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Thrive: The Economic Case for Investing in Children's Health

September 2025

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Executive summary

Executive summary

This report makes the case for early investment in children's healthcare by estimating the social return on investment of expanding access to health interventions.

Applying a cost-of-illness approach to three chronic pediatric conditions as examples, the report quantifies the current economic burden of these illnesses; models the costs and benefits of scaling up access to targeted interventions for children with these illnesses; and estimates the additional benefits of investing in this care earlier in the child's life.

Key findings include:

1. Chronic pediatric conditions impose a significant annual burden on Canada's economy, with estimated costs of $483 million for type 1 diabetes, $6.0 billion for mood and anxiety disorders, and $2.2 billion for epilepsy.
2. Modeling in this analysis across three pediatric conditions indicates a positive social return of $1.39 – $4.89 per dollar invested in improved access, consistent with global evidence of $1.80 – $17.10 returned per dollar invested.
3. Investments tend to yield higher social returns when directed to health interventions with limited access but strong potential benefits.
4. Investing earlier in a child's healthcare journey yields greater return on investment by reducing the ongoing burdens the illness causes for the child and their family.
5. Additional future investments in children's healthcare should be coupled with a strategic plan to ensure that they are being allocated where they are most needed.

Background and context

Purpose of this report

Evidence suggests that Canada's pediatric health system is stretched thin, and Canada underperforms many peer countries on pediatric health spending. Not all children and youth in Canada are receiving the treatments they need, and the economic implications are significant. Through a health economics perspective, this report presents the case that strategic early investments in children's healthcare lead directly to improved societal and economic outcomes.

Past research from around the world has shown that a dollar invested in evidence-based pediatric healthcare interventions can yield between $1.78 to up to $17.07 in future economic returns.[1,2,3,4] Economic gains are realized not just by reducing costly health complications for children, but also by reducing the burden on caregivers and by minimizing the lifelong impacts of illnesses through early intervention.

In this report, three chronic conditions affecting children were selected for a detailed evaluation. **The conditions selected for detailed modeling are type 1 diabetes, mood and anxiety disorders, and epilepsy.**

These conditions were selected because they are high-burden and are treatable with evidence-based healthcare interventions which are not yet universally available to children in Canada. While these three conditions are used as demonstrative cases, the purpose of the report is not to focus on specific conditions. Rather, the broader objective is to illustrate that targeted investments in improving access to necessary but underserved pediatric interventions can deliver significant economic and societal benefits.

Current state of children's health in Canada

Global benchmarking

Despite being a high-income country, Canada's performance in children's health outcomes has consistently ranked poorly relative to peers. **According to UNICEF Report Card 19, Canada now ranks 19th out of 43 wealthy countries, 38 of which are members of the Organization for Economic Cooperation and Development (OECD), for children's overall physical and mental outcomes.**[5]

Alarmingly, Canada has ranked poorly across the following pediatric health categories out of 43 wealthy nations, according to the UNICEF report card:

33rd in adolescent suicide

25th in infant mortality

24th in being overweight

19th in children's outcomes overall

13th in child life satisfaction

While Canadian children rank well in academic proficiency (6th of 42 countries), there is significant room for improvement in pediatric health outcomes.[1]

Pediatric health system capacity constraints

Evidence suggests that there is currently a shortage in pediatric health system resources and capacity to serve demand. **Most children's hospitals are operating at or above 100% capacity**, while pediatric programs in community hospitals and pediatricians in office-based practices are facing reduced capacity and resources to meet the growing demands.[6]

Further, an Ontario study reveals the healthcare cost per encounter of children treated at pediatric hospitals is more than double (140% higher) than costs incurred by adults at general hospitals. These higher costs reflect managing children with greater volume of resources and with specialized care as children typically face greater medical complexity.[7]

Canada invests less in children relative to OECD peers

Approximately 1.5 million children in Canada do not have access to primary care, and more than half of children waiting for life-changing surgical interventions are now waiting longer than clinically recommended wait times. Children's hospital emergency departments are experiencing historic patient volumes, leading to delays in emergent and urgent care and rising wait times for diagnostics and specialist services for children.[6]

The investment gap

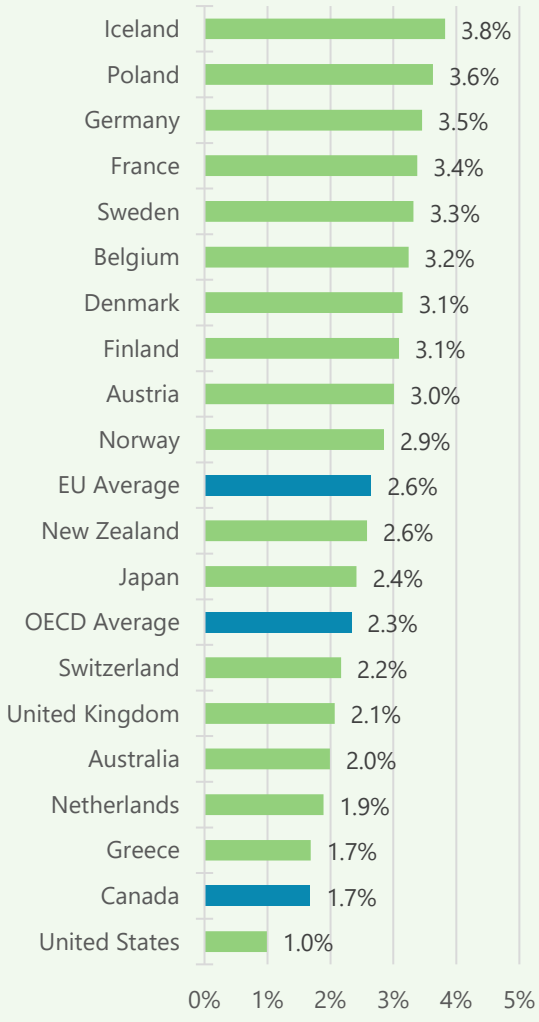
As a wealthy nation, Canada underinvests in children's health and well-being compared to other comparable jurisdictions. **Canada spends only 1.7% of its gross domestic product (GDP) on family benefits like child payments and allowances, parental leave benefits, and childcare support, compared to the OECD average of 2.3%** (Chart 1).[8]

On average, between 2017 and 2020, children and youth aged 0-19 accounted for only 11.5% of total provincial and territorial health expenditures in Canada, despite representing 19% of the population during this period.[9]

In recent years, there have been some examples of health funding being earmarked specifically to meet the care needs of children.

Chart 1: Public spending on family benefits*

Percent of GDP (%), 2021



Source: OECD

Note (*): Family benefits include child payments and allowances, parental leave benefits, and childcare support.

Recent Canadian policies and investments have shown more focus on children's health and wellbeing

As part of the federal government's major expansion of healthcare funding in Budget 2023, **$2 billion in funding was announced to address backlogs in pediatric emergency and surgical care.**[10] Further, a major provincial highlight is Ontario's 2023 announcement of an annual commitment of $330 million towards children's health and well-being, including expansions in mental health supports, additional pediatric surgery staff, an immunization catch-up program, and other specialized pediatric services.[11]

One year after this investment was announced, the children's health system was already showing dividends in the form of increased capacity, reductions in waitlists, and timelier access to services.[11] Holland Bloorview Hospital added four inpatient beds, increased staffing by 10% and serve 60% more clients in the day patient unit. Total visits at the Children's Hospital of Eastern Ontario (CHEO) rose 25% vs. pre-pandemic, including 30,000+ additional ED visits, enabled by funding that added 258 new positions. McMaster Children's Hospital addressed gaps in access to timely care, serving an additional 4,000 patients in outpatient clinics, 330 children in eight new pediatric beds, and 512 pediatric surgeries.[12]

While not direct health care spending, the introduction of the Canada Child Benefit (CCB) in 2016 was a significant expansion of government support for Canadian children. The Canada Child Benefit (CCB) is a tax-free monthly payment aimed at helping low- and middle-income families with the cost of raising children.[13] In its first year, it delivered $23.3 billion to 3.3 million families, with 9 in 10 families receiving more support than under previous programs aimed at child benefits.[13,14]

The CCB has had measurable impacts: **it lifted nearly 300,000 children out of poverty and contributed to a 39.2% drop in child poverty.**[15] Research links the benefit to improved food security, better child and maternal mental health, and modest academic gains, especially for girls and middle-income families.[16,17]

In 2024-25, eligible families can receive up to $7,997 per child under 6 and $6,748 per child aged 6-17.[18] In addition, a subset of families receiving the CCB are eligible for up to an additional $3,411 in the Child Disability Benefit (CDB), offering support for children with disabilities.[18]

During the pandemic, the Canada Emergency Response Benefit (CERB) was also a key driver of reduced child poverty, with the number of children under 18 living in poverty falling from 665,000 in 2019 to 333,000 in 2020. This reflected a year-over-year decline in the child poverty rate of 4.7% (from 9.4% in 2019 to 4.7% in 2020).[19]

Case study: Pediatric asthma in Ontario

Background

In January 2018, Ontario introduced OHIP+, a provincial pharmacare policy offering full public coverage for some prescription medications to children and youth under 25, covering essential asthma treatments like inhalers. The program, costing an estimated C $465 million annually, is aimed at making prescription medications more affordable and accessible.[20,21]

Key Outcomes

Following OHIP+ implementation, publicly covered prescriptions among youth skyrocketed by 290% (from 756 to 2,952 per 1,000 people), and public drug expenditures more than doubled, rising from $379 million in 2017 to $839 million in 2018.[22] Specifically for asthma, removing cost barriers significantly improved access to both controller and reliever inhalers: children in zero cost-sharing groups (no out-of-pocket costs) had more medication claims compared to those with high cost-sharing (over 20% of total prescription costs paid out of pocket): 7.0 vs. 6.6 claims annually.[23] In Ontario, the crude rate of chest X-rays in children visiting the ED for asthma dropped from 13,981 in 2017-18 to 12,080 in 2019-20, a 13.6% drop prior to impacts of COVID-19.[24]

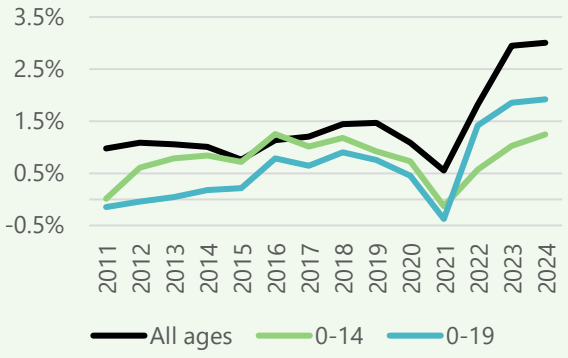
Changing demographics present an opportunity to re-evaluate children's health funding

Children and youth population trends over the past decade

Canada is home to approximately 8.6 million children and youth under the age of 19, representing 20.8% of the total population in 2024. While Canada's overall population has grown approximately 17% over the last decade from 2014 to 2024, the growth in Canada's children and youth population (age 0-19) has only grown at half the rate (9%). As seen in Chart 2 below, the year-over-year growth in children and youth population over the last decade has been consistently lagging growth in the overall population in Canada.[25]

Chart 2: Growth in Population

Year-over-year change (%)



Source: Statistics Canada

This population trend is driven by slowing birth rates despite a falling infant mortality rate. Slowing birth rates can be attributed to financial pressures on young families, 41% of whom report delaying childbearing due to affordability challenges in an Angus Reid Institute survey.[26] Newcomer children and youth (aged 0–19) rose 47% from 2013 to 2023, while net emigration grew slower. Though still a small share of the population (1.1% in 2023), newcomer children and youth often face barriers to healthcare access, which can lead to disproportionate economic burden if illnesses occur.[27,28]

Another demographic trend in Canada is the growing rate of single-parent households. Past research has found higher rates of chronic illness among children in single-parent households.[29,30]

A plan for investing in children's health

Investments can be made in many aspects of children's healthcare and systems. Examples include expanding workforce, infrastructure, medications, technologies and therapies, and/or data systems and research.

