



UNIVERSITY OF
CALGARY

Child Health and Wellness Strategy



**This strategy is dedicated to the children and families we serve.
They are at the heart of this plan and our research.**

Territorial Acknowledgement

We acknowledge that the University of Calgary resides on the traditional territories of the people of the Treaty 7 region in Southern Alberta, which includes the Blackfoot Confederacy (comprising the Siksika, Piikani, and Kainai First Nations), as well as the Tsuut'ina First Nation, and the Stoney Nakoda (including the Chiniki, Bearspaw, and Wesley First Nations). The City of Calgary is also home to Métis Nation of Alberta, Region III. The University of Calgary is situated on land adjacent to where the Bow River meets the Elbow River and the traditional Blackfoot name of this place is "Moh'kins'tsis", which we now call the City of Calgary.

Summary

Child health research is life trajectory research. Exposures, inherent conditions, and stresses during early life have life-long and sometimes multi-generational consequences. Many conditions that manifest in adulthood arise from the complex interplay of biology and environment as children develop and grow. Conditions that arise in infancy and childhood account for the largest proportion of the total human burden of disease. That means when we address harmful exposures, effectively treat inherent conditions, and remediate stressors in infancy and childhood, the benefits to human health are monumental. Furthermore, better understanding of the factors that set the foundation for well-being across the lifespan will better equip parents, caregivers, and service providers to set children on the optimal trajectory.

The well-being of children and families is at the heart of our work. This is the central motivation behind the University of Calgary Child Health and Wellness Strategy. Child health has long been the focus of a diverse group of researchers at the University of Calgary. With four decades of generous support from the community, this group has grown significantly in size, sophistication and reputation. Today, this group includes over 300 principal investigators and well over 700 trainees and research staff. Their strengths are impressive: Child Health and Wellness researchers attracted \$200M in external research funding in the last five years. These researchers **publish and attract citations at an impressive rate** and many are **international leaders** in their fields. Many child health and wellness research teams are embedded within the Alberta Children's Hospital and other health care settings, while others routinely collaborate with healthcare providers and still others work closely with community organizations whose mission centres on child health and wellness. The wider Calgary community is also fortunate to have incredible support from our community leaders and, in particular, the Alberta Children's Hospital Foundation. This combination – a **critical mass** in the quality and quantity of research, the **close integration** of research with organizations that care for children and their families, and the **generous support** of our community leaders – makes now the perfect time to take Child Health and Wellness research at the University of Calgary to the next level. The impact will be better health and wellbeing of children and their families here and around the world.

To develop our strategy, we embarked on an **ambitious journey** to engage Child Health and Wellness researchers across campus, in addition to child and youth-facing agencies, community members and leaders. This journey, **involving 640 participants from 40 organizations**, illuminated the **'sweet spot' for child health and wellness**: the intersection between our research strengths, the needs of our community, and relevant trends and opportunities. The high level goals of this strategy are to: 1) Conduct **high quality, internationally-recognized** child health and wellness research for **children and families**; 2)

Become national and international leaders in **innovative and transformative** research from bench to bedside to backyard and back; 3) Advance national leadership in **community-partnered, child and family-centred** health and wellness research, and 4) Lead **evidence creation, evidence-informed health promotion, and policy development** with and for children and their families in Alberta and beyond.

To achieve these goals, we developed seven objectives, each with specific, measurable and achievable targets. Our objectives are to: (1) Foster a **strong culture and community** of research excellence; (2) Drive forward impactful science through **strength-based research programs**; (3) **Enable cutting-edge research**; (4) **Equip and foster the next generation** of Child Health and Wellness researchers; (5) **Partner with community, children, families and leaders** to address needs in child health and wellness through research; (6) Support Child Health and Wellness researchers to have **international impact**; and (7) Build a **durable support framework** to sustain the strategy. By **mobilizing multidisciplinary research teams and working shoulder to shoulder with our broader community**, we will ensure that discoveries translate into impact for children and families in Southern Alberta and far beyond.

This five-year plan is designed to **capture and learn from the knowledge and lived experiences of children and their families and translate those learnings into tangible outcomes in our community**. We know that issues in child health are complex and require **teams with diverse skills, knowledge and perspectives**. Accordingly, our strategic focus is to build a **dynamic, collaborative culture** that spans the UCalgary research community and our partners, locally and internationally, to address grand challenges in Child Health and Wellness. Furthermore, we value **excellence in both knowledge creation and its translation into practice**. For this reason, we have embedded high standards of peer review and transparency into this plan to ensure that we allocate resources to drive the very best in research and maximize its translation to care. Across all areas of investigation, what continues to unite our researchers is the knowledge that when we improve the health and wellness of children, they grow up to be healthier adults. This reduces human suffering, lowers healthcare costs and builds strong and productive communities.

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Child Research is Life Trajectory Research

Health and wellness challenges early in life are critically important because of their immediate impacts on children and their families and because of their downstream impacts – they can alter the life-course of a child. Early life exposure and the complex interplay of inherited and environmental factors can lead to long-term effects and chronic diseases in adults. Insults during early life often have disproportionate costs and consequences. Adverse events during pregnancy and fetal development can have life-long and even multi-generational consequences. For example, preterm birth remains the main cause of child-related mortality around the world and Calgary has one of the highest preterm birth rates in Alberta.

Child health and wellness is foundational to human health.



