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Analysis in Brief

The Canadian Research and Development Pharmaceutical Sector, 2021

by Christopher Collins, Karine Garneau, Nicole Minnema, and Thomas Wood

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The Canadian Research and Development Pharmaceutical Sector, 2021

by Christopher Collins, Karine Garneau, Nicole Minnema, and Thomas Wood

Background

Innovation in the pharmaceutical sector plays an important role in supporting the health and well-being of Canadians through advancements in medical research and the introduction of new medicines and vaccines to the market, directly contributing to Canada's economy.

This study examines the contribution of the Canadian research and development (R&D) pharmaceutical sector on the Canadian economy in 2021. It builds on the annual reports produced since 2018, sponsored by Innovative Medicines Canada (IMC), an industry association representing patented medicine enterprises in Canada's R&D pharmaceutical sector.

The design and structure of the study remain consistent with past iterations. Integral to these studies is the specification of a cohort of businesses in the Canadian pharmaceutical sector, based on two lists produced by Innovation, Science and Economic Development Canada (ISED) and IMC. The IMC list consists of its members, while the ISED list comprises all companies conducting pharmaceutical research, including those within IMC's membership.

The Canadian R&D pharmaceutical sector's growth slowed on several fronts following its expansion in 2020, with the sector's value added (gross domestic product), edging up slightly from \$15.9 billion in 2020 to \$16.0 billion in 2021. Approximately half of the sector's value added was attributable to IMC members.

Additionally, the R&D pharmaceutical sector saw declines for key measures, such as operating profits and employment. Operating profits registered a loss of \$2.2 billion, following a \$728 million profit in 2020, while employment decreased 4.9% to 102,717 full-time equivalent (FTE) jobs in 2021, just above the level registered in 2019 (102,595 FTEs).

As in the previous year, the scope of this study includes an analytical time series for the sector to further trace the ways in which the Canadian economy is shaped by the sector and, where data permit, by IMC members.

1 Introduction

This report updates the economic footprint study last conducted on the research and development (R&D) pharmaceutical sector¹ in 2020 with new content for 2021. Innovative Medicines Canada (IMC) paid for the report, and it was produced by the Centre for Innovation, Technology and Enterprise Statistics at Statistics Canada.

The pharmaceutical sector's economic contribution can be seen through various measures, such as the government tax revenue generated by the sector, its employment and job creation, R&D investment, and international trade. The study used data from Statistics Canada and the profiles of IMC members covering employment; trade; investment; taxation revenues; R&D claims; capital spending; and economic impacts stemming from direct, indirect and induced effects. Statistics Canada determined the variables used in this analysis based on data availability and quality, using internationally accepted definitions of concepts that are consistent with its economic statistics programs.

The R&D pharmaceutical sector primarily comprises three core industries: pharmaceutical and medicine manufacturers; pharmaceuticals and pharmacy supplies merchant wholesalers; and R&D in the physical, engineering and life sciences. The 2021 study focuses on 237 enterprises within the R&D pharmaceutical sector, 53 of which belong to IMC. These enterprises consist of most of the largest R&D-based pharmaceutical companies in Canada, based on annual revenues. Businesses primarily engaged in medical devices, generic pharmaceuticals or veterinary medicines are not considered in this study.

2 The Canadian research and development pharmaceutical sector

2.1 Economic footprint

2.1.1 Value added

Gross value added (GVA) is the unduplicated monetary contribution that a sector makes to the economic output of a country as measured by its gross domestic product (GDP). In the context of 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.

There are three components associated with GVA: direct impacts, which measure the output, GDP and jobs attributable to an industry; indirect impacts, which examine the upstream activities related to the supply of intermediate inputs (current expenditures on goods and services used in production processes) to an industry; and induced impacts, which involve the economic impacts derived from the spending of labour income from an industry.

The sector contributed more than \$16 billion to the Canadian economy in 2021

In 2021, the R&D pharmaceutical sector contributed \$16.0 billion to the Canadian economy in GVA, an increase of 0.8% from 2020. This followed a larger increase of 5.8% reported from 2019 (\$15.0 billion) to 2020 (\$15.9 billion). Just over half of the total, 51.3%, or \$8.2 billion, was attributable to the direct impacts of the sector, which rose 3.5% from the \$7.9 billion generated in 2020. Indirect impacts accounted for 28.4% of the total GVA in 2021 and increased 1.2% to \$4.6 billion, while induced impacts, which accounted for 20.3% of total GVA, decreased 6.1% to \$3.3 billion.

Overall, the R&D pharmaceutical sector accounted for 0.7% of Canada's GDP at basic prices in 2021, a slight decrease from the 0.8% in each of the two previous years.²

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

Nearly \$13.7 billion (85.5%) of the total GVA (\$16.0 billion) contributed by the sector to the Canadian economy was generated in Ontario (\$8.2 billion) and Quebec (\$5.5 billion). Similarly, of the \$9.3 billion in labour income, 85.8%

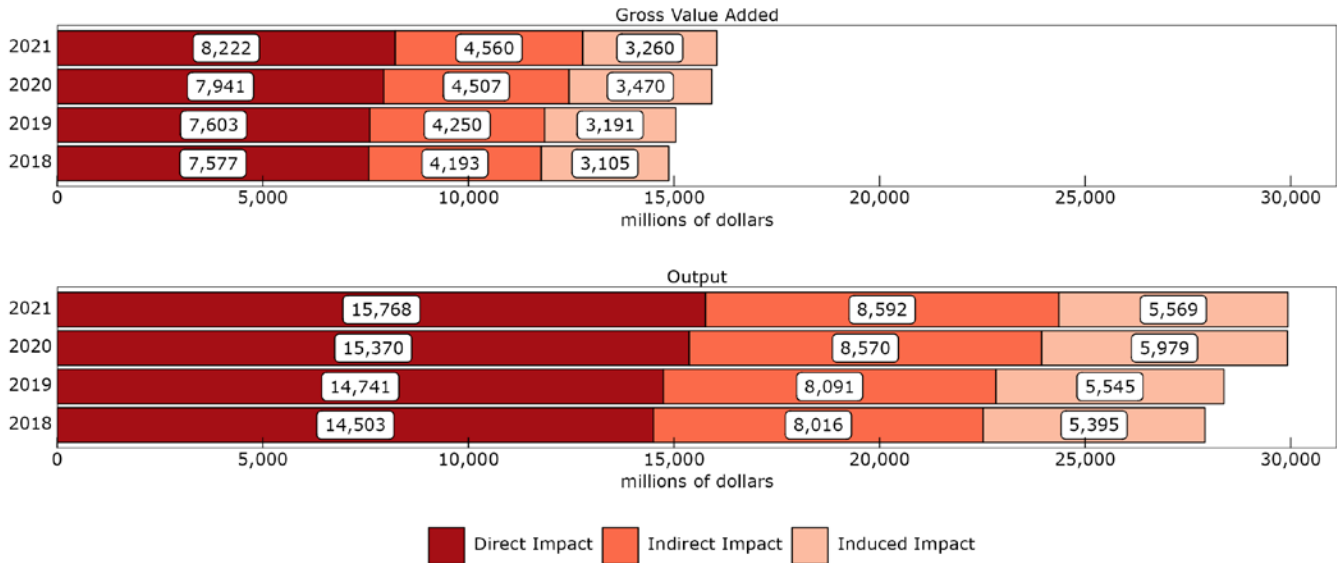
1. The sectorial name, the "research and development pharmaceutical sector", used throughout this report to describe the cohort of companies examined in this study, is not an official name in the North American Industry Classification System (NAICS). The name was chosen based on the companies' reported R&D activities and their placement within the pharmaceutical-related NAICS identified in this study.

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

was attributed to these provinces, with \$4.7 billion coming from Ontario and \$3.2 billion from Quebec. For total GVA and labour income, the provincial breakdowns follow a pattern similar to those seen in previous years.

Figure 1
Gross value added (GDP at basic prices) and value of goods and services (output), 2018-2021 (x 1,000,000)

Canadian Research and Development Pharmaceutical Sector



Note: The R&D pharmaceutical sector's total GVA was \$14,875 million in 2018, \$15,044 million in 2019, \$15,918 million in 2020 and \$16,042 million in 2021. The R&D pharmaceutical sector's total output was \$27,915 million in 2018, \$28,377 million in 2019, \$29,919 million in 2020 and \$29,929 million in 2021.
Source: Statistics Canada, custom tabulation, Industry Accounts Division, reference years 2018-2021.

These two provinces further accounted for the majority (86.2%) of full-time equivalent (FTE) jobs in the sector. Among the 102,717 FTEs in the sector, 49,623 FTEs were in Ontario and 38,937 FTEs were in Quebec, while 14,157 FTEs were in the rest of Canada.

2.1.2 Output

Output of the research and development pharmaceutical sector remained stable at \$30 billion

In 2021, the output³ generated by the Canadian R&D pharmaceutical sector increased slightly by \$10 million from the previous year to just under \$30 billion. This increase follows an upward year-over-year trend in total output since 2018.

The direct impact on this output, which accounted for over half the total economic impact, rose 2.6% from the previous year to \$15.8 billion. The indirect impact on the output, which was 28.7% of the total, posted a smaller increase, up 0.3% to \$8.6 billion. Induced impacts decreased by 6.9% to \$5.6 billion.

The sector reported an operating loss of \$2.2 billion

R&D pharmaceutical businesses in Canada generated \$33.5 billion in operating revenues⁴ in 2021, up 7.0% (\$2.2 billion) from the previous year. However, operating expenses rose at a faster rate, increasing by 16.7% to \$35.7 billion. The increased expenses in the sector were driven by a 17.9% rise, or \$4.5 billion, in purchases of goods, materials and services, and a 9.6% increase, or \$461 million, in wages, salaries and benefits.

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](#).
4. Operating revenue is defined as the revenues from a company's central or principal operation.

As a result, the sector registered an operating loss of \$2.2 billion in 2021, compared with the operating profit of \$728 million reported in 2020. Consequently, the operating profit margin, which is the ratio of operating profit to operating revenue, was negative in 2021 (-6.6%), compared with the positive profit margin reported in 2020 (2.3%).

2.1.3 Employment

Employment in the sector declined, supporting over 102,700 jobs in 2021

Overall employment in the Canadian R&D pharmaceutical sector decreased to 102,717 FTEs in 2021, down 4.9% from the previous year, a loss of 5,256 FTEs. This decrease brought overall employment to levels seen in 2019, when there were 102,595 FTEs in this sector.

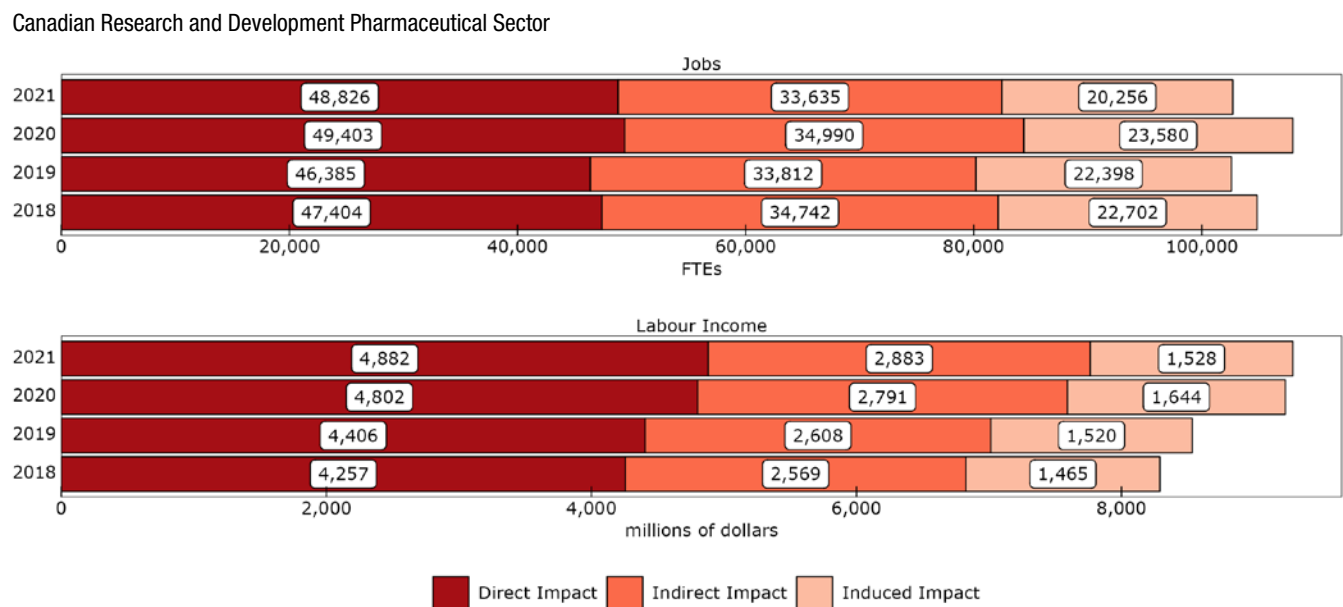
While the overall number of FTEs decreased in 2021, this decline was more noticeable for those with an indirect or induced impact on the sector, compared with those with a direct impact. The number of FTEs with a direct impact on the sector, which supported 48,826 FTEs in 2021, saw a reduction of 578 FTEs from 2020.