To achieve meaningful outcomes, a strategic, data-driven plan is needed. Fragmented investments are less effective than coordinated and targeted efforts focused on underserved populations and proven interventions, with transparency on funding allocations and the ability to track specific health outcomes over time.

Introduction to economic modeling framework

Introduction to Economic modeling framework

Validating data availability and selecting key inputs

1

Literature Review

Search existing health and health economics literature for three conditions to focus on based on data availability and evidence of the cost-effectiveness of certain interventions for each disease category.

Establishing the Current Context

2

Economic Modeling of Current Burden of Illness

Present the current economic burden of illness in Canada for the three chronic illnesses of focus: type 1 diabetes, mood and anxiety disorders, and epilepsy.

Modeling the Economic Impact and Return on Investment of Scaling Interventions

3

Economic Modeling of Intervention Impacts

Using data from the first two stages and additional sources, model three access scenarios to estimate how expanding each intervention reduces the burden of illness, while also capturing per-patient costs and benefits over a lifetime to assess return on investment.

Illustrating lifetime costs saved by investing early

4

The Economic Case for Investing Early

Using economic modeling results, compare lifetime costs and savings from investing earlier vs. later in the lifecycle for each condition–intervention pairing.

Literature review

Purpose of literature review

The literature review aimed to support the broader economic evaluation of pediatric healthcare investment by achieving the following:

1. **Establish general evidence of returns on investments** in children's health by summarizing credible studies.
2. **Inform the selection of three conditions for demonstrative analysis**, using data availability and published evidence of effective interventions and their associated costs.
3. **Gain a holistic understanding of each condition**, including clinical pathways and outcome trajectories, by reviewing high-quality studies and data sources within the Canadian context, even where not directly used for modeling, to better inform the nature of each condition and its associated economic burden.
4. **Identify data inputs for modeling the current economic burden**, with a focus on direct costs to the health system and the indirect costs of lost productivity. Findings are detailed in the appendix.
5. **Identify data inputs for modeling the impact of interventions**, including studies reporting improvements in quality-adjusted life years (QALYs) and/or disability-adjusted life years (DALYs), incremental cost-effectiveness ratios (ICERs), and reductions in caregiving burden or productivity loss in adulthood. Findings are detailed in the appendix.

Past research suggests $1 invested in children's health can return between $1.78 and $17.07 in benefits

Canadian Evidence

There are relatively few published studies that estimate the return on investing in children's health. In the Canadian context, a McKinsey Global Institute study reveals that **every $1 invested in children's health generates $3.3 in economic benefits across the population under age 70, in Canada.**[1,2] This return on investment (ROI) reflects long-term reductions in adverse health outcomes in adulthood, implying direct cost savings for the healthcare system. It also reflects increased labour productivity for child caregivers and higher educational attainment and incomes in adulthood for children with a condition. Further, data from the Institute for Health Metrics and Evaluation (IHME) and World Bank also reveal that **45% of the positive impact to Canada's GDP with such investments will be through expanded participation and access**, 32% from fewer health conditions, 16% from an increase in labour productivity, and 7% due to fewer early deaths.[2]

International Evidence

McKinsey Global Institute's study also estimates that **every $1 invested in children's health generates $2.7 in economic benefits across the population under age 70, globally.**[1,2]

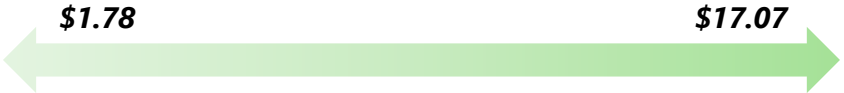
This McKinsey study leverages data from the Global Burden of Disease database and estimates ROI by calculating the number of disability-adjusted life years (DALYs) averted through a given intervention and multiplying this by the cost per DALY, a common health economic metric typically available for lower- and middle-income countries.

A RAND Corporation review estimates that for **every $1 invested in child and youth mental health in the United States, returns range from $1.80 to $17.07**, depending on program design and target population.[3] These findings are drawn from programs implemented in the U.K. and the U.S. and highlight how early interventions reduce the need for acute and long-term care while improving educational and workforce outcomes.

Similarly, the Urban Institute estimates an ROI of $1.78 per dollar spent on comprehensive investments in children's health, education, and safety in the U.S. context.[4] These gains stem from improved health trajectories, higher lifetime earnings, and reduced reliance on social assistance systems.

While these estimates of the ROI ratio differ considerably due to differences in context, program design, and study methodology, these studies all show a positive return on these types of investments in children.

Typical social return from investing $1 in children's health



Narrowing focus by selecting three chronic pediatric conditions to assess social ROI impacts

A review of the children's health literature identified a shortlist of conditions for further analysis, including contenders such as asthma, sickle cell disease, juvenile idiopathic arthritis (JIA), and pediatric cancers. **The diseases chosen for further modeling are type 1 diabetes, mood and anxiety disorders, and epilepsy.**

The goal in selecting conditions was to evaluate a diverse set of conditions that span multiple healthcare settings (community, hospital, rehabilitation) and affect children across different developmental stages, from infancy through adolescence. The selection also had to consider the trade-off between conditions with high prevalence and those with higher per-child costs. The following four key criteria were used to select the final shortlist:

1. **Chronic nature** of the condition, leading to long-term health and economic impacts
2. **High total cost to the system**, either through high prevalence or high costs per-child due to complex requirements
3. **Existence of scalable evidence-based interventions**, where access remains limited or inequitable
4. **Sufficient data availability**, including outcomes, costs, and intervention evidence, as validated through the literature review

This report focuses on investments in healthcare interventions specifically, rather than other important determinants of health. An intervention is a targeted change in care delivery, coverage, or capacity that directly enables diagnosis, treatment, or ongoing management. The goal of investment is to expand equitable access to key interventions that improve outcomes, recognizing that access to many treatments is currently constrained by affordability, demographics, and geography.

Three condition–intervention pairings (Table 1) were selected for the analysis guided by expert input due to current access gaps, data availability and illustrating unique intervention types. These conditions are explored in more detail in the coming pages.

Table 1: Condition-Intervention pairings

Condition	Intervention selected
Type 1 Diabetes	**Real-time Continuous Glucose Monitoring** (rt-CGM)
Mood & Anxiety Disorders	**Digital and stepped interventions** (CBT-based)
Epilepsy	**Investment in capacity expansion for surgical evaluation** to treat drug-resistant epilepsy (DRE)

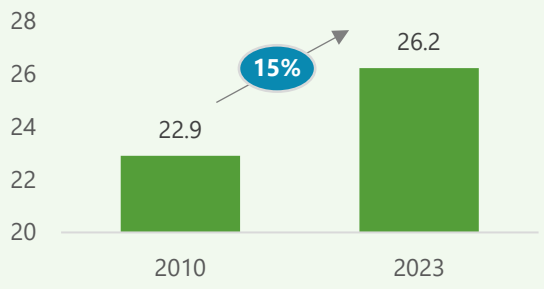
Overview: pediatric type 1 diabetes

Type 1 diabetes (T1D) is an autoimmune disease. The immune system destroys the insulin-producing cells of the pancreas, leaving the individual dependent on an external source of insulin for life. It typically develops in children and youth, but it can occur in adults. **Age 10-14 is the most common age of onset in most populations.**[5,6] **T1D is a 24/7 disease and requires constant management, and children with T1D need to continuously balance insulin intake against eating, exercise, and other activities.**

Canada's evolving data strategy and clinical guidelines prioritize tech-enabled diabetes care with devices such as real-time continuous glucose monitoring (rt-CGM) and automated insulin delivery (AID).[6] Rt-CGM uses a small sensor placed under the skin that continuously measures glucose levels In the interstitial fluid and wirelessly transmits readings, typically every few minutes, to a display device or smartphone app. Automated insulin delivery (AID) integrates an rt-CGM, an insulin pump, and a control algorithm that automatically adjusts insulin delivery in real time in response to glucose trends that were tracked by the rt-CGM. These systems are likely to become increasingly affordable and accessible in the future.

Chart 3: Number of T1D cases

Thousands of children and youth (age 1-19)



Source: CCDSS; Nakhla et al., 2019

T1D causes significant and lifelong economic burden for children and families in Canada. **Annual out-of-pocket cost for families managing T1D can be as high as $18,306 per year** in certain areas of Canada, **with many households' reporting difficulty affording necessary supplies like insulin pumps and continuous glucose monitors (CGMs).**[7] Past economic studies have found a return of $2.23 per dollar invested in diabetes management on medical cost savings, depending on intervention type. While not directly used in this modeling, QALY gains and cost-effectiveness evidence from modern technologies such as rt-CGM and AID are well-documented.[8]

Overview: pediatric mood & anxiety disorders

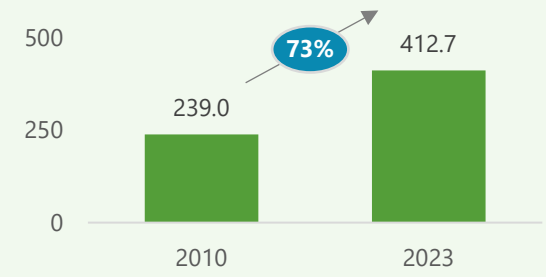
Mood and anxiety disorders are among the most common mental illnesses in Canada, often beginning in childhood or adolescence and frequently co-occurring. Mood disorders, such as depression and bipolar disorder, involve a persistent lowering or elevation of mood, while anxiety disorders are marked by excessive fear or worry. **These often-chronic conditions can interfere with development and daily functioning, persist into adulthood, and place a lasting burden on families.**[9]

There is currently a mental health crisis among Canadian children. The 2023 Canadian Health Survey on Children and Youth found that **26% of children age 12-17 rate their mental health as "fair" or "poor."** Only 12% reported fair or poor mental health in 2019, highlighting an alarming increase over the pandemic years.[10]

Cases of mood and anxiety disorders among children and youth age 1-19 rose 73% between 2010 and 2023 (Chart 4).

