

Fostering a Globally Competitive Life Sciences Ecosystem in B.C.

British Columbia Life Sciences Labour Market Intelligence Study

Final Report

February 2024



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Labour Market Development Agreement.*

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KPMG have relied on information gathered from publicly available sources and stakeholder consultation. We have not audited the information gathered.

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British Columbia Life Sciences Labour Market Intelligence Report

Executive Summary



Land Acknowledgements

Life Sciences B.C.'s office is situated on the traditional, ancestral and unceded territory of the the x^wməθk^wəy̓əm (Musqueam), Sk̓w̓x̓wú7mesh Úxwumixw (Squamish), and səlilwətaʔt (Tseil-Waututh) Nations. We work with the broader Life Sciences Sector from across traditional, ancestral and unceded territories of British Columbia.

Funding Acknowledgements

This British Columbia Life Sciences Labour Market Intelligence Study has been made possible by Life Sciences British Columbia, with funding from B.C.'s Ministry of Post-Secondary Education and Future Skills Sector Labour Market Partnership program. This study had the oversight of a Governance Committee comprising leadership representatives from across the sector – including representation from academic institutions, business and national partners. Insights gained through this study are based on research and stakeholder engagement with more than 100 individuals from across the Province's life science sector.





British Columbia is home to Canada's fastest growing life sciences sector. A healthy labour market is critical to sustain its growth and become a world-class life sciences hub.

In recent years, British Columbia's (B.C.'s) life sciences sector has emerged as a significant driver of innovation, addressing pressing health problems while contributing to economic growth and diversification in the province.

Since 2019, the sector achieved 27% growth in GDP, making it the fastest growing life sciences sector in Canada and outpacing the growth of the overall B.C. economy.¹ Over the last decade, the biotechnology subsector alone has attracted more than US\$13 billion in private sector investments, setting the stage for future expansion.² Today, the sector is a source of high-paying jobs for more than 28,500 B.C. workers.³ It is also home to Canada's leading life sciences organizations – AbCellera, StarFish Medical, STEMCELL Technologies, and Xenon Pharmaceuticals amongst others.⁴

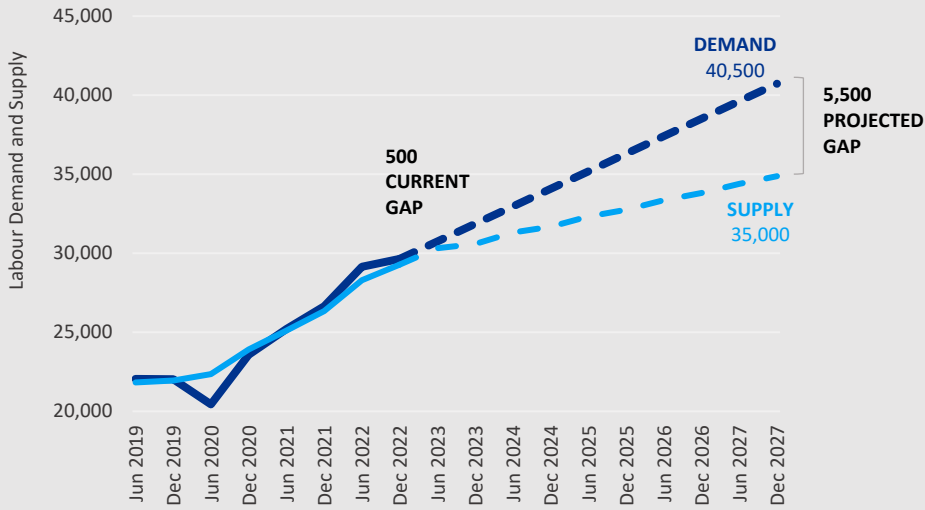
The sector is poised for growth, driven by the pace of discovery at academic and research institutions, advancement of novel therapeutics and platform technologies, and innovation in medical and digital health technologies. This expected growth is complemented by an increasing number of large life sciences companies, complemented by both provincial and national life sciences and biomanufacturing strategies. **The continued growth of the sector, however, is challenged by an increasing labour shortage.**

Over the next five years, the sector is expected to face a widening talent supply gap, projected to increase to 5,500 by the end of 2027 — a more than 10-fold increase from the current gap of 500.

Amidst its rapid growth, the sector is already facing difficulties. The demand for executive talent is high. Local talent are missing critical commercialization and business skills. Repatriation of talent is challenging. Companies looking to scale are limited by the supply of local talent.

1. Statistics Canada. Table 36-10-0402-01: Analysis of Gross domestic product (GDP) at basic prices, by industry, provinces and territories (x 1,000,000). <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3610040201>.
2. Novateur Ventures Inc. (2023).
3. KPMG analysis. Note that this figure differs from the figure presented in the 2023 B.C. Sector Profile Report. Details on the differences are provided in Section 1: Overview of B.C.'s Life Sciences Sector. Additionally, [Appendix 5: Sector Definition](#) provides a reconciliation of the total business and employee counts in this report to the figures reported in the 2023 B.C. Sector Profile Report.
4. B.C. Government in collaboration with LSBC, Global Affairs Canada, Pacific Economic Development Canada (PacifiCan), and Innovation, Science and Economic Development Canada (2023). Life Sciences in B.C.: Sector Profile.

THE WIDENING LABOUR SUPPLY GAP



Together, the sector has recognized:

- The current projected supply of skilled talent will not sustain projected sector growth.
- There is a growing gap between talent skillsets and market need, creating a training gap for certain skills that help advance sector growth.
- There is a lack of resources to support companies in attracting talent and limited awareness of the opportunities within.
- The sector can do more to promote and embrace diversity, equity and inclusion, fostering a sector that creates equal opportunities for individuals to thrive in the workplace.

Without meaningful action, workforce gaps are projected to widen, which could lead to slowed growth and decreased economic output. The sector now has an opportunity to address these challenges and nurture a vital and healthy talent pool so that it can continue to create well-paying jobs, diversify the economy, and deliver health innovations to B.C. and the world.

Investing in talent is critical to transform the life sciences sector into a world-class hub.

5. KPMG analysis.
 6. B.C. Sector Profile Report (2023).
 7. Statistics Canada. Table 36-10-0489-01: Labour statistics consistent with the System of National Accounts (SNA), by job category and industry. <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3610048901>.
 8. KPMG analysis.

LABOUR SNAPSHOT



B.C.'s life sciences companies employ more than 28,500 people⁵



>15% of B.C.'s life sciences labour market has graduate-level education⁶



Average compensation is 21% higher than wages across B.C., in part due to specialized skill requirements⁷



By 2027, there will be a projected gap of over 5,500 skilled individuals⁸

Establishing B.C. as a globally-recognized life sciences hub

B.C.'s emerging talent shortage poses a threat to the future of the sector. Without a robust talent pool, businesses will struggle to sustain and grow their presence in B.C.

The sector recognizes a critical gap in senior or executive-level personnel within the local talent pool who have experience in operating and scaling life sciences companies. This is a challenge not unique to B.C. – Canada's life sciences ecosystem has a limited number of experienced leaders who have led companies that have matured to commercialize and scale up manufacturing.

To help address these gaps, the sector recognizes the need to improve talent attraction and retention collectively, recommending further action through targeted, collaborative initiatives such as:

- **Improving awareness about the sector and opportunities within** – promoting the strengths of the rich ecosystem and funding infrastructure.
- **Explore innovative and creative ways to accelerate** development, attraction, and retention of top-tier talent with an ecosystem of academia, industry and established companies that can continue to attract funding.

“In today's market, scaling up from 100 to 1,000 employees is challenging. We must be deliberate in building our labour supply.”

Bill Hunter
Founder, President & CEO
Canary Medical Inc

Co-Founder, Former CEO
Angiotech Pharmaceuticals





The critical need for new skills across the sector

As a rapidly evolving knowledge-based sector, the life sciences sector requires a variety of specialized skillsets. Careers in the sector often require a combination of interdisciplinary expertise, regulatory knowledge, proficiencies in technology, and both technical skills and business acumen.

Despite strong enrollment in B.C. academic programs that supply the sector's talent pool, the sector faces stiff competition from other jurisdictions and sectors. Further, the sector is facing gaps in skills that are often acquired through experiential training and upskilling outside of a classroom.

Across the sector, stakeholders have recognized critical skills gaps including:

- Business acumen, especially with new STEM graduates and technical hires
- Leadership and management skills, including Interdisciplinary expertise
- Knowledge of quality and regulatory affairs, clinical trials and biomanufacturing
- Commercialization and marketing expertise

In addition to these core competencies, the sector has recognized the need to bridge skills gaps for

career advancement at all levels, including middle management. Many of these skill needs can be met through add-on learning, micro-credentialing and certificate training programs. Despite availability of general training at this level, gaps persist in sector-specific training opportunities.

In alignment with B.C.'s Life Sciences and Biomanufacturing Strategy, the sector is seeking continued partnership between industry and academic institutions to **enable a best-in-class training ecosystem** to ensure the training infrastructure is suited to the current and future needs of the sector.

“Continued academic and industry collaboration remains vital for bridging skills gaps and nurturing a prosperous talent ecosystem.”

Robert McMaster
Vice Dean, Research
University of British Columbia

Fostering excellence in life sciences through diversity and inclusion

It is well-recognized across the sector that investing in diversity, equity, and inclusion (DE&I) is important in fostering improved business performance and innovation.

Despite this recognition, there remain gaps between current sector practices and DE&I best practices, impacting talent recruitment, training and retention across the sector. For example, less than half of sector companies have formal programs to attract, retain, or advance a diverse workforce, such as providing DE&I training.

Workforce diversity remains unclear due to gaps in data collection and availability; however, stakeholders recognize the need for more comprehensive DE&I practices to drive sector growth and to ensure that the talent pool is reflective of B.C.'s broader society.

The sector also recognizes the need for **continued commitment to the journey of reconciliation** through building relationships with Indigenous Communities.

“Embracing diversity, equity, and inclusion is an imperative for a thriving, innovative life sciences sector. The sector has the opportunity to take on a leadership role in ensuring meaningful action on these principles within the province.”

Helen Sheridan
Chief Human Resources Officer
STEMCELL Technologies

Some companies in the sector – particularly some public companies and those with more than 100 employees – have made notable progress on their DE&I strategies and goals. Smaller companies in the sector often have DE&I business practices that are less mature – attributed to resource constraints, lack of training, or less formalized business practices. The varying degrees of DE&I progress represent an **opportunity to exchange best practices** across the sector, contributing to a more diverse, inclusive and equitable sector in B.C.

DE&I SNAPSHOT

Promoting diversity, equity, and inclusion within the life sciences sector can help address labour shortages, foster innovation, provide more equitable access to opportunities, and drive sustainable advancements that benefit society as a whole.



42%

of B.C. life sciences companies have programs supporting diverse workforce advancement



23%

of B.C. life sciences companies monitor DE&I metrics

The path forward: A call to action for B.C.'s life sciences sector

Aligned with the vision to transform B.C. into a world-class life sciences hub, the life sciences sector proposes the following strategic recommendations. These seven strategic recommendations under four pillars can empower the sector to capitalize on opportunities to lay the groundwork for a sustainable, highly-skilled B.C. life sciences market.



ESTABLISH A SINGLE VOICE FOR THE SECTOR

1. **Create a sector talent council** to prioritize and act on the life sciences sector labour and talent needs



FOSTER A GLOBALLY COMPETITIVE ECOSYSTEM

2. **Promote the development of a competitive environment for B.C.'s life sciences sector** to attract and retain skilled talent from other jurisdictions
3. **Develop a strategic talent attraction marketing plan for B.C.'s life sciences sector** to promote the sector as a highly desirable life sciences employment and economic hub



BUILD SECTOR CAPACITY AND CAPABILITIES

4. **Develop a sector-specific DE&I strategy and resources** to create a more diverse, equitable and inclusive life sciences sector in B.C. and enable the sector to tap into underrepresented communities as an immediate source of talent
5. **Enable a responsive, best-in-class training ecosystem** that builds on existing offerings to address current and future workforce needs at all career levels



INVEST IN FUTURE GROWTH

6. **Begin consultations and relationship building with Indigenous organizations** to understand how to foster meaningful sector engagement
7. Enable the acceleration of top-tier talent development, attraction and retention by **exploring innovative ways to nurture and anchor more B.C. life sciences companies**



Additional Considerations

Despite sector efforts in talent recruitment, retention and training, there remain larger economic pressures impacting the growth of the life sciences sector and the broader B.C. economy. These include cost of living, compensation relative to competing national and international sectors, and barriers with recruiting international talent.

These are issues that supersede the ability of the sector to solve on its own and will require ongoing collaboration with related sectors and the provincial and federal governments on economic development strategies. With an emerging labour supply gap, this is an opportunity for ongoing partnership between industry, government, and academia to work collectively to remove barriers and enable a world-class, competitive life sciences hub.

The participation of each sector stakeholder, including industry, government, and academia, will be crucial to evolving B.C.'s life sciences ecosystem into a world-class life sciences hub that will bring sustainable social, health, and economic benefits for generations to come.

The life sciences workforce is an investment towards improved healthcare outcomes and economic growth.



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Introduction

The life sciences sector is critical to British Columbia, both as an economic driver for the province and as a source of innovative products, solutions and services to address the complex issues within our health system.

The life sciences sector in British Columbia (B.C.) is internationally recognized for its innovation. It has gained recognition for its ground-breaking research and discovery in therapeutics, medical devices and vaccine components that contribute to enhancing people's lives and addressing global healthcare challenges. Progress in these fields is made possible by the 28,500 talented and committed individuals working in the sector.

The sector also offers a range of significant economic benefits for the province and the country, including:

- **High-value jobs** that employ individuals with a range of skills;
- Innovation and research that drives the **creation of new products and technologies** leading to **exports and trade** revenue; and
- Attraction of **investment and venture capital** from domestic and international investors.

Despite being an emerging sector relative to the province's major industries, the life sciences sector has contributed \$3.1 billion to B.C.'s real gross domestic product (GDP) in 2022.¹ The biotechnology subsector alone has attracted more than US\$13 billion in investments from the private sector over the last decade.²

Over the last five years, B.C.'s life sciences sector has been the fastest growing life sciences sector in Canada³ and is one of the fastest growing sectors within the province, measured by employment.⁴ Backed by B.C.'s [Life Sciences and Biomanufacturing Strategy](#) and Canada's [Biomanufacturing and Life Sciences Strategy](#), the sector is poised for continued growth due to:

- A growing number of life sciences companies with more than 50 employees;⁵
- The continued progress of innovation in vaccine and therapeutic development;⁶
- Technology advancements in areas such as artificial intelligence, machine learning and cloud technologies;⁷ and
- Ongoing private and public sector investment.⁸

The sector, however, is facing an emerging gap between labour supply and demand. Stakeholders are recognizing critical skill gaps that need to be filled, difficulties with attracting and retaining talent with the right skills and experiences, and the need to progress on diversity, equity, and inclusion (DE&I) practices. A secure pipeline of talent is critical to sustain sector growth, keep companies in B.C., and ultimately accelerate B.C.'s path to becoming a global life sciences and biomanufacturing hub. **This study helps measure and forecast a suspected future gap between**

The COVID-19 pandemic brought heightened attention to B.C.'s life sciences sector and its important role in ground-breaking research and innovation. The pandemic accelerated regulatory collaborations and innovation, leading to sector expansion, particularly within biotechnology and medical technology development and manufacturing. Surging demand for B.C.-led innovation, coupled with increased private and public investment, continues to propel the sector's growth, and has established a foundation to support transformation of the sector into a globally competitive life sciences ecosystem.

labour supply and demand, summarizes key sector challenges, and proposes sector-led solutions to help act on these issues.

Approach

In Summer 2022, with funding from the Ministry of Post-Secondary Education and Future Skills (PSFS), Life Sciences British Columbia (LSBC) launched a labour market study of the life sciences sector in B.C. The purpose of this project was to generate detailed labour market information, gain a better understanding of issues facing the life sciences sector workforce, model different labour market scenarios, and to develop recommendations for sector-led solutions to workforce development challenges and skills training requirements.

This study was led by LSBC with the support of KPMG LLP (KPMG) and the oversight of a Governance Committee comprising leadership representatives from across the sector – including representation from academic institutions, industry and national partners. The Governance Committee provided project oversight, as well as feedback and validation of the methods, key findings, and recommendations. Details on the Governance Committee membership can be found in [Appendix 1: Governance Committee](#).

A combination of methods was used throughout the study, including **labour supply and demand modelling, surveys and consultations, and secondary research**.

LABOUR SUPPLY AND DEMAND MODELLING

Time series modelling was used to forecast labour supply and demand from 2023 to 2027. The Vector Error Correction Model (VECM) modelling approach was used to predict future values based on previously observed values. This approach was used to help capture the long-term relationship among variables that influence labour demand and supply. Results from the modelling were used to assess the evolution of the talent shortage in B.C.'s life sciences sector over five years. Detailed descriptions of the modelling process are presented in [Appendix 2: Labour Demand and Supply Forecast](#) along with the inputs used and key assumptions made.

SECONDARY RESEARCH, SURVEYS, AND CONSULTATIONS

This study included a review of more than 50 sources of publicly available data and life sciences related literature. Key references included a variety of peer-reviewed academic sources and grey literature (e.g., government and industry reports), which are summarized in [References](#).

In addition to secondary research, primary research through engagement with sector stakeholders helped surface and validate key findings. The primary research comprised consultation with more than 100 stakeholders via surveys, focus groups and interviews. These methods included:

- **An employer survey of 67 organizations**, which focused on collecting qualitative and quantitative information that was not publicly accessible. See [Appendix 3: Employer Survey Characteristics](#) for additional details about the survey results.
- **Eleven focus groups with life sciences industry stakeholders** to better understand sector and subsector challenges and validate key findings from the employer survey. See [Appendix 4: Focus Group and Interview Participants](#) for a detailed list of participants.
- **Eighteen interviews with life sciences sector leaders** representing various subsectors (e.g., medical technology, digital health) across a range of organizations and geographic regions. See

Appendix 4: Focus Group and Interview Participants for a more detailed description of interview participants.

REPORT STRUCTURE

This report includes the following four sections.

Section 1: Overview of B.C.'s Life Sciences Sector

This section includes:

- A definition of the life sciences sector;
- An overview of its economic contribution; and
- An overview of its workforce contribution.

Section 2: Labour Supply and Demand Forecast

This section includes:

- A five-year labour market demand and supply forecast; and
- An exploration of alternative scenarios.

Section 3: Analysis and Discussion: Key Labour and Talent Challenges and Barriers

This section summarizes challenges and barriers in three key areas, including:

- Attracting and retaining talent;
- Addressing training and skills needs; and
- Improving diversity, equity and inclusion.

Section 4: Sector-Led Recommendations to Address Labour Market Challenges

This section includes recommendations for sector-led strategies to address workforce and skills needs, with the objective of fostering a globally competitive life sciences ecosystem in B.C.

SECTION 1:

Overview of B.C.'s Life Sciences Sector

B.C.'s life sciences sector is one of the fastest growing sectors in the province and the fastest growing life sciences sector in Canada, contributing to the economy and leading to significant growth in high-paying jobs and increased employer demand for talent.