The sector indirectly supported nearly 33,635 FTEs stemming from the supply of intermediate inputs (1,355 fewer FTEs than in 2020) and 20,256 FTEs related to the induced impacts brought on by increased spending by workers employed in the sector (3,324 fewer FTEs than in 2020).

Despite lower employment, labour income remained stable

Labour income increased slightly from \$9.2 billion in 2020 to \$9.3 billion in 2021, a gain of 0.6%. This growth in labour income follows the upward year-over-year trend of increases in labour income since 2018. Of the three types of economic impacts from labour income, indirect impacts, which accounted for 31.0% of all impacts, saw the greatest increase (3.3%, or \$92 million). The direct impacts of labour income, which accounted for 52.5% of the total, saw an increase of 1.7%, or \$80 million, while induced impacts, which make up 16.4% of the total, decreased by 7.1%, or \$116 million.

Figure 2
Full-time equivalent jobs (FTEs) and labour income (millions of dollars), 2018-2021



Note: The R&D pharmaceutical sector's total jobs were 104,848 FTEs in 2018, 102,595 FTEs in 2019, 107,973 FTEs in 2020 and 102,716 FTEs in 2021. 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 and \$9,293 million in 2021.

Source: Statistics Canada, custom tabulation, Industry Accounts Division, reference years 2018-2021.

2.1.4 Trade

The Canadian R&D pharmaceutical sector engaged in international trade with 102 export markets and 95 import markets in 2021. The majority of businesses in the sector traded in multiple international markets.

Half of all imported goods in 2021 came from Europe

In 2021, 154 enterprises in the sector imported goods from abroad. Overall imports rose to \$24.8 billion, a 6.2% increase from 2020. However, the increases were uneven among trading regions, with imports from one region declining in 2021.

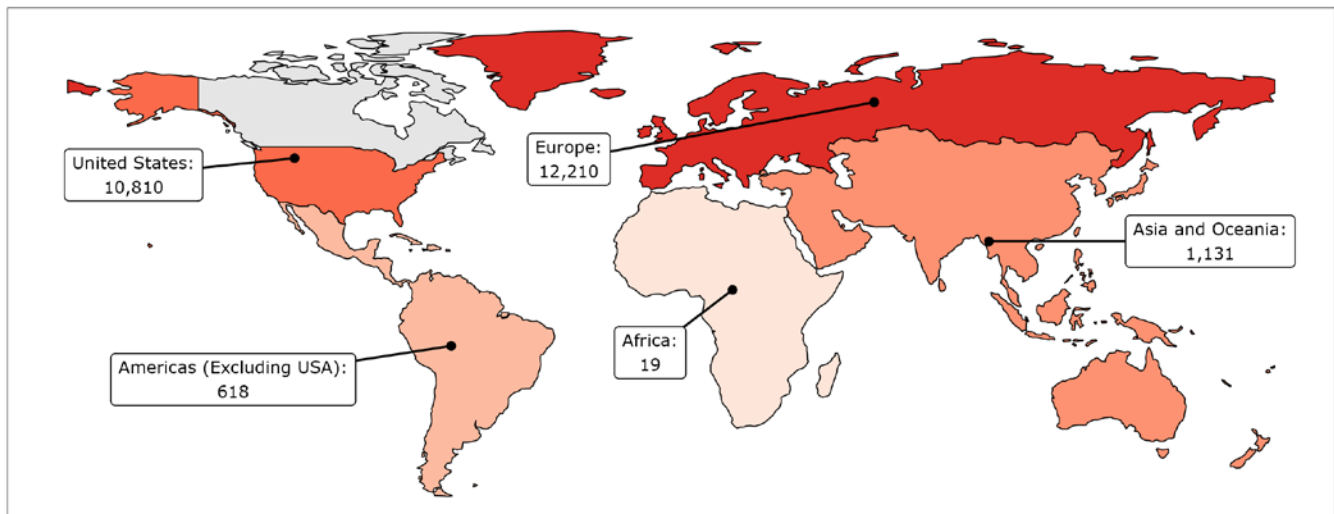
The total value of goods imported from the United States showed the largest increase among trading regions in 2021 (\$2.0 billion), reaching \$10.8 billion and accounting for 43.6% of all imports.

Imports from Asia and Oceania, which constituted 4.6% of total imports, increased \$61 million, or 5.7%, compared with the previous year. Imports from the Americas (excluding the United States), which accounted for 2.5% of the total value, increased 1.1% from the previous year, up \$7 million. Lastly, Africa, which accounted for 0.1% of the total, saw a 171.4% increase (\$12 million), reaching \$19 million in 2021.

Imports from Europe, by contrast, decreased 4.7% in 2021 to \$12.2 billion. Despite this decrease, Europe remained the largest region for imports, accounting for 49.3% of all imports in 2021.

Figure 3
Total value (in dollars) of goods imports by region, 2021 (x 1,000,000)

Canadian Research and Development Pharmaceutical Sector



Note: The value of the R&D pharmaceutical sector's total goods imports in 2021 was \$24.8 billion in 2021.

Source: Statistics Canada, custom tabulation, International Accounts and Trade Division, reference year 2021.

Of the \$24.8 billion the sector spent on imported goods in 2021, pharmaceutical products (products classified under Chapter 30 of the Harmonized System [HS]) were the largest category, representing 71.6% of all imports, with a value of \$17.8 billion. This was followed by optical, photographic, cinematographic, measuring, checking, medical or surgical instruments and apparatus (HS 90), at roughly \$1.4 billion, and essential oils and resinoids; perfumery, cosmetic or toilet preparations (HS 33), at roughly \$700 million.

The types of goods and the proportion of dollars spent on imports by the Canadian R&D pharmaceutical sector have remained relatively constant since 2018. For example, goods classified as HS 30 accounted for 65% to 72% of all goods imported from 2018 to 2021.

Figure 4
Total value (in dollars) of goods imports by Harmonized System Chapters, 2021 (x 1,000,000)

Canadian Research and Development Pharmaceutical Sector



Note: The Harmonized System (HS) Chapter 30 refers to pharmaceutical products, the Chapter 90 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 \$24.8 billion in 2021.

Source: Statistics Canada, custom tabulation, International Accounts and Trade Division, reference year 2021.

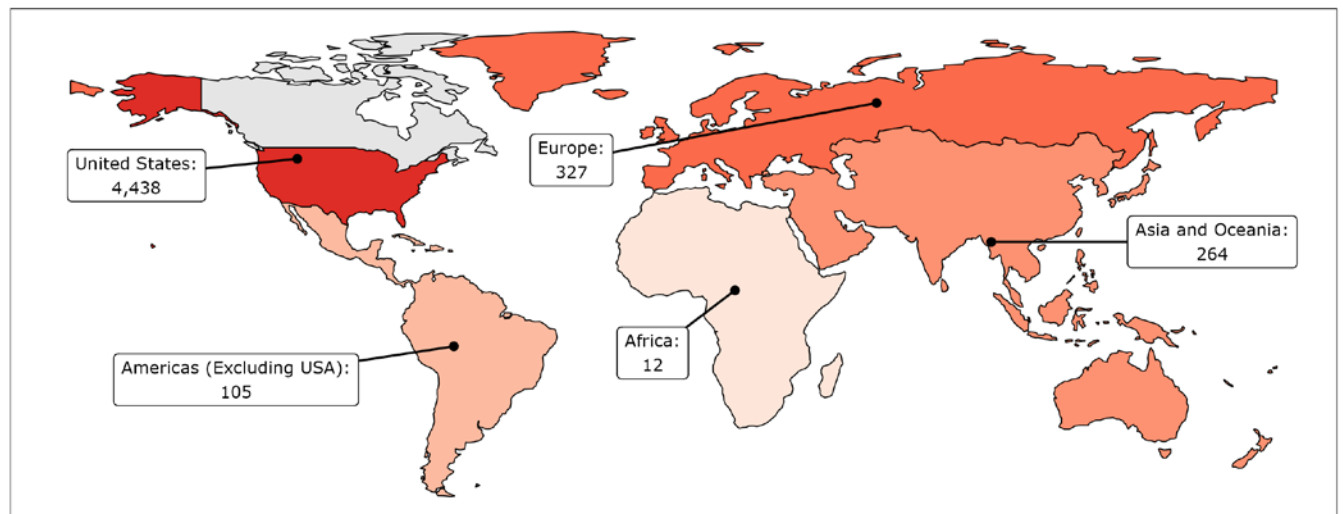
Exports to most trading regions decreased

In 2021, 71 enterprises in the Canadian R&D pharmaceutical sector exported goods abroad. In contrast to the rise in imports, exports by the sector declined to \$5.1 billion in 2021, a drop of 5.5%.

Exports to all regions decreased except for exports to the Americas (excluding the United States), which increased from \$86 million to \$105 million. As in previous years, most exports were sent to the United States (86.2%), amounting to \$4.4 billion, a decrease of 4.3% from 2020. Exports to Europe, the second-largest export market, declined 17.6% to \$327 million.

Figure 5
Total value (in dollars) of goods exports by region, 2021 (x 1,000,000)

Canadian Research and Development Pharmaceutical Sector



Note: The value of the R&D pharmaceutical sector's total goods exports in 2021 was \$5,146 million in 2021.

Source: Statistics Canada, custom tabulation, International Accounts and Trade Division, reference year 2021.

Pharmaceutical products (HS 30) represented 75.9%, or \$3.9 billion, of total exports by the sector, while other products exported totalled \$1.2 billion. The types of goods and the proportion of dollars exported have remained constant since 2018, with 71% to 76% of all exports classified in HS 30 from 2018 to 2021.

Figure 6
Total value (in dollars) of goods exports by Harmonized System Chapters, 2021 (x 1,000,000)

Canadian Research and Development Pharmaceutical Sector



Note: The Harmonized System (HS) Chapter 30 refers to pharmaceutical products. The value of the R&D pharmaceutical sector's total goods exports was \$5,146 million in 2021.

Source: Statistics Canada, custom tabulation, International Accounts and Trade Division, reference year 2021.

Overall, the sector's trade deficit (total imports exceeding exports) reached \$19.6 billion in 2021, marking a 9.8% increase from the previous year. The largest trade deficit, amounting to \$11.9 billion, was with Europe, continuing a trend similar to that of the two previous years.

The most significant changes in the trade deficit occurred with the United States, whose trade deficit increased 51.7% to \$6.4 billion in 2021, and Asia and Oceania, whose trade deficit rose by 13.6% to \$867 million. After experiencing a trade surplus in 2020, Africa also saw a deficit in 2021, decreasing 170.0% from the previous year to a deficit of \$7 million.

2.2 Research and development

2.2.1 Total research and development expenditures

Key information on the R&D activities performed by businesses in Canada is captured through the Annual Survey of Research and Development in Canadian Industry. In this survey, businesses report their R&D expenditures under two categories: in-house and outsourced. In-house R&D is 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, either within or outside Canada. This funding may be provided through grants, fellowships or contracts.