Chart 4: Number of mood and anxiety disorder cases

Thousands of children and youth (age 1-19)



Source: CCDSS

According to the Canadian Institute for Health Information (CIHI), across all mental health disorders there were 16,029 physician visits, 1,090 emergency department visits and 368 hospitalizations per 100,000 children and youth aged 5-24 in Canada, adding significant direct costs to the system along with high costs of dispensed psychotropic medications.[11]

The prevalence of mental health disorders reported in administrative data represents a lower bound; only children who present themselves and are diagnosed in a formal healthcare setting are counted in these data sets. Children who do not receive a diagnosis or physician care may nonetheless suffer from these conditions, especially among populations facing access barriers.

To address these gaps, stepped-care offers a scalable approach that matches individuals to the least intensive effective intervention, with the option to escalate, or "step-up" care if needed. The stepped care pilot 2.0, launched in Newfoundland and Labrador (2017–2019) targeted at both children and adults, implemented rapid-access clinics and digital tools like internet-delivered cognitive behavioural therapy (iCBT) across 15 sites. The pilot reduced wait times by 68% within its first year and expanded access across various population groups, reducing the equity barrier.[12] **Such models have demonstrated approximately 30% improvement in outcomes**, with proven cost-effectiveness and QALY gains, compared to traditional care.[13]

Overview: pediatric epilepsy

Epilepsy is considered the most common serious neurological condition affecting children by the World Health Organization. It is a brain disorder characterized by recurrent seizures. Seizures are caused by abnormal bursts of electrical activity in the brain. Conditions that damage the brain (e.g., head trauma, tumors, infections), autoimmune conditions, and genetics play a role in the development of epilepsy. However, in some cases, no specific cause can be identified. If uncontrolled, epilepsy results in recurrent seizures that vary in frequency, symptoms, and duration.[14] Pediatric epilepsy often co-occurs with developmental and learning disorders, impacting education and long-term quality of life.[15]

Cases of epilepsy among children and youth rose 33% between 2010 and 2023 (Chart 5).

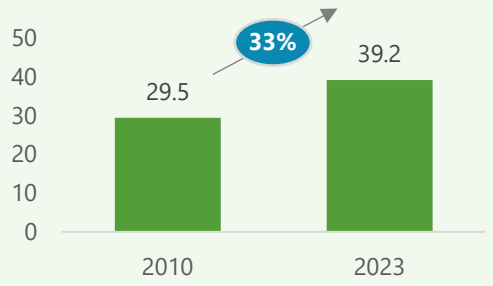
Evidence from Ontario suggests that children with epilepsy incur significantly higher healthcare use, with cumulative care costs 2.5x higher than the general population.[15] **A major driver of this burden is drug-resistant epilepsy (DRE).** DRE is a subset of epilepsy where seizures sometimes are not controlled with antiseizure medications. DRE is also referred to as "uncontrolled" or "intractable" epilepsy. **- About 30% of epilepsy cases are DRE, which persist after two or more medication trials and require specialized care.**[16]

Most DRE care should ideally be delivered through specialized epilepsy clinics, such as the one established in London, Ontario in 2017, where multidisciplinary teams offer advanced diagnostics, ketogenic diet implementation, and surgical evaluation.[17] **Access remains limited due to inadequate infrastructure, insufficient inpatient beds, and costs**, leading to very long wait times.

Specialized treatments - especially epilepsy surgery - are proven to be more cost-effective than prolonged medical management. A Health Quality Ontario study found that while surgery incurs higher initial costs, long-term cumulative costs decline, resulting in total expected costs for surgery over the 20-year time horizon to be $1,788 less than for the no-surgery strategy. Roughly 50% of patients with DRE are referred for further surgical evaluation, and of those, about 40% go on to have surgery, with seizure freedom achieved in many cases.[16]

Chart 5: Number of epilepsy cases

Thousands of children and youth (age 1-19)

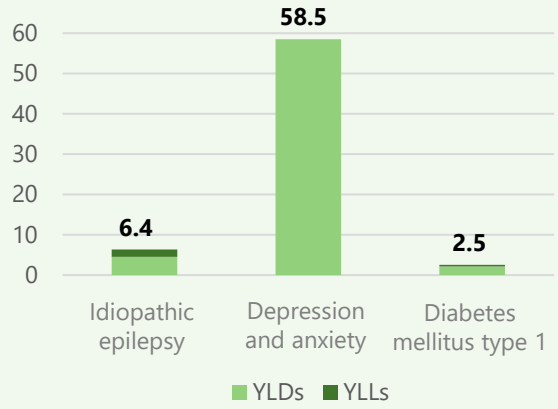


Source: CCDSS

DALYs provide intuition into the true economic burden of T1D, mood & anxiety, and epilepsy

The Global Burden of Disease (GBD) dataset from the Institute for Health Metrics and Evaluation (IHME) and World Health Organization (WHO) offers valuable insight into the relative health burden of key pediatric conditions using the DALY. **DALYs are defined as the sum of years of life lost (YLLs) due to premature mortality and years lived with disability (YLDs) due to illness or impairment.** This combined metric reflects both the fatal and non-fatal consequences of disease and is widely used in global health to compare the overall burden of different conditions.

Chart 6: Disability Adjusted Life Years
Thousands of years (Canada, age 1-19)



Source: IHME, WHO: Global Burden of Disease

As seen in Chart 6, the DALY burden for each of the three conditions of focus reveals distinct profiles of morbidity and mortality.

- **Depression and Anxiety** contribute approximately 58,500 DALYs, entirely driven by YLDs.[18] This reflects both the high volume of affected youth and the prolonged duration of disability that can impair development, education, and future workforce participation.
- **Idiopathic Epilepsy*** accounts for an estimated 6,400 DALYs, including 5,000 YLDs and 1,400 YLLs.[18] Idiopathic epilepsy is defined as seizure disorders without an identifiable structural cause and represents only a subset (44.7%) of all epilepsy-related disability. As such, this figure underestimates the total epilepsy burden.
- **Type 1 Diabetes** contributes approximately 2,500 DALYs, composed of 2,000 YLDs and 500 YLLs, reflecting a lifelong disease that carries both long-term health risks and daily management demands if not well controlled.[18]

Note (*): Idiopathic epilepsy is the subset of epilepsy where the underlying cause is not known (and is presumed to be genetic). Its counterpart is symptomatic epilepsy, where the cause of seizures is attributable to an underlying disease or injury. The Global Burden of Disease dataset reports only on idiopathic epilepsy and should be interpreted in that context; by contrast, our economic burden analysis in the following pages draws on data covering all types of epilepsy.

Estimating the current economic burden of illness

Introduction to the cost of illness (COI) approach for modeling the current economic burden

In this report, the burden of illness is quantified using the cost-of-illness (COI) approach. This is an established and broad economic framework that sets out to capture the economic impact of a non-communicable condition/disease. **It views the cost of a condition as the sum of several categories of direct and indirect costs.**

Direct costs refer to visible costs associated with diagnosis, treatment, and care. Direct costs may include personal medical care costs or personal non-medical costs such as the cost of transport to a health provider.[1,2]

Indirect costs refer to the invisible costs associated with lost productivity and income owing to disability or death. The COI approach can also include non-personal health costs (such as research and public health education campaigns). The cost of pain and suffering may also be considered in this approach, although it is rare to find COI studies that place a monetary value on pain and suffering.[1,2]

The estimation of indirect costs follows the human capital approach, a method within the COI framework, which calculates productivity losses using the present value of future earnings.

Due to data availability constraints, some components that are typically included in the COI and human capital approach are not quantified, such as the non-absenteeism productivity impacts of disability; early retirement; non-personal health costs; and the value of pain and suffering. To approximate the present value of lost incomes and productivity, current annual income losses experienced by adults with the condition are used as a proxy. The next page outlines each of the direct and indirect cost components.

Summary of the COI framework

Direct Costs

- **Healthcare costs** of hospitalizations, physician visits, and drugs

Indirect Costs

- **Productivity losses** due to work absence in future and/or early retirement
- **Income losses** due to mortality, disability or morbidity, and caregivers' lost time off work.

Components of the current burden of illness

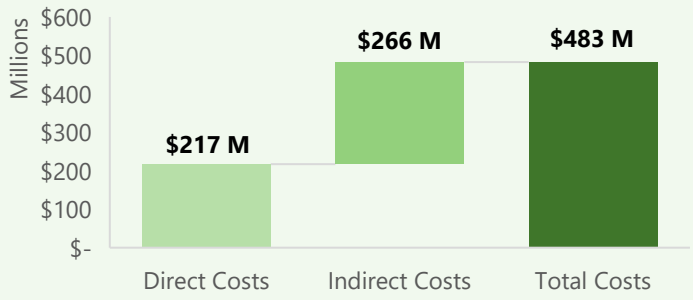
		Age group
(A) Hospital Costs	The total amount spent towards hospital visits and overnight hospitalizations for a given condition or illness	**0-19**
(B) Physician Costs	The total amount spent towards physician consultations for a condition	**0-19**
(C) Drug Costs	The total amount spent on prescribed medication for treating a condition	**0-19**
(D) Total Direct Costs = *A* + *B* + *C*	**Direct costs are estimated for patients aged 0-19**	
(E) Mortality Costs	The lost value of total labour income from premature deaths due to a condition	**15-64**
(F) Morbidity Costs	The lost value of total labour income from a drop in productivity and/or employment outcomes due to living with a condition carried into adulthood	**20-64**
(G) Caregiving Costs	The lost value of total labour income from a drop in productivity an/or employment outcomes for a caregiver of a child aged 0-19 living with a condition	**20-64***
(H) Total Indirect Costs = *E* + *F* + *G*	**Mortality costs are estimated for patients aged 15-64, morbidity and caregiving costs for those aged 20-64***	
Total Economic Burden = *D* + *H*	**Defined as the sum of direct costs and indirect costs and represents a snapshot of the total burden at a point in time across different ages**	

Note (*): Caregiving costs are estimated for caregivers of children aged 0–19. As this study assumes age 20 as the typical start of employment and age 65 as retirement, caregiver ages are assumed to fall within the 20–64 age range.