Sector Definition

Life sciences refers to fields that involve the scientific study of living organisms.⁹ Knowledge, innovation, and technologies developed by the sector have many practical applications and produce numerous societal benefits.¹⁰ Definitions of life sciences sector vary in Canada province to province. For this project, the sector has been defined using the North American Industry Classification System (NAICS)¹¹ in a manner that is generally aligned with the [2023 B.C. Sector Profile Report](#). Consistent with the 2023 B.C. Sector Profile Report, this study does not consider the broader healthcare system or bio-energy, bio-industrial, and agri-bio to be part of the life sciences sector; however, unlike the 2023 B.C. Sector Profile Report, this study does include the digital health sub-sector.ⁱ

Within this context, B.C.'s life sciences sector is made up of more than 1,800 businesses with employeesⁱⁱ operating within four key subsectors:

- **Biotechnology**, which includes nearly 150 companies that develop, manufacture, and distribute pharmaceuticals and medicines;

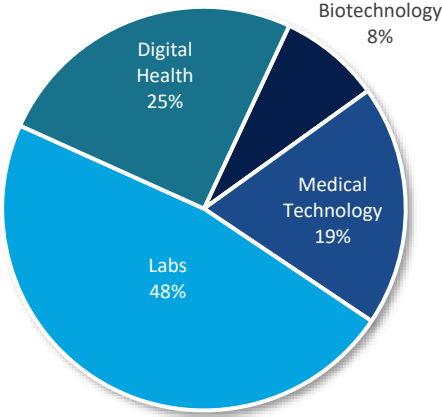


Figure 1: Businesses by Subsector in B.C.'s Life Sciences Sector, 2022

Source: Statistics Canada, Table 33-10-0661-01: Canadian Business Counts, with employees, December 2022.

ⁱ The 2023 B.C. Sector Profile Report sector definition excludes the healthcare system, medical cannabis, and digital health companies. For this report, an analysis was performed to isolate the digital health companies within the NAICS codes related to the technology sector. A similar analysis could not be performed for the medical cannabis sector due to data limitations.

ⁱⁱ This compares to approximately 1,350 businesses with employees identified in the 2023 B.C. Sector Profile Report. Differences in the business counts with the 2023 B.C. Sector Profile Report stem from two reasons: (1) timing differences (i.e., December 2021 for the 2023 B.C. Sector Profile Report and December 2022 for this report) and (2) the inclusion of the Digital Health subsector in this report. See [Appendix 5: Sector Definition](#) for additional details on the difference between the 2023 B.C. Sector Profile Report and this report.

- **Medical Technology**, which includes more than 350 companies that develop, manufacture, and distribute medical devices and diagnostics;
- **Labs**, which includes more than 850 contract research firms and testing and medical labs; and
- **Digital Health**, which includes more than 450 technology companies that operate at the intersection of life sciences and technology.

[Appendix 5: Sector Definition](#) includes additional details regarding the NAICS codes included in the sector definition.

Common Sector Occupations

In Canada, occupations are generally classified using a system of codes called the National Occupational Classification (NOC) system. The NOC system uses broad occupational categories that represent the type of work performed, the field of study, and the industry of employment where industry-specific work experience is required.¹² Data showing the NOC codes that are relevant for the life sciences sector as defined in this report was not available from Statistics Canada, but the following NOC codes are considered central to the sector in B.C.:¹³

- **2110 Physical Science Professionals:** individuals who conduct research and analysis in support of medical diagnosis and treatment, biotechnology, nanotechnology and other applications;
- **2111 Life Sciences Professionals:** individuals who conduct basic and applied research to develop new practices and products related to medicine;
- **2121 Mathematicians, Statisticians, Actuaries and Data Scientists:** individuals who use advanced analytics technologies to support the identification of trends and provide automated recommendations;
- **2123 Computer, Software and Web Designers and Developers:** individuals who research, design, evaluate, integrate and maintain software applications;
- **2210 Technical Occupations in Life Sciences:** individuals who provide technical support and services to scientists and other professionals working in fields such as plant and animal biology, microbiology, cell and molecular biology and health sciences; and
- **3212 Medical Technologists and Technicians:** individuals who conduct medical laboratory tests, experiments and analyses to assist in the diagnosis, treatment, monitoring and prevention of disease.

The sector also employs individuals in roles such as finance, administration, engineering, law, sales, transportation and manufacturing. A detailed list of the roles that are relevant for B.C.'s life sciences sector can be found in [Appendix 6: Life Sciences Workforce Definition](#).

Regional Distribution

Consistent with the findings of the 2023 B.C. Sector Profile Report, B.C.'s life sciences sector activity is largely concentrated in the Mainland / Southwest and Vancouver Island regions. The sector findings presented in [Section 3: Analysis and Discussion: Key Labour Strengths and Barriers](#) largely reflect the strengths and barriers identified by stakeholders in these two regions.

Smaller pockets of sector activity can be found in Interior and Northern B.C., where industry is still at its early stages. Key stakeholders from these regions, including representatives from industry, academic institutions, accelerators, and health authorities, identified strengths such as the regions' unique populations and close coordination among stakeholders. The regions also face common challenges in competing with the Mainland / Southwest and Vancouver Island regions for talent, in attracting financial support to the region, and in managing intellectual property between stakeholders. Further details on the regional differences for these two regions can be found in *Appendix 7: Perspectives from Interior and Northern B.C.*

Sector Economic Contribution

EMPLOYMENT AND GDP GROWTH

In 2022, the life sciences sector in B.C. employed 28,500 individuals across more than 1,800 companies. From 2019 to 2022, the life sciences sector in B.C. outpaced the growth of the overall provincial economy, achieving double-digit growth in both the number of businesses (+24%) and employment (+34%). During the same period, sector job vacancies grew at a similar rate as the overall B.C. economy (+43% compared to +47%). The sector's real GDP reached \$3.1 billion in 2022, an increase of 8% from 2021 and 27% from 2019, representing a growth rate that was substantially higher than the overall B.C. economy.

Indicator	B.C. Life Sciences Sector		All B.C. Sectors
	2022	2019 – 2022 % change	2019 – 2022 % change
Business count (with employees)	1,818	+24%	+2%
Employment	28,470	+34%	+4%
Job vacancies	1,167	+43%	+47%
GDP (chained 2012 \$ billions)	\$3.1B	+27%	+7%

Table 1: Key Statistics for B.C.'s Life Sciences Sector, 2019-2022

Sources: Analysis of Statistics Canada. Table 33-10-0661-01: Canadian Business Counts, with employees, December 2022. <https://www150.statcan.gc.ca/t1/tbl/en/tv.action?pid=3310066101>; Statistics Canada. Table 14-10-0201-01: Employment by industry, monthly, unadjusted for seasonality. <https://www150.statcan.gc.ca/t1/tbl/en/tv.action?pid=1410020101>; Statistics Canada. Table 14-10-0225-01: Job vacancies, labour demand and job vacancy rate, annual, inactive. <https://www150.statcan.gc.ca/t1/tbl/en/tv.action?pid=1410022501>; and Statistics Canada. Table 36-10-0402-01: Gross domestic product (GDP) at basic prices, by industry, provinces and

In 2022, the Labs subsector accounted for nearly half of the life sciences sector’s employment (44%, more than 12,500 jobs), followed by the Digital Health subsector (23%, more than 6,500 jobs). The Labs subsector also contributed nearly half of the total GDP for the sector (45%, \$1.4 billion), followed by the Biotechnology subsector (23%, \$0.7 billion).

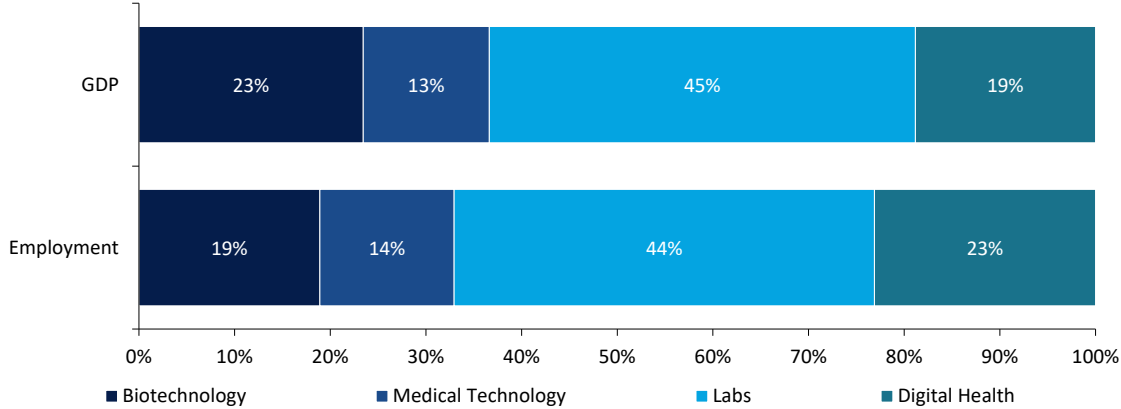


Figure 2: Employment and GDP by Subsector in B.C.’s Life Sciences Sector, 2022

Source: Statistics Canada. Table 33-10-0661-01, Table 14-10-0201-01 and Table 36-10-0402-01

Both employment and GDP have been growing at different rates within the subsectors. The Digital Health subsector has experienced the most rapid growth in employment in the last three years (77%, approximately 3,000 jobs), while the Biotechnology subsector has seen the most rapid GDP growth during this period (48%, \$0.25 billion).¹⁴

B.C.’s life sciences sector has demonstrated strong growth, contributing to employment and GDP within the province and positioning itself as a key driver of economic prosperity in the region.

GROWTH IN THE NUMBER AND SIZE OF BUSINESSES

B.C. has Canada’s third largest life sciences sector, behind Ontario and Quebec. Since 2019, the number of companies in B.C. has increased by 24%, outpacing these two jurisdictions and nearly double the national average.

Province	Number of Businesses	Growth in Number of Businesses (2019 – 2022 % Change)
Canada	11,720	+14%
Ontario	5,669	+18%
Quebec	2,220	+12%
B.C.	1,818	+24%

Table 2: Life Sciences Businesses with Employees by Province, 2019-2022

Source: Statistics Canada. Table 33-10-0661-01.

Note: For the purposes of this figure, the life sciences sector has been defined for Canada and all provinces in the same manner as B.C. (see [Appendix 5: Sector Definition](#)).

B.C. is home to some of Canada's largest life sciences companies by employment including:¹⁵

- **AbCellera:** A Vancouver-based biotech company that partners with global pharmaceutical and biotech companies to develop new therapeutic treatments.
- **StarFish Medical:** A Victoria-based full service medical design, development, and contract manufacturing company.
- **STEMCELL Technologies:** A Vancouver-based biotech company that provides high quality instruments, research materials, and services to researchers across the globe.

B.C. is continuing to attract and grow companies with more than 50 employees. From 2019 to 2022, the number of businesses with more than 50 employees grew by nearly 35%.¹⁶

The life sciences industry largely comprises of small and medium-sized businesses. As of December 2022, 94% have fewer than 50 employees and a subset of 61% have fewer than five (5) employees.¹⁷ Many of these businesses are pre-revenue and if successful, will likely require significant employee growth as they scale. Ensuring access to a qualified and large enough pool of candidates will be important to enable this growth.

B.C. has positioned itself as a significant player in the Canadian life sciences landscape. This growth reflects the province's potential to become a global leader in the industry.

IMPACT OF COVID-19

The global impact of the COVID-19 pandemic on the life sciences sector has been asymmetrical, leading to varying outcomes among different subsectors. While certain subsectors have experienced growth, others have faced a decline due to the pandemic's effects. B.C.'s life sciences sector made significant contributions to the global fight against COVID-19 due to its strengths in areas such as antibodies, genomics, nano and precision medicines, lipid nanoparticles (LNP) and messenger ribonucleic acid (mRNA) technologies. Related companies experienced a period of unparalleled growth. In other subsectors, such as medical devices, COVID-related health service interruptions have impacted product demand.¹⁸ In this complex landscape, B.C.'s life sciences sector showcased its resilience and innovation, even as challenges and disparities existed among different subsectors. The impacts of COVID-19 on the labour market were considered in the labour demand and supply forecasting.

PRIVATE SECTOR INVESTMENT: ATTRACTING INVESTMENT THROUGH PARTNERSHIPS

Over the last decade, B.C.'s life sciences sector has attracted investments from national and international funding sources, supporting sector growth and development. These investments included corporate partnerships and collaborations with global entities to fund research development and innovation initiatives through various deal mechanisms (e.g., licensing, co-development). Over the last decade, the Biotechnology subsector has fostered 247 partnerships and asset purchase deals (**Figure 3**). Total deal value, for Biotechnology deals with disclosed values, exceeded US\$13 billion, representing an average deal value of US\$250 million.¹⁹

Based on the most recent data available from 2021, B.C.'s annual deal value and volume ranked second relative to all other provinces and territories in Canada.²⁰ Based on sector activity this year to-date, 2023 is on track to become a record-breaking year for B.C.'s life sciences transactions, with a

total deal value of US\$6 billion to-date.²¹ An overview of current partnerships and activities is illustrated in **Figure 3**.

Investments and partnerships with global organizations present opportunities to drive growth and innovation but can be perceived as an increased risk of talent leaving the sector. Historically, some B.C. life sciences companies have been acquired by other companies who have relocated operations elsewhere, drawing skilled professionals and intellectual property away from the provincial sector. Balancing investment with talent retention efforts is crucial to ensure that the benefits of investment in the province's life sciences sector are not lost to talent migration.

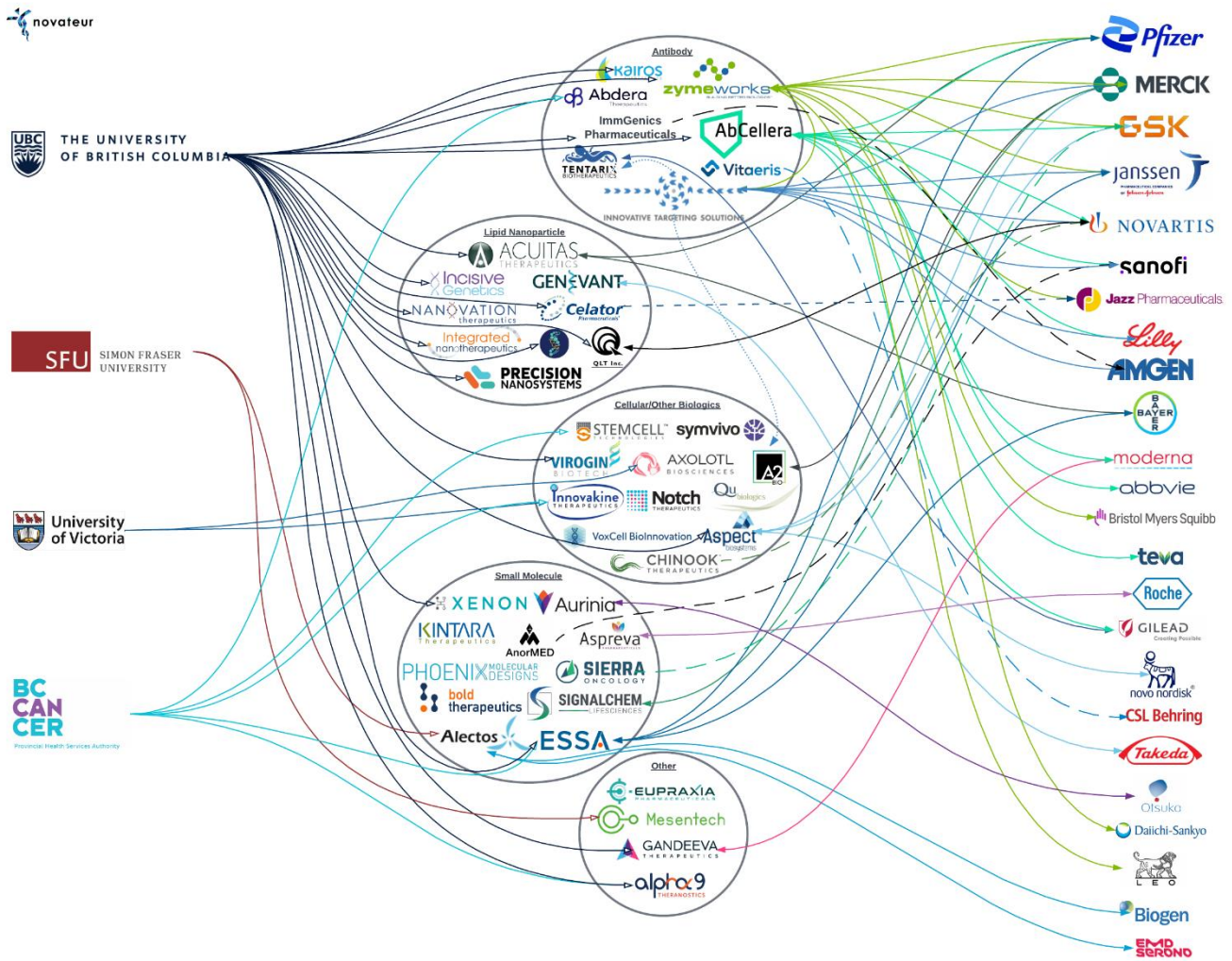


Figure 3: Active Partnerships and Merger & Acquisition Activities in B.C.'s Biotech Subsector Over the Past Decade

Source: Novateur Ventures Inc. (2023)

PROVINCIAL AND FEDERAL FUNDING SUPPORT

In addition to private-sector transactions, between 2020 and 2023, both the B.C. Government and the Government of Canada have made material investments in the life sciences sector. The B.C. Government has made approximately \$640 million in investments that are expected to benefit the province's life sciences sector directly or indirectly. Additionally, the Government of Canada supported B.C.'s life sciences sector growth through approximately \$539 million in total investments over seven biomanufacturing projects. Where available, information on the number of jobs created has been referenced.

- **October 2023:** \$4.2 million from the B.C. Government for the creation of a Phase 1 clinical trial unit at Mount Saint Joseph Hospital in Vancouver. A further \$2.4 million investment was provided to establish a clinical research chair at the University of British Columbia (UBC) – providing academic leadership for the new clinical trial unit, as well as leading research, education, and residency initiatives for clinical pharmacology²²
- **June 2023:** \$20.0 million investment from the B.C. Government in the Michael Smith Genome Sciences Centre (GSC).²³
- **May 2023:**
 - \$300 million from the Government of Canada and the B.C. Government to AbCellera to create a state-of-the-art biotech campus equipped with a new preclinical antibody development facility and for significant upgrades to its existing facilities in Vancouver, which is expected to create 400 new jobs in B.C.^{24, 25}
 - \$2.5 million investment from the B.C. Government in a new 7,000 square foot wet lab facility on Vancouver Island;²⁶ and
 - A combined \$480 million investment from the B.C. Government in the [Future Ready Action Plan](#), with initiatives such as rapid response training, an increase in the number of seats for technology students, and student financial aid, which are likely to benefit the life sciences sector.^{iii 27}
- **April 2023:**
 - \$50.0 million from the B.C. Government to Mitacs to support 10,000 paid internships over five years; and²⁸
 - As part of the launch of the B.C. Life Sciences and Biomanufacturing Strategy, a \$10.0 million investment from the B.C. Government in adMare for a new 30,000 square foot facility.²⁹
- **February 2023:** A joint \$7.2 million investment between the B.C. Government and Pacific Economic Development Canada (a federal economic development entity) towards a new National Biomanufacturing Training Centre at the British Columbia Institute of Technology (BCIT).³⁰
- **May 2022:** Up to \$92 million from the Government of Canada to adMare to support research and development, company creations, scale-up and training activities.³¹
- **June 2021:** A \$15.0 million investment from the B.C. Government in the Innovator Skills Initiative (ISI) to prioritize under-represented people in the technology sector, benefiting the Digital Health subsector.³²

ⁱⁱⁱ While this investment is intended to benefit the entire B.C. economy, it is also expected to have a positive impact on the training opportunities available within the life sciences sector.