The research and development pharmaceutical sector had \$2.3 billion to \$3.0 billion in research and development expenditures in 2021

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). In 2021, total R&D expenditures by

the R&D pharmaceutical sector were estimated to range from \$2.3 billion to \$3.0 billion, compared with the range of \$1.8 billion to \$2.4 billion from the previous year.

2.2.2 In-house research and development expenditures

Businesses in the R&D pharmaceutical sector spent almost \$1.6 billion on total in-house R&D,⁵ a 25.0% increase from 2020. This accounted for 5.8% of all business enterprise expenditures on research and development (BERD) in 2021, compared with 5.4% of BERD in 2020.⁶

Table 1
In-house R&D expenditures, 2018-2021 (x1,000,000)

| | 2018 | 2019 | 2020 | 2021 |
|--|---------------------|--------|--------|--------|
| | millions of dollars | | | |
| Total industrial R&D (all industries) ^{1,2} | 20,855 | 21,920 | 23,679 | 27,287 |
| Canadian R&D pharmaceutical sector | 1,032 | 1,107 | 1,274 | 1,592 |
| IMC members | 623 | 723 | 797 | 911 |

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 2020 and earlier are now considered final and may differ from previous publications. The value for 2021 is still preliminary.

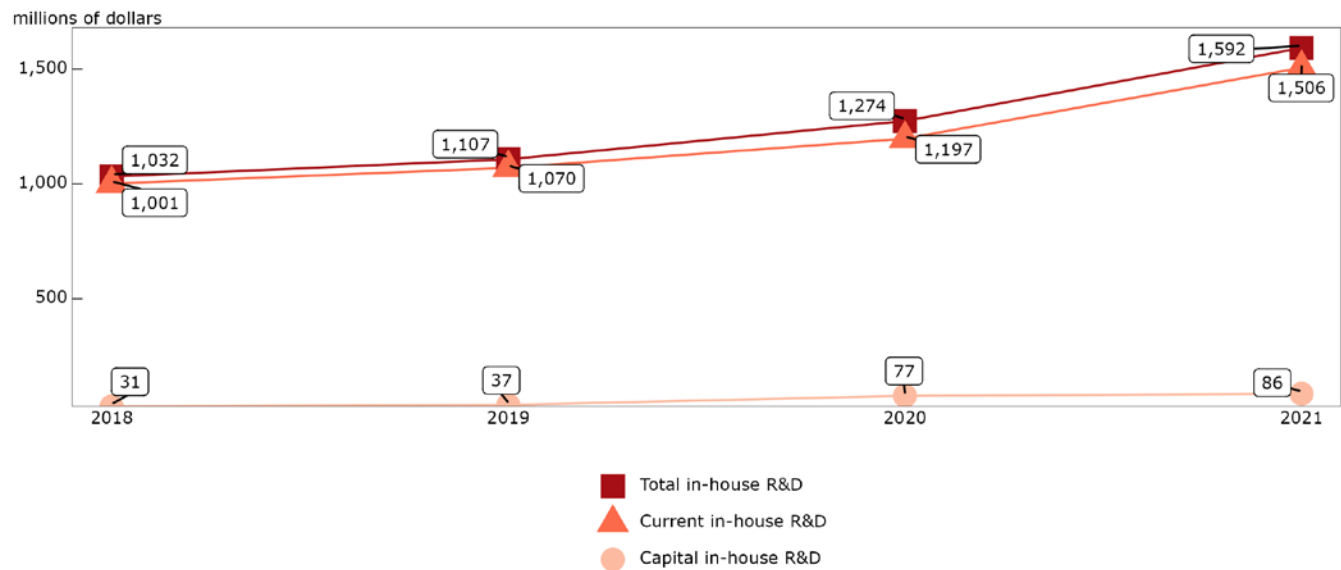
Source: Statistics Canada, custom tabulation, Research and Development in Canadian Industry survey, reference year 2018-2021.

The sector had \$1.5 billion in current in-house research and development expenditures in 2021 and supported 8,529 personnel

Of the \$1.6 billion spent on total in-house R&D, the majority (94.6%) was current in-house R&D expenditures, amounting to \$1.5 billion, a 25.8% increase from the previous year. At the same time, in-house capital expenditures (e.g., software, land, buildings and equipment) increased from \$77 million in 2020 to \$86 million in 2021. Spending on current in-house R&D has consistently represented at least 94.0% of total in-house R&D since 2018.

Figure 7
In-house R&D expenditures, 2018-2021 (x 1,000,000)

Canadian Research and Development Pharmaceutical Sector



Source: Statistics Canada, custom tabulation, Research and Development in Canadian Industry survey, reference years 2018-2021.

5. Total in-house R&D expenditures is 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).

6. 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](#).

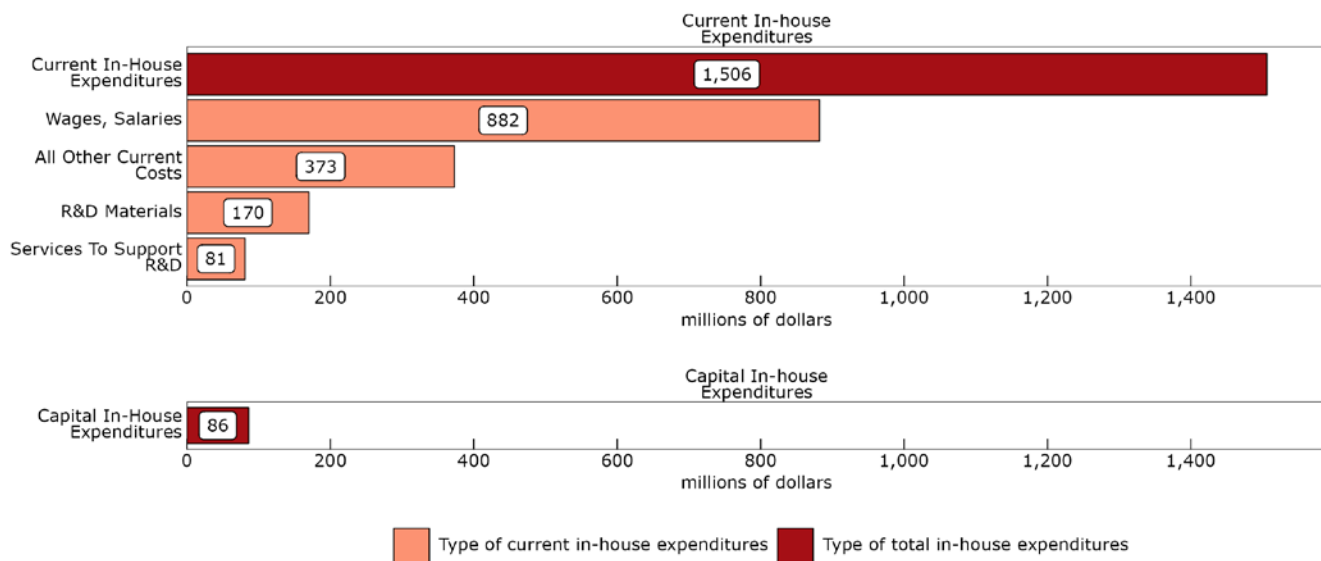
Within current in-house R&D, wages and salaries⁷ constituted the largest single expenditure (58.6%), totalling \$882 million and marking a 17.8% increase from 2020. R&D materials (\$170 million), services to support R&D (\$81 million) and all other current costs (\$373 million) comprised the remainder of current expenditures on in-house R&D.

The sector also supported 8,529 FTE in-house R&D personnel, an increase of 12.1% from 2020. This contrasts with the total FTEs employed by the sector, which declined from 2020 to 2021.

The growth in research FTEs in 2021 was due to increases in Quebec, which saw an increase of 41.8% from the previous year. Because of the gain, more than half of the sector's FTEs were in Quebec (56.6%). Ontario accounted for the second-largest share of FTEs in Canada, at 27.7%, while the rest of Canada accounted for the remaining 15.7%.

Figure 8
In-house R&D expenditures by type of expenditure, 2021 (x 1,000,000)

Canadian Research and Development Pharmaceutical Sector



Note: The R&D pharmaceutical sector's total in-house R&D expenditures was \$1,592 million in 2021.

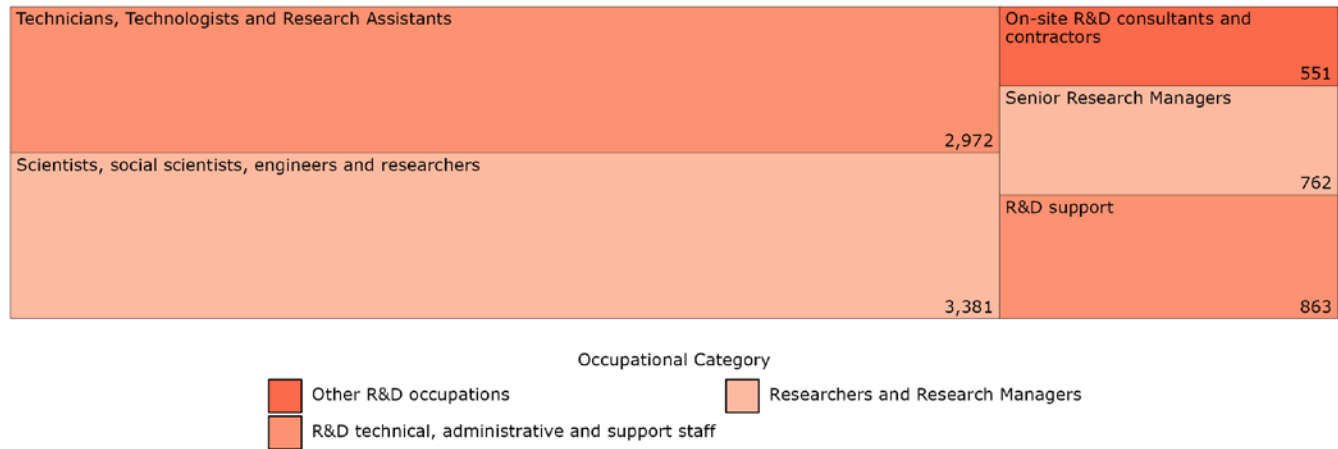
Source: Statistics Canada, custom tabulation, Research and Development in Canadian Industry survey, reference year 2021.

The increase in FTEs, as noted above, was driven by a 48.5% rise in the number of technicians, technologists and research assistants, followed by a 29.5% increase in senior research managers. Additionally, while scientists, engineers and researchers saw a small increase from 2020 (1.0%), they remained the most prevalent personnel type in the sector, accounting for roughly 39.6% of all personnel in the Canadian R&D pharmaceutical sector.

7. 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 9
Full-time equivalent jobs (FTEs) in R&D personnel by occupation, 2021

Canadian Research and Development Pharmaceutical Sector



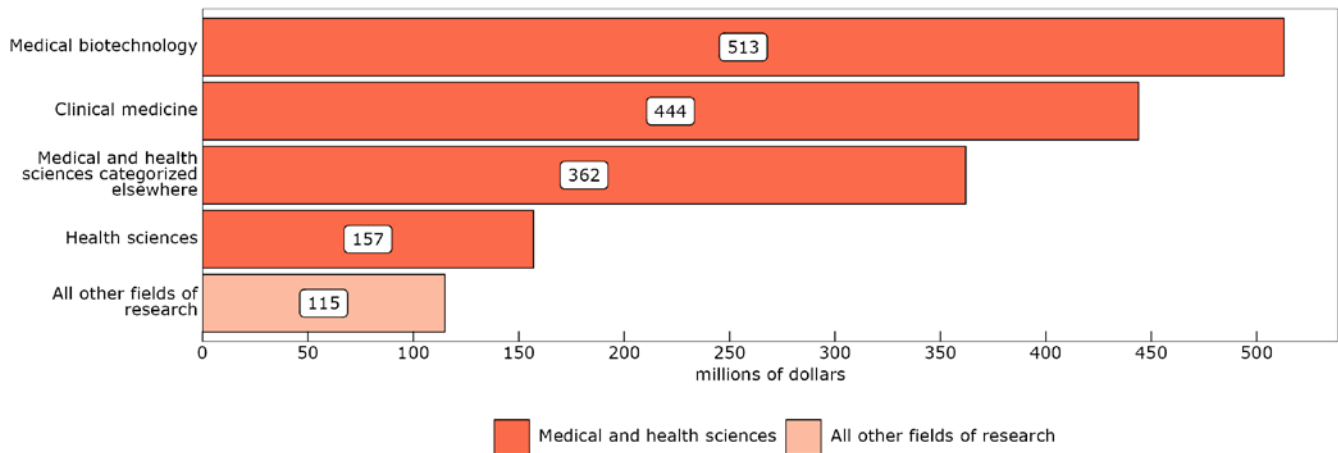
Note: The R&D pharmaceutical sector's total jobs in R&D personnel were 8,529 in 2021.