Estimate of the current economic burden of the three illnesses of focus

Type 1 Diabetes

Annual Burden of Illness (CA$ 2023)

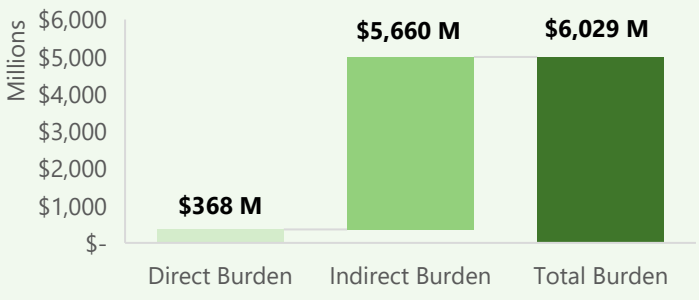


CA$ millions

Hospital Costs	$107.5
Physician Costs	$59.4
Drug Costs	$50.1
Total Direct Burden	**$217.0**
Mortality Costs	$20.5
Morbidity Costs	$169.7
Caregiving Costs	$75.9
Total Indirect Burden	**$266.0**
Total Burden	**$483.0**

Mood & Anxiety Disorders

Annual Burden of Illness (CA$ 2023)

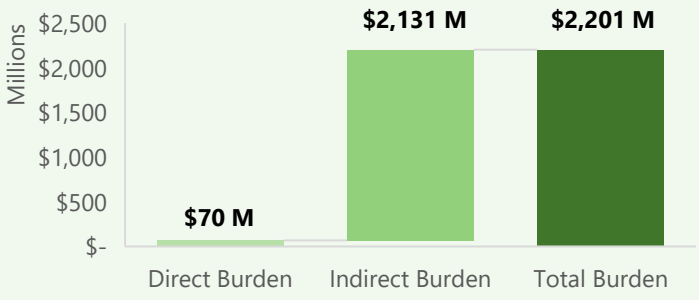


CA$ millions

Hospital Costs	$271.8
Physician Costs	$40.1
Drug Costs	$56.4
Total Direct Burden	**$368.4**
Mortality Costs	$2,019.3
Morbidity Costs	$2,258.1
Caregiving Costs	$1,382.8
Total Indirect Burden	**$5,660.1**
Total Burden	**$6,028.5**

Epilepsy

Annual Burden of Illness (CA$ 2023)



CA$ millions

Hospital Costs	$59.5
Physician Costs	$10.2
Drug Costs	$0.3
Total Direct Burden	**$70.0**
Mortality Costs	$2.8
Morbidity Costs	$1,283.7
Caregiving Costs	$844.7
Total Indirect Burden	**$2,131.2**
Total Burden	**$2,201.2**

Sources: Public Health Agency of Canada, CIHI, Deloitte analysis
Note: Methodology outlined in the appendix section

Modeling the impact of additional investments

Three access scenarios are used to highlight the impact of early interventions on the burden of illness

After collecting evidence on the magnitude of the impact of each intervention on pediatric patients suffering from respective conditions, the next step is to use those results to model each intervention's impact on the economic burden of illness in Canada.

A scenario analysis is used to assess the impact of each intervention on the direct and indirect economic burden of illness for the three diseases of focus in this research. This section concludes with an assessment of the results' implications across the broader disease categories.

To evaluate the potential impact of each intervention on these conditions, two alternative scenarios—an improved access and an ideal access scenario—are compared to the current access scenario.

- **The Current Access Scenario** forms the baseline burden of illness estimate, reflecting current uptake of the identified interventions among children with the condition.
- **The Improved Access Scenario** estimates the impact on the economic burden of illness assuming a realistic increase in access to each intervention, supported by targeted investment.
- **The Ideal Access Scenario** estimates the impact on the economic burden of illness if the intervention were fully accessible to all who need it and serves as a benchmark goal for equitable access.

Table 2: Intervention access scenarios
Percent of pediatric patient cases by condition

Condition-Intervention Pairing	Current Access (%)	Improved Access (%)	Ideal Access (%)
T1 Diabetes (Rt-CGM)*	80%[1]	85%	90%
Mood & Anxiety (Digital Interventions)	20%[2]	60%	100%
Epilepsy (DRE specialized care incl. surgery)**	14%[3]	21%	30%

Comparing these scenarios highlights the significant economic value of expanding access, demonstrating how targeted interventions can substantially reduce the burden of illness and deliver meaningful social and economic cost savings.

Note (*): Not all patients with pediatric type 1 diabetes are clinically eligible for rt-CGM. In this modeling, 90% is therefore used as the ceiling for access to this technology.
Note (**): Drug-resistant epilepsy (DRE) accounts for approximately 30% of total pediatric epilepsy cases. In this modeling, 30% is therefore used as the ceiling for access to specialized epilepsy care including surgery.

There are significant reductions in economic burden with improved access to care

Type 1 diabetes

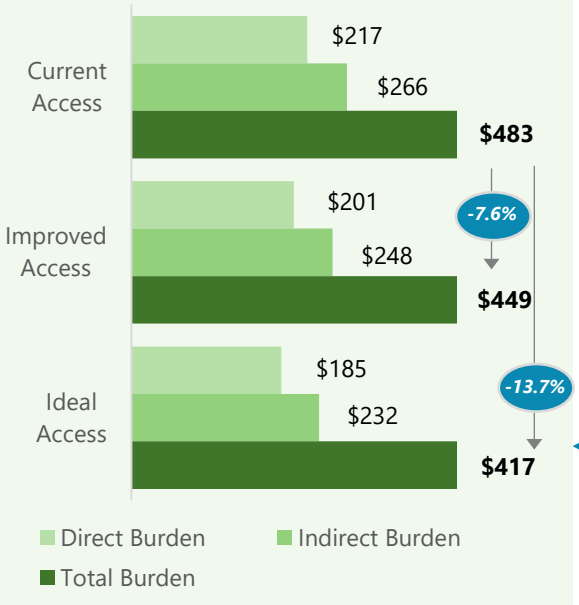
Currently, approximately 80% of Canadian children with T1D have access to some form of Continuous Glucose Monitoring (CGM).[1] Expanding access to rt-CGM for those not yet using it could reduce the total burden of illness by an estimated $34 million (-7.6%) at 85% access. In an ideal scenario where rt-CGM reaches 90% of children with T1D, aligning with the upper bound of clinical need, cost savings could reach $66 million (-13.7%).

Current CGM uptake varies across provinces, driven largely by differences in access and affordability. Our current access assumption of 80% of the children and youth population is an upper bound for current access, as it is based on uptake of all types of CGM (not just rt-CGM) in Ontario, Alberta, and Quebec.

According to Diabetes Canada, provincial drug coverage for CGM varies widely. In low-income scenarios (family income of $30K), Quebec's RAMQ covers up to 99% of youth T1D related costs, leaving families with just $130 in out-of-pocket expenses. In contrast, Manitoba does not cover CGM, resulting in significantly higher out-of-pocket costs of $1,381 despite partial coverage of other diabetes-related supplies. For higher-income families ($150K), Nova Scotia and New Brunswick offer no coverage at all for youth T1D-related costs, resulting in annual out-of-pocket costs up to $14,007 and $18,306, respectively.[2]

Beyond provincial policy, socioeconomic disparities present a further barrier to equitable access. These disparities have not been adequately quantified in the Canadian context, underscoring the need for deeper research on access gaps and their implications for health outcomes and economic burden.

Burden of illness under different access scenarios: type 1 diabetes
CA$, millions



Source: Deloitte analysis

How to read burden reduction charts
The numbers beside "Current Access" reflect the current burden of this illness. The bars show how the total burden (dark green) is divided between the direct and indirect burden (lighter green).

The "Improved Access" and "Ideal Access" numbers show how the burden of this illness would fall under these expanded access scenarios.

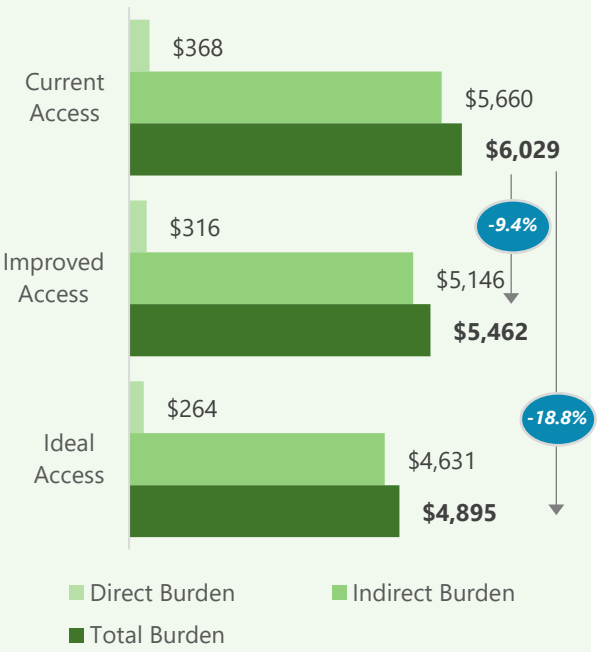
There are significant reductions in economic burden with improved access to care

Mood & Anxiety Disorders

There is a lack of credible data sources on the percentage of children with mood and anxiety disorders currently receiving therapy. As noted in the literature review section for mood and anxiety disorders, while the CCDSS provides counts of diagnosed cases, the true prevalence is believed to be significantly higher due to significant number of underdiagnosed cases. It also does not account for counts of children who receive care in school or community settings.

Burden of illness under different access scenarios: mood and anxiety disorders

CA$, millions



Source: Deloitte analysis

In the absence of consistent national data on stepped care uptake, the share receiving appropriate mental health services, i.e., guideline-concordant care delivered across clinical, school, community, and digital settings, serves as the best available proxy.

A conservative 20% baseline is used for current access to effective care, consistent with estimates that only about one in five children in Canada are receiving appropriate mental health services.[3] This low level highlights a significant gap in access to care.

As shown in the chart at left, scaling access to care from 20% of the pediatric population with mood and anxiety disorders to 60% could reduce the total economic burden by an estimated $567 million (-9.4%). In an ideal scenario, where access reaches 100% of the pediatric population with mood an anxiety disorders, an estimated $1.1 billion (-18.8%) in direct and indirect costs could be abated, reflecting the full potential of early, scalable mental health interventions.

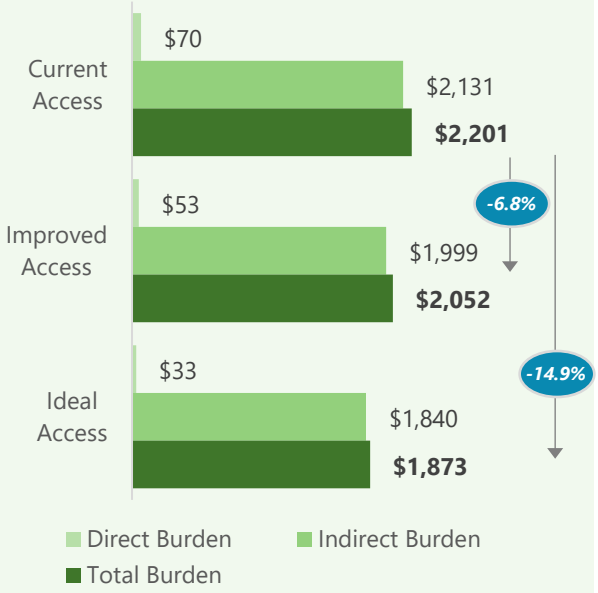
There are significant reductions in economic burden with improved access to care

Epilepsy

DRE affects roughly 30% of all pediatric epilepsy cases and requires specialized care, including surgical evaluation.[4] Currently, only 14% of children with epilepsy receive such care (equivalent to 45% of children with DRE), and there are often very long wait times for evaluation and surgery.[5] Note that this figure specifically represents patients receiving specialized care from an inter-professional team.