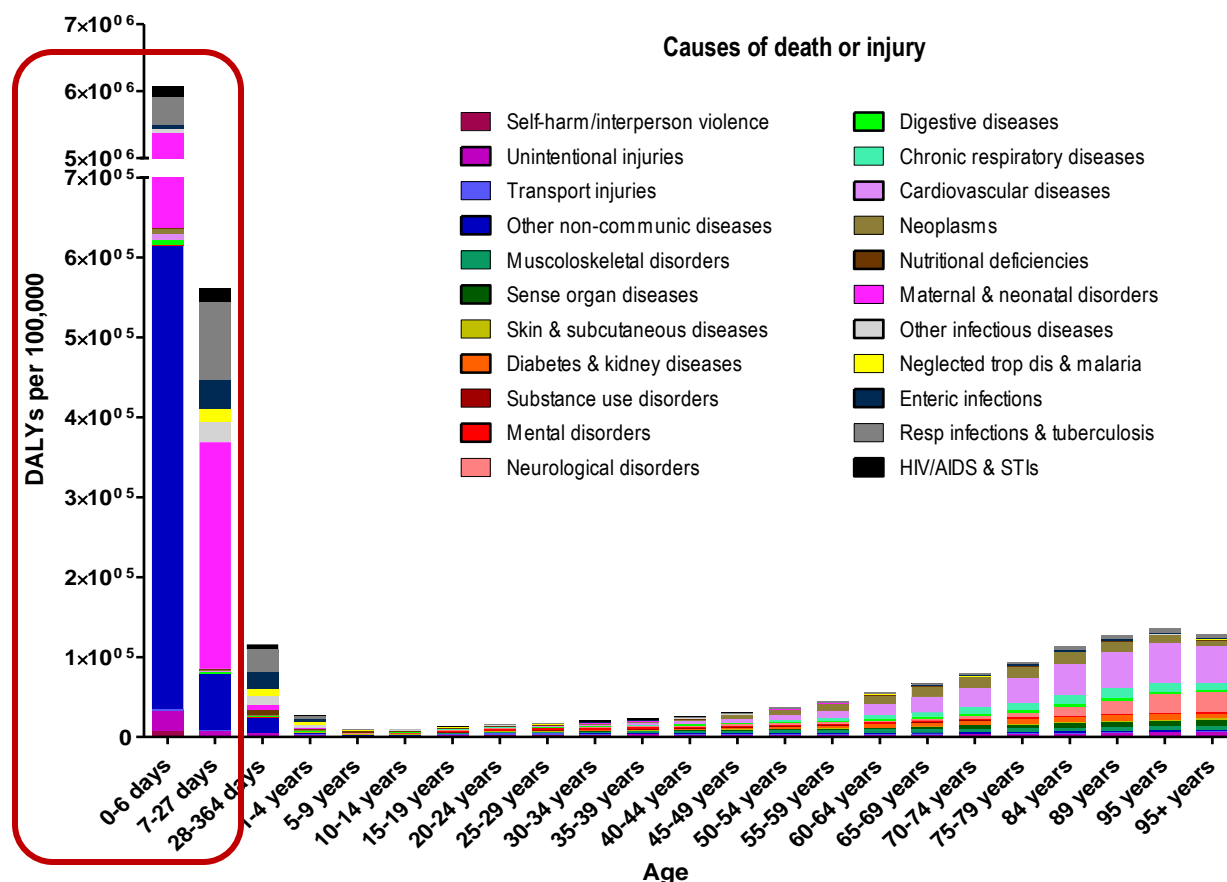
The global burden of childhood disease is staggering. Data from the international Global Burden of Disease project clearly show that the burden of diseases of infancy and childhood dwarf all other health issues in terms of years of life lost to death or disability. Neonatal conditions and diseases as a group are the largest contributors to the global burden of disease by this measure. This is true both in Canada and worldwide (**Figure 1**). Preventing and treating threats to health and development in childhood maximizes the return on investment because of the fundamental potential to alter life trajectories and ensure that these children – and future generations – reach their full potential. Optimizing early life conditions, including prenatal conditions, promotes a trajectory of health and wellness. Furthermore, **investment in early childhood development is more effective, both socially and economically, than investment in later life remediation.**¹

*The Global Burden of Disease project measures the impact of health issues as potential life lost due to early death or productive life lost to disability. Did you know that **diseases during pregnancy and infancy take a greater toll on human health by this measure than diseases of all other age groups combined?***

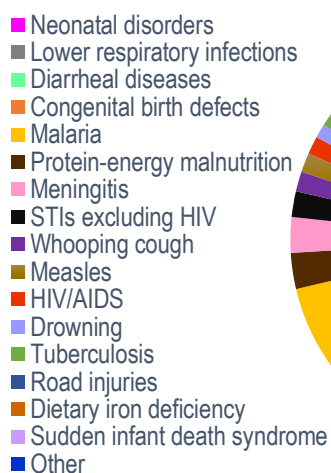
¹ Statement adapted from Professor Heckman in “The Heckman Equation Brochure”:
<https://heckmanequation.org/resource/the-heckman-equation-brochure/>

Figure 1: The burden of diseases of infancy and childhood measures in disability adjusted life years (DALY's).
Source: Global health data exchange (<http://ghdx.healthdata.org/gbd-results-tool>).