- **February 2021:** Up to \$25.1 million from the Government of Canada to Precision NanoSystems Inc. to support the expansion of Canada’s capabilities in the production of RNA vaccines and future genetic medicine, which is expected to create up to 125 new jobs.^{33, 34}
- **December 2020:**
 - Up to \$0.3 million from the Government of Canada to Bold Therapeutics for a project to prepare preclinical efficacy data in live COVID-19 and to support preparation for clinical trials and manufacturing of its BOLD-10 investigational therapy to treat patients with viral infections;³⁵ and
 - Up to \$0.1 million from the Government of Canada to Qu Biologics Inc. for its project to provide proof-of-concept evidence for the safety and efficacy of a treatment to protect the lungs and prevent serious COVID-19 infection.³⁶
- **May 2020:** \$175.6 million from the Government of Canada to AbCellera for antibody therapy research and the construction of an antibody production facility.³⁷
- **October 2020:**
 - Up to \$18.2 million from the Government of Canada to Precision NanoSystems Inc. to help advance the development of a COVID-19 vaccine candidate through preclinical studies and trials;³⁸ and
 - \$2.8 million from the Government of Canada to Symvivo to advance its bacTRL-Spike oral DNA vaccine candidate in preclinical and phase 1 clinical trials for the prevention of COVID-19.³⁹

B.C.’s life sciences sector is expected to continue to benefit from provincial and federal government support as a result of B.C.’s [Life Sciences and Biomanufacturing Strategy](#) (developed by the Ministry of Jobs, Economic Development, and Innovation and the Ministry of Health), which is committed to positioning B.C. as a global life sciences hub, and Canada’s [Biomanufacturing and Life Sciences Strategy](#), which is committed to rebuilding Canada’s domestic biomanufacturing capabilities.

While the recent investment from government has benefited the industry, a combination of continued investment from both the private and public sector will be required to maintain the economic growth and impact of the life sciences sector on B.C.

Workforce Profile

SECTOR WAGES AND WAGE GROWTH

The life sciences sector is a source of high-paying jobs in B.C. (\$53 per hour in 2022 compared to \$43 per hour for the overall B.C. economy). Growth in sector wages has mirrored the growth of wages in the overall B.C. economy but has improved slightly faster than the broader economy over the last three years (21% growth relative to 20%).

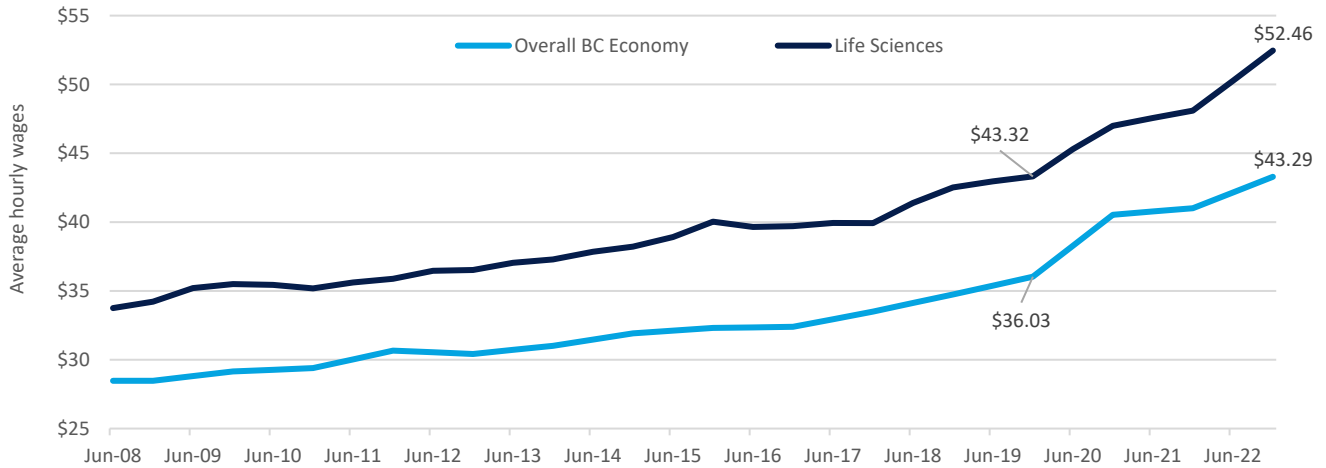


Figure 4: Hourly Compensation Growth, 2008-2022

Source: Statistics Canada. Table 36-10-0489-01: Labour statistics consistent with the System of National Accounts (SNA), by job category and industry. <https://www150.statcan.gc.ca/t1/tbl/en/tv.action?pid=3610048901>

Compared to related sectors, the life sciences sector wage growth from 2019 to 2022 reflects a slower growth than the technology sector, but outpaced wage growth in healthcare and academia.

Sector	Average Hourly Compensation (2022)	Growth in Average Hourly Compensation (2019 – 2022 % Change)
Overall B.C. economy	\$43.29/hour	+20%
Life sciences sector	\$52.46/hour	+21%
Technology sector	\$68.49/hour	+26%
Healthcare sector	\$46.53/hour	+8%
Academia	\$48.12/hour	+11%

Table 3: Average Hourly Compensation for Life Sciences and Competing Sectors in B.C., 2019-2022

Source: Statistics Canada. Table 36-10-0489-01.

Sector wages in B.C. have grown at the fastest pace in the country, ahead of both Ontario and Quebec. While sector wages in B.C. are comparable with Quebec and the national average, they are trailing behind Ontario.

Province	Average Hourly Compensation (2022)	Growth in Average Hourly Compensation (2019 – 2022 % Change)
Canada	\$52.40/hour	+14%
Ontario	\$54.91/hour	+12%
Quebec	\$51.99/hour	+20%
B.C.	\$52.46/hour	+21%

Table 4: Average Hourly Compensation for Life Sciences in B.C. and Comparable Provinces, 2019-2022

Source: Statistics Canada, Table 36-10-0489-01.

Note: For the purposes of this figure, the life sciences sector has been defined for Canada and all provinces in the same manner as B.C. (see [Appendix 5: Sector Definition](#)).

EDUCATION AND QUALIFICATIONS

The life sciences labour market is made up of highly skilled individuals. Across Canada, most jobs in the life sciences sector require either a postsecondary diploma or a bachelor's degree or higher.⁴⁰ Among postsecondary graduates in B.C., the following fields of study are most relevant for the life sciences sector:

- **Physical and life sciences and technologies**, which include biological and biomedical sciences, physical sciences and science technologies (e.g., physics and chemistry);^{iv}
- **Mathematics, computer and information sciences**, which include computer and information sciences, mathematics and statistics; and
- **Health and related fields**, which include medical and dental programs.

^{iv} We note that biomedical engineers is not captured here as this program is listed under the engineering field of study, which includes a large variety of academic programs that are not relevant for the life sciences sector. The data is not available at a level which enables the segregation of biomedical engineers from other types of engineers.

B.C.'s public postsecondary institutions provide high quality training and a steady pipeline of new, qualified graduates. Some of these training programs are highlighted in **Table 5** below, with detailed information presented in *Appendix 8: PSI Skills Training Summary* and *Appendix 9: Industry and Government Skills Training Summary*.

<p>B.C. Postsecondary Institutions Provide foundational training to support a pipeline of life sciences talent through degrees, diplomas and certificate programs</p>	<p>Industry-based Training and Funding Programs Provide or fund training opportunities to upskill and reskill life sciences talent, support research programs, and bridge academia and industry through experiential learning opportunities</p>
<ul style="list-style-type: none"> • British Columbia Institute of Technology (BCIT) • Simon Fraser University (SFU) • The University of British Columbia (UBC and UBC Okanagan), including distributed medical undergraduate programs delivered across four geographically distinct sites in Vancouver, Kelowna, Victoria and Prince George, and supporting hands-on training at more than 80 hospitals and clinics around the province • The University of Northern British Columbia (UNBC) • The University of Victoria (UVic) 	<ul style="list-style-type: none"> • adMare • BC Tech Association • BioTalent Canada • The Canadian Advanced Therapies Training Institute (CATTI) • Canadian Alliance for Skills Training in Life Sciences (CASTL) • Facilitating Access to Skilled Talent (FAST) British Columbia • Genome BC • Innovate BC • LSBC • Michael Smith Health Research BC • Mitacs • Other B.C. Government programs (e.g., The Skills Training for Employment Program, BC Employer Training Grant)

Table 5: Key Postsecondary Institutions and Training Programs in B.C.
Source: Stakeholder interviews

In 2020, more than 17,000 students graduated from these programs across the province, representing 12% growth since 2017 (**Table 6**). Although the B.C. life sciences sector labour market benefits from these graduates, other sectors also rely on these programs for labour supply. Other relevant sectors, including non-health related technology, healthcare, and academia, are large employers in B.C., employing nearly 10 times the number of people within the life sciences sector (**Figure 5**). Additional details on the definition of these other sectors can be found in [Appendix 5: Sector Definition](#).

Field of Study	Graduates (2020)	Growth in Graduates (2017 – 2020 % Change)
Physical and life sciences and technologies	3,618	+14%
Mathematics, computer, and information sciences	4,140	+61%
Health and related fields	9,450	-2%
Total	17,208	+12%

Table 6: Graduates from Relevant Academic Programs, 2017-2020
 Source: Statistics Canada. Table 37-10-0012-01: Postsecondary graduates, by field of study, program type, credential type, and gender.
<https://www150.statcan.gc.ca/t1/tbl/en/tv.action?pid=3710001201>

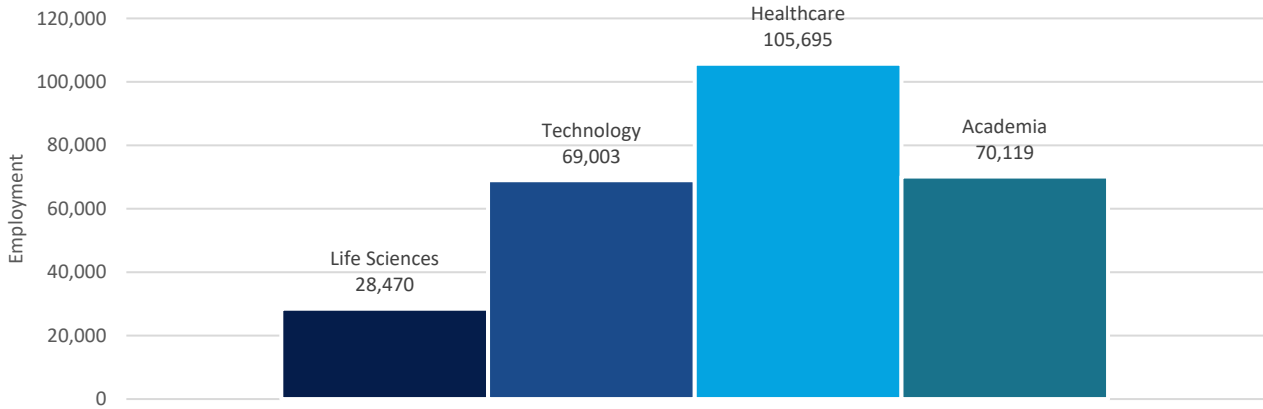


Figure 5: Relative Employment within the Life Sciences Sector and Related Sectors, 2022
 Source: Statistics Canada. Table 33-10-0661-01 and Table 14-10-0201-01.

PROFESSIONALS TRAINED OUT-OF-PROVINCE

B.C.’s life sciences sector benefits from individuals trained outside the province and outside of Canada. These individuals are critical to supporting the province’s labour market supply.

Although sector-specific data is not available, it is approximated that 60% of the workforce is educated in B.C. and 40% are educated elsewhere. This approximation is derived from the overall provincial labour force, where 40% of those trained in relevant disciplines (e.g., life sciences) were trained outside of B.C.

Location of Study	Percentage of Overall Labour Force
Studied in B.C.	58%
Studied in Canada but outside B.C.	17%
Studied outside Canada	25%

Table 7: Location of Study of Workers in B.C. with Life Sciences Related Education, 2021

Source: Statistics Canada. Table 98-10-0445-01: Labour force status by major field of study, highest level of education, location of study compared with location of residence, age and gender: Canada, provinces and territories, census metropolitan areas and census agglomerations with parts. <https://www150.statcan.gc.ca/t1/tbl/en/tv.action?pid=9810044501>.

Relative to Ontario and Quebec, B.C. relies more on labour supply from sources out of the province. In Ontario, only 30% of those trained in life sciences fields were trained outside of Ontario, and merely 17% in Quebec.⁴¹

DIVERSITY EQUITY AND INCLUSION (DE&I) IN THE WORKFORCE

Generally, in B.C., life sciences sector diversity data is scarce, and little is known about the diversity composition of the sector. Despite these limitations, the following approximations represent a summary of the current data available. When data is unavailable, data on students/trainees in relevant fields has been used to provide insights into the supply of talent.

Indigenous: Indigenous workers are estimated to make up less than 1% of the life sciences workforce in Western Canada.⁴² The number of Indigenous students enrolled in life sciences related programs has declined from 3.6% in 2018/19 to 3.5% in 2021/22. However, the number of credentials awarded to Indigenous students during this period has increased from 2.4% in 2018/19 to 3.2% in 2021/22.⁴³

International professionals: Life sciences sector data on internationally educated professionals in B.C. is unavailable; however, as indicated in **Table 7**, 26% of B.C.'s qualified workforce was educated outside Canada.

Gender: One in three people in the life sciences workforce in Western Canada is estimated to be female.⁴⁴ Over the last few years, there have been substantial increases in the number and proportion of women graduating in sector-related fields, suggesting a potential increase in the supply of trained female talent.

Field of Study	Graduates (2020)		Growth in Graduates (2017 – 2020 % Change)	
	Male	Female	Male	Female
Physical and life sciences and technologies	1,557	2,058	+1%	+27%
Mathematics, computer and information sciences	2,763	1,377	+54%	+79%
Health and related fields	1,911	7,521	-8%	+0%

Field of Study	Graduates (2020)		Growth in Graduates (2017 – 2020 % Change)	
	Total	6,231	10,956	+15%

Table 8: Gender Diversity in B.C. Postsecondary Graduation

Source: Statistics Canada. Table 37-10-0012-01 and Table 37-10-0011-01

Age: Relative to the overall B.C. workforce, the B.C. life sciences workforce is estimated to have a larger portion of the workforce aged 25 to 44. This estimate is based on the age distribution of the overall B.C. workforce educated in sector-related fields and is indicative of the post-secondary and advanced education required to contribute to the field in entry-level positions (**Table 9**).

Age Group	Proportion of B.C.'s Labour Force Educated in Sector-Related Fields	Proportion of B.C.'s Overall Labour Force
15 to 24 years	5%	13%
25 to 44 years	53%	45%
45 to 54 years	21%	19%
55 to 64 years	16%	17%
65 years and over	5%	6%

Table 9: Labour Force by Age, 2022

Source: (1) Statistics Canada. Table 14-10-0019-01: Labour force characteristics by educational attainment, monthly, unadjusted for seasonality. <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1410001901>. (2) Statistics Canada. Table 98-10-0445-01.

While the data on DE&I in the life sciences sector in B.C. may be limited, these available approximations highlight some important trends. Efforts to increase the representation of Indigenous Communities and other underrepresented groups in the workforce are ongoing across the sector. More work is needed and continuing to monitor and address DE&I within the industry will be vital for fostering a more inclusive and diverse life sciences workforce.

SECTION 2: Labour Supply and Demand Forecast

B.C.'s life sciences sector is projected to face a widening talent gap, projected to increase to more than 5,500 people by the end of 2027 — a more than 10-fold increase from the current gap of 500.

Over the last decade, the B.C. life sciences sector has experienced a tight labour market, with demand closely matching supply. From 2008 to 2017, labour demand and supply generally aligned, with supply outpacing demand. As sector growth accelerated starting in 2017, labour demand began to outpace supply. In mid-2020, the sector experienced a drop in labour demand, driven by COVID-19 lockdown disruptions. Subsequently, labour demand rebounded in 2021 and 2022, with the labour supply lagging during this period. Additional details on the methodology and data sources for the modelling can be found in [Appendix 2: Labour Demand and Supply Forecast](#)

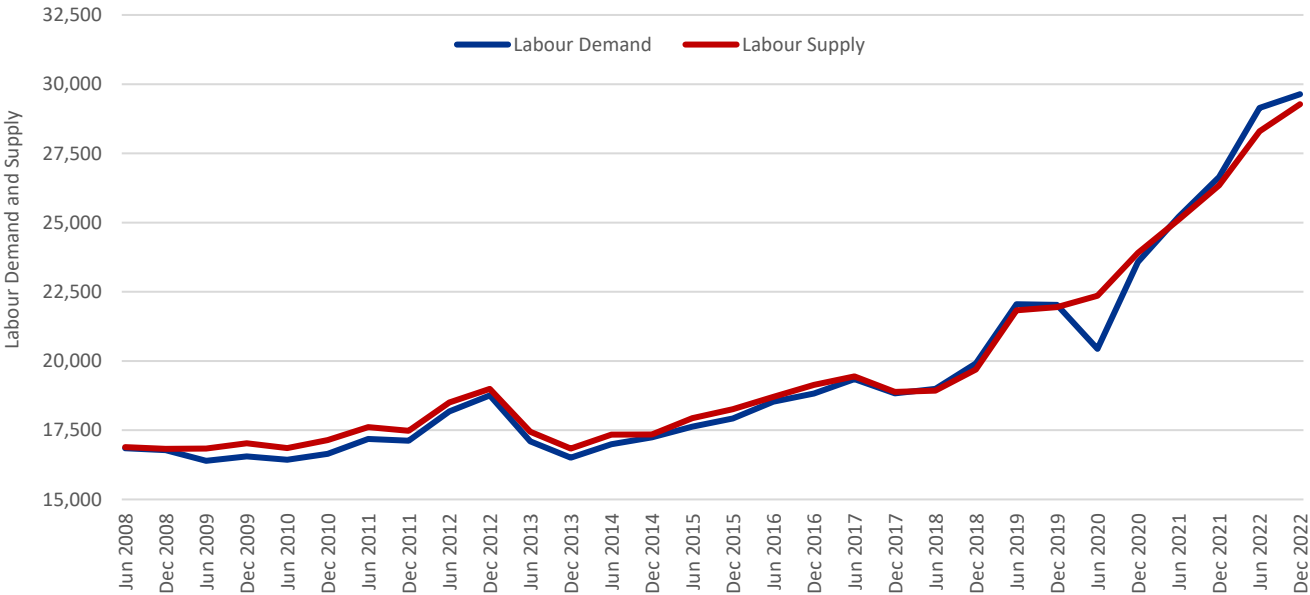


Figure 6: Historical Labour Demand and Supply for B.C.'s Life Sciences Sector, 2008-2022

Source: KPMG analysis

BASELINE FORECAST RESULTS

Based on the labour market demand and supply forecast developed through this study, the sector is projected to face a widening talent shortage over the next five years (2023 to 2027). The talent gap as of 2022 was approximately 500, with labour demand of 29,500 and labour supply of 29,000. By the end of 2027, labour demand is projected to grow more than 37% and reach nearly 40,500 people, while labour supply is projected only to grow 19% to reach 35,000 people. **The talent gap is projected to exceed 5,500 people, or 16% of the sector's total projected 2027 workforce, representing a more than ten-fold increase from the current gap.** The forecast results indicate that labour market supply constraints will become a growing challenge for the sector.

