual fees or rents for the use of fixed assets should be included in current expenditures, as should overhead costs associated with R&D. *See also other current costs*.

Direct impacts are the effects directly attributed to an industry's production. *See also indirect impact; induced impact.*

An **economic footprint study** aims to measure the total economic impact (direct, indirect, or induced) of an organization, sector or industry on a specific country or region during a given period. Economic impacts typically considered include gross value added and employment data. *See also direct impact; indirect impact; induced impact*.

Employees are all persons who work in or for the reporting unit, who have a contract of employment with the unit and who receive compensation in cash or in kind at regular intervals of time.

Experimental development is systematic work, drawing on knowledge gained from research and practical experience and producing additional knowledge, which is directed to producing new products or processes or to improving existing products or processes. *See also applied research; basic research*.

Exports are goods produced or manufactured in Canada that are subtracted from the stock of material resources in Canada, as a result of their movement out of the country.

A **foreign-controlled company** is any company whose country of control is not Canada, *see country of control*.

Full-time equivalent (FTE) is the total hours worked divided by average annual hours worked in full-time jobs.

Full-time equivalent (FTE) R&D personnel is defined as the ratio of working hours actually spent on R&D during a specific reference period (usually a calendar year) divided by the total number of hours conventionally worked in the same period by an individual or by a group.

Gross Domestic Product (GDP) is the total unduplicated value of the goods and services produced in the economic territory of a country or region during a given period. *See also value added*.

Gross value added is a measure of the contribution that a producer, industry or sector makes to GDP, it is defined as the value of output less the value of intermediate consumption. *See also gross domestic product (GDP) and intermediate consumption*.

Harmonized System (HS) is an internationally standardized system of names and numbers used to classify traded products.

Imports are goods that have entered the country by crossing territorial (customs) boundaries, whether for immediate domestic consumption or for storage in customs warehouses. Re-imports are included in Canadian trade data. These are goods, materials or articles that are imported in either the same condition in which they were exported or after undergoing repair or minor alterations (e.g., blending, packaging, bottling, cleaning or sorting) that leave them essentially unchanged. Domestic re-imports are goods of Canadian origin, whether grown, extracted, or manufactured in Canada that are exported to another country and then returned to Canada in 'the same state' as they were sent out. *See also exports*.

Indirect impacts are upstream economic activities associated with supplying intermediate inputs (the current expenditures on goods and services used up in the production process) to the directly impacted industries. *See also direct impact; induced impact*.

Induced impacts are additional economic activities derived from the labour income generated by both the direct and indirect effects when spent in the market place. *See also direct impact; indirect impact*.

An **industry** is a group of establishments engaged in the same, or similar, kinds of economic activity. *See also North American Industry Classification System (NAICS); sector*.

In-house R&D is expenditures within Canada for R&D performed within this business by employees or self-employed individuals or contractors who are working on site on a business's R&D projects.

Intermediate consumption is the products used by an industry to produce outputs. These products may come from domestic production or from imports. *See gross value added*.

Labour income consists of the sum of wages and salaries and employer's social contributions of employees and the labour income of the self-employed.

North American Industry Classification System (NAICS) is a business-classification system developed through a partnership among the United States, Mexico and Canada. Companies are classified by their same or similar production processes. NAICS Canada 2017 Version 3.0 divides the Canadian economy into 20 sectors, 102 subsectors, 324 industry groups, 710 industries and 928 Canadian industries. *See also sector; industry*.

Other current costs are non-capital purchases of materials, supplies, equipment and services to support R&D performed by the reporting unit in the reference year. Examples are water and fuel (including gas and electricity); books, journals, reference materials, subscriptions to libraries, scientific societies, etc.; imputed or actual costs of small prototypes or models made outside the reporting unit; and materials for laboratories (e.g., chemicals, animals, etc.). Other current costs include royalties or licences for the use of patents and other intellectual property rights, the lease of capital goods (machinery and equipment, etc.) and the rental of buildings to support R&D performed by the reporting unit in the reference year. Overhead costs associated with R&D are also included in other current costs. See also current R&D expenditures.

Output consists primarily of the value of goods and services produced by an industry.

Outsourced R&D are payments made within or outside Canada to other businesses, organizations or individuals to fund R&D performance through grants, fellowships, or contracts.

R&D personnel are all persons engaged directly in R&D, whether employed by the reporting unit or external contributors fully integrated into the reporting unit's R&D activities, as well as those providing direct services for the R&D activities (such as R&D managers, administrators, technicians and clerical staff).

The **reporting unit** is the unit *from which* data are reported. This corresponds to the unit that would receive a questionnaire or interview. In the case of administrative data, it would correspond to the unit that is represented by the individual record.