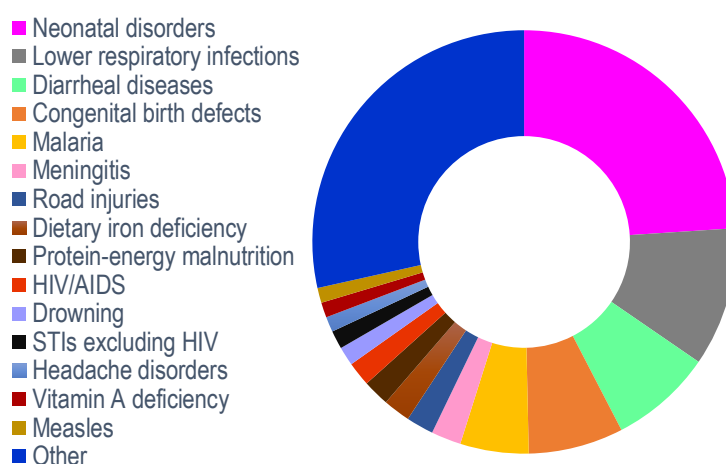
i): Global burden of disability and disease by age.



ii): Top causes of death or injury <5 years of age.



iii): Top causes of death or injury <20 years of age.



Research Drives Impact

Improving child health and wellness requires more than resources; it also requires advances in knowledge driven by research. Research is at the heart of all of our advances in effective interventions, accurate predictions and diagnoses, effective and efficient health care systems, and strong public policies that enable children to thrive. **The application of knowledge is key to improving the human condition.**

Modern research is a grand-scale endeavour to systematize knowledge creation via scientific reasoning, discourse and debate. Researchers disseminate, curate and preserve knowledge via the academic literature.

Knowledge requires understanding to have impact. With knowledge and understanding come innovation. However, the relationship between academic literature and innovations that lead to improvements in child health and wellness is complex. For example, it takes 17 years, on average, for evidence from randomized controlled trials to make its way into practice.²

“Academic publishing is the first-order product of knowledge creation. This is where knowledge is reviewed, discussed and curated for future use. It is a resource accessed by industry, governments, NGOs, educators and researchers. Contributing to the growth and evolution of knowledge via publishing is a core function of a research institute.” – Dr. Benedikt Hallgrimsson, ACHRI Scientific Director – Basic Science

Meaningful advances tend to be embedded in dense networks of knowledge within academic literature upon which innovators from many sectors, both private and public, build new tools, treatments or practices that improve health.³ **The path from discovery to innovation and impact is rarely direct or simple.** It requires **participation and partnership – with children and all those who contribute to their futures**, including families, service providers, healthcare professionals, and influencers from all disciplines and sectors. We will continue to focus our research efforts on areas in which we are poised for effecting positive change in child health and wellness, based on our strengths and building on the central theme of the University of Calgary Strategic Research Plan.

² “Crossing the Quality Chasm: A new health system for the 21st century” Published by the former Institute of Medicine in 2001; brief report available at: <http://www.nationalacademies.org/hmd/~/media/Files/Report%20Files/2001/Crossing-the-Quality-Chasm/Quality%20Chasm%202001%20%20report%20brief.pdf>

³ Jaffe, Adam B., and Manuel Trajtenberg. *Patents, citations, and innovations: A window on the knowledge economy*. MIT press, 2002.

The University of Calgary Opportunity

The University of Calgary (UCalgary) provides the ideal environment for building teams to address the grand challenges of Child Health and Wellness. Our culture is entrepreneurial and innovative and our Eyes High Strategy seeks to build a community of “discovery, creativity and innovation.”⁴ The UCalgary Strategic Research Plan seeks to **create impact by matching strengths to opportunities, building research capacity, and driving innovation.**⁵ The University is currently focusing its efforts to achieve these goals through six cross-cutting research themes that recognize major areas of research strength within the academy (**Figure 2**).

With the success of these research themes, it is now time to expand our focus to new areas of strength for the University of Calgary. Child Health and Wellness, along with One Health⁶, were selected as the two major emerging areas of research strength. Child Health and Wellness researchers already integrate closely with several of the existing research themes and our community of scholars is uniquely positioned to harness the power of partnership and contribute to the successes of the existing (and emerging) research themes.

Figure 2: The current University of Calgary Strategic Research Themes - Complementing existing research strengths



Cross-pollinating research themes. Active large-scale child health research programs are already engaged with the Infections, Inflammation and Chronic Diseases theme through the International Microbiome Centre, with the Brain and Mental Health theme through neuroimaging and neurostimulation platforms, and with the Engineering Solutions for Health: Biomedical Engineering theme through interdisciplinary trainee projects and the student-led Innovation4Health Health Hack. Researchers studying social determinants of child health and wellness integrate closely with the Human Dynamics in a Changing World theme. Several of our researchers are ready to engage with the emerging One Health research theme in areas such as antibiotic stewardship during the early years of life.

⁴ University of Calgary Eyes High Strategy 2017-2022

⁵ University of Calgary Strategic Research Plan 2018-2023

⁶ <https://vet.ucalgary.ca/news/funds-injected-support-cross-cutting-research-strengths>

Child Health and Wellness and UCalgary's innovation landscape

Several other campus-wide developments and strategies contribute to a rich environment of support for Child Health and Wellness. The commercialization and social innovation landscape at UCalgary supports all stages of innovation, from idea to market testing to scale-up, through the recently established Hunter Hub for Entrepreneurial Thinking⁷, the recently reorganized Innovate Calgary⁸, and the internationally positioned Creative Destruction Lab⁹ (Rockies location).