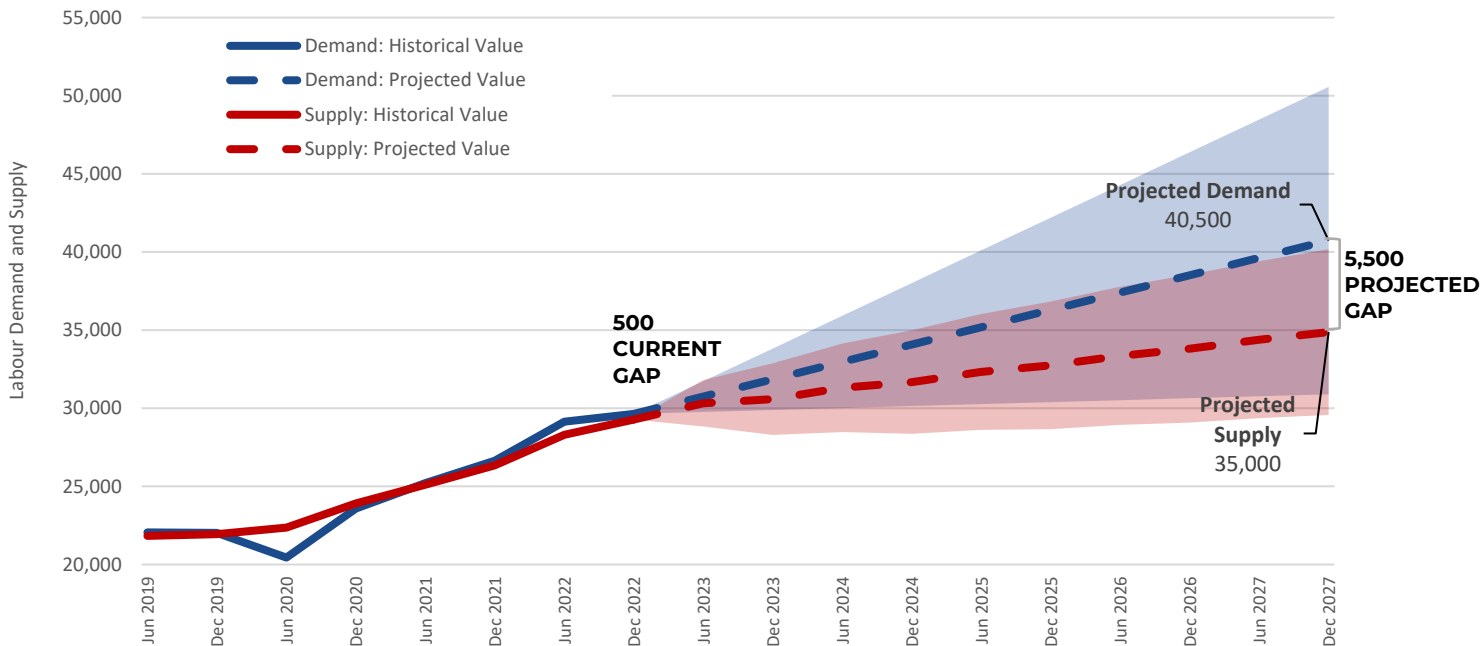


Figure 7: B.C. Life Sciences Sector Labour Market Forecast – Baseline
Source: KPMG analysis

The forecast includes 95% confidence intervals of both labour supply and demand, which correspond to two standard deviations from the baseline forecast. The overlap of these confidence intervals illustrates the possibility that labour supply could sufficiently meet labour demand over the next five years. However, these confidence intervals also illustrate that the talent shortage may far exceed the projections.

Additional context on the sources of labour demand and supply are presented below.

SOURCES OF DEMAND: EXPANSION VS. REPLACEMENT

Labour demand was further analyzed and segmented into expansion and replacement demand:

- Expansion demand refers to the increase of labour demand stemming from economic growth.
- Replacement demand refers to the increase in labour demand created by individuals leaving the labour force due to factors such as retirement, disability, and death, as well as individuals leaving the province or the sector.

Replacement demand accounts for a larger portion of total labour demand than expansion demand, indicating that the majority of the new jobs in the sector will be driven by workers leaving the labour force permanently. In contrast, a smaller number of new jobs will be created by continued sector expansion. This speaks to the need for the sector to focus on retention and not only on recruitment to reduce the number of individuals leaving the sector.

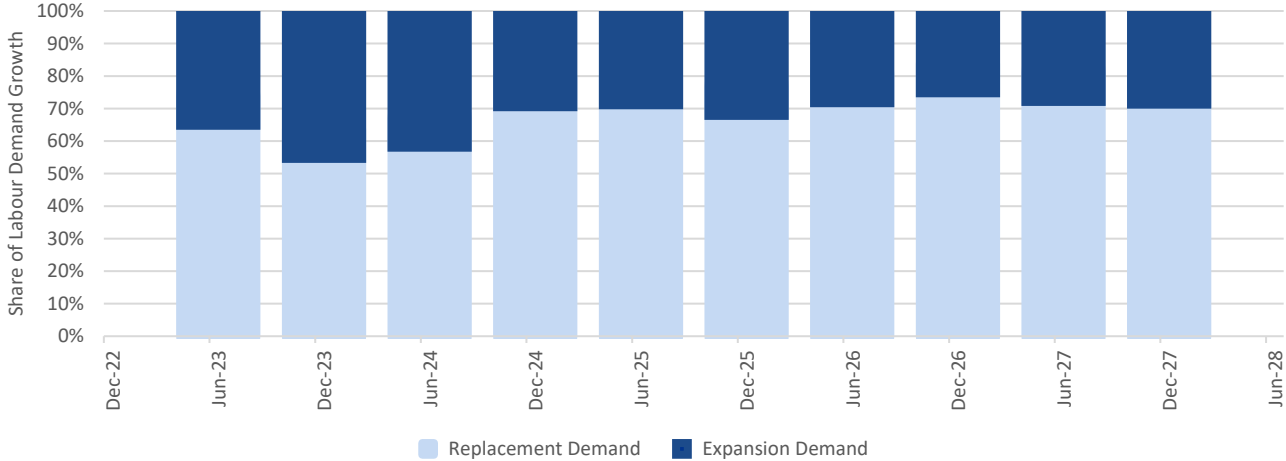


Figure 8: Forecasted Expansion and Replacement Demand
 Source: KPMG analysis

SOURCES OF SUPPLY: GRADUATES VS. MIGRANTS

Labour supply was further analyzed and segmented between the two key sources of new employees: postsecondary graduates from relevant academic programs in B.C. and migration from other Canadian provinces or from outside Canada. Based on historical data, net international migration accounts for a greater proportion of the labour force than net interprovincial migration.

Migration accounts for a larger portion of total labour supply than students, although the forecast indicates more volatility in migration than in the number of students available to the sector. This speaks to the need for the sector to focus on attracting and retaining foreign and domestic talent and not only increasing the number of postsecondary graduates in B.C.

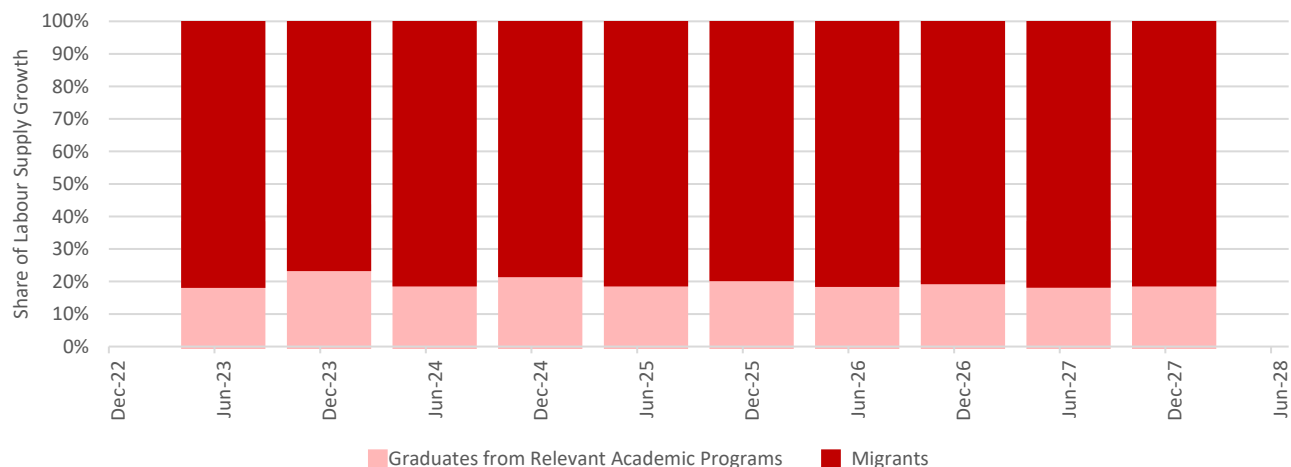


Figure 9: Components of Forecasted Supply

Source: KPMG analysis

SCENARIO ANALYSIS

Three additional scenarios were explored, each representing potential alternative futures of labour demand and supply trends. The scenarios are intended to stress-test the conclusions drawn from the baseline forecast.

SCENARIO 1: CONSTRAINED GROWTH SCENARIO (DEMAND-SIDE SHOCK REDUCING THE DEMAND FOR LABOUR)

The Constrained Growth Scenario explores a future where fewer B.C. companies become revenue-generating than the baseline forecast due to:

- A global recessionary environment;
- A more challenging funding environment relative to competing jurisdictions; and
- Limited infrastructure availability.

In this scenario, sector GDP declines by \$0.5 billion from current expectations (equivalent to a one standard deviation decrease from the baseline forecast) and the labour demand of B.C.'s life sciences sector declines throughout the five-year forecasted period.

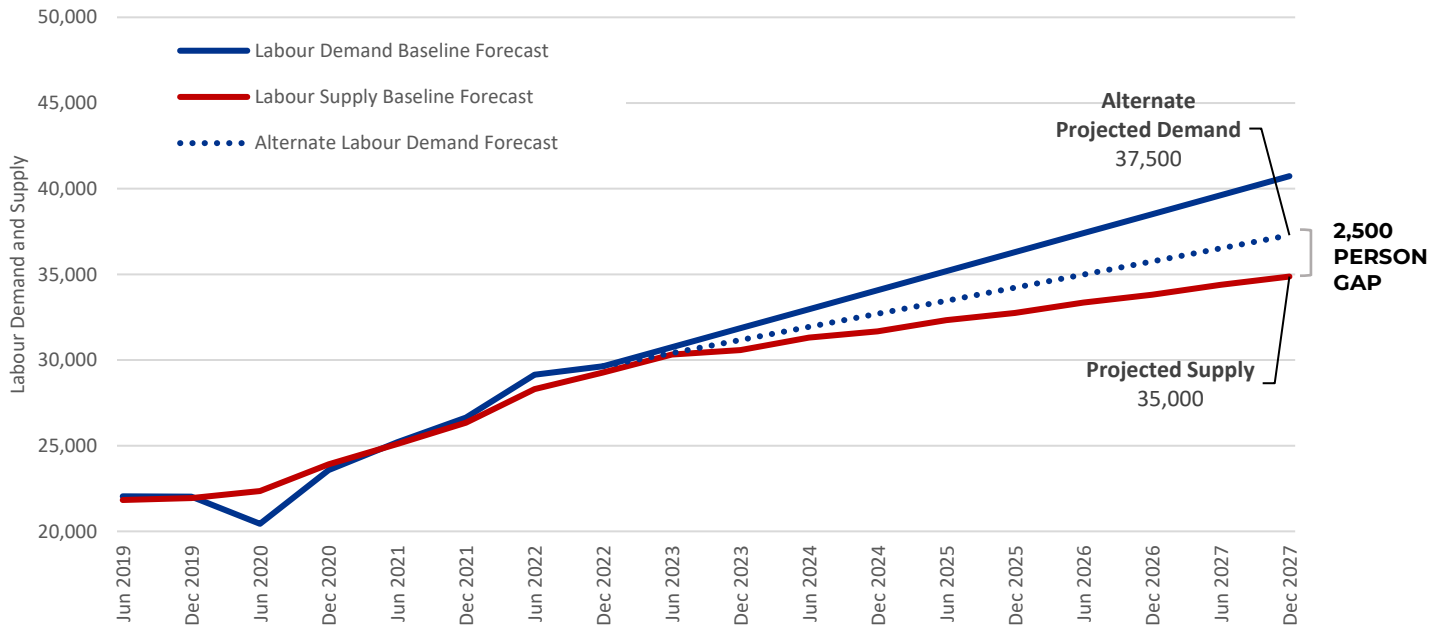


Figure 10: B.C. Life Sciences Labour Market Forecast – Constrained Growth Scenario
 Source: KPMG analysis

In this scenario, labour demand would exceed labour supply by approximately 2,500 people, with demand reaching nearly 37,500 and supply reaching nearly 35,000 by the end of 2027. Under this scenario, the projected gap in the baseline forecast is reduced by approximately 55%.

This scenario demonstrates that even if B.C.’s life sciences sector grows less rapidly than projected in the baseline forecast, B.C. would likely still have a talent shortage. It highlights the need for coordinated action to address gaps in labour supply quantity and quality.

SCENARIO 2: RAPID GROWTH SCENARIO (DEMAND-SIDE SHOCK INCREASING THE DEMAND FOR LABOUR)

The Rapid Growth Scenario explores a future where more B.C. companies become revenue-generating than the baseline forecast and the number of B.C. anchor companies increases due to:

- An influx of early-stage funding into B.C.’s life sciences sector;
- Investments to support scale up of companies in the sector;
- Increased investments in land and infrastructure; and
- Increased manufacturing and commercialization footprint in B.C.

In this scenario, sector GDP increases by \$1 billion from current expectations (equivalent to a two standard deviation increase from the baseline forecast) and the labour demand of B.C.'s life sciences sector increases throughout the five-year forecasted period.

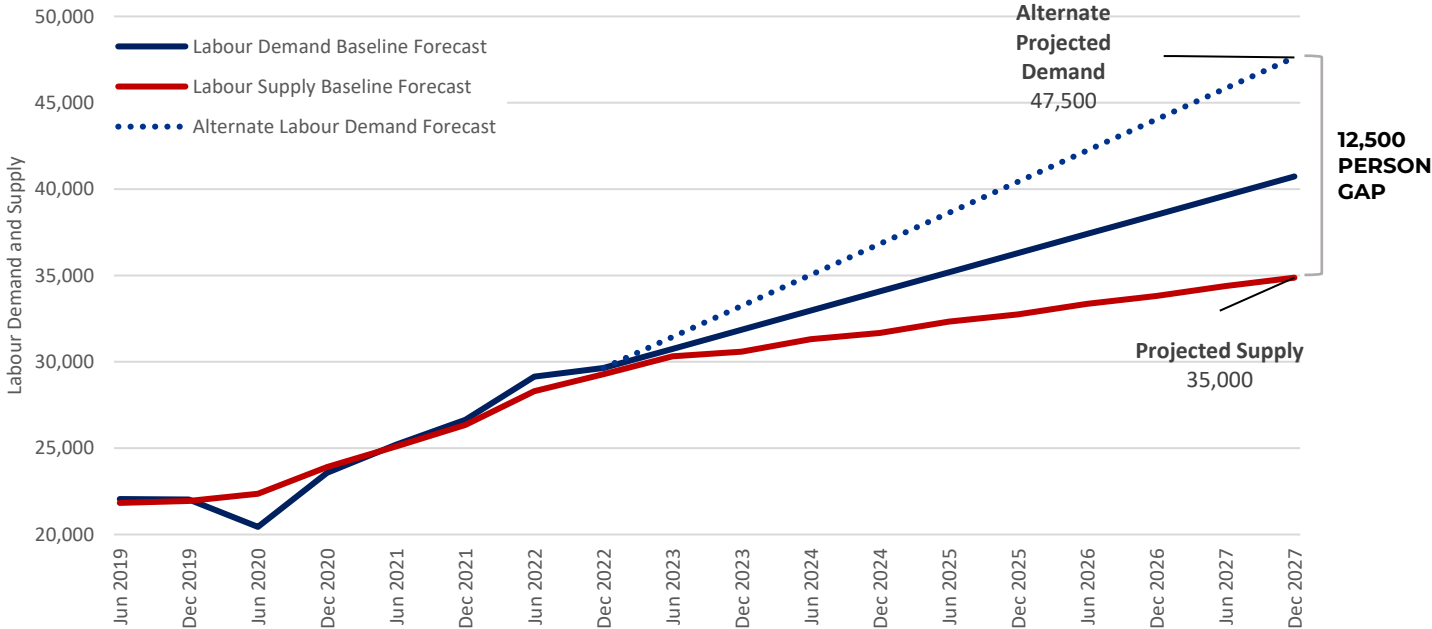


Figure 11: B.C. Life Sciences Labour Market Forecast – Rapid Growth Scenario
 Source: KPMG analysis

In this scenario, labour demand is projected to reach over 47,500 people by the end of 2027. With a supply of nearly 35,000 people, the gap between supply and demand would exceed 12,500 people, more than double the projected gap in the baseline forecast.

This scenario demonstrates that talent shortages could impede B.C.'s life sciences sector even if other growth constraints like capital and infrastructure can be overcome. In this case, the growth of B.C. life sciences companies would benefit other jurisdictions as companies are likely to expand their footprint where the environment is most conducive to anchoring and growing their business.

SCENARIO 3: DECLINING LABOUR SUPPLY (SUPPLY-SIDE SHOCK)

The Declining Labour Supply Scenario explores a future where fewer postsecondary graduates are available to B.C.’s life sciences sector due to:

- Widening skills gaps resulting from rapid technological advancement;
- Widening gap between compensation and cost of living in B.C. encouraging migration outside B.C.; and
- Successful recruitment of B.C. postsecondary graduates by other jurisdictions and sectors.

In this scenario, the sector’s ability to find appropriately skilled talent becomes even more restricted than the current state. Specifically, *the number of postsecondary graduates available to the sector decreases by 125 people from current expectations* (equivalent to a one standard deviation decrease from the baseline forecast) and the labour supply of B.C.’s life sciences sector declines throughout the five-year forecasted period.