Source: Statistics Canada, custom tabulation, Research and Development in Canadian Industry survey, reference year 2021.

In 2021, over \$9 of every \$10 spent on in-house R&D by the sector continued to be in fields related to medical and health sciences (92.7%). In-house R&D expenditures on projects related to medical biotechnology reached \$513 million, an increase of 56.9% from the previous year, while spending on clinical medicine-related projects increased by 44.6% to \$444 million. Despite the overall rise, spending on health sciences saw a marginal decrease in 2021, falling \$20 million to \$157 million.

Figure 10
In-house R&D expenditures by field of research, 2021 (x 1,000,000)

Canadian Research and Development Pharmaceutical Sector



Note: The R&D pharmaceutical sector's total in-house R&D expenditures was \$1,592 million in 2021.

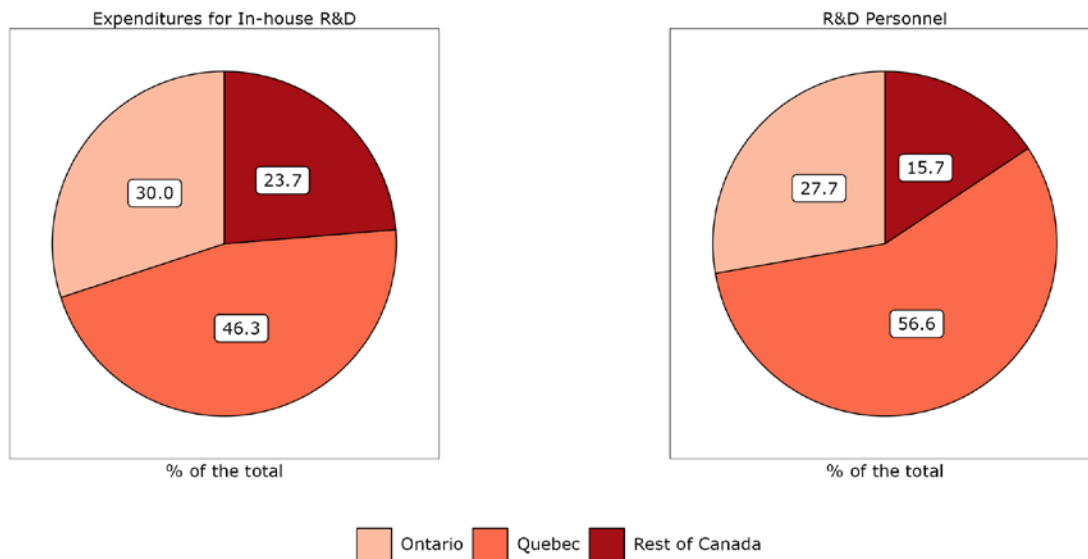
Source: Statistics Canada, custom tabulation, Research and Development in Canadian Industry survey, reference year 2021.

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

As in previous years, the bulk of in-house R&D work was conducted in Quebec (46.3%) and Ontario (30.0%). In-house expenditures reached \$736 million in Quebec, a 33.3% increase from 2020, while Ontario saw a 7.4% increase from 2020, rising to \$478 million. The rest of Canada accounted for \$377 million, representing a 36.6% increase from 2020.

Figure 11
Share of in-house R&D expenditures and full-time equivalent jobs (FTEs) in R&D personnel by region, 2021

Canadian Research and Development Pharmaceutical Sector



Note: The R&D pharmaceutical sector's total in-house R&D expenditures was \$1,592 million in 2021 and total jobs in R&D personnel were 8,529 FTEs.

Source: Statistics Canada, custom tabulation, Research and Development in Canadian Industry survey, reference year 2021.

Canadian-funded in-house research and development expenditures rose by one-third

In 2021, Canadian-funded in-house R&D expenditures increased by 31.3%, reaching \$696 million, up from \$530 million in 2020. Funding from foreign sources also rose, reaching \$896 million, up 20.4% from 2020. The majority of the sector's total in-house R&D expenditures continued to be funded from foreign sources (56.3%). However, this was a slight decrease from 2020 (58.4%), as funding from Canadian sources grew at a higher rate in 2021.

The nature of the research and development work done by the Canadian research and development 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 on the types of outcomes guiding the R&D. International statistical standards distinguish research activities from experimental development activities.⁸ Research can be conducted either to acquire knowledge (basic research) or to generate new knowledge directed towards a practical aim (applied research). Experimental development builds on knowledge already in existence to develop or improve products or processes.

In 2021, the R&D pharmaceutical sector spent over half of its total in-house R&D funding (\$850 million out of \$1.6 billion) on research endeavours aimed at generating novel knowledge, with the remaining \$742 million (46.6%) going towards experimental development to enhance or create products. In comparison, businesses in all other industries generally allocate a significantly greater proportion of their in-house R&D budget towards experimental development. In 2021, this translated to companies in all other industries spending nearly 90% of their in-house R&D budget (\$22.8 billion) on experimental development and a small fraction (\$2.9 billion) on basic research activities.⁹

8. 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.

9. 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, 2021 (x 1,000,000)

| | Canadian R&D Pharmaceutical Sector | All Other Industries ¹ |
|---|------------------------------------|-----------------------------------|
| | millions of dollars | |
| Total in-house research and development expenditures in Canada | 1,592 | 25,695 |
| Research | 850 | 2,936 |
| Experimental development | 742 | 22,760 |

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.

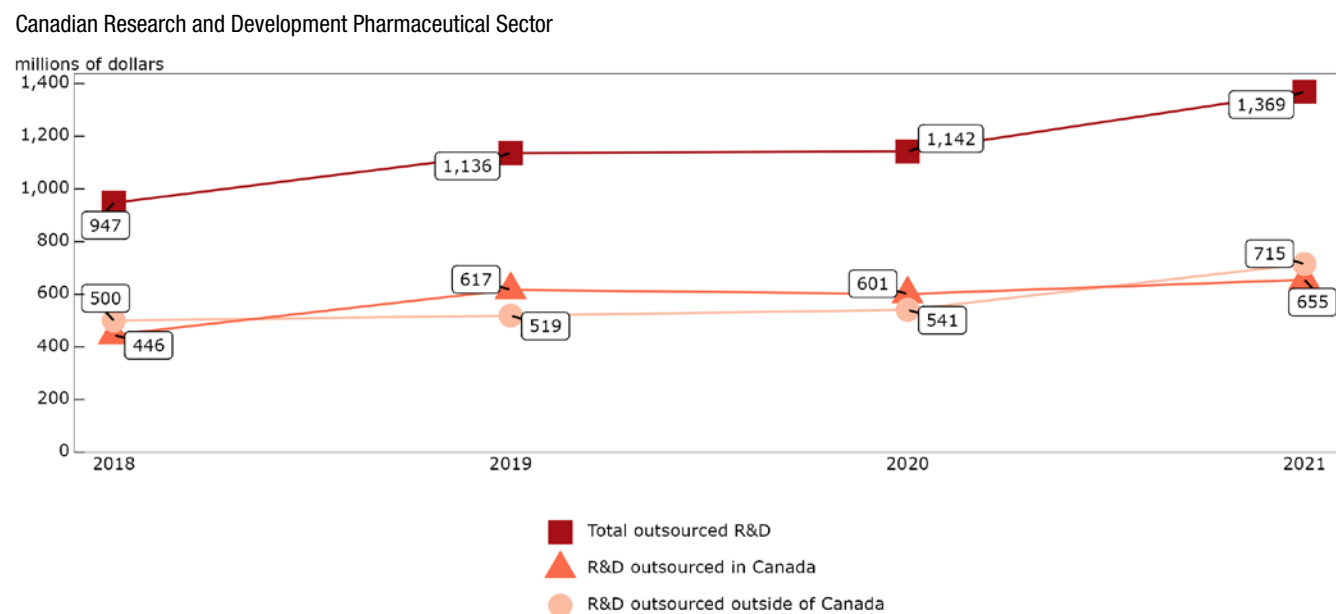
2.2.3 Outsourced research and development expenditures

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

The R&D pharmaceutical sector spent \$1.4 billion on outsourced R&D expenditures in 2021, an amount only slightly smaller than total spending on in-house R&D (\$1.6 billion). This contrasts with the ratio seen across all other industries, where total in-house spending (\$25.7 billion) is nearly six times greater than spending on outsourced R&D (\$4.4 billion).¹⁰

Total outsourced R&D expenditures by the sector increased 19.9% (\$227 million) from 2020. Three-quarters of this growth came from higher spending on R&D outsourced to performers outside Canada, which reached \$715 million in 2021, an increase of 32.2%. The remaining R&D was outsourced to performers in Canada, which rose 9.0% to \$655 million.

Figure 12
Outsourced R&D expenditures by recipient, 2018-2021 (x 1,000,000)



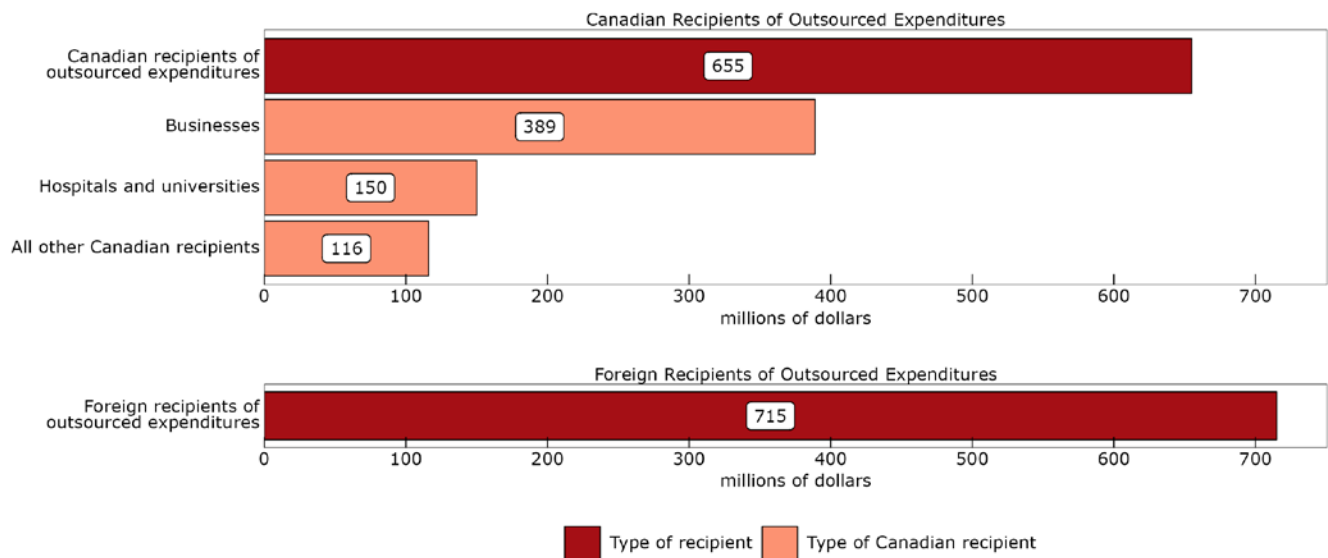
Source: Statistics Canada, custom tabulation, Research and Development in Canadian Industry survey, reference years 2018-2021.

In terms of R&D expenditures outsourced within Canada, the R&D pharmaceutical sector paid \$389 million (59.4%) to other businesses for R&D, followed by \$150 million (22.9%) to hospitals and universities, and \$116 million (17.7%) to other Canadian recipients. Compared with the previous year, the sector outsourced an additional \$20 million to Canadian businesses, \$10 million more in R&D funding to hospitals and universities, and \$24 million more to all other Canadian recipients in 2021.