UCalgary is working to address **equity, diversity and inclusion** gaps in the entrepreneurial landscape with **WELab**, a federally-funded training program for women¹⁰. In the health context, the **Life Sciences Innovation Hub**¹¹ offers physical space and resources (including IMPACT: Integrated Management Platform to Accelerate Clinical Trials) for commercialization and

translation, and the W21C Research and Innovation Centre¹² has been bringing innovation to the healthcare system for over 15 years. UCalgary's partnership with the national not-for-profit Mitacs¹³ provides an invaluable opportunity for research trainees to gain industry and international research and development experience. Of particular note, **the student-led Innovation4Health's 2019 Health Hack**¹⁴ focused on bringing skilled personnel together with healthcare professionals, caregivers and patients to find solutions for child health-related problems. **Child Health and Wellness researchers are already taking advantage of this burgeoning innovation landscape** and our strategy aims to further increase and support innovation for the benefit of children and families.

"The child health and wellness cross-cutting theme is destined for success at the University of Calgary because of its support for social innovation. This support enables effective community-based interventions, such as Welcome to Parenthood, to be quickly scaled and spread to other jurisdictions." – Dr. Karen Benzies, Associate Dean Research, Nursing; Child Health Thought Leader

⁷ <https://www.ucalgary.ca/hunter-hub/>

⁸ <https://innovatecalgary.com/>

⁹ <https://www.creativedestructionlab.com/locations/calgary/>

¹⁰ https://ucalgary.ca/news/ucalgary-launches-first-women-entrepreneurship-training-program?mkt_tok=eyJpIjoiTkrZMlIUQXdZMkI5WVRRReCisInQIiJKb0RvUGNOYk5sbW1iNWRnTE9EZHo0bFwvcDZlWXdxS0FudWNuNFBPeUVLQk9CdZJNdW03TXNGNkZXSkJ3QWFwYnp2a0hUU0xtTU5tMVBzOXk0b2tsYVJxYW5FZjZlQWNIQStBOFB3UFV4ckx4Y3A4OW1kWkhraDJpdHM1dzJFZlIifQ%3D%3D

¹¹ <https://research.ucalgary.ca/innovation/ecosystem/life-sciences-innovation-hub>

¹² <https://www.w21c.org/>

¹³ <https://research.ucalgary.ca/conduct-research/funding/apply-grants/external-grants/mitacs;>
<https://www.mitacs.ca/en>

¹⁴ <https://www.innovation4health.com/>

Matching Strengths with Opportunities

With expertise spanning the entire research continuum, UCalgary is well-positioned to build on its strengths and enter a new era of maternal, child, and family research - one that harnesses the energy, intellect and resources of the entire institution. Between 2012 and 2018, 9.5% of UCalgary's total publications were authored by child health and wellness researchers across eight faculties and accounted for >10% of UCalgary citations. Interestingly, child health and wellness researchers featured in this analysis represent only 3% of UCalgary research-active faculty.¹⁵ **Child health and wellness researchers are punching above their weight.** In-depth analysis of the keywords in UCalgary child health-focused publications since 2012 reveals key areas of strength in which UCalgary researchers publish the most and garner the largest number of citations (Figure 3). The tendency of these keywords to co-occur in highly cited publications is shown by the connections among keywords.