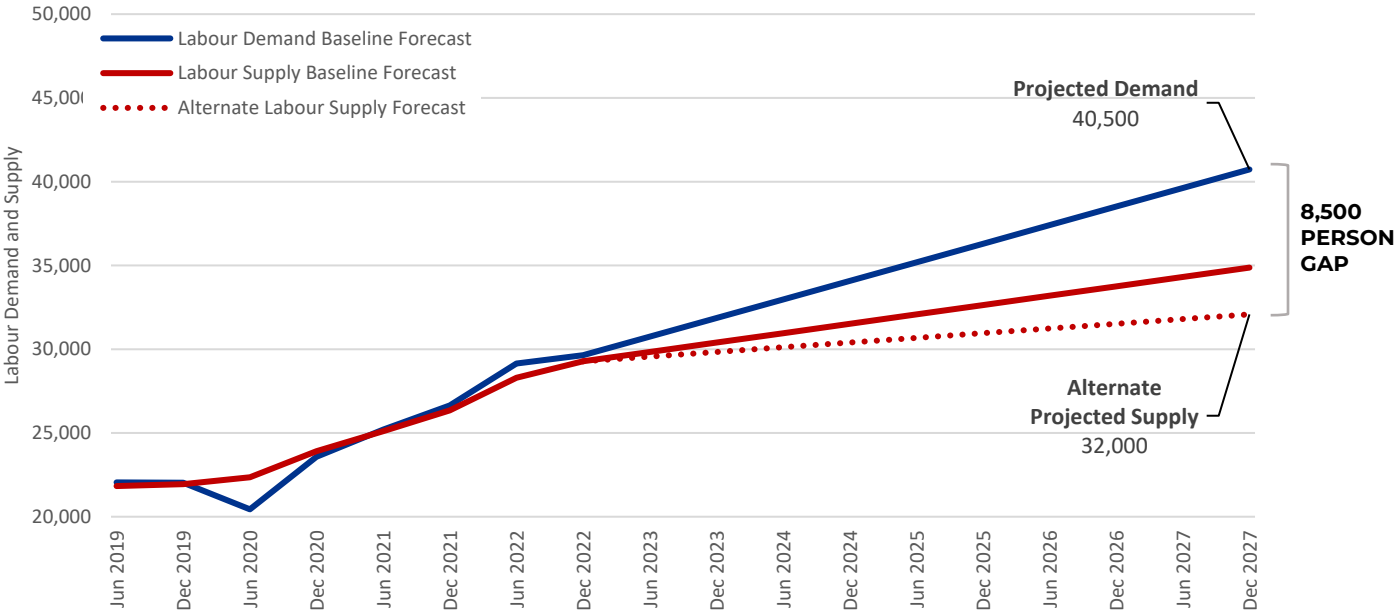


Figure 12: B.C. Life Sciences Labour Market Forecast – Declining Labour Supply
 Source: KPMG analysis

In this scenario, labour supply is projected to exceed 32,000 people by the end of 2027. With a projected demand of 40,500 people, the gap between supply and demand would exceed 8,500 people by the end of 2027, approximately 55% higher than the projected gap in the baseline forecast.

This scenario demonstrates the need for B.C. to develop a skills training ecosystem that can rapidly adapt to the sector’s needs and to ensure alignment between compensation and cost of living. An agile and adaptable ecosystem is required to enable B.C. to develop into a global life sciences hub.

SECTION 3:^v

Analysis and Discussion: Key Labour Strengths and Barriers

B.C.'s life sciences sector is poised to continue growing, driven by the pace of discovery at academic and research institutions, advancement of novel therapeutics and platform technologies, and innovation in medical and digital health technologies, This growth is supported by provincial and national life sciences and biomanufacturing strategies.

The continued growth of the sector is challenged by a projected **talent shortage of over 5,500 skilled workers** over the next five years (2023 to 2027) and **gaps in critical skills**, limiting the potential for companies to grow and scale in B.C.

The B.C. life sciences sector's talent shortage is driven by challenges and barriers in three key areas: (1) **attracting and retaining talent**, (2) **addressing training and skills needs**, and (3) **improving diversity, equity, and inclusion**.

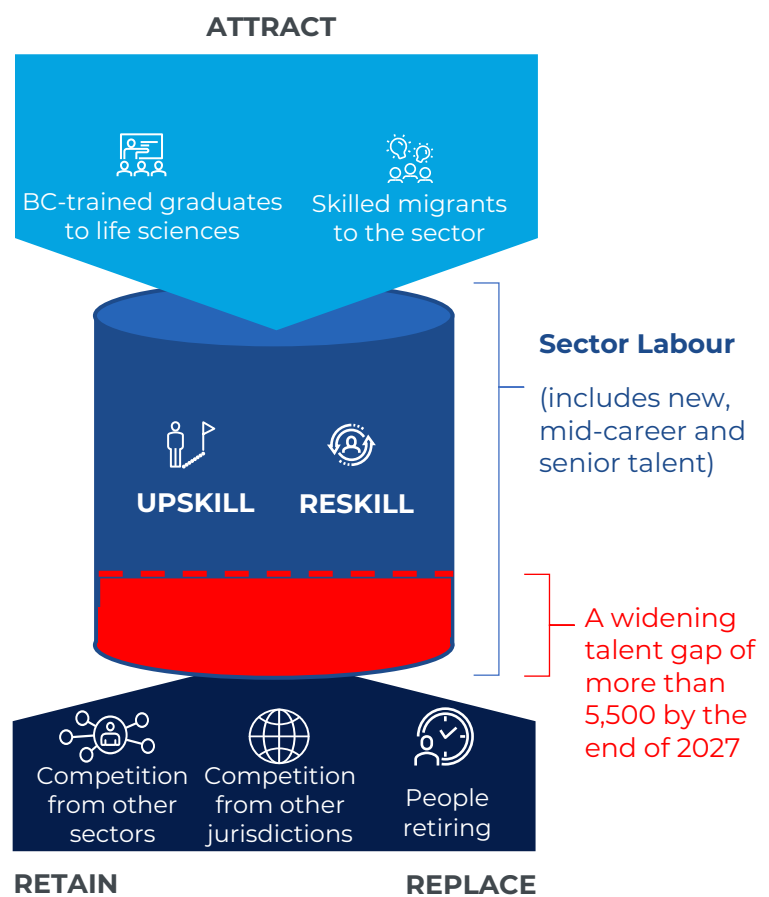


Figure 13: The Life Sciences Labour Supply Puzzle
Source: KPMG analysis

^v This section is a synthesis of research and labour market modelling conducted over the course of this labour market intelligence study. Data sources include reviews of over 50 sources of publicly available data and life sciences related literature, engagement activities (surveys, focus groups, and interviews) with over 100 stakeholders, and a labour supply and demand model.

1. ATTRACTING AND RETAINING TALENT

SECTOR STRENGTHS FOR TALENT ATTRACTION AND RETENTION

Presently, B.C.'s life sciences companies are primarily managing their talent attraction and retention efforts at the company level. The recruitment strategies used include traditional approaches like compensation, benefits, engagement initiatives, and rewards programs, alongside more nuanced strategies such as:

- **Collaborating on local recruitment efforts:** Organizations within the sector have begun collaborating to attract top talent through campus and industry networking events (e.g., LSBC Career Connect Day). In certain regions (e.g., Vancouver Island), companies are enhancing recruitment via shared networking opportunities.
- **Tapping national & international labour markets:** Companies are recruiting talent from national and international sources, (e.g., United States and Europe) to address talent supply gaps, supported by foreign talent programs (e.g., VanHack and DEEL).
- **Supporting internal career development:** Organizations provide on-the-job support to assist workers in advancing their careers, including upskilling and reskilling training via industry programs (e.g., CASTL, BioTalent Canada, adMare Academy), leadership development programs, and rotational programs. Furthermore, certain organizations have implemented clear internal promotion ladders, designed to offer meaningful changes in title and compensation.
- **Fostering healthy working cultures:** Organizations seek to foster attractive work cultures that reflect their mission-driven purpose – often related to improving human health and health systems. Organizations noted that the establishment of healthy working cultures may aid in retaining talent. To establish healthy working cultures, organizations promote internal community building, mentoring, and networking. Remote and flexible work arrangements may be offered to relieve affordability concerns for staff in urban centres.

On average, 70% of the sector's new labour supply is projected to come from interprovincial and international migration over the next five years (Figure 9), highlighting the importance of strong national and international recruitment strategies for B.C.'s life sciences companies.

BARRIERS FOR TALENT ATTRACTION AND RETENTION

While B.C.'s life sciences companies are predominantly using company-level initiatives to attract and retain talent, many of the barriers they face are complex and can be challenging to address without sector-wide coordination. New graduates are finding jobs in other sectors and mid-career and experienced leadership are difficult to find.⁴⁵ With nearly 80% of labour demand over the next five years coming from replacement, retention is of critical importance to the sector (**Figure 8**). These barriers are driven by a few key factors:

- **Specialized talent requirements:** The life sciences sector is highly regulated, particularly in pharmaceuticals and medical devices. Navigating these complex regulatory frameworks (e.g., Health Canada, US Food and Drug Administration, International Organization for Standardization) requires deep industry knowledge and unique skillsets, and it can be difficult to attract and retain talent with the expertise needed to ensure compliance. Companies in Canada

also face a shortage of mid-career professionals and senior leaders experienced in the sector, primarily due to the limited scale up and commercialization within the B.C. and Canadian life science sectors compared to their global counterparts. Certain professions within the sector are regulated, adding complexity to attracting talent from outside B.C. In October 2023, legislation was introduced to improve credential recognition for internationally trained professionals for specific professions (e.g., professional biologists, applied biology technicians, registered biology technologists).

- **Local competition for technical talent:** The sector requires specialized skills, such as software development and engineering, that are in high demand across other sectors. Despite a growing number of seats at B.C.'s postsecondary institutions,⁴⁶ several sectors are vying for the same pool of specialized talent, and the life sciences sector competes with healthcare and academia – along with the emerging technology sector – for some specialized skillsets.
- **High cost of living:** In certain regions, the high cost of living relative to sector wages poses a significant hurdle. This is especially true in life sciences hubs like Vancouver, where employees may struggle to afford housing and meet their basic needs on industry-standard salaries.
- **Global competition for talent:** B.C.'s life sciences sector operates in a global talent marketplace and professionals in the sector have opportunities beyond the province. Attracting and retaining talent is increasingly difficult due to global competition, requiring competitive compensation packages. Currently, compensation levels in B.C. are, on average, lower than in Ontario and global hubs like Boston and San Francisco, which provide more competitive wages relative to the cost of living. Moreover, challenges associated with international credential recognition may create barriers that inhibit the timely integration of skilled international workers.
- **Limited awareness:** A key barrier to talent attraction is the lack of awareness about the life sciences sector and the career opportunities within. Recent graduates may not fully understand the breadth and depth of roles within the industry, leading them to explore alternative career paths. Experienced life sciences employees in other jurisdictions may be hesitant to relocate due to the perception of limited opportunities within B.C.'s life sciences sector relative to global life sciences hubs like Boston and San Francisco – a perception which is exacerbated by a lack of home-grown anchor companies.

In Metro Vancouver, more than 1 in 3 employers reported insufficient resources to pay competitive wages.⁴⁷

Key Takeaways

While certain organizations have achieved success through innovative talent attraction and retention strategies, the sector continues to grapple with attracting and retaining skilled talent.

- **B.C.'s (and Canada's) life sciences sector is experiencing a widening talent shortage at all career levels.** Graduates have an array of options across multiple sectors. Mid-career professionals and senior leaders with experience in the sector are rare because of limited scale up and commercialization within the B.C. and Canadian life science sectors. The shortage of

skilled and qualified workers limits the sector's ability to develop home-grown anchor companies and restricts the growth of companies that are prepared to scale.

- **Competition for talent is strong.** Other sectors and jurisdictions attract talent that would be ready to contribute to B.C.'s life sciences sector. Moreover, there is a lack of resources to support companies in attracting talent (both domestically and internationally), and limited awareness about the sector and opportunities within.
- **Challenges with affordability hinder talent attraction and retention efforts.** High cost of living in British Columbia (especially Vancouver) impacts the sector's ability to attract and retain talent. Companies face competition from other jurisdictions in Canada and abroad where the ratio of cost of living to wages provides greater affordability.

2. ADDRESSING TRAINING AND SKILLS NEEDS

SECTOR STRENGTHS FOR ADDRESSING TRAINING AND SKILLS NEEDS

B.C.'s training ecosystem is made up of renowned academic institutions, industry-based training programs, and government support – enabling a technically strong talent supply that is well qualified in life sciences research and scientific literacy. The strengths of the existing training ecosystem include:

- **Strong technical training:** B.C.'s academic ecosystem includes renowned institutions with strong technical programs, including UBC, BCIT, SFU, and UVic (**Table 5**), which lay the foundation for the sector's talent supply.
- **Unique industry-based programs:** Non-academic organizations in B.C. offer sector-specific training programs that deliver training for a range of both technical and non-technical skills. These programs include micro-credentialling and extended learning options for reskilling and upskilling workers in the life sciences sector, including the adMare Academy and others. While micro-credentialling provides an additional avenue for addressing skills gaps, B.C.'s introduction of a [Micro-credential Framework](#) was intended to create a coordinated and consistent approach to micro-credentials, and, while a step in the right direction, it is only designed for use by public post-secondary institutions and further industry coordination is still required. Despite the strength of these programs, program offerings are unable to keep up with sector demand.
- **Provincial government sector-specific support:** The first pillar of B.C.'s [Life Sciences and Biomanufacturing Strategy](#) aims to support future life sciences talent development. This includes an investment in the [Future Ready Action Plan](#), with initiatives such as rapid response training, an increase in the number of seats for technology students, and student financial aid. Additionally, a new National Biomanufacturing Training Centre on BCIT's Richmond campus will help develop industry-recognized biomanufacturing training to current and future employees in the sector to help address the industry's specialized needs. While this provincial support holds promise and will undoubtedly assist in addressing training and skill requirements in the medium- to long-term (starting in 2024 and ramping up to approximately 700 people participating per year by 2026⁴⁸), they do not address the immediate talent shortage in the sector. Additionally, the B.C. government provides support to two pivotal health research funding agencies critical in the development of provincial health research talent: Michael Smith Health Research BC and Genome BC.

These strengths are complemented by in-house training opportunities that help fill unique company-specific and employee-specific skills gaps. Further details on training offerings by the sector are summarized in [Appendix 8: PSI Skills Training Summary](#) and [Appendix 9: Industry and Government Skills Training Summary](#).

BARRIERS FOR ADDRESSING TRAINING AND SKILLS NEEDS

While the training ecosystem in B.C. has areas of strength, the sector recognizes gaps in the nature of training, the number of class spots available in universities, and the agility of the programming available. Specific barriers include:

- **Need for biomanufacturing workers:** The biomanufacturing subsector is expected to grow across B.C. and Canada. By 2029, it is projected that the sector will need 3,400 additional biomanufacturing workers in Metro Vancouver alone.⁴⁹ While the biomanufacturing training centre at BCIT will help alleviate some of this gap, the forecasted worker demand is likely too large to be filled by the new centre and there will still remain a need for experienced talent to be brought in.
- **Non-technical skills gaps:** B.C.'s talent pool is facing gaps in commercialization (e.g., intellectual property, licensing, translational medicine), both in training and experience. Furthermore, new B.C.-trained graduates entering the workforce often require complementary business skills to round out their technical skills (e.g., management, leadership, business and financial acumen).
- **Subsector-specific skills gaps:** Within subsectors like digital health, there are gaps in healthcare-specific sales skills and experience (e.g., understanding of complex health landscape and payment systems).
- **Need for coordination and agility:** Post-secondary institutions alone cannot address the mismatch between sector demand and market supply. These challenges require diverse interventions beyond traditional academic undergraduate, graduate, and diploma programs; some of these needs may be better addressed by upskilling and reskilling through stand-alone courses, part-time accreditation and certificate options, and experiential learning opportunities. Diversity of training providers is also key; private training organizations can complement the role of B.C.'s post-secondary institutions, providing the agility that is needed to respond to the sector's rapidly evolving training and skills needs. Having a coordinated and complementary approach between PSIs and private organizations will enable these training gaps to be filled more effectively.

Key Takeaways

B.C.'s training ecosystem has strengths in technical training and some industry-based programming. While more sector-specific training is planned, they do not address the immediate talent shortage.

- **The sector needs unique skillsets.** In addition to strong technical skills, the sector needs talent with key business skills unique to life sciences (e.g., growing biomanufacturing capabilities) that are required to scale and grow life sciences companies.⁵⁰
- **The sector needs non-traditional training modalities.** Traditional undergraduate and graduate programs provide a supply of new talent, but the sector requires upskilling and

reskilling beyond these programs for a variety of specialized areas, including stand-alone courses, industrial PhD programs, part-time accreditation and certificate options, and micro-credentialing. Both post-secondary institutions and private training organizations have a role to play in developing the agile training ecosystem needed for the sector to thrive.

3. IMPROVING DIVERSITY, EQUITY, AND INCLUSION

SECTOR STRENGTHS IN DE&I

The importance of embracing DE&I is widely acknowledged by the sector. Universally, companies within the sector of all sizes recognize the importance of prioritizing DE&I initiatives. Moreover, embracing DE&I is widely acknowledged as a catalyst for innovation and an important strategy for growing the talent pool. Companies leading in this area tend to be larger companies with national and/or international presence. These organizations typically have invested in DE&I strategies and policies that complement their DE&I objectives and may have dedicated resources responsible for DE&I initiatives. Furthermore, these companies have mature DE&I practices, including training to help provide employees with the necessary knowledge and tools to support DE&I, as well as DE&I tracking, targets, and programs. Some companies also report on diversity metrics and targets.

However, these companies are the minority; only 42% of B.C. life sciences companies have established DE&I programs aimed at attracting, retaining, or advancing a diverse workforce.^{vi}

BARRIERS FOR IMPROVING DE&I

In general, there are gaps between current practices in B.C.'s life sciences sector and DE&I best practices, impacting talent recruitment, training, and retention across the sector. Sector stakeholders acknowledge the need to continue including equity-deserving groups in order to establish the sector as a truly diverse, equitable, inclusive, and innovative environment.

Many B.C. life sciences companies, especially those that have fewer than 50 employees and are growing, grapple with implementing DE&I best practices. The programs that do exist and encompass initiatives like DE&I training, remain underdeveloped. Most small and medium companies, which make up the majority of the sector, often work with limited budgets and have an immediate focus on revenue generation, which may constrain their priorities and ability to allocate resources to DE&I efforts. However, these companies do recognize the importance of DE&I initiatives such as recruiting from diverse talent pools, community and mentorship, and pay equity.

Further, as indicated above, only 23% of B.C. life sciences companies monitor DE&I metrics, and even fewer have specific DE&I targets.^{vii} This lack of data impedes a comprehensive understanding of sector-wide DE&I challenges and the creation of targeted strategies to address gaps.

Beyond internal DE&I efforts, the sector also recognizes the ongoing need to build relationships with Indigenous Communities in alignment with the Truth and Reconciliation Commission of Canada: Business and Reconciliation (Call to Action 92), which underscores the corporate sector's role in

^{vi} Based on the results of the sector survey conducted in this study.

^{vii} Based on the results of the sector survey conducted in this study.

adopting the United Nations Declaration on the Rights of Indigenous Peoples as a framework for reconciliation. Within the sector, a key challenge is the lack of participation from Indigenous Communities. The sector has the opportunity to establish collaborative relationships with Indigenous organizations – fostering a deeper understanding of these challenges and paving the way for inclusive, informed engagement initiatives.

Key Takeaways

- **There are diversity gaps in the sector.** Stakeholders recognize gaps in diversity – particularly among equity-deserving groups. However, only a few companies track data on DE&I, making it difficult to develop deeper understanding of the gaps.
- **Indigenous engagement must become a priority.** Stakeholder acknowledged the importance of increasing Indigenous engagement within the sector, and that steps must be taken to foster meaningful relationships with Indigenous organizations.
- **There are opportunities to formalize DE&I practices.** With less than half of sector companies having programs to attract, retain, or advance a diverse workforce, there are significant ranges in how companies address DE&I and opportunities exist to share resources and leading practices across the sector.