Investing in additional infrastructure and health care system capacity to extend access to specialized care to 21% of children with epilepsy (i.e., 70% of children with DRE) could reduce the total economic burden by an estimated $149 million (-6.8%). In an ideal scenario, with 30% of epilepsy cases (i.e., all children with DRE) receiving appropriate access to specialized care, up to $328 million (-14.9%) in costs could be abated.

Burden of illness under different access scenarios: epilepsy
CA$, millions



Source: Deloitte analysis

Introduction to our approach in estimating return on investment

The Concept of Lifetime ROI

In the next section, we present estimates of the return on investment (ROI) to investments in children's health. **Because the focus is on investments that expand access to treatment, ROI is calculated on a per-patient basis among the patients who benefit from the expanded access.** The costs and benefits are assessed with reference to a counterfactual where access is not improved.

For each of the three conditions of focus, the main ROI analysis is a base case where the intervention occurs at the age of average incidence. Annual intervention costs and annual benefits are counted starting at this age. The intervention (and associated costs) continues for the patient's entire life, but different benefits are counted for different stages of life: direct benefits are counted from onset through age 64; caregiving benefits are counted from onset through age 20; premature death is counted from age 15 through age 64; and morbidity impacts are counted during prime working years, age 20-64.

Future annual costs and benefits are discounted at 4% to present value (PV). The social ROI equals PV(Lifetime Benefits) ÷ PV(Lifetime Costs). The results are presented in real 2023 dollars.

Scope of ROI Analysis

Chronic illness is complex and evolves over a lifetime. The purpose of the quantitative analysis in this section is to estimate the lifetime return on a marginal dollar invested in early pediatric treatment. Since the focus is on childhood, some lifecycle impacts are out of scope:

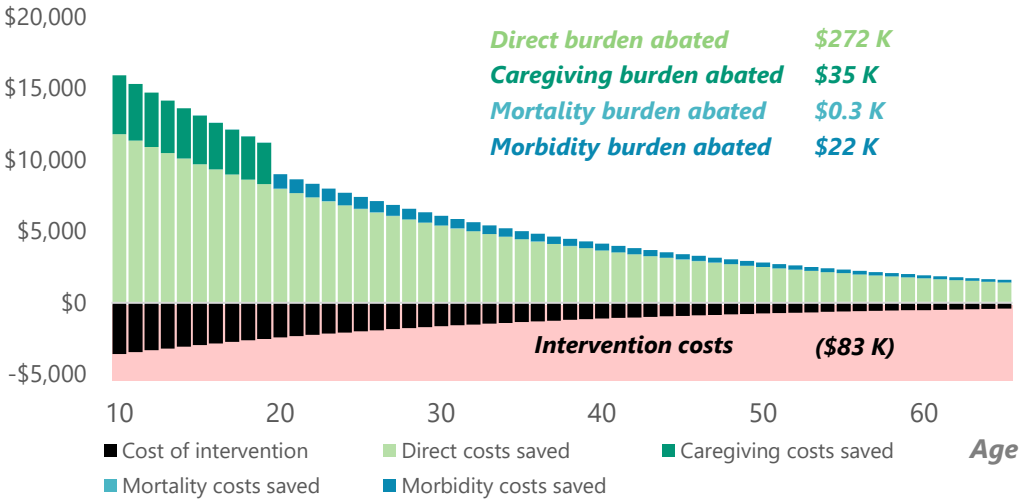
- The impact of childhood illness on caregivers of children is accounted for, but formal and informal caregiving costs are not counted after age 20.
- Chronic illness is likely to escalate in severity if left untreated. Direct costs are based on childhood data; counterfactual costs for an untreated individual may be higher than reflected here, particularly later in life.
- Similarly, a given treatment may be less effective for someone who has been living with a chronic illness for many years. This analysis assumes the treatments are equally effective whether they are applied at age 10, 18, 25, or 30.
- Finally, chronic childhood illness can result in higher rates of school absenteeism which may harm children's future earnings potential. However, there is limited quantitative, time-series data on these dynamics and the analysis does not consider this potential channel of impact.

Taken together, these limitations mean the benefits of investing early in children's health are likely to be greater than estimated here. Future research could attempt to make additional assumptions to address the above limitations.

Value of investing in rt-CGM for type 1 diabetes

Incremental costs and benefits over a lifetime for a typical patient with T1D with access to real-time Continuous Glucose Monitoring (rt-CGM) at age 10

CA$, Present value of costs (base year = age 10), discounted at 4%



Per Patient Economics

Lifetime costs saved

$328,636

Lifetime costs

$82,914

Social ROI

$3.96 return on $1 invested

Source: Deloitte analysis

The above chart presents the per-patient lifecycle economics of rt-CGM initiated at age 10, the average age of T1D onset.

Ages 0–9 represent a healthy childhood. At age 10 the child is diagnosed for T1D and uses rt-CGM as part of their treatment, incurring a recurring annual intervention cost of $3,588.[6] At the same time, the intervention helps avoid an estimated $11,768 per year in direct healthcare costs (e.g., hospital visits, physician fees, drug costs) due to better daily management of T1D. Most notably, from ages 10 to 20, it substantially reduces the caregiving burden on parents, yielding $4,114 in annual savings per child.

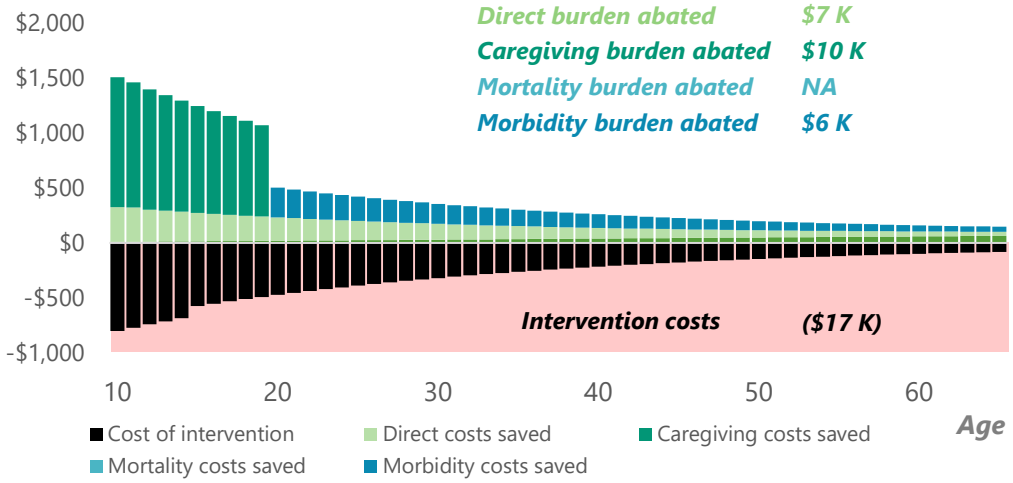
These costs reflecting lost parental productivity are the largest driver of early economic benefit. Starting at age 15, modest mortality-related cost savings ($13/year) begin accruing. These are expected costs saved, reflecting the low but present risk of premature death due to T1D. From ages 20 to 65, the model captures morbidity reduction valued at $999 annually, as the child benefits from better long-term health and improved future productivity in the workforce as an adult. Costs and benefits end at age 65, the assumed retirement age in this analysis.

This timeline illustrates how early intervention drives substantial long-term value, with caregiving and morbidity related gains driving economic value.

Value of investing in digital and stepped interventions for mood & anxiety disorders

Incremental costs and benefits over a lifetime for a typical patient with a mood or anxiety disorder having access to digital or stepped care

CA$, Present value of costs (base year = age 10), discounted at 4%



Per Patient Economics

Lifetime costs saved

$23,139

Lifetime costs

$16,637

Social ROI

$1.39 return on $1 invested

Source: Deloitte analysis

The above chart presents the per-patient lifecycle economics of stepped-care interventions initiated at age 10, the average age of onset for mood and anxiety disorders.

Ages 0–9 represent a healthy childhood. At age 10 the child begins receiving mental health support through a stepped-care or digital intervention model, incurring a recurring annual intervention cost of $802 for the first 5 years.[7,8] Starting in year 6, the modeling assumes a 63.6% drop-out rate, with the remaining patients continuing with more specialized care at an annual cost of $1,922.[7,8,9] The intervention helps avoid approximately $315 per year in direct healthcare costs.

From ages 10 to 20, the caregiving burden on parents is reduced significantly, resulting in $1,184 in annual benefits. These caregiving costs representing savings in parental productivity are the largest driver of early economic benefit.

Beginning at age 20, the morbidity burden is reduced by $270 per year as the individual experiences fewer absences from work as a result of early intervention. Costs and benefits at age 65, the assumed retirement age.

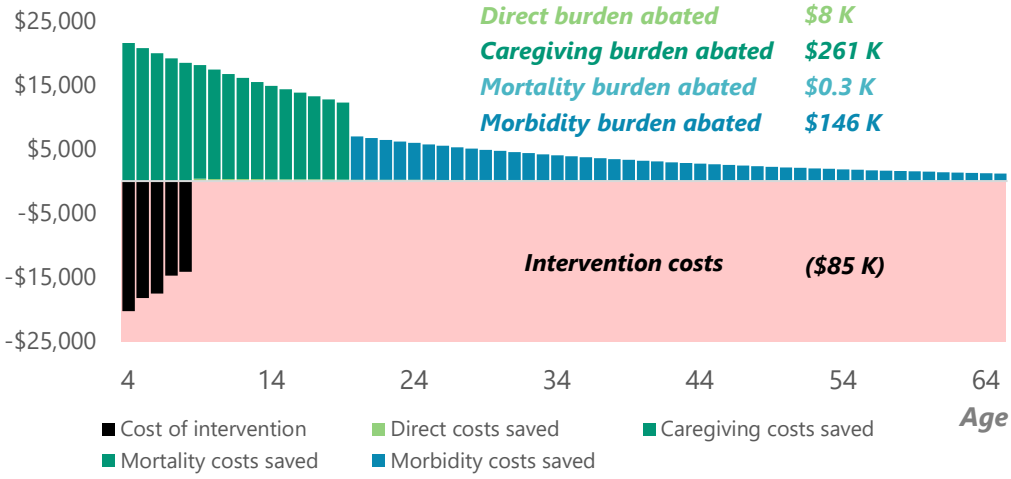
Unlike the other chronic conditions, no reduction in mortality is attributed to expanded treatment for mood and anxiety disorders.* To the extent that improved access to mental health care may reduce suicides, the return on investment may be more positive than estimated here.

Note (*): While suicide is a leading cause of death among youth, intentional self-harm is influenced by complex and multifactorial risk factors. Out of caution, we do not attribute reductions in suicide to the modeled interventions.