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

Figure 13
Outsourced R&D expenditures by sector, 2021 (x 1,000,000)

Canadian Research and Development Pharmaceutical Sector



Note: The R&D pharmaceutical sector's total outsourced R&D expenditures was \$1,369 million in 2021.

Source: Statistics Canada, custom tabulation, Research and Development in Canadian Industry survey, reference year 2021.

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 program that promotes R&D among qualifying businesses, regardless of their size or sector. Under this program, qualifying businesses receive either a deduction against their income or an investment tax credit of 15% to 35%, depending on the size and type of business.¹¹ Certain expenses, such as capital expenditures and R&D projects that are outsourced outside Canada, are not eligible for this program.

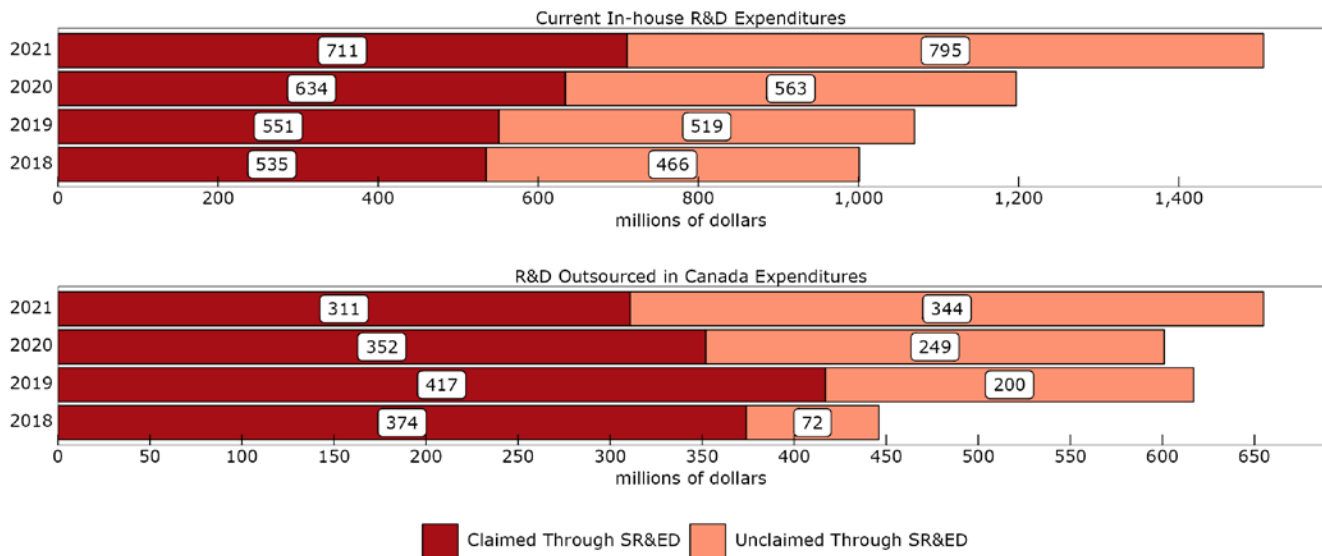
The research and development pharmaceutical sector claimed over \$1 billion in Scientific Research and Experimental Development Program tax credits

In 2021, businesses in the R&D pharmaceutical sector claimed \$1.0 billion in expenditures under the SR&ED Program, 69.5% of which was spent on in-house R&D, while the remaining 30.4% was for R&D outsourced within Canada. As in previous years, SR&ED Program claims of in-house expenditures amounted to approximately half (47.2%) of current in-house expenditures.

11. Canada Revenue Agency. (2023, June 22). [What are SR&ED tax incentives - Scientific Research and Experimental Development \(SR&ED\) tax incentives.](#)

Figure 14
R&D expenditures claimed through SR&ED versus total R&D expenditures, 2018-2021 (x 1,000,000)

Canadian Research and Development Pharmaceutical Sector



Note: 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 and \$1,506 million in 2021. The sector's total outsourced in Canada R&D expenditures was \$446 million in 2018, \$617 million in 2019, \$601 million in 2020 and \$655 million in 2021.
Source: Statistics Canada, custom tabulation, Research and Development in Canadian Industry survey, reference year 2021.

Canadian-controlled companies made the majority of Scientific Research and Experimental Development Program claims on in-house expenditures

Of the 104 businesses that received SR&ED Program support in the R&D pharmaceutical sector in 2021, 70 (67.3%) were Canadian-controlled and the remaining 34 (32.7%) were foreign-controlled. Of the foreign-controlled companies receiving support, 44.1% had a U.S. parent and the other 55.9% had foreign parents from countries other than the United States.

Despite having fewer claims, foreign-controlled entities accounted for over three-quarters (76.8%) of the \$711 million in total in-house SR&ED Program support claimed by the sector in 2021. Canadian-controlled firms were beneficiaries of \$165 million (23.2%) of total sector claims, an 18.7% increase compared with 2020. United States-controlled firms made up two-thirds (63.2%) of the payouts to non-Canadian firms (\$345 million), up 9.9% over the previous year, and other foreign-controlled firms received \$201 million in support through the SR&ED Program, an 11.0% increase over the previous year.

SR&ED Program claims on outsourced R&D expenditures further decreased in 2021 to \$311 million, following a \$65 million decline from \$417 million in 2019 to \$352 million in 2020. The decrease was the result of an 18.7% drop (\$53 million) in claims by foreign-controlled companies. In contrast, Canadian-controlled companies received an additional \$12 million, or 17.4% more, in support in 2021, claiming \$81 million in SR&ED expenditures.

3 Innovative Medicines Canada members

3.1 Economic footprint

3.1.1 Value added

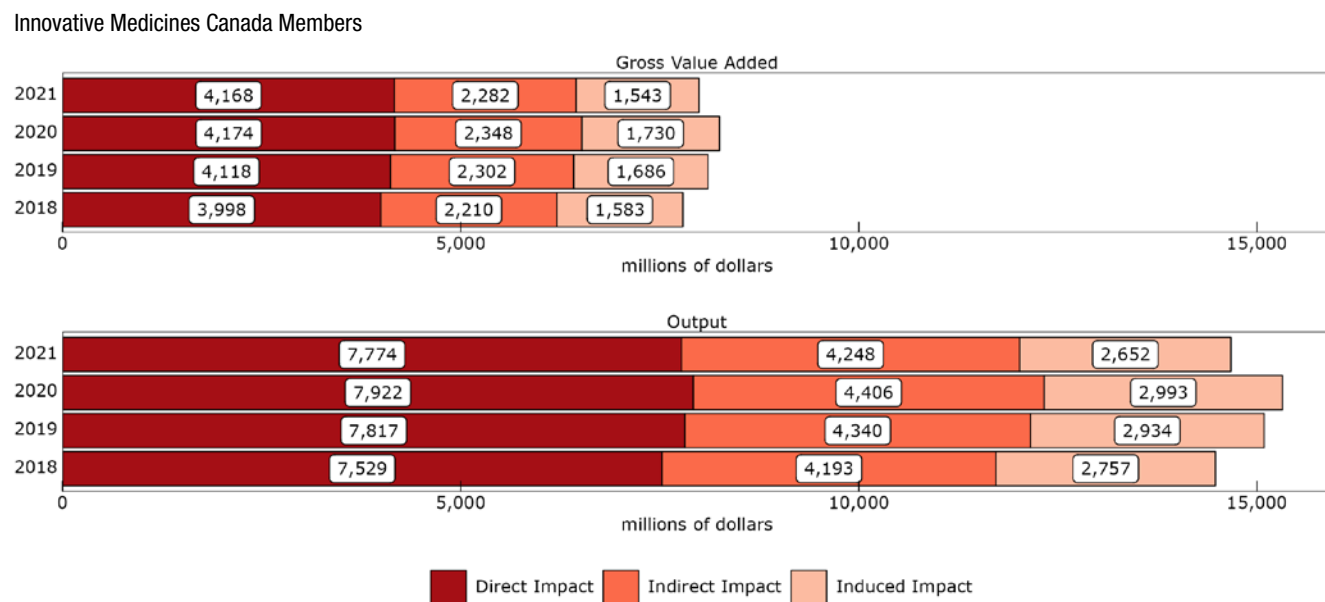
Innovative Medicines Canada members contributed \$8 billion to the Canadian economy in 2021

IMC is an industry association that acts on behalf of its members in the Canadian R&D pharmaceutical sector, ranging from start-ups to established organizations.

In 2021, IMC members contributed \$8.0 billion in GVA to the Canadian economy, accounting for half the contribution made by the entire R&D pharmaceutical sector (\$16.0 billion). The GVA of IMC members decreased 3.1% (\$259 million) from the previous year. In comparison, non-IMC members contributed over \$8.0 billion in GVA, an increase of 5.0% (\$383 million) compared with 2020.

As was observed in the R&D pharmaceutical sector, over half of the total GVA by IMC members (\$4.2 billion) was tied to direct impacts. Of the remainder, members contributed \$2.3 billion in indirect impacts and \$1.5 billion in induced impacts, decreases of 2.8% and 10.8%, respectively, from 2020. In 2021, Canada's GDP at basic prices accounted for a similar percentage for IMC members (0.34%) and the rest of the R&D pharmaceutical sector (0.34%). This contrasts with the previous year, when IMC members accounted for a higher percentage (0.40%, compared with 0.37% for the rest of the sector).¹²

Figure 15
Gross value added (GDP at basic prices) and value of goods and services (output), 2018-2021 (x 1,000,000)



Note: IMC members' total GVA was \$7,791 million in 2018, \$8,106 million in 2019, \$8,252 million in 2020 and \$7,993 million in 2021. IMC members' total output was \$14,479 million in 2018, \$15,091 million in 2019, \$15,321 million in 2020 and \$14,674 million in 2021.

Source: Statistics Canada, custom tabulation, Industry Accounts Division, reference years 2018-2021.

12. 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).

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, totalling 92.4%, compared with 78.6% for non-IMC members.

Of the \$8.0 billion in GVA IMC members contributed to the Canadian economy, \$4.0 billion was generated in Ontario, \$3.4 billion in Quebec and \$606 million in other regions of Canada. Likewise, 92.6% of all labour income originated in these two provinces, with \$2.2 billion tied to Ontario, \$2.0 billion to Quebec and \$331 million to other regions of Canada.

Non-IMC members in the sector also generated the majority of their GVA in Ontario (\$4.2 billion) and Quebec (\$2.1 billion). They had a higher share of their GVA in Ontario compared with IMC members (52.5% versus 49.5%). Non-IMC members' share of GVA generated in Quebec was lower than IMC members' (26.1% versus 42.9%). Non-IMC members' activities were more widely distributed across the country, with 21.4% of GVA in other regions of Canada, compared with 7.6% for IMC members.

3.1.2 Output

Innovative Medicines Canada members' output totalled approximately \$15 billion

IMC members contributed \$14.7 billion to Canada's economic output in 2021, a decline of \$647 million, or 4.2%, from 2020, after posting several years of growth. This decline resulted in IMC members' output being just above the level observed in 2018. By contrast, the output of non-IMC members rose to \$15.3 billion, marking a 4.5% increase from 2020.

Declines were seen in all three types of impacts measured. Direct impacts attributed to IMC members, constituting over half (53.0%) of their total impacts, declined 1.9% to \$7.8 billion in 2021. Indirect impacts decreased 3.6% in 2021 to \$4.2 billion, and induced impacts saw the largest decrease, down 11.4% to \$2.7 billion.

Operating profits of Innovative Medicines Canada members declined in 2021

IMC members generated \$18.8 billion in operating revenue (56.2% of the overall sector) in 2021, an increase of 6.0% from the previous year. Operating expenses for IMC members also increased from the previous year, up \$1.3 billion to \$18.5 billion. Given the variance between operating revenue and expenses, operating profits amounted to \$334 million, a 41.2% decrease from profits reported in 2020. The operating profit margin, which is calculated by dividing the operating profit by the operating revenue, decreased from 3.2% in 2020 to 1.8% in 2021.