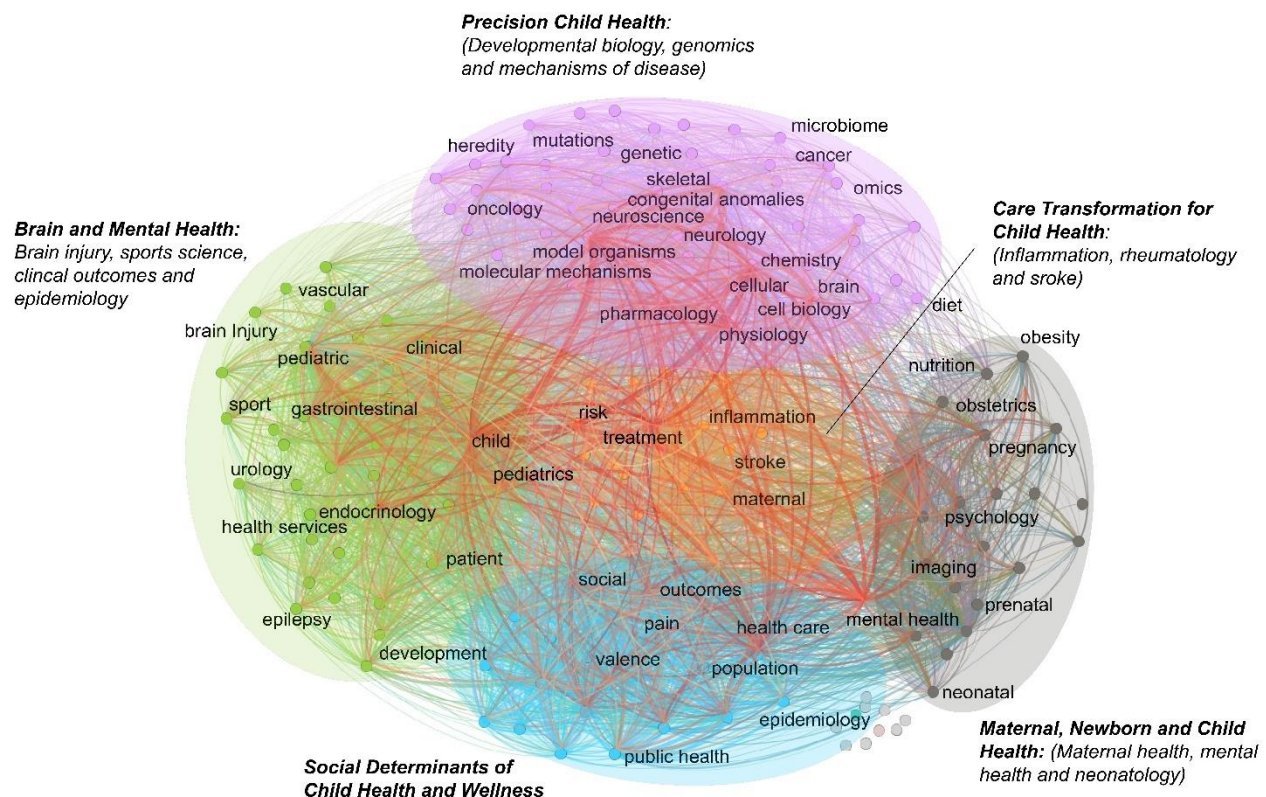


Figure 3: Child health and wellness research strength: Bibliometric analysis of >35,000 child health-focused UCalgary publications (2012-2018)

¹⁵ Child Health and Wellness Scan, ACHRI. May, 5, 2019. Full report available on request.

Our research strengths are also reflected in the many successful national and international Calgary-led teams that have generated major investments in child health and wellness. In the last five years, child health and wellness researchers have attracted more than \$200M in external research funding, which includes community investment of \$50M in matching funding, infrastructure and centre support via the Alberta Children's Hospital Foundation (ACHF) to enable this success (**Table 1**). Our researchers have been **incredibly successful leveraging philanthropic investments** to obtain competitive external funding, maximizing the impact of this research in Calgary and beyond.

Table 1: Examples of Calgary-led child health and wellness research teams and their outstanding peer-reviewed funding successes enabled by significant investments from ACHF

Investments	Title & Team	Focus & Impact
ACHF (>\$10M) Canada Foundation for Innovation NSERC CRC Tier II >\$12M tri-council funding total	Owerko Centre Dr. Graham <i>et al</i>	<ul style="list-style-type: none"> • Neurodevelopmental and child mental health • Bio-psychosocial translational approach <p>Generating knowledge, developing effective interventions, and shaping policies and practices for the benefit of children and families affected by neurodevelopmental and child mental health disorders</p>
ACHF (\$18M) Canada Foundation for Innovation (\$12.8M) Genome Canada/AB (\$6M) CIHR (\$4.5M) NIH (\$3M)	Precision Child Health Drs. Bernier, Childs, Cross, Hallgrimsson, Innes, Kurrasch, Parboosingh, Shutt <i>et al</i>	<ul style="list-style-type: none"> • Precision medicine of genetic disease in children • Rapid discovery of genetic etiology of severe childhood diseases <p>Ending the diagnostic odyssey for kids with genetic disease, finding potential treatments, bringing hope to families</p>
ACHF Alberta Innovates >\$23M leveraged from initial investments	Alberta Births Common Data (ABCD includes All Our Families & Alberta Pregnancy Outcomes and Nutrition) Drs. Letourneau, Tough <i>et al</i>	<ul style="list-style-type: none"> • Longitudinal birth cohort with rigorous, standardized data: social determinants, service utilization, health history, and biological data • Used by >100 researchers across Canada and globally in >140 studies <p>Informing programs, policy and practice in Alberta; sharing data with qualified investigators more broadly; partnering with community – all to maximize impact of knowledge for children and families</p>
ACHF External research funding from multiple sources (\$15M for pain research; \$14.4M in 2018/19 for rehab research)	Vi Riddell Pain & Rehabilitation Program Drs. Emery, Kirton, Noel, Trang, <i>et al</i>	<ul style="list-style-type: none"> • Neurological mechanisms, treatment and management of pain • Innovative rehabilitation strategies in children with perinatal stroke, neurodevelopmental conditions (e.g. cerebral palsy), physical disabilities, MSK conditions, concussion, and other chronic medical conditions (e.g. pediatric cancers) <p>Integrating research from investigation to intervention and implementation to improve quality of life for children living with pain and children requiring rehabilitation</p>