SECTION 4:

Sector-Led Recommendations to Address Labour Market Barriers

B.C. is home to Canada’s fastest growing life sciences sector, and a healthy labour market is critical to sustaining its growth. In the face of increasing labour market pressures, the sector recognizes there are opportunities to work together to address common challenges and help foster a globally competitive life sciences ecosystem.

B.C.’s life sciences sector has experienced unprecedented growth over the past few years and this momentum is expected to continue. But **emerging gaps between labour supply and demand are projected to widen, creating a threat to the sector’s growth trajectory.** Through this study, stakeholders have raised common labour market challenges, such as bringing qualified talent to B.C., retaining and upskilling the workforce, and building awareness around B.C.’s strengths. There is also a need to create a strong investment climate that will help drive more capital into the province to create and grow companies, which will increase the attractiveness of the sector as an employer.

This study has presented an opportunity for stakeholders to align on strategic objectives and recommendations to help ensure the sector has access to the right talent required to continue to grow. B.C.’s life sciences sector has the potential to become a global life sciences hub.

The following four pillars represent the overarching goals developed by the sector for the sector, each with accompanying recommendations and future actions to help foster a globally competitive life sciences ecosystem. Sector stakeholders – including industry partners, provincial and federal government, academic and training organizations, equity-deserving groups, and supporting services – must all play important roles in prioritizing and leading the implementation of these recommendations.^{viii}

^{viii} Further coordination, strategic planning and implementation is required to carry out on these suggested actions, which was not in scope of this Labour Market Intelligence Study.

RECOMMENDATION SUMMARY

Four key pillars were identified by sector stakeholders, with seven recommendations to address labour market challenges:



ESTABLISH A
SINGLE VOICE
FOR THE SECTOR

1. **Create a sector talent council** to prioritize and act on the life sciences sector labour and talent needs



FOSTER A GLOBALLY
COMPETITIVE
ECOSYSTEM

2. **Promote the development of a competitive environment for B.C.'s life sciences sector** to attract and retain skilled talent from other jurisdictions
3. **Develop a strategic talent attraction marketing plan for B.C.'s life sciences sector** to promote the sector as a highly desirable life sciences employment and economic hub



BUILD SECTOR
CAPACITY AND
CAPABILITIES

4. **Develop sector-specific DE&I strategy and resources** to create a more diverse, equitable and inclusive life sciences sector in B.C. and enable the sector to tap into underrepresented communities as an immediate source of talent
5. **Enable a responsive, best-in-class training ecosystem** that builds on existing offerings to address current and future workforce needs at all career levels



INVEST IN
FUTURE
GROWTH

6. **Begin consultations and relationship building with Indigenous organizations** to understand how to foster meaningful sector engagement
7. Enable the acceleration of top-tier talent development, attraction and retention by **exploring innovative ways to nurture and anchor more B.C. life sciences companies**

RECOMMENDATION DETAILS



ESTABLISH A **SINGLE VOICE** FOR THE SECTOR

1

Create a sector talent council to prioritize and act on the life sciences sector labour and talent needs

Create a diverse and representative council, inclusive of representatives from academia, research, and industry, to serve as a centralized support function for the sector in B.C. The focus of this council could be to:

- Evaluate and prioritize labour, talent and workforce needs within the sector;
- Drive workforce initiatives, including policy and advocacy for programs such as those addressing out-of-country recruitment challenges;
- Facilitate collaboration across the industry to amplify best practices in talent management, recruitment, retention and DE&I efforts;
- Monitor sector needs and talent trends to develop proactive and coordinated sector response; and
- Serve as a voice for the sector on workforce-related matters.



FOSTER A **GLOBALLY COMPETITIVE ECOSYSTEM**

2

Promote the development of a competitive environment for B.C.'s life sciences sector to attract and retain skilled talent from other jurisdictions

Work with other sectors, provincial and federal bodies, and their counterparts to develop policies that enable future sector growth. This may include addressing regulatory barriers to retaining technical talent (e.g., engineers), and creating favourable immigration policies that facilitate the timely entry of skilled international workers. Specifically:

- Develop and enhance programs that provide support and opportunities for spouses and family members of skilled professionals;
- Advocate for the streamlining of work visa processes for highly skilled individuals to help minimize delays that deter talent (e.g., adding the life sciences sector as a strategic priority area to the B.C. Provincial Nominee Program);
- Advocate for continued improvements in the recognition of international qualifications that are valuable to the life sciences industry;

- Advocate for the removal of barriers that inhibit companies from recruiting skilled talent to B.C. (e.g., professional licensee engineering regulation); and
- Advocate for the development of clear pathways to permanent residency for qualified professionals to help them become long-term contributors to the sector, the province, and the country.

3

Develop a strategic talent attraction marketing plan for B.C.'s life sciences sector to promote the sector as a highly desirable life sciences employment and economic hub

Leveraging provincial and other resources, collaborate within the sector – including academic institutions, businesses, and government – to develop, support and execute a talent attraction marketing plan.

The plan should include:

- Increase the visibility of the sector, showcasing the sector at networking events, and highlighting career opportunities and success stories of those within the sector;
- Highlight the benefits of working in the sector and opportunities for impactful research and collaboration;
- Promote a world-leading education, training and innovation ecosystem;
- Develop resources that attract and empower top talent thereby enhancing competitiveness, fostering innovation, and promoting industry growth; and
- Demonstrate the long-term vision and prospects for the sector, highlighting government commitments and the sector's unique collaborative environment.



BUILD SECTOR **CAPACITY AND CAPABILITIES**

4

Develop a sector-specific DE&I strategy and resources to create a more diverse, equitable and inclusive life sciences sector in B.C. and enable the sector to tap into underrepresented communities as an immediate source of talent

Create and implement a strategy to promote DE&I along with accompanying resources to provide practical guidelines and best practices. Key steps in development could include:

- Conduct a current state assessment of the sector's DE&I landscape to identify gaps and barriers;
- Engage with stakeholders, including those who are underrepresented in the sector, to develop a DE&I strategy that is comprehensive, culturally sensitive, and aligned with the needs of stakeholders; and
- Establish sector-wide goals and transparent measurement and reporting mechanisms.

These initiatives may be driven by a sector talent council and/or partnerships with existing organizations in this space (e.g., TAP Network).

5

Enable a responsive, best-in-class training ecosystem that builds on existing offerings to address current and future workforce needs at all career levels

Leverage existing strategies and partnerships to bring together academic, commercial and other relevant stakeholders to address current workforce needs and curate a training ecosystem that is responsive to future workforce needs. This may include:

- Strengthen partnerships with academic institutions to explore opportunities to include sector training needs (e.g., regulatory affairs, biomanufacturing) and funding organizations to build on potential funding opportunities;
- Improve the bridge between academic programs and industry jobs by expanding experiential opportunities, such as internship offerings;
- Explore innovative solutions and partnerships to address needs that are best addressed by non-academic stakeholders;
- Support and promote industry-specific micro-credentialing offerings (including those funded by the Ministry of Post-Secondary Education and Future Skills) for upskilling and reskilling the workforce; and
- Support the development of segmented training programs for different talent groups (e.g., senior level, mid-level or new talent) that addresses the unique needs of each group.



INVEST IN **FUTURE GROWTH**

6

Begin consultations and relationship building with Indigenous organizations to understand how to foster meaningful sector engagement

Support Indigenous-led B.C.-wide review of the sector to better understand barriers to engagement and identify opportunities for supporting Indigenous inclusion in the life sciences workforce, in alignment with the Truth and Reconciliation Commission of Canada: Call to Action 92. Depending on the engagement and review, initiatives may include:

- Expand Indigenous cultural safety learning and training opportunities for life sciences employers to be prepared to welcome, understand and support Indigenous workers; and
- Collaborate with Indigenous researchers and experts on projects that align with community priorities and concerns.

7

Enable the acceleration of top-tier talent development, attraction and retention by **exploring innovative ways to nurture and anchor more B.C. life sciences companies**

Partner with stakeholders within and beyond the sector to explore innovative and creative ways to accelerate the growth of a top-tier talent pool with the right skillsets. This will set up the sector for sustainable success for future generations to:

- Showcase a competitive sector with a collaborative and vibrant community;
- Strengthen partnerships between industry, academia and government to support the growth of home-grown companies;
- Create the infrastructure, talent and capital environment for the incubation of B.C start ups and commercialization of B.C. innovations;
- Nurture a cluster of industry leaders that attract talent and capital and create a hub of life sciences activity within B.C.; and
- Continue investment in programs that bring research trained innovators into the industry, including developing programs to encourage post-secondary graduates to seek employment in B.C.

CONCLUSION

B.C.'s life sciences sector faces a labour gap that is forecasted to grow in the coming years. Sector stakeholders have demonstrated a resolute commitment to address this challenge head on and the seven strategic recommendations above have been shaped by the complexity of this challenge. Although it is complex, this challenge is achievable. Led by the sector, and through collaboration with government and academia, action can be taken to address B.C.'s life sciences talent shortage. The sector has the opportunity to bridge this gap and pave the way for a future in which B.C. becomes a global life sciences hub providing health innovation and sustainable economic growth enhancing the well-being and prosperity of residents in B.C. and across Canada.

The image features a dark blue background with an abstract graphic design on the left side. The design consists of several overlapping, rounded rectangular shapes in various shades of blue and white, creating a sense of depth and movement. The shapes are layered, with some appearing to be in front of others, and they curve and flow downwards. The overall aesthetic is modern and clean.

APPENDICES

Appendix 1: Governance Committee

The Governance Committee comprised representatives from various sectors within B.C.'s life sciences industry, encompassing academic institutions, businesses, and national collaborators. This committee played a pivotal role in overseeing this study, as well as provided feedback and validation of the methods, key findings, and recommendations. Lastly, the Governance Committee provided their endorsement for this labour market study.

The following individuals formed the Governance Committee:

Ali Ardakani

Founder & Managing Director, Novateur Ventures
Chair, Board of Directors, LSBC

Lisa Chu

Dean, School of Health Sciences, British Columbia
Institute of Technology

Tom Frohlich

Co-Founder, Chinook Therapeutics

Rob Henderson

President & CEO, BioTalent Canada

Geoff Payne

President and Vice Chancellor, University of
Northern British Columbia

Helen Sheridan

Chief Human Resources Officer, STEMCELL
Technologies

Greg Block

Co-Founder & CEO, Histone Therapeutics

Amanda Fox

Senior Director, People & Culture, Aspect
Biosystems

David Helliwell

Co-Founder & Executive Board Chair, Thrive Health
Member, Board of Directors, LSBC

Robert McMaster

Vice Dean, Research, University of British Columbia

Pamela Potts

Senior Vice President, People & Culture, StarFish
Medical

In addition, the following individuals participated in the Governance Committee as *ex officio* members:

Todd Bailey

Director of Special Projects, Ministry of Jobs,
Economic Development and Innovation

Cecile Lacombe

Executive Project Director, Research and Innovation,
Ministry of Jobs, Economic Development and
Innovation

Susannah Machelak

Senior Program Manager, Ministry of Post-
Secondary Education and Future Skills

Profound appreciation is extended to the distinguished members of the Governance Committee for their unwavering dedication, exceptional expertise, and astute contributions, all of which have greatly enriched the project's progress and outcomes.

Appendix 2: Labour Demand and Supply Forecast

Objective

The objective of the labour demand and supply forecasting was to generate projections for labour demand and supply in B.C.'s life sciences sector over the five-year period spanning from 2023 to 2027. The goal was to determine the extent of the talent shortage, which refers to the difference between the projected labour demand and the projected available labour supply.

Methodology

MODEL SELECTION

The labour demand and supply forecasting was conducted using time series modelling, which is a common approach in forecasting that predicts future values based on previously observed values. Specifically, a panel Vector Error Correction model (VECM) was used, which is a statistical technique used to analyze the long-run relationships (i.e., trend behavior) and short-run dynamics (i.e., policy implications of wage changes over the labour demand) among multiple variables. Statistical best practices were used to validate the functional form of the VECM and confirm its suitability over other types of time series models.

MODEL ASSUMPTIONS

There are four key assumptions underlying a panel VECM:

1. The past influences the future.
2. The variables that significantly influence labour demand and supply are explicitly included in the model and these variables have stable long-term relationships with each other (referred to as co-integration).
3. The variables under consideration are stationary in their first differences. Stationarity means that the variables do not exhibit consistent upward or downward trends over time and instead fluctuate around an average value.
4. There is a long-run equilibrium relationship among the variables, which implies that any deviations from this equilibrium are eventually corrected. Even if the variables temporarily move away from their balanced relationship (i.e., their average), they will eventually return to that balance.

MODEL SPECIFICATION

Based on economic literature, labour demand and labour supply have been modelled as a function of the following variables:

Labour Demand	Labour Supply
GDP	Labour force
Labour productivity	Graduates from relevant academic programs
Wages	Migration
Cost of capital	Retirement
Job vacancies	Labour supply elasticity
Employment	

Table 10: Labour Demand and Supply Model Parameters
 Source: KPMG analysis

The nature of the VECM is such that the variables within the model influence each other. For example, this means that labour demand impacts GDP and the other variables, while GDP impacts labour demand and the other variables. The only exception is the cost of capital, which is exogenous and determined by the Bank of Canada rate.

Data Sources and Mapping

This report's forecasts used data sources from Statistics Canada. To have data at the correct level of granularity and specificity for the B.C. life sciences sector, certain data mapping was required, and assumptions were taken to support this data mapping. Assumptions were validated with project stakeholders.

The following table details the data source and considerations used for each model parameter for the labour demand and supply models.

Variable	Data Source ^{ix}	Data Mapping
Employment	Statistics Canada. Table 33-10-0661-01 Statistics Canada. Table 14-10-0201-01	<ul style="list-style-type: none"> Used business count data to create employment estimate-based allocation keys, which map data to the B.C. life sciences sector at the 6-digit NAICS code level. Used methodology that is consistent with the one used for the 2023 B.C. Sector Profile Report (see Appendix A, page 44).

^{ix} In some cases, the most recent data set (2022) has been linked, however the same series was used for all previous years (2008-2021).

Variable	Data Source ^{ix}	Data Mapping
Job Vacancies	Statistics Canada. Table 14-10-0326-01 Statistics Canada. Table 14-10-0225-01	<ul style="list-style-type: none"> Used employment-based allocation keys to map data to the B.C. life sciences sector at the 6-digit NAICS code level.
GDP	Statistics Canada. Table 36-10-0402-01	<ul style="list-style-type: none"> Generated bi-annual data points in June and December of each year. Used employment-based allocation keys to map data to the B.C. life sciences sector at the 6-digit NAICS code level.
Labour Productivity	Statistics Canada. Table 36-10-0489-01	<ul style="list-style-type: none"> Generated bi-annual data points in June and December of each year. Calculated labour productivity as: $GDP / (Employment \times \text{Hours worked})$, where average hours worked was calculated as: $Total\ hours\ worked / Total\ number\ of\ jobs$.
Wages	Statistics Canada. Table 36-10-0489-01	<ul style="list-style-type: none"> Generated bi-annual data points in June and December of each year. Assumed consistency in wage rates between available data (3- or 4-digit NAICS code level) and the 6-digit NAICS code level required for the B.C. life sciences sector.
Bank of Canada Rates (e.g., Cost of Capital)	Statistics Canada. Table 10-10-0139-01	<ul style="list-style-type: none"> Selected bi-annual data points from June and December of each year.
Labour Force	Statistics Canada. Table 14-10-0019-01 Statistics Canada. Statistics Canada. Census Data.	<ul style="list-style-type: none"> Estimated qualified labour force for the life sciences sector as holders of postsecondary certificates, diplomas or degrees. Assumed sector was comprised of 70% of jobs requiring STEM qualifications in (i) physical and life sciences and technologies, (ii) mathematics, computer and information sciences and (iii) health and related fields AND 30% of jobs requiring non-STEM qualifications such as (i) social and behavioural sciences and law, (ii) business, management and public administration, and (iii) architecture, engineering, and related trades. Applied unemployment rate for qualified labour force to B.C. life sciences sector employment to estimate sector labour force.
Graduates from Relevant	Statistics Canada. Table 37-10-0012-01	<ul style="list-style-type: none"> Generated bi-annual data points in June and December of each year.

Variable	Data Source ^{ix}	Data Mapping
Academic Programs	Statistics Canada. Statistics Canada. Census Data.	<ul style="list-style-type: none"> Estimated the number of qualified graduates using the same assumptions as the overall labour force (i.e., postgraduate diploma or degree AND 70% / 30% split between STEM and non-STEM fields of study). Estimated the share of graduates that remain in B.C. using census data. Allocated a share of graduates to the life sciences sector using the employment-based allocation keys relative to competing sectors.
Migration	Statistics Canada. Table 17-10-0040-01 Statistics Canada. Table 98-10-0443-01 Statistics Canada. Table 17-10-0040-01 Statistics Canada. Table 98-10-0443-01	<ul style="list-style-type: none"> Generated bi-annual data points in June and December of each year. Estimated net international and interprovincial migration based on inbound and outbound migration figures. Estimated the number of qualified migrants in the labour force using the same assumptions as the overall labour force (i.e., postgraduate diploma or degree AND 70% / 30% split between STEM and non-STEM fields of study) by timing of immigration. Allocated a share of migrants to the life sciences sector using the employment-based allocation keys relative to competing sectors.
Retirement	N/A – no information exists on the number of retirees in B.C.	<ul style="list-style-type: none"> Assumed all qualified individuals in the labour force over the age of 65 years will retire. Allocated a share of retirees to the life sciences sector using the employment-based allocation keys relative to competing sectors.
Labour Force Elasticity	Statistics Canada. Table 11-10-0239-01 Statistics Canada. Table 36-10-0489-01	<ul style="list-style-type: none"> Created instrumental variable using the log of non-labour income, life sciences sector wages, and competing sector wages. Generated bi-annual data points in June and December of each year.

Table 11: Labour Demand and Supply Model Inputs
Source: KPMG analysis

Forecasting Limitations

As with all forecasting, the accuracy of the projections can be influenced by:

1. **Inherent uncertainty of the future:** There may be exogenous events, as demonstrated by the COVID-19 pandemic, that drastically alter the outlook of B.C.'s life sciences sector. Examples of such events include global economic shifts, policy decisions in other provinces with a strong life sciences presence, and technological changes that materially impact the productivity of B.C.'s life sciences sector.
2. **Sector definition:** Sector-based data in Canada is classified using the NAICS code system. These codes do not directly align with B.C.'s life sciences sector. We relied on the NAICS codes used in the 2023 B.C. Sector Profile Report, with the addition of the Digital Health subsector.
3. **Reliance on assumptions:** As granular life sciences data was not available, certain data mapping was performed to allocate more aggregate data to B.C.'s life sciences sector.
 - Several NAICS codes included in the sector definition contained both life sciences and non-life sciences companies. Canada-specific data on the companies included in each NAICS code were not publicly available. Following common practices, data from US-based databases were relied upon to determine the share of life sciences companies in these NAICS codes. The data did not exist in the public domain to determine whether the resulting allocations were accurate for Canada.
 - Numerous data points were available at 3- or 4-digit NAICS code levels and assumptions were taken to allocate these data points to the required 4- or 6-digit level. The data did not exist in the public domain to determine whether these allocations were accurate.
4. **Selection of historical time horizon:** The time horizon for historical data (i.e., June 2008 to December 2022) and frequency of the data (i.e., bi-annual) were dictated by the availability of Statistic Canada's Canadian Business Count data series. Where other data points did not match this time horizon or frequency, reasonable assumptions were taken to modify these data sources to match the length and frequency of the business count data. The time horizon and frequency used may have an impact on the forecast due to the types of trends that are captured as a result.
5. **Historical data inaccuracies:** Forecasts depend on past values to determine future projections. Any data inaccuracies in the source data may affect the trajectory of forecasts by a significant amount.