Value of investing in specialized care and surgical facilities for drug-resistant epilepsy (DRE)

Incremental costs and benefits over a lifetime for a typical patient with drug-resistant epilepsy (DRE) with access to specialized care

CA$, Present value of costs (base year = age 10), discounted at 4%



Per Patient Economics

Lifetime costs saved

$415,603

Lifetime costs

$84,968

Social ROI

$4.89 return on $1 invested

Source: Deloitte analysis

The above chart presents the per-patient lifecycle economics of expanding access to specialized comprehensive care for DRE (30% of all pediatric epilepsy cases) initiated at age 4, the average age of onset for epilepsy.

Investment begins at diagnosis (age 4) and includes infrastructure and clinical costs to scale access to specialized centers for diagnosis, inpatient beds, video electroencephalography (EEG) monitoring, surgical evaluation, and treatment. While upfront costs are high, direct cost savings are realized over time by accounting for the probability-weighted mix of surgical and non-surgical care compared to direct costs with no expanded access.[10] Costing assumptions are detailed in the appendix.

From ages 4 to 20, caregiving cost savings of $21,547 per year are the largest driver of early economic value, reflecting improved seizure control and reduced caregiving burden. Starting at age 15, modest mortality-related cost savings of $14 per year begin accruing. These are expected costs saved, reflecting the low but present risk of premature death due to epilepsy. Starting at age 20, $6,712 in annual morbidity savings reflect improved functioning and long-term productivity. Benefits end at age 65, the assumed retirement age.

Although costs are front-loaded, the lifetime social and economic returns are substantial, with reductions in caregiver burden and morbidity accounting for the largest share of benefits.

There are significant cost savings from investing early in interventions

To test how sensitive the results are to delays in intervention, three additional scenarios demonstrate how returns differ if interventions are delayed. Investing at the typical age of incidence delivers the highest net economic benefit across all three conditions.

Comparing outcomes at age 18 (transition to adulthood), 25, and 30 shows a clear decline in returns the longer intervention is delayed. These scenarios provide a realistic range of outcomes and highlight the steep opportunity cost of not acting early, as highlighted in Table 3 below.

Table 3: Net Benefits of investing early in interventions

CA$	Type 1 Diabetes			Mood & Anxiety			Epilepsy		
Investing Early									
Age at early intervention	10			10			4		
Lifetime Costs	($83 K)			($17 K)			($85 K)		
Lifetime Benefits	$329 K			$23 K			$416 K		
(A) Net Benefit	$246 K			$7 K			$331 K		
Investing Late									
Age at late intervention (3 scenarios)	18	25	30	18	25	30	18	25	30
Lifetime Costs	($79 K)	($75 K)	($71 K)	($16 K)	($15 K)	($14 K)	($85 K)	($85 K)	($85 K)
Lifetime Benefits	$289 K	$266 K	$251 K	$15 K	$12 K	$12 K	$196 K	$147 K	$139 K
(B) Net Benefit	$210 K	$191 K	$181 K	($0.8 K)	($3 K)	($3 K)	$111 K	$62 K	$54 K
Benefits of Investing Early vs Late									
Age at early intervention	10	10	10	10	10	10	4	4	4
Age at late intervention	18	25	30	18	25	30	18	25	30
Net Benefit of investing early **= (A – B)**	$35 K	$55 K	$65 K	$7 K	$9 K	$9 K	$220 K	$269 K	$277 K

Key takeaways

Key takeaways

1. The annual economic burden to the Canadian economy caused by chronic pediatric conditions is substantial: $483 M for type 1 diabetes, $6.0 B for mood & anxiety disorders, and $2.2 B for epilepsy.

2. Improving access to key interventions significantly abates both direct and indirect economic burden.

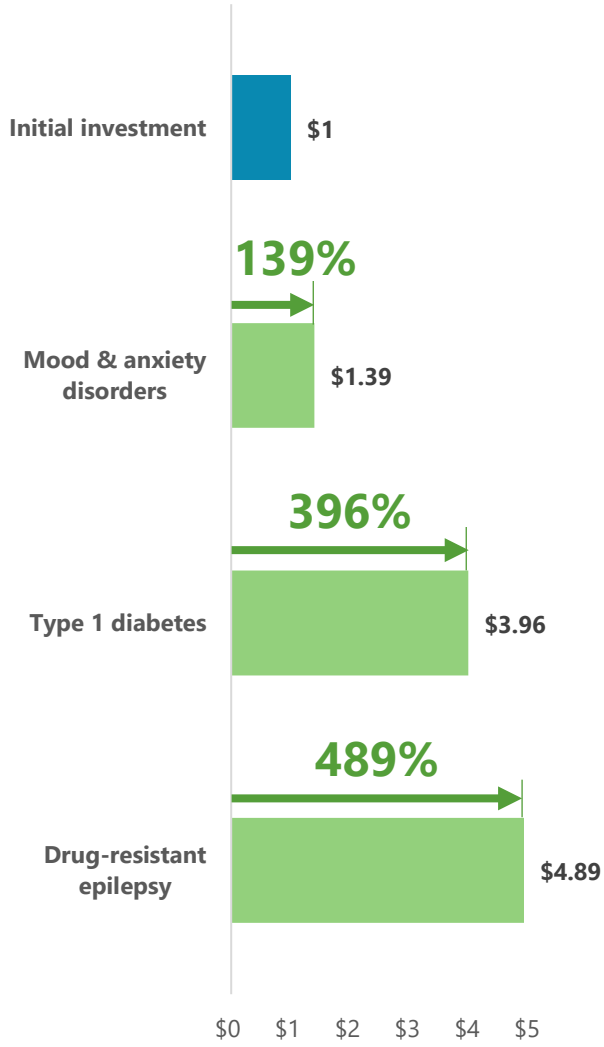
3. Modeling in this analysis across three pediatric conditions indicates a positive social return of $1.39 – $4.89 per $1 invested in improved access, consistent with global evidence of $1.80 – $17.10 returned per $1.

4. The largest share of benefits realized arise from reductions in indirect burden, notably fewer productivity and income losses for caregivers of children suffering with a condition.

5. Earlier expansion of access to an intervention in a child's lifecycle yields greater benefits by preventing complications and avoid significant costs that compound annually.

6. Impactful investments should arguably focus on scaling access by targeting underserved, evidence-based interventions. The type of investment can vary depending on condition-specific strategies. Examples include drug coverage, technologies, therapies, workforce, and/or infrastructure. Such investments must be evaluated on a lifetime, per-person basis.

ROI for investments in children's health
CA$, Per patient



Appendices

Appendix: Table of Contents

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1. Methodology

1a. Estimating the current burden of illness

To estimate the current economic burden of illness in Canada for pediatric Type 1 Diabetes, Mood & Anxiety Disorders, and Epilepsy, the Economic Burden of Illness in Canada (EBIC) studies conducted by the Public Health Agency of Canada (PHAC) were used as the starting point. These studies provided comprehensive historical data points, which were then back-casted to estimate the burden of these illnesses in 2023.

In the EBIC, the total economic burden of each condition is made up of direct and indirect components. The direct burden includes hospitalization costs; physician costs; and drug costs. The indirect burden includes the impact of premature mortality on productivity ("mortality costs") and the impact of the disease itself on productivity ("morbidity costs").

Estimating Direct Costs and Mortality Costs

The 2010 EBIC study was used for direct cost breakdowns for children aged 1-14 with the following conditions: combined diabetes types, mood (affective) disorders, and epilepsy.[1,2] To estimate the 2023 burden of illness, the 2010 results were scaled up using diagnosis counts from the Canadian Chronic Disease Surveillance System (CCDSS) to account for the growth in number of cases and to expand the data to cover all children aged 1-19. The costs were further scaled up to account for healthcare cost inflation between 2010 and 2023.

Note that mood (affective) disorders, as categorized by PHAC in the EBIC 2010 report do not account for anxiety disorders. To account for costs associated with anxiety disorders, PHAC's 1998 EBIC study was used as it was the most recent study by PHAC providing a detailed breakdown of direct costs associated with anxiety disorders.[3] This data was scaled to 2023 and added to the "mood (affective)" disorders costs in 2023 to accurately reflect the current burden of "mood and anxiety" disorders collectively. For diabetes, 95% of pediatric diabetes cases were assumed to be type 1, and this ratio was applied to the direct costs for diabetes.[4]

PHAC also provided mortality costs for ages 15-64 for diabetes and epilepsy. However, the mortality figures for mood & anxiety disorders are incomplete in this data. We therefore estimate mood & anxiety mortality costs. Statistics Canada's Table 13-10-0394-01 reports 197 children and youth suicides due to intentional self-harm in 2023. For the purposes of this report, we used $9.6 million as the value of a statistical life (VSL), which is aligned with the VSL figures for the other two diseases in this analysis.[5] Multiplying the number of suicides by the VSL figure results in a total estimated burden of $1.9 billion in 2023.

1a. Estimating the current burden of illness

Table A1: Scaling Methodology and Assumptions

Condition	Year	Source	Modelling assumptions
Direct Burden (Hospital, Physician, and Drug)			
Type 1 Diabetes	2010	PHAC	Scaled to 2023 using: • The healthcare industry price deflator growth rate.[6] • Growth in condition-specific prevalent number of cases (ages 1-14), sourced from the Canadian Chronic Disease Surveillance System (CCDSS).[7]
Mood Disorders	2010	PHAC	
Epilepsy	2010	PHAC	
Anxiety Disorders	1998	PHAC	
Indirect Burden (Mortality Burden)			
Type 1 Diabetes	2010	PHAC	For diabetes and epilepsy, mortality costs were scaled to 2023 solely using the healthcare industry price deflator growth rate due to the negligible absolute number and change in pediatric mortality cases over this period.[6]
Epilepsy	2010	PHAC	
Mood Disorders	2010	PHAC	Value scaled to 2023 using growth in healthcare industry price deflator and growth in number of pediatric deaths.[5,6]
Mood & Anxiety Disorders	2023	PHAC, Deloitte Estimate	Value from PHAC excludes suicides. Estimated for 2023 using Statistics Canada's death counts for intentional self-harm as outlined on the previous page.[5]

Note on Anxiety Disorders Specific Adjustment (1998 to 2023): As data was only available from PHAC's 1998 EBIC study, the following steps were taken to update and align this data:

1. First, the total anxiety-related direct costs from 1998 were scaled to 2023 using: The healthcare industry price deflator growth rate and the growth in anxiety disorder prevalence across the general population. This direct cost data was available for the 1-64 age group.

2. Next, to isolate the pediatric burden (ages 1-14), the per-patient cost of anxiety disorders were calculated as follows: the scaled 2023 direct anxiety burden (all ages 1-64) was divided by total anxiety cases (ages 1-64), resulting in a cost per patient (~$115 in 2023). This per-patient figure was then multiplied by the total pediatric anxiety cases (ages 1-14), estimated at 293,985 (details outlined on the next page), to yield a total direct anxiety burden of approximately $33.9 million for 2023. This figure was then added to the mood disorder direct burden to represent the total direct burden for "mood and anxiety disorders".