ACHF (\$4M) CIHR (\$4.6M) AHS (\$0.5M) Brain Canada (\$0.5M) NIH (\$1M)	Integrated Concussion Research Program (ICRP) Dr. Yeates <i>et al</i>	<ul style="list-style-type: none"> • Concussion prevention, diagnosis, prognosis, mechanism and rehabilitation <p>Improve outcomes for children and youth who experience concussions</p>
Terry Fox Research Institute (TFRI) ACHF Kids Cancer Care, Alberta Cancer Foundation \$16.4M leveraged from initial \$5M from TFRI	Precision Oncology for Young People Drs. Chan, Narendran, Senger <i>et al</i> with >30 pediatric cancer research and funding organizations across Canada	<ul style="list-style-type: none"> • Pan-Canadian study of molecular tumor profiling in young people with high-risk cancers • Utilizes infrastructure and protocols of UCalgary's Brain and Pediatric Tumour Bank <p>'Improving the outcomes of young people with cancer, one child at a time'¹⁶</p>
ACHF (\$1M) Genome Canada (\$8.5M) CIHR (\$5M) ZonMw (Netherlands, \$3M) The Arthritis Society (\$0.75M)	Understanding Childhood Arthritis Network (UCAN) UCAN.CAN-DU & UCAN.CURE Drs. Benseler, Marshall, Twilt, Currie <i>et al</i>	<ul style="list-style-type: none"> • Genomic precision diagnostic and therapy for >24,000 Canadian and >12,000 Dutch children with arthritis <p>Early targeted treatments control joint inflammation and prevent lifelong disability</p>
AIHS CIHR ACHF AHS \$2M total	Alberta Family Integrated Care (FICare) Drs. Benzie, Lodha, Aziz, Shah, McNeil <i>et al</i>	<ul style="list-style-type: none"> • Cluster RCT and implementation of parental support intervention for parents of preterm infants in NICU <p>Evidence-based parental support to impact overall health and developmental outcomes for preterm infants, reduce distress for parents and decrease infant hospital stay</p>
UCalgary AB Economic Development & Trade CFI-JELF ACHF CIHR \$3.5M total	Alberta BLOOM Drs. Arrieta, Sycuro <i>et al</i>	<ul style="list-style-type: none"> • Longitudinal study of maternal and early life microbiome in the context of preterm birth and chronic diseases such as asthma and inflammatory bowel diseases <p>Understanding the microbiome's contribution to health and disease in order to 'empower women to make healthy choices for their bodies and their babies'¹⁷</p>
ACHF (\$4.6M) CIHR CRC Tier 2 NSERC NeuroDevNet NCE SPOR SickKids Foundation >\$7M external funding	Child and Adolescent Imaging Research (CAIR) Drs. Bray, Harris, Lebel, MacMaster	<ul style="list-style-type: none"> • Magnetic resonance-based structural, white matter, spectroscopic and functional imaging research <p>Understanding brain development and the brain basis of learning and language difficulties, and symptoms of neurodevelopmental and child psychiatric disorders and brain injury in order to improve detection, treatment and monitoring for vulnerable children¹⁸</p>

¹⁶ [https://www.tfri.ca/our-research/research-project/precision-oncology-for-young-people-\(profyle\)](https://www.tfri.ca/our-research/research-project/precision-oncology-for-young-people-(profyle))

¹⁷ <https://albertabloom.ca/>

¹⁸ <https://cumming.ucalgary.ca/research/child-adolescent-imaging/about-us>

Mature research ecosystem

As we map out the next five years of discovery, we are in a superb position to build on existing strengths in child health and wellness. We now have a mature research ecosystem in which our investigators are leading larger teams on the national stage, attracting multi-centre team grants, and asking big questions to solve complex problems with transformational impacts. Partnership with stakeholders – children, families, health system partners, child and youth serving agencies and policy-makers – is essential to accelerating research and outcomes for children and families here and beyond. The cornerstone of our approach is mutual benefit and reciprocity – we are asking the critical questions that our partners want answered to address the health and wellbeing of all children, including the most vulnerable.

Partnering for broader impact: Provincial child health and wellness stakeholders

Alignment of our Child Health and Wellness strategy with those of our partners and stakeholders is critical. Many of our researchers are leaders in our university; others are leaders within Alberta Health Services (AHS) – a health care system that has the unique feature of being fully provincial in scope. Of note, AHS will soon be unified under a common clinical information system known as Connect Care, which will enhance the ability to conduct high quality clinical research for children and families.

Aligning our strategy with our major partners and child health stakeholders will enhance interdisciplinary teams and maximize our impact. Our unique strengths include: (1) a diverse, broad and passionate collective of researchers in child health and wellness; (2) a learning healthcare system with robust connections between research, clinical care and community practice; (3) a dynamic community of patients, families, community leaders, and agencies passionate about accelerating outcomes through research.

Several child health researchers undertake their research at the Alberta Children's Hospital (ACH). As part of its current strategic plan¹⁹ the ACH focuses on “enthusiastically embracing education and research” along with advancing quality improvements and outcomes measurement to demonstrate excellence. As with care provided at ACH, our research addresses the full spectrum of the health needs of children and young people as defined by the Health Quality Council of Alberta: “being healthy, getting better, living with illness or disability, and end of life”.²⁰

We have recently forged a pan-Alberta partnership with child health research organizations who share goals and priorities. These partners include the University of Alberta's Women's and Children's Health Research Institute (WCHRI), AHS' Maternal, Newborn Child

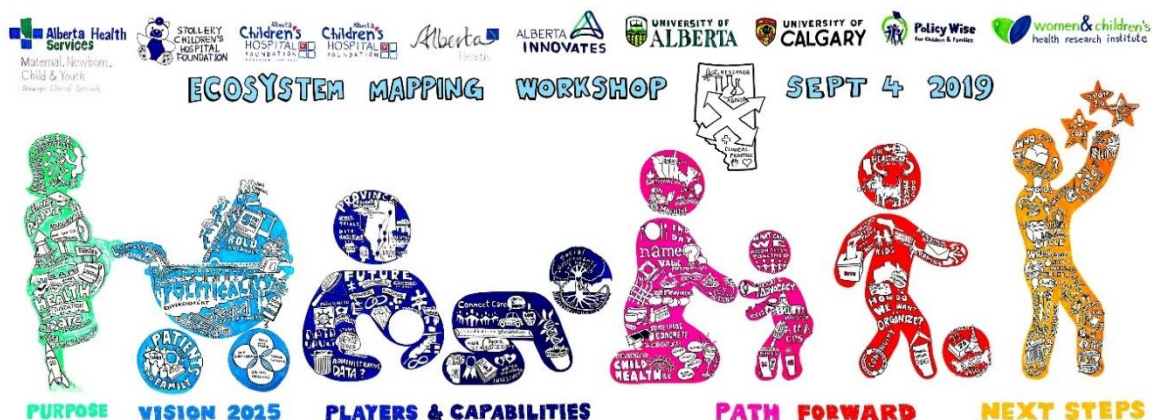
The new Centre for Child and Adolescent Mental Health, embedded in AHS, will provide a central community resource for young people to access services and novel interventions for mental health. It also promises to be Canada's most research-intensive clinical mental health facility for youth and invites young people and families to help inform research.