As a result, there is a degree of uncertainty associated with the labour market forecasts in this report and the results should be interpreted with caution.

Appendix 3: Employer Survey Characteristics

Below is a summary of the results of the employer survey by key indicator such as subsector, location, company age, and more.

The respondents were able to submit the employer survey without completing every question. As a result, the sample size (“n”) may vary across the different questions.

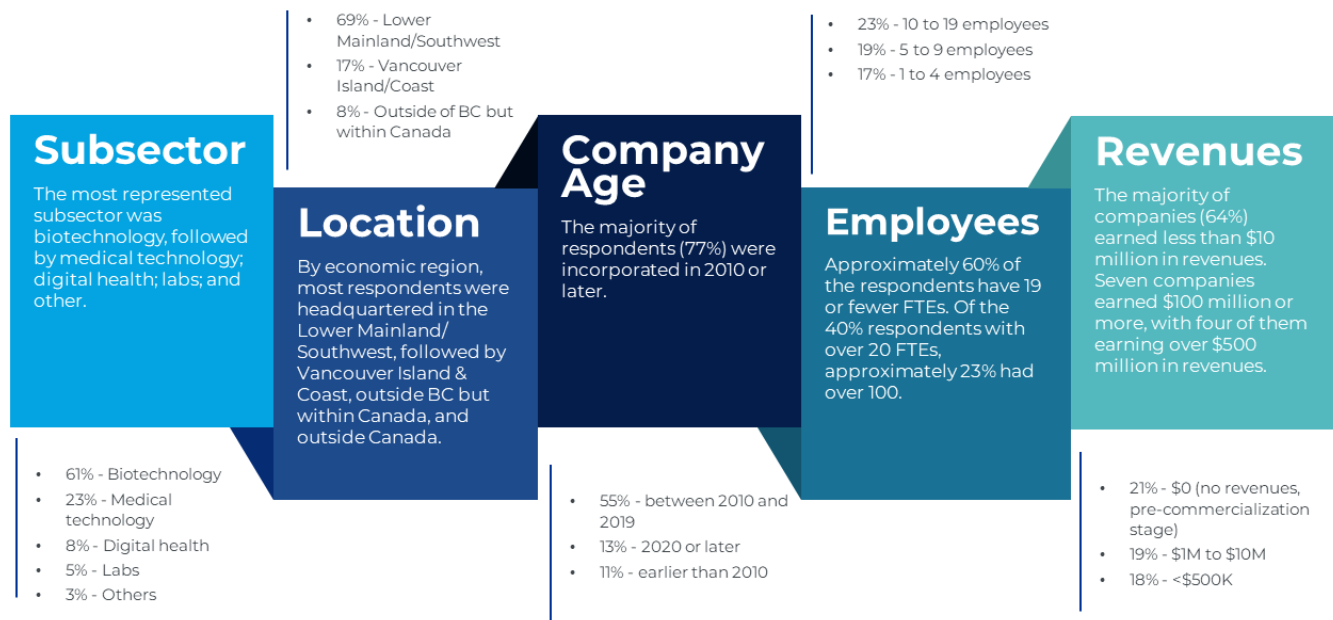


Figure 14: Key Characteristics of Survey Respondents

Source: KPMG analysis of completed surveys

Based on the survey respondents' selection of their primary operating subsector,^x the most represented subsector was Biotechnology, followed by Medical Technology, Digital Health, Labs and others.^{xi} As the survey is not a representative sample of the sector, the information gathered through the survey was used to inform further stakeholder consultation and modelling rather than a single source for drawing insights.

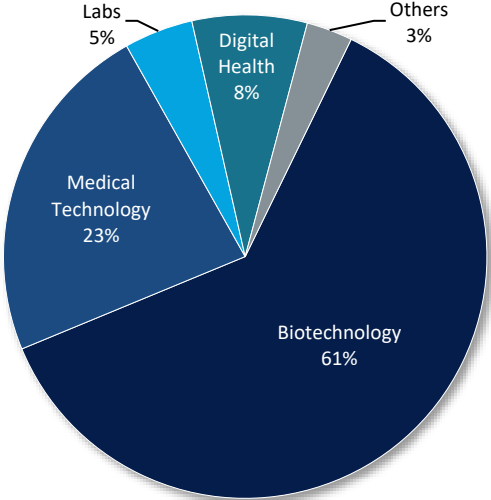


Figure 15: Subsector Distribution of Survey Respondents (n=67)
 Source: KPMG analysis of completed surveys

By economic region, most respondents were headquartered in the Mainland / Southwest, followed by Vancouver Island, outside B.C. but within Canada, and outside Canada. Organizations headquartered outside of B.C. also had B.C. operations, which were the focus of the survey.

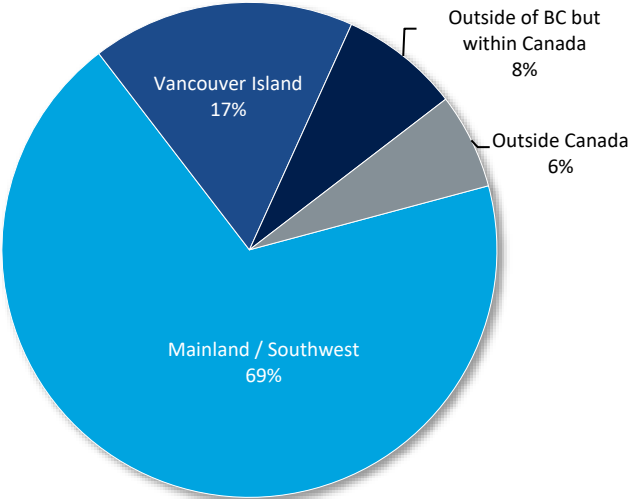


Figure 16: Summary of the Economic Regions of Survey Respondents (n=65)
 Source: KPMG analysis of completed surveys

^x In the employer survey, respondents were asked to rank their top three subsectors of operation. Figure 15 summarizes the distribution of respondents based on their selection of their top (i.e., primary) subsector.
^{xi} The 'others' category includes a biopharmaceutical company and a cannabis product manufacturing.

Of the survey respondents, the majority were private companies (79%), while the remaining 21% were publicly traded companies.

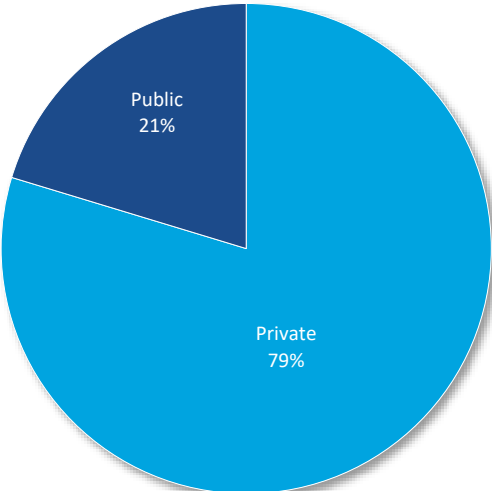


Figure 17: Distribution of Publicly Traded versus Private Companies among Survey Respondents (n=66)
 Source: KPMG analysis of completed surveys

The table below provides a summary of the year of incorporation for the respondents. The majority of respondents (77%) were incorporated in 2010 or later.

Year of Incorporation	Number of Companies	Percentage of Companies
2020 or later	9	13.4%
Between 2010 and 2019	37	55.2%
Between 2000 and 2009	6	9.0%
Earlier than 2000	7	10.5%
Not provided	8	11.9%
Total	67	100.0%

Table 12: Summary of Years of Incorporation of Survey Respondents (n=67)
 Source: KPMG analysis of completed surveys

The table below provides a summary of revenue earned by the survey respondents. 20.9% of companies earned no revenues during their most recent fiscal year. The majority of companies (64.2%) earned less than \$10 million in revenues. Seven companies earned \$100 million or more, with four of them earning over \$500 million in revenues.

Revenues	Number of Companies	Percentage of Companies	Cumulative Percentage
\$0 (no revenues)	14	20.9%	20.9%
\$1 to \$499,999	12	17.9%	38.8%
\$500,000 to \$999,999	4	6.0%	44.8%
\$1,000,000 to \$9,999,999	13	19.4%	64.2%
\$10,000,000 to \$49,999,999	6	9.0%	73.1%
\$50,000,000 to \$99,999,999	4	6.0%	79.1%
\$100,000,000 to \$199,999,999	1	1.5%	80.6%
\$200,000,000 to \$299,999,999	0	0.0%	80.6%
\$300,000,000 to \$399,999,999	2	3.0%	83.6%
\$400,000,000 to \$499,999,999	0	0.0%	83.6%
Over \$500,000,000	4	6.0%	89.6%
Prefer not to answer	6	9.0%	98.5%
No response	1	1.5%	100.0%
Total	67	100.0%	

Table 13: Revenues Earned by Survey Respondents (n=65)

Source: KPMG analysis of completed surveys

Approximately 60% of the respondents have 19 or fewer full-time equivalent employees (FTEs. Of the 40% respondents with over 20 FTEs, approximately 23% had over 100.

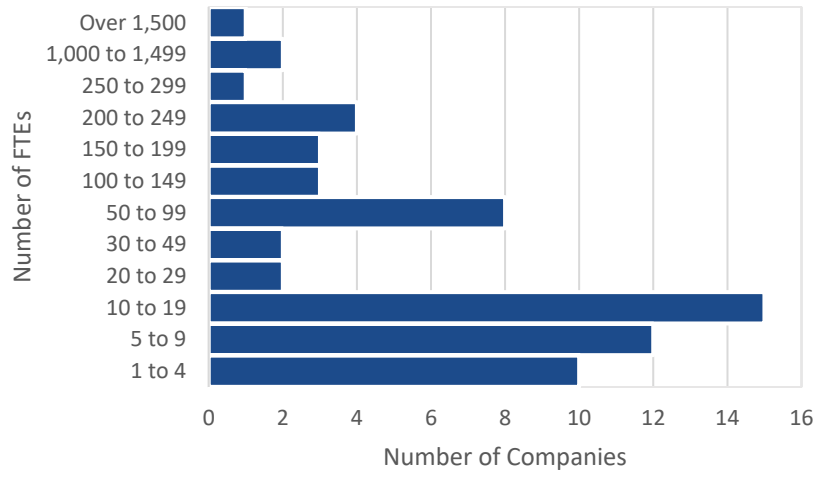


Figure 18: Distribution of Firm Size by FTEs of Survey Respondents (n=64)
Source: KPMG analysis of completed surveys

Appendix 4: Focus Group and Interview Participants

Eleven focus groups were conducted during the primary research. The focus groups were designed to group stakeholders with common traits. Focus groups were conducted for the following categories:^{xii}

- 100+ employees
- Biotechnology SMEs
- Medical technology
- Digital health
- PSIs and other training institutions
- Vancouver Island (2)
- Northern B.C. (2)
- Interior B.C. (2)

Eighteen interviews were conducted with stakeholders from across the industry, including biotechnology, medical technology, and digital health companies, as well as stakeholders from academia and the clinical trial network. Interviews were conducted for the following categories:

- Biotechnology (2)
- Digital health (2)
- Medical devices and diagnostics (2)
- Company in the commercial stage of operations (2)
- Company with regulatory/marketing approval
- Start-up in clinical stage
- Organization with commitment to diversity
- Contract research organization
- Life sciences entrepreneur
- Life sciences investor
- 100+ employees
- PSIs (2)
- Clinical trial network

^{xii} While the Mainland / Southwest represents the largest region for life sciences activity in B.C., a separate focus group was not conducted for this region as these companies were well represented in the other focus groups.

Appendix 5: Sector Definition

LIFE SCIENCES NAICS CODES

For the purposes of this report, the following NAICS codes have been included in the definition of the life sciences sector.

Subsector	NAICS Code	NAICS Code Description
Biotechnology	3254	Pharmaceutical and medicine manufacturing
	414510	Pharmaceutical and medicine wholesalers
Medical Technology	339110	Medical equipment and supplies manufacturing
	417930 *	Professional machinery, equipment and supplies merchant wholesalers
Labs	541380	Testing laboratories
	541710 *	Research and development in the physical, engineering and life sciences
	6215	Medical and diagnostic laboratories
Digital Health	513211 *	Software publishers (except video game publishers)
	541514 *	Computer systems design and related services (except video game design and development)

Table 14: B.C. Life Sciences Sector Definition

Source: KPMG analysis

The NAICS codes marked with an asterisk (*) include companies in the life sciences sector, as well as companies that operate outside the sector. Therefore, only a portion of the companies in these NAICS codes was included in the forecasting analysis.

- For the NAICS codes in the Medical Technology and Labs subsector, assumptions were taken in line with the [2023 B.C. Sector Profile Report](#). Specifically, 36% of the companies listed under NAICS code 417930 were included in the business count and employment data, while 41% of the companies listed under NAICS code 541710 were included in the business count data and 47% of the companies were included in the employment data. For further details on the analysis supporting these assumptions, see Appendix A of the [2023 B.C. Sector Profile Report](#) (pages 45 and 46).
- For the NAICS codes in the Digital Health subsector, KPMG conducted an analysis in Dun & Bradstreet's Hoovers database. Specifically, KPMG identified the companies located in B.C. under each of these NAICS codes and conducted a keyword search for "health" or "healthcare". Approximately 10% of the companies listed in each code used these keywords in their description. Accordingly, 10% of the companies in each of these NAICS codes were included in the business count and employment data.

As noted in *Section 1*, the sector definition used in this LMI Study differs from the 2023 B.C. Sector Profile Report in that it includes the Digital Health subsector. Additionally, the business count and employment data presented in this study uses more recent data than the 2023 B.C. Sector Profile Report (December 2022 and December 2021, respectively). These two factors resulted in a difference in the business count and employment data, as summarized in the table below.

Subsector	2023 B.C. Sector Profile Report (December 2021)			LMI Study (December 2022)		
	Total Business Count	Business Count with Employees	Employment	Total Business Count	Business Count with Employees	Employment
Biotechnology, Medical Technology and Labs	2,277	1,338	19,100	2,342	1,360	21,891
Digital Health	n/a	n/a	n/a	1,223	458	6,579
Total	2,277	1,338	19,100	3,565	1,818	28,470

Table 15: Comparison between 2023 B.C. Sector Profile Report and LMI Study
Source: KPMG analysis

COMPETING SECTOR NAICS CODES

For the purposes of this report, the following NAICS codes have been included in the definition of the competing sectors.

Sector	NAICS Code	NAICS Code Description
Technology	334110	Computer and peripheral equipment manufacturing
	513211 *	Software publishers (except video game publishers)
	518210	Computing infrastructure providers, data processing, web hosting, and related services
	519290	Web search portals and all other information services
	541514 *	Computer systems design and related services (except video game design and development)
Healthcare	6211	Offices of physicians
	6212	Offices of dentists
	6213	Offices of other health practitioners
	6214	Out-patient care centres
	6216	Home health care services
	6219	Other ambulatory health care services

Sector	NAICS Code	NAICS Code Description
	622	Hospitals
	623	Nursing and residential care facilities
Academia	6112	Community colleges and CEGEPs ^{xiii}
	6113	Universities
	6114	Business schools and computer and management training

Table 16: Sector Definition for Competing Sectors

Source: KPMG analysis

The NAICS codes marked with an asterisk (*) include companies in the life sciences sector, as well as companies that operate outside the sector. In both cases, 10% of the companies in these NAICS codes have been included in the life sciences sector definition (as the Digital Health subsector) and the remaining 90% have been included in the technology sector definition.

^{xiii} CEGEPs operate exclusively in Quebec and publicly funded colleges that provide a mix of technical, vocational and academic programs.

Appendix 6: Life Sciences Workforce Definition

The NOC system is a standard occupational classification system that categorizes the entire range of occupational activity in Canada for collecting, analyzing, and disseminating occupational data for labour market information and employment related program administration. KPMG identified the following NOC codes based on the NAICS codes included in the sector definition for B.C.'s life sciences sector and data from Statistics Canada.

NOC Code	NOC Code Description
1001	Administrative services managers
1110	Auditors, accountants and investment professionals
1120	Human resources and business service professionals
1201	Administrative and financial supervisors
1210	Administrative and regulatory occupations
1220	Accounting, insurance and related business administrative occupations
1310	Administrative, property and payroll officers
1311	Office administrative assistants - general, legal and medical
1410	Office support and court services occupations
1420	Financial, insurance and related administrative support workers
1440	Supply chain logistics, tracking and scheduling coordination occupations
2001	Managers in engineering, architecture, science and information systems
2110	Physical science professionals
2111	Life science professionals
2112	Public and environmental health and safety professionals
2121	Mathematicians, statisticians, actuaries and data scientists
2112	Computer and information systems professionals
2123	Computer, software and Web designers and developers
2132	Manufacturing and processing engineers
2139	Other engineers
2210	Technical occupations in physical sciences
2211	Technical occupations in life sciences
3212	Medical technologists and technicians
4110	Judges, lawyers and Quebec notaries
5111	Writing, translating and related communications professionals
6002	Retail and wholesale trade managers
6210	Technical sales specialists in wholesale trade and retail and wholesale buyers
6410	Retail salespersons and non-technical wholesale trade sales and account representatives
7202	Contractors and supervisors, technical maintenance trades and heavy equipment and transport operators

NOC Code	NOC Code Description
7240	Machinery and transportation equipment mechanics (except motor vehicles)
7330	Transport truck and transit drivers
9001	Managers in manufacturing and utilities
9201	Supervisors, processing and manufacturing occupations
9202	Supervisors, assembly and fabrication
9310	Central control and process operators in processing and manufacturing
9411	Machine operators and related workers in chemical, plastic and rubber processing
9510	Labourers in processing, manufacturing and utilities

Table 17: NOC Codes for B.C.'s Life Sciences Sector

Source: KPMG analysis of Statistics Canada Labour Force Survey data (custom request)

Appendix 7: Perspectives from Interior and Northern B.C.

The majority of life sciences activity in B.C. is clustered in the economic regions of the Mainland / Southwest and the Vancouver Island region, with smaller pockets of activity in Interior (Thompson-Okanagan and Kootenay regions) and Northern B.C. (i.e., Cariboo, North Coast & Nechako, and Northeast regions), where industry is still at its early stages. To better understand the life sciences ecosystem in the Interior and North, focus groups were held with key stakeholders including representatives from industry, academic institutions, accelerators, and health authorities.

Both regions recognized their unique populations and the region's strengths in close coordination among stakeholders. Both regions also face common challenges including:

- Competing with Mainland / Southwest and Vancouver Island for talent;
- Attracting financial support for the sector in the region; and
- Managing intellectual property between stakeholders.

INTERIOR B.C.