1a. Estimating the current burden of illness

Estimating number of cases for mood disorders and anxiety disorders, individually: To estimate the isolated cost burdens for mood disorder and anxiety disorder, the respective pediatric anxiety and pediatric mood cases needed to be determined as a first step. To arrive at the number of cases for each, disorder-specific prevalence rates from Statistics Canada (2023) were used:

- Mood Disorders prevalence: 2.1%.[8]
- Anxiety Disorders prevalence: 5.2%.[8]

Thus, the allocation used to split the number of patients as well as direct burden for "mood and anxiety disorders" as a collective was:

- Mood Disorders share = 2.1 / (2.1 + 5.2) = ~29%
- Anxiety Disorders share = 5.2 / (2.1 + 5.2) = ~71%

These shares were applied to the total number of prevalent cases for "mood and anxiety disorders" reported by the Canadian Chronic Disease Surveillance System (CCDSS), yielding in 293,985 cases of anxiety disorders and the remaining 118,725 cases of mood disorders in 2023. The direct cost per patient calculated for anxiety was therefore multiplied with the 293,985 cases for the total direct burden of anxiety disorders in 2023.

Estimating Morbidity Costs (2023)

Due to gaps in existing PHAC datasets, morbidity (productivity loss) and caregiving costs were estimated based on a targeted literature review, selecting key data inputs for calculation.

To quantify morbidity burden, incremental workdays lost (ID) due to each condition over a three-month period were identified from a 2016 published study by Zhang W et al. titled "The relationship between chronic conditions and absenteeism and associated costs in Canada".[9]

The concept of incremental workdays lost (ID) reflects the difference between absenteeism observed among individuals with a specified condition and that of a comparable control group with no condition. No-condition controls establish a baseline, and the ID metric captures the additional lost productivity attributable solely to the health condition, ensuring a cleaner estimate. Table A2 on the next page highlights key inputs used from this study along with our methodology for estimating total morbidity burden for diabetes, as well as mood and anxiety disorders.

1a. Estimating the current burden of illness

Table A2: Estimating morbidity burden for Diabetes and Mood & Anxiety disorders

			T1D	Mood	Anxiety
A	Incremental Workdays (ID) lost due to health problems and productivity losses caused by the given condition over 3 months		0.43	1.17	0.13
B	Annualized ID	=A*4	1.72	4.68	0.52
C	Avg. Daily Income (Statistics Canada, 2023)[10]		$279.6	$279.6	$279.6
D	Lost Income in 1 year	=B*C	$480.9	$1,308.5	$145.4
E	Add Team Productivity Multiplier	=D*1.44	$692.5	$1,884.2	$209.4
F	Add Additional Benefits Multiplier (15% wage multiplier)	=(E + 0.15*D)	$764.6	$2080.5	$231.2
G	Total Cases (age 20-64, CCDSS, 2023)		221,913*	851,172	2,107,663
	Total Morbidity Burden (2023)	**=F*G**	**$169.7M**	**$1,770.9M**	**$487.2M**

Since IDs were reported over a 3-month period, the figures were multiplied by 4 to extrapolate to a full year's productivity loss. Then, multiplying by average daily income (sourced from Statistics Canada) produced an estimate of direct individual loss.[10] Team productivity multiplier and benefits factors were applied to scale up the costs, before finally scaling by the total number of working-age individuals (ages 20-64) with the condition to estimate aggregate morbidity burden.

In this analysis, a wage multiplier of +44% (i.e., a factor of 1.44) is used to account for team productivity losses, as described by the source used that reported ID values. This incorporates the ripple effect an absent worker has on overall team output, beyond just their own wages. Additionally, a 15% uplift for employee benefits was applied on top of adjusted wages to reflect employer-paid non-wage labor costs, consistent with the study's methodology.

Note (*): The number of adult cases (age > 20) of diabetes (type 1 and 2 combined) as reported in the CCDSS were adjusted to only account for type 1 cases. We assume 8% of all adult diabetes cases are type 1.

1a. Estimating the current burden of illness

Unfortunately, this reference study did not include epilepsy within its scope of study, and a different methodology was therefore used to estimate the morbidity burden due to epilepsy. The Canadian Epilepsy Alliance states that the unemployment rate of those with epilepsy is approximately double that of the general population.[11] According to Statistics Canada, the base employment rate in Canada was 61.7% in 2011. Statistics Canada also reports the employment rate for people with epilepsy was 50.4% during 2011, resulting in an excess unemployment of 11.3% due to epilepsy.[12] We assume this excess unemployment of 11.3% has sustained over the years and is the case in 2023 as well.

Multiplying the average annual employment income reported by Statistics Canada of $59,400 (in 2023) by 11.3% yields $6712, reflecting the annual income lost for an average patient with epilepsy compared to a non-epilepsy counterpart.[13] Multiplying $6712 by the number of adult epilepsy cases (ages 20-64) of 191,255 in 2023, yields a total morbidity burden of $1.28 billion in 2023 for epilepsy.[7,13] Note that the Canadian Epilepsy Alliance also states 40% of people with epilepsy are under-employed, however, this effect was not included within the morbidity burden due to data limitations regarding the income impacts of underemployment, and therefore the true morbidity burden for pediatric epilepsy is likely higher than estimated here.[11]

Estimating Caregiving Costs (2023)

Type 1 Diabetes:

Informal caregiving costs for T1D were estimated using both event-based work loss and long-term employment disruption due to a child's diagnosis.

- A Canadian study reported that caregivers lose 3.3 to 7.5 hours of work time per diabetes-related event. The modeling in this report assumes 7.5 hours (1 full workday) lost per event.[14]
- Another study found that 15.1% of mothers stopped working entirely, and 11.5% reduced their working hours following their child's diagnosis.[15]

Steps:

1. In 2023, there were an estimated 12,645 pediatric T1D cases in Canada.[4,7]
2. Labour force participation rate for mothers of children was 61.1% (Statistics Canada Table 14-10-0020-01), yielding 7,726 employed mothers.[16]

1a. Estimating the current burden of illness

3. Of these, 82% were working full-time and 18% part-time, resulting in 6,297 full-time and 1,429 part-time employed mothers.[16]
4. Applying the 15.1% estimate, 1,167 mothers exited the workforce entirely. Using the average annual income for women ($56,434), the total annual income loss is $65.8 million.[13]
5. Applying the 11.5% estimate for mothers reducing hours (888 mothers), and assuming a drop from 5 to 4 workdays per week (loss of 7.5 hours/week), the income loss is estimated at $10.0 million annually.

This results in an estimated annual caregiving burden of $75.9 million for T1D, in 2023

Mood and Anxiety Disorders:

Caregiving costs for mood and anxiety disorders were estimated based on missed workdays due to parental responsibilities.

- A survey in Ontario found that 1 in 4 parents missed work to care for children facing anxiety-related challenges.[17]
- Of these, 87.5% missed 2 days annually, and 12.5% missed approximately 2.4 weeks (12 days).[18]

Steps:

1. In 2023, there were 6,086,900 Canadian households with children.[19]
2. Applying the 1-in-4 estimate, 1,521,725 parents missed work due to caregiving.
3. Weighted by the number of days missed, this results in a total of 4,945,606 lost workdays.
4. Using the average daily income ($279.60), the aggregate income loss is $1.38 billion annually.[10]

This results in an estimated annual caregiving burden of $1.38 billion for mood and anxiety disorders, in 2023

1a. Estimating the current burden of illness & 1b. Estimating the impacts of interventions to the current burden of illness

Epilepsy:

Caregiving costs for pediatric epilepsy were estimated based on observed income disparities at the household level.

- A Canadian study found that households with a child who is suffering from epilepsy earned $14,000 less than the average household income in 2010.[20]
- In 2023, there were approximately 39,200 pediatric epilepsy cases in Canada.

Steps:

1. Adjusted for total income growth in Canada between 2010 and 2023, $14,000 of lost income in 2010 amounts to a $21,547 income gap per household in 2023.[13,20]
2. Multiply the income gap ($21,547) by the number of cases (39,200).[7]

This results in an estimated annual caregiving burden of $844.7 million for epilepsy, in 2023

1b. How we estimated the impacts of interventions to the current burden of illness

To estimate the potential reduction in the economic burden of illness due to improved access to interventions, we conducted our analysis supported with key inputs sourced from published literature and disease-specific evidence. The tables on the following pages outline the key sources and assumptions used to model the intervention impact for each of the three pediatric conditions.

Our modeling relied on two main inputs per condition:

- **Access Scenarios**
    - The proportion of children currently accessing the intervention
    - The improved access and ideal access scenarios
- **Intervention Effectiveness**
    - For each cost component (e.g., direct healthcare costs, mortality, morbidity, caregiving), we applied an estimated percentage reduction in burden based on evidence of how much that component improves with access to the intervention

1b. Estimating the impacts of rt-CGM on the burden of illness for Type 1 Diabetes

Data Point	Value	Source
Reduction in Direct Burden		
Number of cases	12,645 (type 1 and 2, age 1-14, 2023)	CCDSS.[7]
Percent of children currently receiving intervention	79.7% (uptake of all types of CGM in Ontario, Alberta, and Quebec)	Ladd et al., 2025.[21]
Intervention impact	Rt-CGM reduces hospitalization admission days from 54 to 18 per 100 patient-years	Charleer et al., 2018.[22]
Reduction in Indirect Burden (Caregiving Burden)		
Number of cases	12,645 (type 1 and 2, age 1-14, 2023)	CCDSS.[7]
Proportion of cases that are type 1	95% of childhood diabetes cases	Nakhla et al., 2019.[23]
Productivity loss of caregiver (hours of work lost)	**15.1%** of mothers stopped working entirely and **11.5%** reduced their working hours following their child's diabetes diagnosis. Caregivers lost 3.3 to 7.5 hours of lost work time per event.	Brod et al., 2013.[14] Dehn-Hindenberg et al., 2021.[15]
Intervention impact	Rt-CGM reduces hospitalization admission days from 54 to 18 per 100 patient-years	Charleer et al., 2018.[22]
Reduction in Indirect Burden (Morbidity Burden)		
Number of cases	221,913 (type 1 and 2, age 20-64, 2023)	CCDSS.[7]
Proportion of cases that are type 1	5% - 10% of adult diabetes cases	Public Health Agency of Canada, 2023.[24]
Impact of diabetes on ability to work	0.43 incremental number of absent workdays due to health problems and productivity losses over a 3-month period	Zhang et al., 2016. [25]
Intervention impact	Work absenteeism decreased from one quarter of individuals reporting missed work in the year prior to rt-CGM to 9% of individuals missing work after rt-CGM initiation	Charleer et al., 2018.[22]
Reduction in Indirect Burden (Mortality Burden)		
Number of deaths due to pediatric diabetes complications	9 deaths (age 1-19), mainly due to complications such as diabetic ketoacidosis (DKA) (mortality: 0.15%-0.31%) and cerebral edema (impacts 0.5-1.0% of pediatric admissions for DKA, with a mortality rate of 25%)	Statistics Canada Table 13-10-0394-01.[26] Skitch and Valani, 2015.[27]
Intervention impact	12.9% fewer deaths using any CGM than self-monitoring of blood glucose (SMBG)	Rotondi et al., 2022. [28]