¹⁹ Strategic and Operational Directions 2019-2024: Advancing Child Health Care Excellence in Calgary and Southern Alberta

²⁰ Alberta Quality Matrix for Health User Guide (https://www.hqca.ca/wp-content/uploads/2018/05/HQCA_User_Guide_Web.pdf)

and Youth Strategic Clinical Network (MNCY SCN), Alberta Innovates, ACHF, the Stollery Children's Hospital Foundation, PolicyWise, and the Alberta Children's Hospital Research Institute (ACHRI). This diverse collective offers us a powerhouse opportunity to have pan-Alberta impacts and outcomes (**Figure 4**).

Figure 4. A provincial group of child and maternal health stakeholders gathered in Red Deer in September 2019 to strategize around a common research agenda for children and families in Alberta.



Strong and diverse communities rally around Child Health and Wellness

Robust partnerships with our communities allow us to drive meaningful innovation for the benefit of children and families. Calgary is an entrepreneurial city; we pride ourselves on building innovation through partnership. AHS works as a learning health system focusing on health care excellence and advancing care for children and families in partnership with dedicated clinical and translational researchers within UCalgary. Our community has been generously supporting child health and wellness care providers and researchers for more than four decades through the ACHF and the University of Calgary. The University has established critically important collaborations with many community partners including United Way, CUPS, Boys and Girls Clubs, Wood's Homes, and institutions such as the City of Calgary, Calgary Board of Education, and the Calgary Catholic School District (**Figure 5**). Children and families are at the centre of all these partnerships.



Figure 5: Child Health and Wellness is surrounded by a strong community of support. **Community Townhall:** *left:* **Calgary Public Library**; *middle:* **Margaret Fullerton**, Senior Operating Officer, Alberta Children's Hospital, Alberta Health Services, **Sid Viner**, Calgary Zone Medical Director, Alberta Health Services, and **Saifa Koonar**, President and CEO, Alberta Children's Hospital Foundation; *right:* more than 140 participants and 35 community organizations passionately engaged in Child Health and Wellness discussions.

Children and families are key to accelerating outcomes

We are engaging children and families, community leaders and community organizations to guide our strategy and hold us accountable. Better lives, improved health and wellness for children and families through research, partnership, and innovation – these are the ultimate measures of our success. Importantly, partnerships allow us to identify and frame the questions that most urgently need answers to promote and improve the health and wellness of children in our community and beyond. Children and families will guide us when addressing grand challenges of child health and wellness.

*“Patients and their families are the ultimate decision-makers in their own care. Yet the system is not designed to learn from their lived experience and their knowledge is rarely valued. Patients are central to the continuum of care because they are the ones who are always there. **Their knowledge is an untapped resource that can be used improve both their own care and the system as a whole.**”*
– Child Health & Wellness Champion Charlie Fischer

Patients, community and scientists partner to shape research

UCalgary has **unique strengths and opportunities in patient-partnered research**. The Patient and Community Engagement Research (PaCER) unit²¹ within the O’Brien Institute for Public Health trains patients to be researchers, and supports research teams to engage with patients. UCalgary researchers, such as Dr. Maria Santana, are implementing patient-reported outcomes and experiences within the health system and co-developing ways to ensure that patients are at the centre of care.

Child and youth-facing community agencies face the health and wellness struggles of children and families every day. Our plan is designed to facilitate partnerships with these agencies to conduct research to inform their work on the frontlines. These kinds of transformative research partnerships are demonstrated by projects such as the **All Our Families** (formerly All Our Babies) study led by Dr. Suzanne Tough in close partnership with Calgary Reads, the City of Calgary, United Way, and First 2000 Days (**Figure 6**). Projects such as this develop knowledge with local, national, and global impact; *All Our Families* is now **internationally recognized** for its tremendous contribution to our understanding of key developmental processes and milestones in children.



Figure 6. Decade of partnership with children & families

Child Health and the UCalgary Indigenous Strategy

Understanding our local community is also informed by the history of the land on which we reside. The **UCalgary Indigenous strategy, *ii’ taa’poh’to’p*, acknowledges and pays tribute to the traditional territories of Treaty 7** on which our campus and city are built. This includes the “...Blackfoot Confederacy (comprised of the Siksika, the Piikani, and the Kainai First Nations), the Tsuut’ina First Nation, and the Stoney Nakoda (including Chiniki, Bearspaw, and

²¹ <https://pacerinnovates.ca/>

Wesley First Nations).²² The Indigenous strategy **sets us on a path to reconciliation** and recognizes our ongoing need to improve our understanding of the devastating effects of colonization on Indigenous peoples in our local context and across Canada. The Child Health and Wellness strategy supports UCalgary in its **seven commitments made in *ii' taa'poh'to'p***. As we provide care and study child health and wellness, we must be mindful of our local history, helping to ensure that policies and practices respect Indigenous ways and create space for **full circle engagement and dialogue with Indigenous communities**.