Research and development (R&D) is creative and systematic work undertaken in order to increase the stock of knowledge – including knowledge of humankind, culture and society – and to devise new applications of available knowledge. *See also applied research; basic research; experimental development*.

Researchers are professionals engaged in the conception or creation of new knowledge. They conduct research and improve or develop concepts, theories, models, techniques instrumentation, software or operational methods.

The **Scientific Research and Experimental Development (SR&ED) Tax Incentive Program** is intended to encourage Canadian businesses of all sizes and in all sectors to conduct R&D in Canada. These tax incentives come in three forms: an income tax deduction, an investment tax credit (ITC), and, in certain circumstances, a refund. Corporations, individuals, trusts and members of a partnership can use these Government of Canada incentives.

A **sector** is a high level section of the economy encompassing economic activity in several related industry groups. *See also industry; North American Industry Classification System (NAICS)*.

5.2 Populations

The IMC provided two cohort lists to Statistics Canada. The first was a list of its members. The second was a list of peer companies, comprising those in the pharmaceutical space that were actively involved in developing new medicines and treatments. It excluded generic pharmaceutical manufacturers, wholesalers without R&D in Canada, pure medical device manufacturers and businesses primarily involved in veterinary medicines. Statistics Canada supplemented the peer list with companies whose R&D was primarily focused on human medicine and health sciences. Data in the report comprised estimates for the R&D pharmaceutical sector (both IMC members and the peer group) and IMC members only.

5.3 Business structures

For collection purposes, Statistics Canada distinguishes between four different business levels, all of which are present in all businesses in Canada. These levels, from highest to lowest, are enterprise, company, establishment, and location. For simple businesses, particularly those where all business activities are based in one location, there are no practical differences between the four levels. Statistics Canada recognizes that complex businesses, which may haves a head office and separate locations for regional offices, R&D, manufacturing, sales, etc., produce and record different types of information at different levels within the business. Therefore, different levels of entities are surveyed depending on the nature of the data being sought.

This study pulled data from several different Statistics Canada business surveys, which surveyed companies at different business levels. The cohort lists provided to Statistics Canada were at the company level. Statistics Canada linked entities at the company level to those at the establishment or enterprise levels, depending on the suitable conceptual level for the data.

Data on gross value added and employment, and all associated impacts – direct, indirect and induced – were processed at the establishment level, the lowest level at which accounting data required to measure production is available.

Tax data are processed by the Canada Revenue Agency at the business number level, which generally corresponds to the company level. Since many companies that perform R&D report Scientific Research and Experimental Development (SR&ED) tax credit claims, R&D data are collected at the same level as tax data to reduce response burden by enabling reporting units to use the same accounting level for reporting R&D.

Trade and financial data are collected at the enterprise level, the highest level within the business structure. This is the level at which businesses keep these types of records.

Where a complex enterprise has a company which is part of the R&D pharmaceutical sector and another company which is not, both companies are included by virtue of the business organizations reporting structure.

5.4 Methods

Where microdata were provided, analysts undertook a data review to confirm the suitability of the data for use in this report. As a result, one enterprise record was modified to include only business activities in Canada.

The R&D data were comprised primarily of actual respondent data. For more information on data sources, accuracy, and methodology of the RDCI survey please refer to the Integrated Metadatabase, the metadata repository for Statistics Canada products.

5.4.1 Economic impacts

The direct economic impacts of the Canadian R&D pharmaceutical sector were measured on the basis of the sector's outputs and gross value added. Outputs include the measurement of goods and services produced by an establishment. Gross value added measures the value of output less the value of intermediate consumption, which consists of all goods and services used up in the course of production within an accounting period.

The calculation of the economic impacts was derived using the 2018 through 2022 tax data associated with the companies and enterprises identified as members of IMC, as well as the overall sector. This information was entered into the Statistics Canada Input-Output Model Simulations (Statistics Canada service 36-23-0002) which provided estimates for the other direct impact metrics such as labour income, jobs and FTEs, as well as the indirect and induced economic impact for all variables.

The Statistics Input-Output Model Simulations is derived from the Supply and Use Tables (Statistics Canada catalogue 15-602-X). The model is updated every year to coincide with the most recent version of the Supply and Use Tables. The Input-Output model used in the economic impact study is based on the 2021 version of the Supply and Use tables.

The impact estimates provided by the model for output, gross value added and labour income are derived from information included in the Supply and Use Tables. The impact estimates provided by the model for jobs and FTEs are derived from the labour productivity and related measures by business sector industry and by non-commercial activity consistent with the industry accounts (Statistics Canada table 36-10-0480-01).