Stakeholders recognized the region's strengths to include:

- **Phase 3 clinical trials:** The region has key infrastructure in place and experience with running Phase 3 clinical trials.
- **Rural and remote health/life sciences applications:** Due to the remote nature of the region, the region has strength in developing life sciences innovations that are portable and mobile.
- **Receptiveness to alternative medicine:** The region has an openness to and understanding of alternative medicine practices, including medical cannabis, psilocybin, and different types of rehabilitation and therapeutics.
- **Connectivity and coordination:** Companies and professionals in the region are very coordinated and connected and the region's strength lies in its close network.
- **Collaboration:** Collaboration between academic institutions, industry and the health authority is common, and this collaboration supports new ideas and helps companies grow.
- **Cost of living:** The region has a lower cost of living than the Mainland / Southwest and Vancouver Island regions.

NORTHERN B.C.

Stakeholders recognized the region's strengths to include:

- **Age technology:** The Centre for Technology Adoption for Aging in the North is a driver of research in the region.
- **Northern Biobank:** The Northern Biobank captures data and specimens from the unique populations of Northern B.C. (e.g., Indigenous populations).
- **Connectivity and coordination:** Companies and professionals in the region are very coordinated and connected and the region's strength lies in its close network.

- **Collaboration:** Collaboration between academic institutions, industry and the health authority is common, and this collaboration supports new ideas and helps companies grow.
- **Cost of living:** The region has a lower cost of living than the Mainland / Southwest and Vancouver Island regions.

Appendix 8: PSI Skills Training Summary

Please note that this list represents main findings and is not meant to be exhaustive. This information was sourced from the websites of these institutions and additional information provided by select post-secondary institutions.

Institution	Economic Region	Degrees, Certificates, and Extended Learning Courses	Extended Learning Summary	Future Initiatives
British Columbia Institute of Technology ⁵¹	Mainland / Southwest	<p>Undergraduate Programs</p> <ul style="list-style-type: none"> • Bachelor of Science – Honours in Biotechnology (BCIT-UBC) • Bachelor of Science – Combined Honours in Biochemistry and Forensic Science • Bachelor of Health Science (Magnetic Resonance Imaging Option) • Bachelor of Science – Radiation Therapy <p>Diplomas</p> <ul style="list-style-type: none"> • Biomedical Engineering Technology • Cardiology Technology • Clinical Genetics Technology • Diagnostic Medical Sonography • Electroneurophysiology • Magnetic Resonance Imaging • Medical Laboratory Science • Medical Radiography • Nuclear Medicine • Prosthetics and Orthotics • Sonography (Cardiac Option) <p>Part-time Certificates</p> <ul style="list-style-type: none"> • Cardiac Sciences • Cardiovascular Perfusion • Digital Health • Forensic Health Sciences • Magnetic Resonance Imaging <p>Part-time Micro-credentials</p>	<p>Member of ACE-WIL.⁵²</p> <p>Offers wide range of education programming aimed at to prepare students to transition to the workforce and address the filling of skills gaps identified by employers within the Life Sciences sector.</p> <p>Students are prepared through a robust focus on hands-on skill development within simulation and laboratory facilities on campus. Industry supported practicums and Co-op provide students with the opportunity to work and learn with real world experience.</p> <p>In addition to co-op and practicums, further learning experiences can be achieved through apprenticeships, student internships, consulting, and capstone projects.⁵³</p>	<p>B.C. National Biomanufacturing Training Centre (NBTC), in partnership with CASTL to deliver hands-on and theoretical training in biopharmaceutical manufacturing from a globally recognized curriculum.⁵⁴</p> <p>Canada's Immuno-Engineering and Biomanufacturing Hub (CIEBH) plan, in partnership with B.C. Biotech Industries, International Pharmaceutical Industries, BCIT, B.C.'s Research Universities (UBC, SFU, UVic, UNBC), Dalhousie University, and University of Waterloo. This plan proposes up to 5 biomanufacturing hubs across Canada to build a solid foundation by strengthening research systems and the talent pipeline in coordination with industry.⁵⁵</p>

Institution	Economic Region	Degrees, Certificates, and Extended Learning Courses	Extended Learning Summary	Future Initiatives
		<ul style="list-style-type: none"> Animal Cell Culture Breast Sonography Musculoskeletal Sonography Sterile Field and the Aseptic Environment 		
Simon Fraser University ^{56, 57}	Mainland / Southwest	<p>Undergraduate Programs</p> <ul style="list-style-type: none"> Bachelor of Applied Science – Biomedical Engineering Bachelor of Science – Biological Physics Bachelor of Science – Biological Sciences Bachelor of Science – Health Sciences Bachelor of Science – Biomedical Physiology Bachelor of Science – Behavioural Neuroscience Bachelor of Science – Molecular Biology and Biochemistry <p>Graduate Programs</p> <ul style="list-style-type: none"> Master of Science and PhD – Biological Sciences Master of Science and PhD – Health Sciences Master of Science and PhD – Biology and Biochemistry 	<p>Member of ACE-WIL.</p> <p>Offers co-op programs, including international co-ops, as part of its undergraduate programs.⁵⁸</p> <p>Offers continuing education with some courses that specialize in business skills and leadership skills, project management, and project communication.⁵⁹</p> <p>Extended learning certifications offered, including a “Certificate in Innovation and Entrepreneurship”, available to students in any faculty through the Beedie School of Business.⁶⁰</p>	Canada’s Immuno-Engineering and Biomanufacturing Hub (CIEBH) plan, in partnership with B.C. Biotech Industries, International Pharmaceutical Industries, BCIT, B.C.’s Research Universities (UBC, SFU, UVic, UNBC), Dalhousie University, and University of Waterloo. This plan proposes up to 5 biomanufacturing hubs across Canada to build a solid foundation by strengthening research systems and the talent pipeline in coordination with industry. ⁶¹
University of British Columbia - Vancouver ^{62, 63, 64}	Mainland / Southwest	<p>Undergraduate Programs</p> <ul style="list-style-type: none"> Bachelor of Applied Science – Biomedical Engineering Bachelor of Applied Science – Chemical and Biological Engineering Bachelor of Medical Laboratory Science Bachelor of Pharmaceutical Sciences Bachelor of Science – Biochemistry Bachelor of Science – Biology 	<p>Member of ACE-WIL.</p> <p>Offers co-op as part of undergraduate programs, including work abroad. Offers work learn (Vancouver) programs as a co-op alternative (part-time work).⁶⁵</p> <p>The Life Sciences Institute offers industrial collaboration where students</p>	Canada’s Immuno-Engineering and Biomanufacturing Hub (CIEBH) plan, in partnership with B.C. Biotech Industries, International Pharmaceutical Industries, BCIT, B.C.’s Research Universities (UBC, SFU, UVic, UNBC), Dalhousie University, and University of Waterloo. This plan proposes up to 5 biomanufacturing hubs across Canada to build a solid

Institution	Economic Region	Degrees, Certificates, and Extended Learning Courses	Extended Learning Summary	Future Initiatives
		<ul style="list-style-type: none"> • Bachelor of Science – Biophysics • Bachelor of Science – Biotechnology • Bachelor of Science – Cellular, Anatomical and Physiological Sciences • Bachelor of Science – Microbiology and Immunology • Bachelor of Science – Pharmacology <p>Graduate Programs</p> <ul style="list-style-type: none"> • PharmD – Pharmacy • Master of Applied Science, Master of Engineering and PhD – Biomedical Engineering • Master of Applied Science, Master of Engineering, Master of Science and PhD – Chemical and Biological Engineering • Master of Science and PhD– Biochemistry and Molecular Biology • Master of Science and PhD – Bioinformatics • Master of Science and PhD – Cell and Developmental Biology • Master of Science and PhD – Experimental Medicine • Master of Science and PhD – Genome Science and Technology • Master of Science and PhD – Medical Genetics • Master of Science and PhD – Medical Physics • Master of Science and PhD – Microbiology and Immunology • Master of Science and PhD – Pathology and Laboratory Medicine • Master of Science and PhD – Pharmaceutical Sciences 	<p>can do collaborative research with a company.⁶⁶</p> <p>Offers extended learning (online courses) and micro-credentials.⁶⁷</p> <p>Hosts the Creative Destruction Lab (CDL) a seed-stage program that helps high-caliber technology start-ups.⁶⁸</p> <p>entrepreneurship@UBC (e@UBC) is a program that provides UBC students, researchers, faculty members, alumni and staff with the resources, networks and funding they need to help facilitate success.⁶⁹</p>	<p>foundation by strengthening research systems and the talent pipeline in coordination with industry.⁷⁰</p>

Institution	Economic Region	Degrees, Certificates, and Extended Learning Courses	Extended Learning Summary	Future Initiatives
		<ul style="list-style-type: none"> • Master of Science and PhD – Pharmacology • MDPHD – Medicine Certificates and Extended Learning <ul style="list-style-type: none"> • Certificate in Biomedical Visualization and Communication • Micro-certificate in Regulatory Affairs in the Life Sciences 		
University of British Columbia - Okanagan ^{71, 72}	Thompson/ Okanagan	Undergraduate Programs <ul style="list-style-type: none"> • Bachelor of Science – Biochemistry and Molecular Biology • Bachelor of Science – Biology • Bachelor of Science – Microbiology Graduate Programs <ul style="list-style-type: none"> • Master of Science and PhD – Biology • Master of Science and PhD – Biochemistry and Molecular Biology • 	<p>Member of ACE-WIL.</p> <p>Offers co-op as part of undergraduate programs, including work abroad, or work study programs as a co-op alternative (part-time work).⁷³</p> <p>Offers extended learning (online courses) and micro-credentials.⁷⁴</p>	No relevant new programs currently in development that are specific to the Okanagan campus.
University of Northern British Columbia (main campus) ⁷⁵	Cariboo	Undergraduate Programs <ul style="list-style-type: none"> • Bachelor of Health Science – Biomedical Studies • Bachelor of Science – Biochemistry and Molecular Biology • Bachelor of Science – Biology Graduate Programs <ul style="list-style-type: none"> • Master of Science and PhD – Biochemistry • Master of Science – Health Sciences 	<p>Member of ACE-WIL.</p> <p>New partnership with UBC Faculty of Medicine for a Northern Centre for Clinical Research (NCCR), which will create more opportunities for clinical and biomedical research and increase participation in critical health studies relevant to northern, remote, and Indigenous Communities.</p>	Canada's Immuno-Engineering and Biomanufacturing Hub (CIEBH) plan, in partnership with B.C. Biotech Industries, International Pharmaceutical Industries, BCIT, B.C.'s Research Universities (UBC, SFU, UVic, UNBC), Dalhousie University, and University of Waterloo. This plan proposes up to 5 biomanufacturing hubs across Canada to build a solid foundation by strengthening research systems and the talent pipeline in coordination with industry. ⁷⁶
University of Victoria ^{77, 78}	Vancouver Island	Undergraduate Programs <ul style="list-style-type: none"> • Bachelor of Engineering – Biomedical Engineering 	Member of ACE-WIL.	Canada's Immuno-Engineering and Biomanufacturing Hub (CIEBH) plan, in

Institution	Economic Region	Degrees, Certificates, and Extended Learning Courses	Extended Learning Summary	Future Initiatives
		<ul style="list-style-type: none"> • Bachelor of Science – Biochemistry • Bachelor of Science – Biochemistry and Chemistry • Bachelor of Science – Biology • Bachelor of Science – Chemistry for the Medical Sciences • Bachelor of Science – Microbiology • Bachelor of Science – Microbiology and Chemistry • Bachelor of Science – Physics and Biochemistry <p>Graduate Programs</p> <ul style="list-style-type: none"> • Master of Science and PhD – Biochemistry and Microbiology • Master of Science and PhD – Biology • Master of Engineering – Biomedical Engineering 	<p>Offers co-op as part of its undergraduate programs.⁷⁹</p> <p>Offers a variety of professional development programs.⁸⁰</p> <p>Offers a work study program (provides financial assistance through part-time employment opportunities for students with financial need).⁸¹</p> <p>Offers several Indigenous career programs:⁸²</p> <ul style="list-style-type: none"> • Indigenous International WIL exchange program • Career fair and mock interview clinic • LE, NONET Community Internship • Indigenous Resource hub • CanWork program (for those who identify as having a disability or mental health challenge) 	<p>partnership with B.C. Biotech Industries, International Pharmaceutical Industries, B.C.'s Research Universities (UBC, BCIT, SFU, UNBC), Dalhousie University, and University of Waterloo. This plan proposes up to 5 biomanufacturing hubs across Canada to build a solid foundation by strengthening research systems and the talent pipeline in coordination with industry.⁸³</p> <p>New Master of Engineering in Biomedical Systems program commences in September 2024.⁸⁴</p>

Table 18: PSI Skills Training Summary
Source: KPMG analysis

Appendix 9: Industry and Government Skills Training Summary

Please note that this list represents main findings and is not meant to be exhaustive. This information was sourced from the websites of these institutions and additional information provided by select training institutions.

Organization	Program Name and Description
adMare	<p>The adMare Academy trains highly qualified personnel, from undergraduates to industry executives, who will drive the growth of the Canadian life sciences industry. Within the adMare Academy, there are specialized programs including:</p> <p>The Executive institute is a custom-designed program focused on advancing leadership capacity among Canadian life sciences professionals.</p> <p>The BioInnovation Scientist program is an online program developed to provide early-career science professionals with the foundational drug development knowledge and soft skills to succeed in the commercial Canadian life sciences industry. adMare will be adding courses to this program to increase the breath and depth of knowledge related to therapeutics development.</p> <p>The Fellowship and undergraduate programs offer research-intensive roles with hands-on bench work in adMare's drug development laboratories.</p> <p>The BioManufacturing training program has a partnership with CASTL to build the talent urgently needed in Canada's biopharmaceutical manufacturing sector.⁸⁵</p> <p>New Programs: adMare will be adding courses to the BioInnovation Scientist program to increase the breath and depth of knowledge related to therapeutics development.</p> <p>Source: PSI Focus Group</p>
B.C. Tech Association	<p>B.C. Reskilling is a program designed to help unemployed, underemployed and transitioning workers by providing rapid reskilling for careers in the technology industry.⁸⁶</p>
BioTalent Canada	<p>The essential skills fundamentals is a training program that offers professional development to new talent and enhances an employer's onboarding program.⁸⁷</p> <p>The Student Work Placement Program is an initiative to increase the job-readiness of students registered in STEM, healthcare, business, and all other programs at Canadian post-secondary institutions.⁸⁸</p> <p>New Programs: BioTalent Canada will be launching the following new online courses in June 2023:</p> <ul style="list-style-type: none"> • Introduction to Bio-health Industry • Introduction to HR issues in the bio-economy⁸⁹

Organization	Program Name and Description
CATTI	<p>CATTI offers e-learning and on-site GMP biomanufacturing training programs. CATTI is led by a Consortium of two Networks of Centres of Excellence in Canada, one being CCRM, a Centre of Excellence for the Commercialization of Research, and CellCAN, a Knowledge Mobilization Network. Their interest in joining efforts rely on the facts that manufacturing and commercializing cell and gene therapy products requires a highly qualified workforce and that there is currently a dearth in finding such qualified personnel.⁹⁰</p>
CASTL	<p>CASTL is the exclusive provider of certification programs developed by the National Institute for Bioprocessing Research and Training (NIBRT). NIBRT provides a range of training and education solutions to suit the learning requirements of individuals and companies.</p> <p>The NBIRT Online Academy is an online learning platform for the biopharma manufacturing industry.⁹¹</p>
FAST BC	<p>Facilitating Access to Skilled Talent (FAST) is a free online employment preparation program helping incoming and landed immigrants to get a head start in their Canadian careers. Started as only in B.C. but is now Canada-wide.⁹²</p>
Genome BC	<p>Geneskool, as part of Genome B.C.'s societal educational programs, provides high school students with a variety of resources and programs to expose them to genomics and equip them with basic science skills. This includes classroom workshops, campus field trips, travelling exhibits, free resources, and a summer science program.</p>
Innovate BC	<p>Tech Co-op Grant (training) provides grants to tech employers to support the hiring and training of undergrad co-op students. The program is delivered in close collaboration with co-op departments at British Columbia post-secondary institutions.</p> <p>Innovator Skills Initiative is delivered by New Ventures B.C. to help tech entrepreneurs hire and train students with entrepreneurship skills.⁹³</p>
LSBC	<p>Investor Readiness Program (IRP) brings together and pairs early-stage B.C. small and mid-size enterprises with entrepreneurs-in-residence to support the small and mid-size enterprises to become investor-ready. The program is designed around individual coaching and complemented by educational sessions, goal setting, peer-to-peer feedback, conference opportunities and group meetings. After seven months of development, the program culminates with an investor pitch session where participants use their new skills to pitch to a group of pre-qualified investors.</p> <p>AccelerateIP supports hundreds of innovative startups in B.C., Yukon, Nunavut, and Northwest Territories to grow and protect their ideas and intellectual assets. Led by New Ventures BC and prime collaborator Innovate BC, along with a network of accelerators and incubators, the program provides enhanced access to education, skills development, and financial support for protecting, managing and leveraging your intellectual property.</p> <p>Bio Basics 101: The Biology of Biotech for the Non-Scientist is a two-day course designed to help non-scientists gain a foundational understanding of the science that forms the backbone of biopharma so that you can converse more effectively with colleagues, clients, regulators, and scientists.</p> <p>Bio Basics 201: The Biology of Biotech for the Non-Scientist is an intensive, nine-hour course focused on vaccines, cell therapies, gene therapies, therapeutic antibodies, and</p>

Organization	Program Name and Description
	<p>RNA-based drugs. It is designed for the non-scientist who has taken BioBasics 101 or for those who understand the basics of DNA, RNA, proteins, and cell signaling and is taught by industry experts who explain how these complex drugs work in a simple, engaging manner.</p>
<p>Michael Smith Health Research BC</p>	<p>Michael Smith Health Research BC offers various funding programs and learning opportunities to support health researchers in devoting time to research, enabling career development and enriching B.C.'s health research talent.⁹⁴</p> <p>Clinical Trials BC offers educational programming to B.C.'s researchers with a focus on regulatory compliance. Programs offered by Clinical Trials B.C. include the <i>Clinical Research Professional Certification Program</i>, <i>Network of Networks (N2)</i>, and the <i>Association of Clinical Research Professionals (ACRP)'s Learning Management System</i>.⁹⁵</p>
<p>Mitacs internship programs</p>	<p>Accelerate offers experiential learning opportunities to college and university students as well as postdoctoral fellows by connecting and placing them with businesses, non-profit organizations, and academic researchers across the country.</p> <p>Elevate is a one- to two-year research management training program and postdoctoral fellowship that nurtures the development of research management skills among fellows, who gain direct experience solving real world industry problems.⁹⁶</p> <p>Mitacs Training offers professional development training to advanced degree graduates, supplementing their education and research experience with the tools necessary to succeed in today's workforce.⁹⁷</p>
<p>Other B.C. Government programs</p>	<p>The B.C. Government offers a variety of programs that target skills development. Some of the relevant programs include:</p> <p>The Skills Training for Employment Program helps meets the needs of vulnerable and under-represented groups by providing skills training and employment support to participants to help them obtain sustainable employment.</p> <p>The B.C. Provincial Nominee Program offers a series of sub-programs strategically designed to attract immigrants in areas which will benefit the province. This program helps recruit the highly skilled foreign workers, entrepreneurs, and investors to the province.</p> <p>The B.C. Employer Training Grant is a cost-sharing grant program that provides employers with skill training funding to respond to changing labour needs.⁹⁸</p>

Table 19: Industry and Government Skills Training Summary

Source: KPMG analysis

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