While IMC members reported positive operating profits in 2021, non-IMC members reported an operating loss of \$2.5 billion, which led to the R&D pharmaceutical sector's loss of \$2.2 billion.

3.1.3 Employment

Innovative Medicines Canada members were responsible for over 50,000 FTE jobs supported by the sector

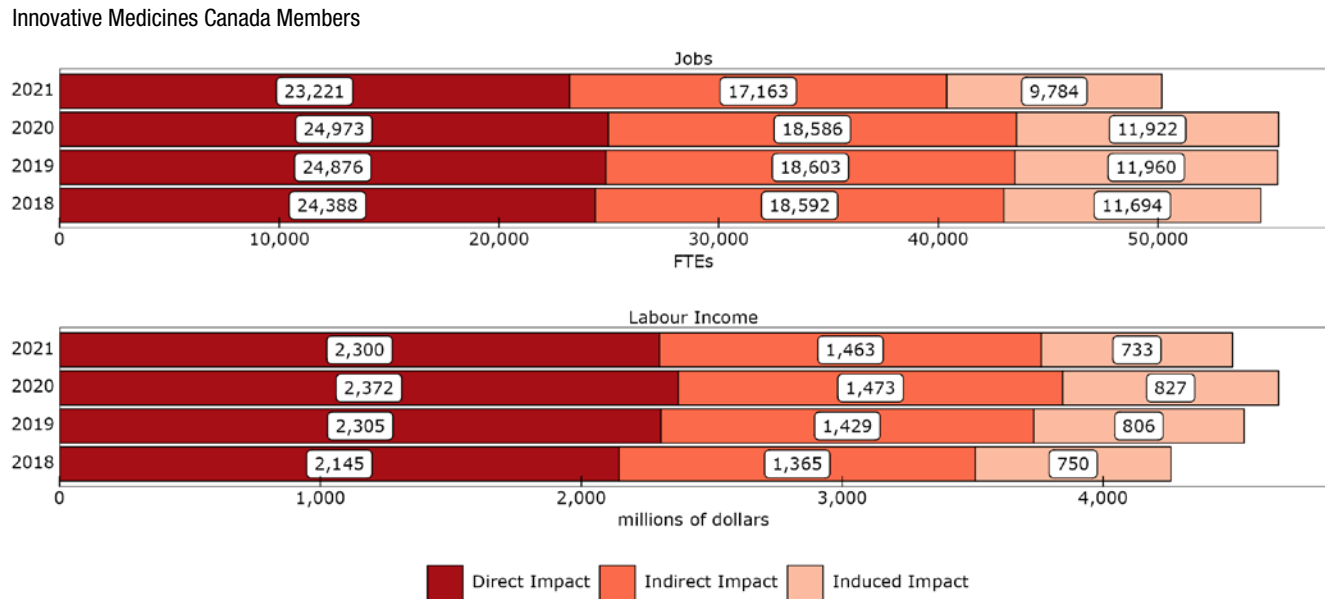
In 2021, IMC members accounted for 50,168 FTE jobs, which represent a decrease of 5,313 jobs compared with 2020, the lowest FTEs since 2018. Non-IMC members accounted for over half the total jobs in the R&D pharmaceutical sector, with 52,549 FTEs in 2021.

FTE jobs associated with direct, indirect and induced impacts arising from IMC members decreased by 7.0% (1,752 FTEs), 7.7% (1,423 FTEs) and 17.9% (2,139 FTEs), respectively, compared with 2020.

The Impact of labour income for Innovative Medicines Canada members reached \$4.5 billion

Labour income associated with IMC member companies decreased 3.8% to \$4.5 billion in 2021, while the rest of the sector saw an increase, with labour income rising 5.1% to \$4.8 billion. Direct, indirect and induced impacts on labour income for IMC members decreased by 3.0% (\$72 million), 0.7% (\$10 million) and 11.4% (\$94 million), respectively, compared with 2020.

Figure 16
Full-time equivalent jobs (FTEs) and labour income (millions of dollars), 2018-2021



Note: IMC members' total jobs were 54,674 FTEs in 2018, 55,439 FTEs in 2019, 55,481 FTEs in 2020 and 50,168 FTEs in 2021. IMC members' total labour income was \$4,260 million in 2018, \$4,540 million in 2019, \$4,672 million in 2020 and \$4,496 million in 2021.

Source: Statistics Canada, custom tabulation, Industry Accounts Division, reference years 2018-2021.

3.1.4 Trade

Innovative Medicines Canada members imported more than non-members in 2021

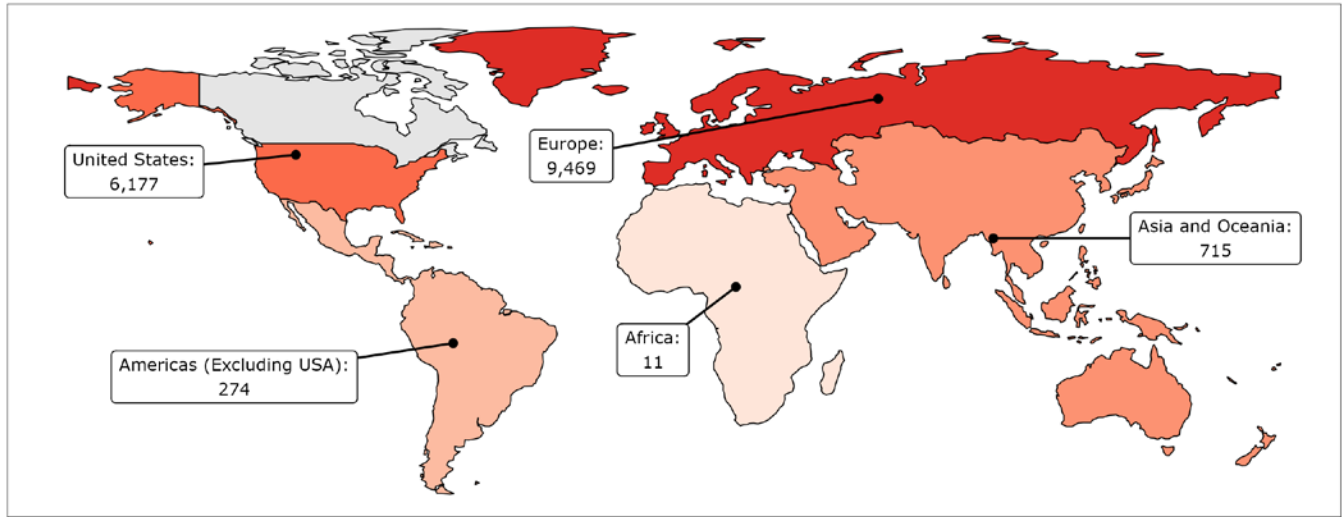
Two-thirds of the \$24.8 billion of goods imported by the R&D pharmaceutical sector were by IMC members (\$16.6 billion) in 2021, a 17.7% increase from the previous year. Non-IMC members imported \$8.1 billion during the year, a decrease of 11.4%.

As was the case in previous years, IMC members imported the majority of their goods from Europe, with 56.9% of their goods originating from Europe in 2021, marking an increase of \$223 million from 2020.

Goods from the United States accounted for 37.1% of total imports by IMC members, an increase of \$2.2 billion from 2020. Among all countries, the United States remains the largest trading partner for IMC members. Similar to previous years, IMC members relied less heavily on the United States compared with non-IMC members (56.9%).

Figure 17
Total value (in dollars) of goods imports by region, 2021 (x 1,000,000)

Innovative Medicines Canada Members

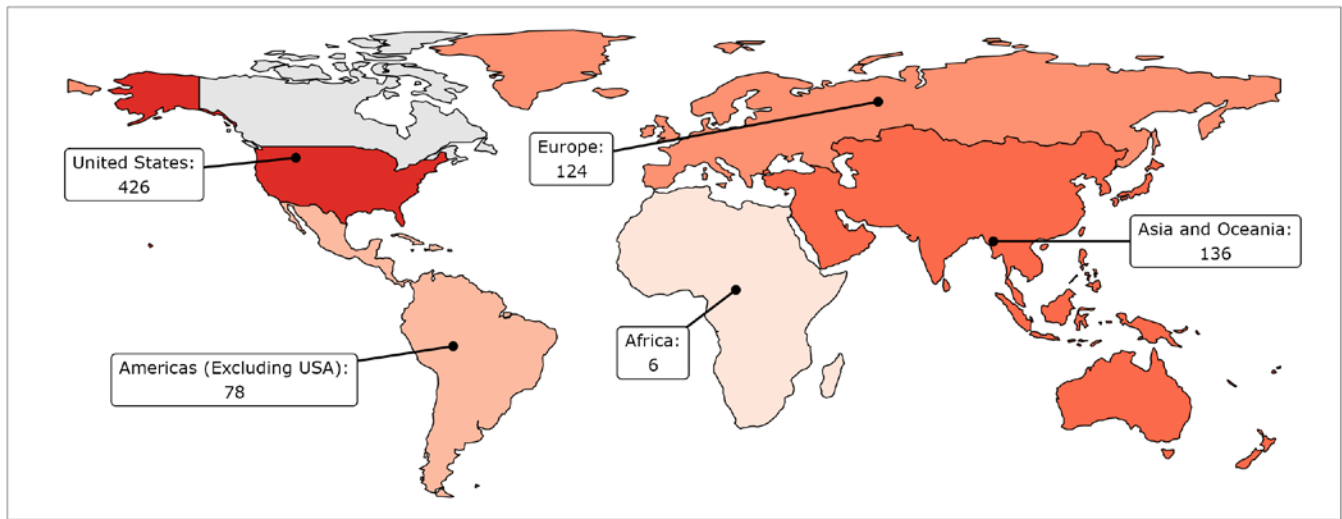


Note: The value of IMC members' total goods imports in 2021 was \$16.6 billion in 2021.
Source: Statistics Canada, custom tabulation, International Accounts and Trade Division, reference year 2021.

IMC members exported nearly \$769 million in goods in 2021, accounting for 14.9% of the R&D pharmaceutical sector's total exports. Goods destined for the United States represented more than half (55.4%) of total exports by IMC members. In 2021, exports to the United States decreased 49.6% to \$426 million. As with imports, the share of exports to the United States was lower for IMC members compared with non-IMC members. Of the \$4.4 billion exported by non-IMC members, 91.7% went to the United States (\$4.0 billion).

Figure 18
Total value (in dollars) of goods exports by region, 2021 (x 1,000,000)

Innovative Medicines Canada Members



Note: The value of the IMC members' total goods exports in 2021 was \$769 million in 2021.
Source: Statistics Canada, custom tabulation, International Accounts and Trade Division, reference year 2021.