1b. Estimating the impacts of stepped interventions on the burden of illness for mood and anxiety disorders

Data Point	Value	Source
Reduction in Direct Burden		
Number of cases	154,955 (age 1-14, 2023)	CCDSS.[7]
Percent of children currently receiving intervention	20% of Canadian children receive appropriate mental health services	Mental Health Commission of Canada.[29]
Intervention impact	48% remission rate with internet-delivered CBT versus 15% in control	Jolstedt et al., 2018.[30]
Reduction in Indirect Burden (Caregiving Burden)		
Number of cases	154,955 (age 1-14, 2023)	CCDSS.[7]
Productivity loss of caregiver (hours of work lost)	1 in 4 parents in Ontario missed workdays to care for their children facing issues with anxiety. ~90% parents miss 2 days of work; 10% miss 2.4 weeks of work	Ipsos, 2017.[31] Children's Mental Health Ontario (CMHO).[32]
Intervention impact	48% remission rate with internet-delivered CBT versus 15% in control	Jolstedt et al., 2018.[30]
Reduction in Indirect Burden (Morbidity Burden)		
Number of cases	2,958,835 (age 20-64, 2023)	CCDSS.[7]
Impact of mood and anxiety disorders on ability to work	Incremental number of absent workdays due to health problems and productivity losses over a 3-month period = 0.13 (Anxiety) and 1.17 (Mood)	Zhang et al., 2016.[25]
Intervention impact	48% remission rate with internet-delivered CBT versus 15% in control	Jolstedt et al., 2018.[30]
Reduction in Indirect Burden (Mortality Burden)		
Number of deaths due to mood & anxiety disorders	197 (age 1-19, 2023)	Statistics Canada Table 13-10-0394-01.[33]
Intervention impact	**N/A**; Unlike the other chronic conditions, we do not model mortality-related savings for mood and anxiety disorders and therefore assume zero mortality cost savings. While suicide is a leading cause of death among youth, intentional self-harm is influenced by complex and multifactorial risk factors. Out of caution, we do not attribute reductions in suicide to the modeled interventions.	

1b. Estimating the impacts of specialized care to the burden of illness for epilepsy

Data Point	Value	Source
Reduction in Direct Burden		
Number of cases	23,980 (age 1-14, 2023)	CCDSS.[7]
Percent of children currently receiving intervention	45% of DRE cases (equivalent to 14% of all pediatric epilepsy cases)	Ryvlin P et al, 2014.; Lim ME et al, 2013.[34,35]
Intervention impact	30% reduction in total costs across the ER, inpatient visits, and critical admissions.	Children's Hospital, London Health Sciences Centre.[36]
Reduction in Indirect Burden (Caregiving Burden)		
Number of cases	23,980 (age 1-14, 2023)	CCDSS.[7]
Productivity loss of caregiver (hours of work lost)	Households with a member diagnosed with epilepsy earned $14,000 lesser than an average household in 2010. This value was scaled to $21,547 using growth in nominal employment income between 2010 and 2023.	Brna and Gordon, 2023.[20] Statistics Canada.[5]
Intervention impact	30% reduction assumed	Children's Hospital, London Health Sciences Centre.[36]
Reduction in Indirect Burden (Morbidity Burden)		
Number of cases	191,255 (age 20-64, 2023)	CCDSS.[7]
Impact of diabetes on ability to work	The unemployment rate among people with epilepsy is double that of the general population. Also, 40% are under-employed.	Canadian Epilepsy Alliance.[11]
Intervention impact	30% reduction assumed	Children's Hospital, London Health Sciences Centre.[36]
Reduction in Indirect Burden (Mortality Burden)		
Number of deaths due to epilepsy	90 (age 1-19, 2023) (Mortality rate: 2.3/1000 person-years)	Schnier and Chin, 2023.[37]
Intervention impact	30% reduction assumed	Children's Hospital, London Health Sciences Centre.[36]

1b. Estimating the impacts of interventions on the current burden of illness

Example: Modeling Direct Burden reduction for Type 1 Diabetes (T1D) patients with improved access to rt-CGM (under the improved access scenario)

- Current access to CGM: 80%
- Improved access scenario: 85%
- Reductions in the direct cost component with CGM access:: –22%

In 2023, we estimate the direct cost burden of T1D at $104.6 million, assuming 80% of children are using some form of CGM. To understand the baseline (no intervention) burden, we back-calculate using the following logic: Let ***B*** be the true burden in the absence of CGM access. If 80% of the population faces a 22% reduction in cost due to access, and 20% face the full burden, then:

Total burden = (80% × ***B*** × [1 – 22%]) + (20% × ***B***)

$104,605,187 = (0.8 × ***B*** × 0.78) + (0.2 × ***B)***

=> ***B*** = $126,723,969 (baseline burden without intervention)

Next, we apply the **improved access scenario** of 85%:

Improved burden = (85% × ***B*** × [1 – 22%]) + (15% × ***B***)

= (0.85 × $126,723,969 × 0.78) + (0.15 × $126,723,969)

= $103,134,302

Therefore, the **burden abated** under improved access =
$104,605,187 – $103,134,302 = $1,470,885

General Approach:

This modeling logic was applied consistently across all three conditions using condition-specific inputs for each access scenario, and the percentage reduction in specific cost components due to the intervention.

For each condition, we estimated the baseline burden in the absence of intervention, then modeled the reduced burden under improved and ideal access scenarios to calculate total burden abated by scaling access to evidence-based interventions.

1c. Estimating the return on investment

To assess the return on investment (ROI) for each intervention, we compared the present value of benefits (i.e., costs avoided due to improved access) against the present value of intervention costs, expressed as a ratio:

$$\text{ROI (\%)} = \frac{\text{Present Value of benefits accrued over a lifetime}}{\text{Present Value of costs accrued over a lifetime}} \times 100$$

Step 1: Estimating Individual-Level Cost Savings

We first calculated the burden abated for each cost component under the improved and ideal access scenarios (as described in the previous section). These burden abatements were then converted into individual-level savings by dividing by the relevant patient population for each cost component:

- Direct costs: Calculated for children aged 0–14, divided by the number of patients aged 0–14
- Mortality costs: Calculated for ages 15–64, divided by the number of patients in that range
- Morbidity costs: Calculated for ages 20–64, divided by the number of patients in that range
- Caregiving costs: Calculated for parents of children aged 0–14 (parent age assumed 20–64), divided by the number of children aged 0–14. This produced annual per-patient savings for each cost component. Note that the per patient caregiving costs were extended up to age 20 when evaluating lifetime costs as we assume children enter the workforce at age 20 and will require caregiver support until then.

This produced annual per-patient savings for each cost component.

Step 2: Intervention Costs

The annual per-patient cost of providing the intervention was determined through primary research and published sources. For example:

- **Type 1 Diabetes:** $3,588 per year for real-time continuous glucose monitoring (rt-CGM).[38]
- **Mood & Anxiety disorders:** $802 per year for iCBT for the first 5 years. Starting in year 6, we assume a 63.6% drop-out rate, with the rest continuing specialized care costing ~$1922 annually thereafter, implying an annual expected cost of $699 starting in year 6.[39, 40]

1c. Estimating the return on investment

- **Epilepsy:** The intervention for epilepsy is modeled as a comprehensive capacity expansion for specialized care, incorporating both infrastructure investment and surgical pathways.
    - **Infrastructure costs** represent the upfront capital investment required to expand specialized/comprehensive epilepsy care, including surgical equipment and facility upgrades. These are modeled as a fixed annual cost over 5 years, after which no additional infrastructure expenditure is assumed. Costs without expanded access, i.e., steady state direct costs, are subtracted from this total as we look to isolate the impact of this specific intervention.[41]
    - **Surgical costs:** Based on primary research findings, 17% of patients undergoing comprehensive care receive epilepsy surgery. For this subset that undergoes surgery, an upfront surgical cost of $35,776 is realized and in subsequent years, annual treatment costs are ~$610 (excluding infrastructure costs). The remaining 83% of patients incur ongoing treatment costs of $2,874 annually, with no upfront surgical expenditure.[41]
    - Therefore, lifetime costs are modeled as a weighted average of the surgical and non-surgical pathways, calculating using the probabilities noted above. Infrastructure costs are applied over the first 5 years and combined with the weighted treatment costs to produce a per-patient lifetime intervention cost.

Step 3: Time Horizon and Age of Onset

For each condition, we assumed access to the intervention begins at the average age of onset among children aged 0–19:

- **Type 1 Diabetes: Age 10**.[7]
- **Mood & Anxiety Disorders: Age 10**.[7]
- **Epilepsy: Age 4**.[42]

Savings begin accruing at the age of onset and continue annually until age 65 (assumed retirement age).

1c. Estimating the return on investment

Step 4: Discounting Future Costs and Benefits

- In the first year of intervention, benefits and costs are taken at full value (undiscounted).
- From the second year onwards, both benefits and intervention costs are discounted at 4% per year to reflect present value.

Step 5: Calculating Return on Investment

- Sum of the present value of annual individual-level savings (direct, mortality, morbidity, and caregiving) from the age of onset to age 65.
- Sum of the present value of annual intervention costs over the same time horizon.
- ROI (%) = $\frac{\text{Present Value of benefits accrued over a lifetime}}{\text{Present Value of costs accrued over a lifetime}} \times 100\%$

2. Glossary

OECD – Organization for Economic Co-operation and Development

GDP – Gross Domestic Product

CCB – Canada Child Benefit

CDB – Child Disability Benefit

ED – Emergency Department

CHEO – Children's Hospital of Eastern Ontario

OHIP+ – Ontario Health Insurance Plan Plus

PHAC – Public Health Agency of Canada

IHME – Institute for Health Metrics and Evaluation

WHO – World Health Organization

QALY – Quality-Adjusted Life Year

ICER – Incremental Cost-Effectiveness Ratio

ROI – Social Return on Investment

DALY – Disability-Adjusted Life Year

YLL – Years of Life Lost

YLD – Years Lived with Disability

COI – Cost-of-Illness

T1D – Type 1 Diabetes

T2D – Type 2 Diabetes

CGM – Continuous Glucose Monitoring

rt-CGM – Real-Time Continuous Glucose Monitoring

AID – Automated Insulin Delivery

CIHI – Canadian Institute for Health Information

CCDSS – Canadian Chronic Disease Surveillance System

iCBT – Internet-delivered Cognitive Behavioral Therapy

DRE – Drug-Resistant Epilepsy

EEG – Electroencephalography

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