3.2 Research and development

3.2.1 Total research and development expenditures

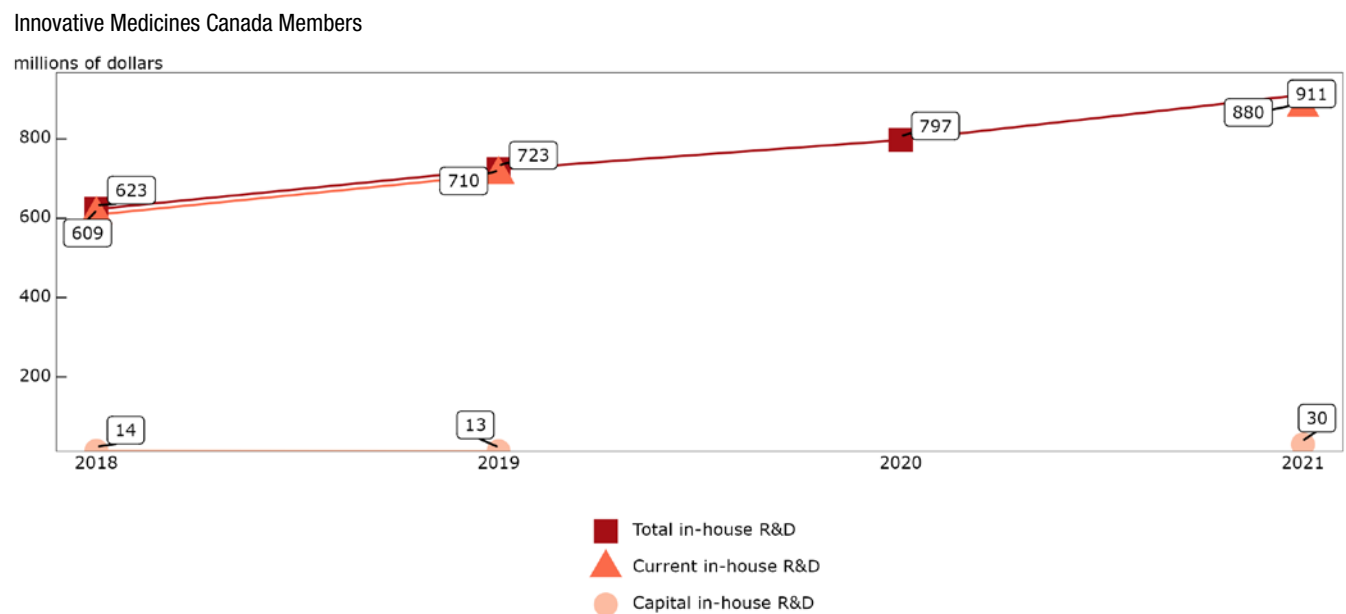
As previously mentioned, in-house and outsourced R&D expenditures are reported separately rather than as an aggregate to avoid double counting. Considering this, IMC members' total R&D expenditures ranged from \$1.2 billion to \$1.7 billion in 2021. In comparison, in 2020, R&D expenditures ranged from \$987 million to \$1.4 billion.

3.2.2 In-house research and development expenditures

In-house research and development spending supported nearly two-thirds of all FTE personnel in the research and development pharmaceutical sector

In-house expenditures by IMC members increased 14.3% from 2020, reaching \$911 million in 2021. Compared with the entire R&D pharmaceutical sector, IMC members' spending amounted to more than half the total for the sector (57.2%) and 3.3% of all BERD in Canada. The remaining 42.8% (\$681 million) of total in-house spending by the R&D pharmaceutical sector (\$1.6 billion) was from non-IMC members.

Figure 19
In-house R&D expenditures, 2018-2021 (x 1,000,000)



Source: Statistics Canada, custom tabulation, Research and Development in Canadian Industry survey, reference years 2018-2021.

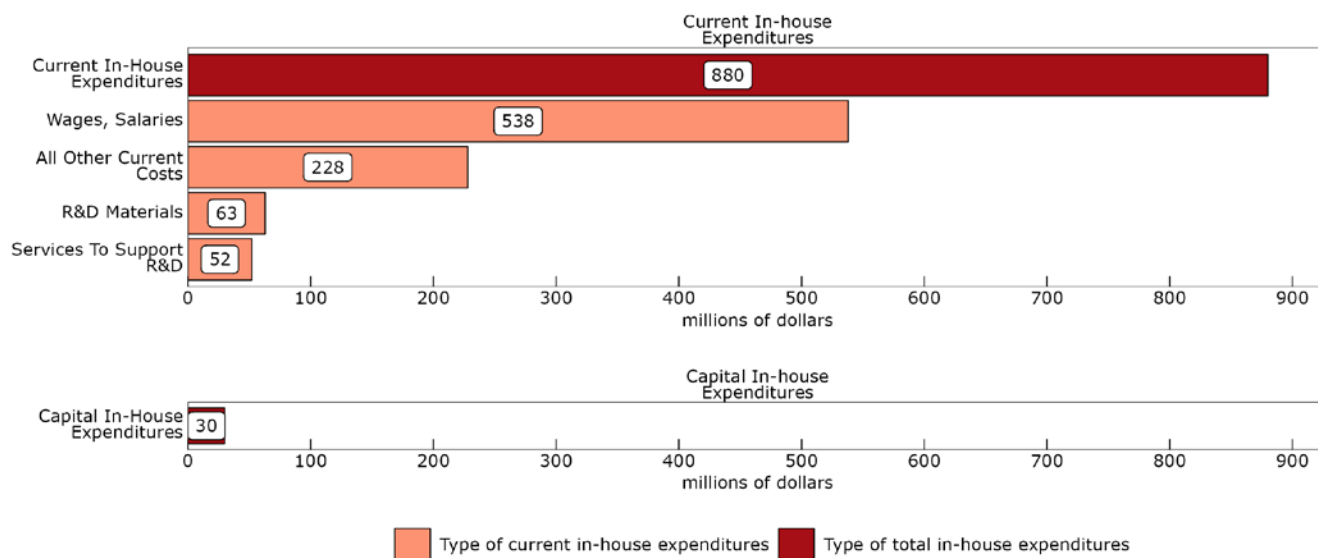
The majority of research and development expenditures were allocated to current in-house operations

For IMC members, current in-house R&D represents the majority of expenditures (96.6%), with \$880 million spent. Of this, wages and salaries¹³ constituted the largest expenditure (61.1%), with IMC members spending \$538 million, a 7.6% increase from 2020, while all other current costs (25.9%) and R&D materials (7.2%) also contributed to current expenditures. As for non-IMC members, their distribution of total current in-house expenditures, totalling \$626 million in 2021, did not differ greatly from that of IMC members for wages and salaries, which represented 55.0% of total spending.

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.

Figure 20
In-house R&D expenditures by type of expenditure, 2021 (x 1,000,000)

Innovative Medicines Canada Members



Note: IMC members' total in-house R&D expenditures was \$911 million in 2021.

Source: Statistics Canada, custom tabulation, Research and Development in Canadian Industry survey, reference years 2018-2021.

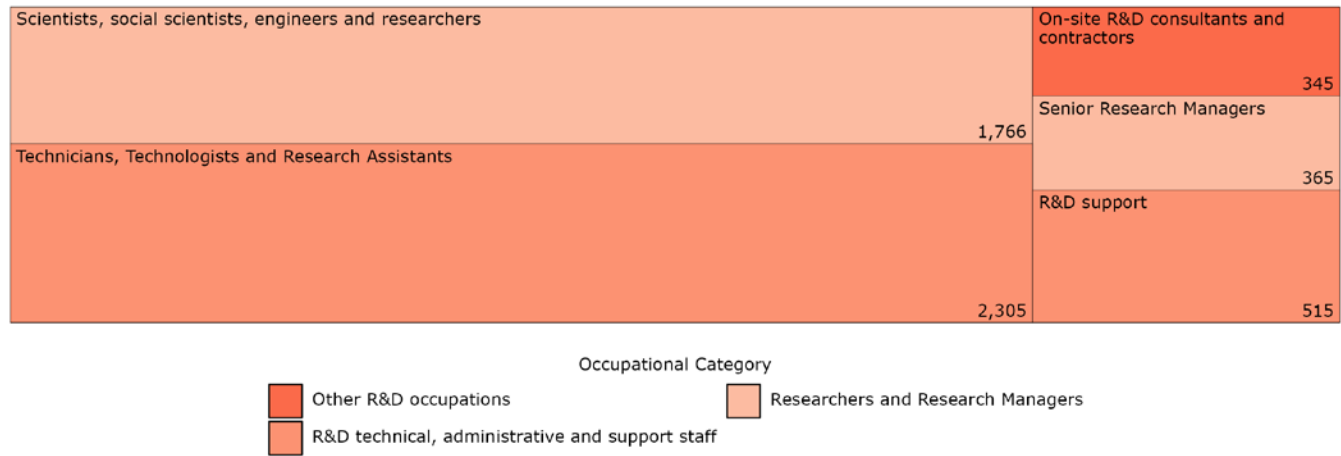
Although there were fewer IMC members than non-IMC members in 2021, IMC members supported 5,296 of the 8,529 FTE R&D personnel in the sector and were responsible for 308 of the 920 additional R&D FTE positions added in 2021.

Technical, administrative and support staff accounted for over half (53.2%) of IMC members' R&D personnel, totalling 2,820 FTEs, while researchers and research managers comprised 40.2% (2,130 FTEs). In contrast, non-IMC members' R&D personnel had a larger proportion of researchers and research managers (62.2%, or 2,012 FTEs) than technical, administrative and support staff (31.4%, or 1,016 FTEs).

In 2021, IMC members added 340 new FTE positions for technical, administrative and support staff and 193 FTEs jobs for consultants and contractors. At the same time, the number of researchers and research managers fell by 227 FTEs, compared with the previous year.

Figure 21
Full-time equivalent jobs (FTEs) in R&D personnel by occupation, 2021

Innovative Medicines Canada Members



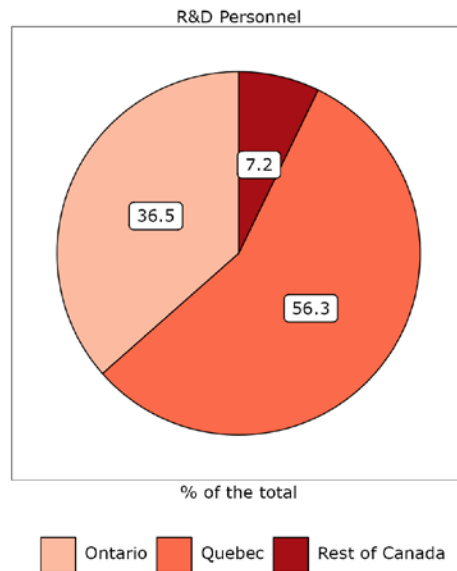
Note: IMC members' total jobs in R&D personnel were 5,296, in 2021.

Source: Statistics Canada, custom tabulation, Research and Development in Canadian Industry survey, reference year 2021.

In 2021, 56.3% of IMC members' R&D FTE personnel were concentrated in Quebec (2,980 FTEs), followed by 36.5% in Ontario (1,934 FTEs). The remaining 7.2% of R&D FTE personnel were in the rest of Canada.

Figure 22
Share of full-time equivalent jobs (FTEs) in R&D personnel by region, 2021

Innovative Medicines Canada Members



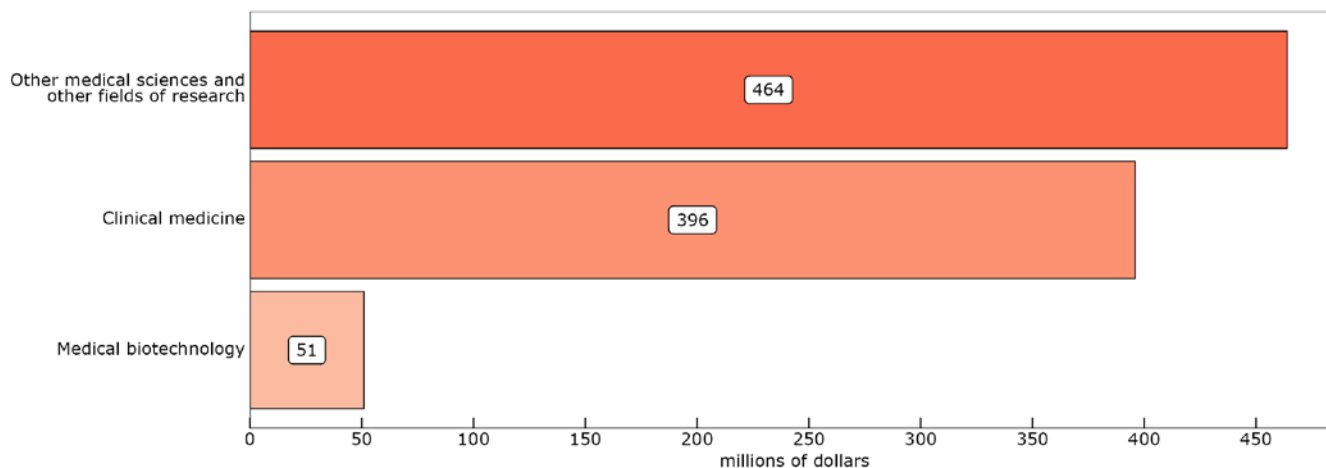
Note: IMC members' total jobs in R&D personnel were 5,296, in 2021.

Source: Statistics Canada, custom tabulation, Research and Development in Canadian Industry survey, reference year 2021.

In 2021, 43.5% of in-house R&D expenditures among IMC members were for clinical medicine R&D projects, an increase of 50.0% to \$396 million. Additionally, \$51 million was allocated to the field of medical biotechnology.

Figure 23
In-house R&D expenditures by field of research, 2021 (x 1,000,000)

Innovative Medicines Canada Members



Note: IMC members' total in-house R&D expenditures was \$911 million in 2021.

Source: Statistics Canada, custom tabulation, Research and Development in Canadian Industry survey, reference year 2021.

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

Following the previous year's decline, Canadian-funded in-house R&D by IMC members increased from \$219 million in 2020 to \$312 million in 2021, an increase of 42.5%. By comparison, non-IMC members reported an increase of 23.5%, from \$311 million in 2020 to \$384 million in 2021. Taken together, the increase for the whole sector was 31.3%.

In 2021, IMC members' foreign-funded R&D increased \$20 million to \$599 million from 2020, an increase of 3.5%. In contrast, non-IMC members saw an 80.0% increase in foreign-funded R&D, rising \$132 million to \$297 million in 2021. Over one-third (34.2%) of all in-house R&D expenditures by IMC members were funded by Canadian sources in 2021, while non-IMC members had a greater proportion of funding through Canadian sources, with 56.4% of their total in-house R&D expenditures funded during the year.

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

As noted earlier, research and experimental development activities are distinct: research aims to acquire or generate knowledge, while experimental development aims to improve products or processes using existing knowledge. In 2021, 55.7% of all in-house R&D expenditures by IMC members were on research, equalling \$507 million, a decline of 2.5% from the previous year. The remaining 44.3% of expenditures were on experimental development, which amounted to \$404 million in 2021, an increase of 45.8%. In contrast, non-IMC members' spending was more evenly split between research and experimental development. Of the \$681 million spent on in-house R&D, 50.4% was directed towards research (\$343 million) and 49.6% towards experimental development (\$338 million).

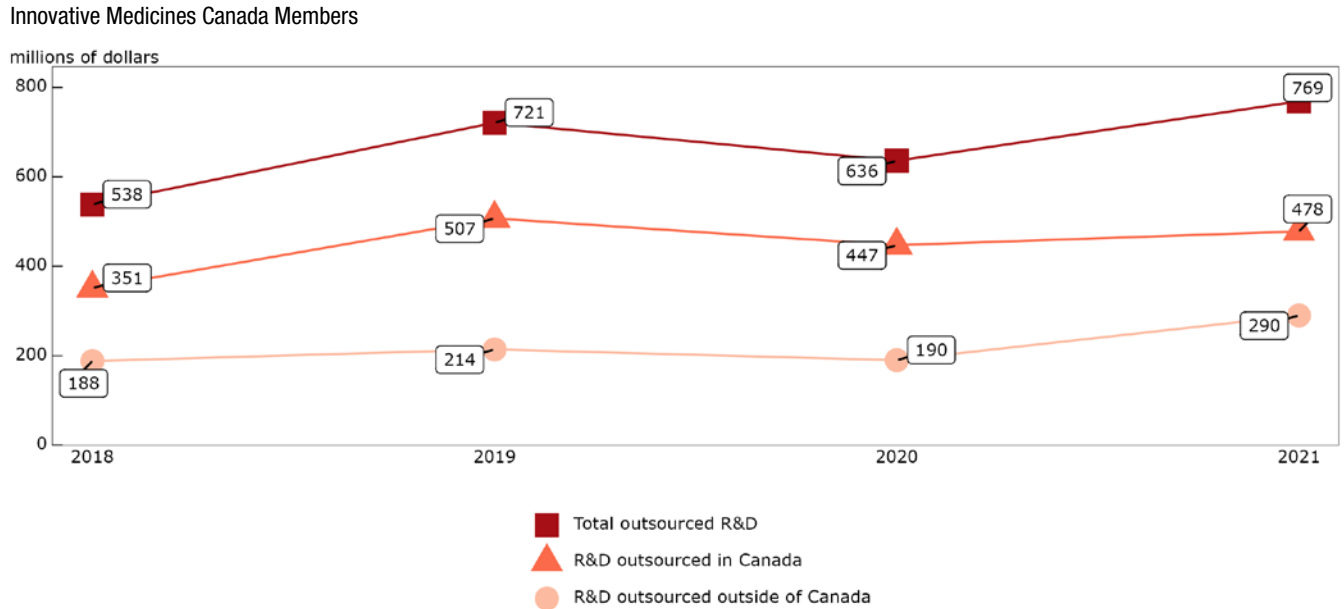
3.2.3 Outsourced research and development expenditures

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

IMC members outsourced \$769 million in R&D expenditures in 2021, representing more than half of total outsourced spending in the R&D pharmaceutical sector (\$1.4 billion). Among the outsourced spending by IMC

members, 62.2% went to entities within Canada, amounting to \$478 million, while 37.7% (\$290 million) went to entities outside Canada.

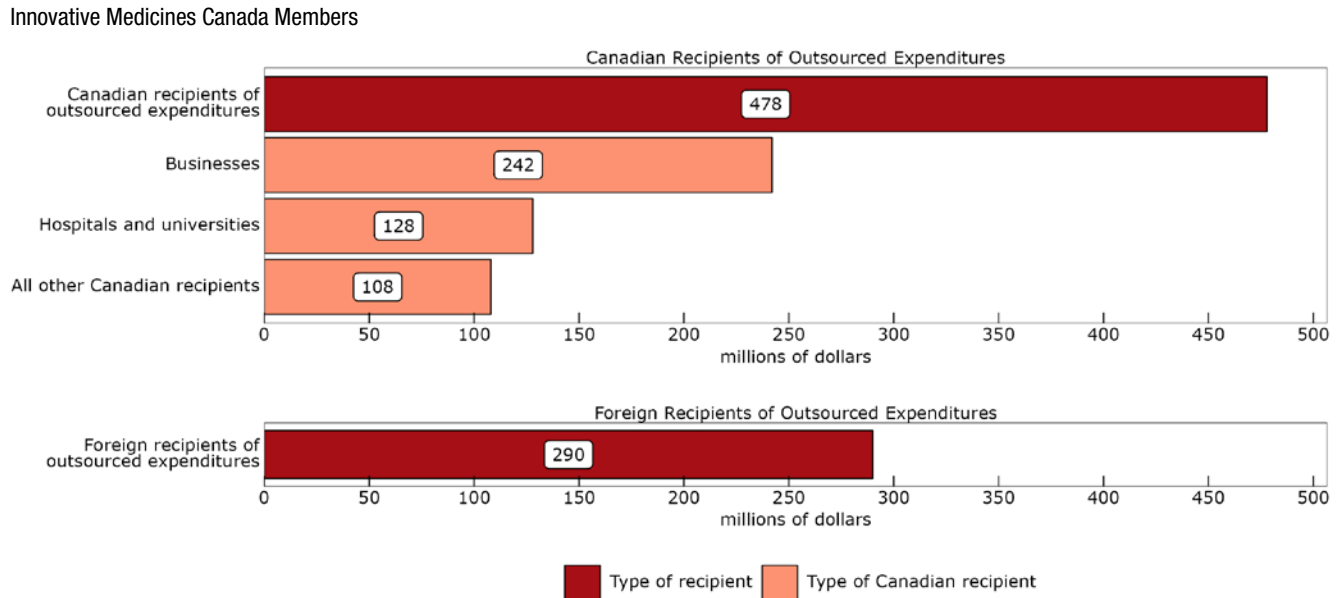
Figure 24
Outsourced R&D expenditures by recipient, 2018-2021 (x 1,000,000)



Source: Statistics Canada, custom tabulation, Research and Development in Canadian Industry survey, reference years 2018-2021.

Among the Canadian recipients, \$242 million (50.6%) went to businesses, \$128 million (26.8%) to hospitals and universities, and the remaining \$108 million to all other Canadian recipients.

Figure 25
Outsourced R&D expenditures by sector, 2021 (x 1,000,000)



Note: IMC members' total outsourced R&D expenditures was \$769 million in 2021.

Source: Statistics Canada, custom tabulation, Research and Development in Canadian Industry survey, reference year 2021.

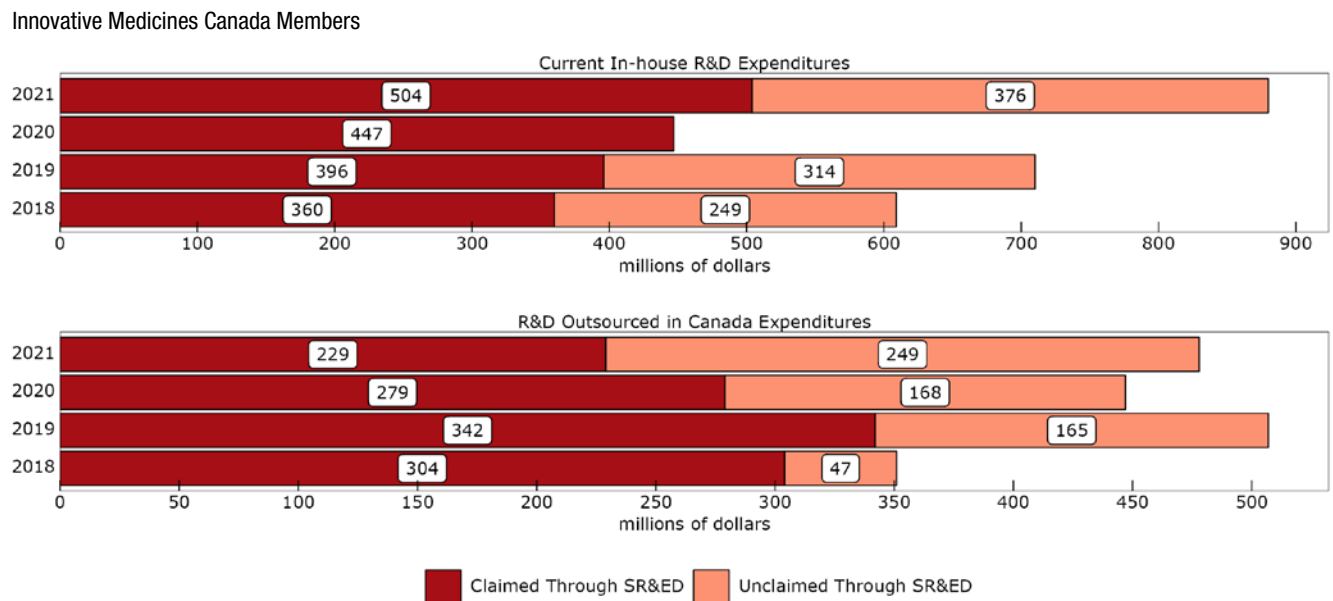
3.2.4 Research and development expenditures eligible for the Scientific Research and Experimental Development Program

Innovative Medicines Canada members accounted for the majority of Scientific Research and Experimental Development Program support for the research and development pharmaceutical sector in 2021

IMC members accounted for 71.7% (\$773 million) of all SR&ED Program claims made by the Canadian R&D pharmaceutical sector in 2021, up 1.0% from 2020. Non-IMC members accounted for the remaining 28.3%, amounting to \$290 million. Of the claims made by IMC members, \$504 million (68.8%) were for in-house R&D expenditures, up 12.8% from 2020. Meanwhile, outsourced R&D represented the remaining \$229 million (31.2%), which decreased 17.9%.

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 versus total R&D expenditures, 2018-2021 (x 1,000,000)



Note: The amount of eligible current in-house R&D expenses that were unclaimed through the SR&ED program in 2020 cannot be calculated since IMC's total current in-house expenditures and total capital expenditures for 2020 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 and \$478 million in 2021.
Source: Statistics Canada, custom tabulation, Research and Development in Canadian Industry survey, reference year 2021.

4 Limitations

This analysis aims to gauge the effects of the innovative R&D pharmaceutical sector, including IMC members, on the Canadian economy in 2021, drawing from various economic datasets. While the study offers a comprehensive overview, its scope is limited to the data that are available. For example, detailed information regarding factors such as gender, age, immigrant status and education was absent, making a more thorough examination of employment characteristics through a sociodemographic lens impossible.

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 have 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 2021 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 2020 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](#)).