In partnership with AHS, physicians like Dr. Janet Tapper have been able to provide equitable care under Jordan's principle²³ to Indigenous children with physical trauma. At a national level, Dr. Nicole Letourneau is collaborating with Dr. Peter Jaffe (Western University) on *Domestic Violence Risk Assessment, Risk Management and Safety Planning with Indigenous Populations*. Their research includes interviewing family, friends, and service providers of the victims of domestic homicide.²⁴

"Let us move forward with promise, hope and caring for the sake of those children not yet born, seven generations into the future."

ucalgary.ca/indigenous

National evidence illuminates the challenges facing Indigenous children and families. The O'Brien Institute for Public Health's 2018 report, *Raising Canada – a report on children in Canada, their health and wellbeing*, highlights statistics from Health Canada: "Suicide rates are five to seven times higher for First Nations youth than for non-Aboriginal youth; suicide rates among Inuit youth are among the highest in the world, at 11 times the national average."²⁵ Injuries are also one of the top 10 threats to children's health in Canada, and the O'Brien report finds "26% of deaths amongst First Nations' children are injuries, compared to 6% of the Canadian population."²⁶ **This evidence reaffirms the need for our strategy to prioritize vulnerable children and families.**

Social accountability is at the heart of this plan, embedded in *ii' taa'poh'to'p* and also woven into the **Indigenous Health Dialogue**, the Cumming School of Medicine's response to Truth and Reconciliation. CSM supports include an Elder-in-Residence program and emerging Indigenous Hub – valuable resources for CHW researchers and their teams, especially those engaging with Indigenous community partners.

Instilling equity, diversity and inclusion

Equity, diversity and inclusion (EDI) is foundational to the Child Health and Wellness plan. It is one of our core values. The EDI thread runs through each of our seven objectives; we have a plan to operationalize EDI across our strategic blueprint. EDI is a mandate across the university

²² The University of Calgary Indigenous Strategy ([https://live-ucalgary.ucalgary.ca/sites/default/files/teams/136/Indigenous%20Strategy Publication digital Sep2019.pdf](https://live-ucalgary.ucalgary.ca/sites/default/files/teams/136/Indigenous%20Strategy%20Publication%20digital%20Sep2019.pdf))

²³ <https://www.canada.ca/en/indigenous-services-canada/services/jordans-principle/definition-jordans-principle-canadian-human-rights-tribunal.html>

²⁴ <http://cdhpi.ca/domestic-violence-risk-assessment-risk-management-and-safety-planning-indigenous-populations>

²⁵ <https://www.canada.ca/en/indigenous-services-canada/services/first-nations-inuit-health/health-promotion/suicide-prevention.html>

²⁶ <https://www.canada.ca/en/indigenous-services-canada/services/first-nations-inuit-health/health-promotion/keeping-safe-injury-prevention-first-nations-inuit-health-health-canada.html>

and AHS. Our approach to EDI is also informed by frameworks articulated by national partners – for example, Sick Kids Research Institute, and its action plan for EDI.²⁷

Calgary-led research has global impact

Many UCalgary researchers are **leaders in child health and wellness on a global scale**. This is true for scholars such as Dr. Scott Patten, the *Cuthbertson-Fischer Chair in Pediatric Mental Health*, who contributes to the international body of work on the Global Burden of Disease. It is also true for Drs. Carolyn Emery, Kathryn Schneider, and Keith Yeates (*Ronald and Irene Ward Chair in Pediatric Brain Injury*), who have influenced the international consensus on sport concussion. Dr. Stephen Freedman, holder of the *ACHF Professorship in Child Health and Wellness*, has published and presented internationally his research into gastrointestinal infections – this work also informs better treatments for children in Southern Alberta.

UCalgary medical geneticists including Drs. Francois Bernier and Michael Innes diagnose genetic diseases for children at the Alberta Children's Hospital and integrate their work within international consortia such as Care4Rare²⁸ that strive to **end the diagnostic odysseys of children with genetic diseases around the globe**. Dr. Susa Benseler, Marinka Twilt, Deborah Marshall, and the Calgary Rheumatology team have developed precision diagnostics and treatments for patients with arthritis in Calgary while co-leading the national Understanding Childhood Arthritis Network (UCAN) team to advance precision medicine for childhood arthritis in Canada, the Netherlands, and beyond²⁹.

The combination of acting locally while impacting globally is also true for those engaged in global child health projects. In accordance with the UCalgary International Strategy³⁰, our researchers lead and contribute to global health projects in East Africa, such as the Healthy Child Uganda and MamaToto projects in Uganda and Tanzania. These efforts and many others exemplify the contributions of Child Health and Wellness researchers to the Eyes High Foundational commitment to integrate UCalgary in our local community and around the world.

A history of enduring partnership

The story of child health and wellness is a story of enduring partnership – **five decades of partnership between UCalgary, AHS, ACH, and ACHF**. Child health research in Calgary began in the Alberta Children's Hospital on Richmond Road in 1978 when ACHF funded the Behavioural Research Unit – today members of the Child and Family Health Research Unit (Paediatrics), the Owerko Centre, and the Brain and Mental Health Program at ACHRI.

Another milestone year was 1982: ACHF funded the Genetics Research Unit – now the Cumming School of Medicine's Department of Medical Genetics, and ACHRI's Precision Medicine & Disease Mechanisms Program. That same year, ACHF funded and built the Kinsmen Research Centre as a home for those two research groups. In 1990, they joined forces and, in 1996, emerged as the University of Calgary's Child Health Research Centre.

²⁷ <http://www.sickkids.ca/PDFs/Research/Research-EDI/80592-The%20Hospital%20for%20Sick%20Children%20EDI%20Action%20Plan%20-%20December%202019.pdf#page18>

²⁸ <http://care4rare.ca/>

²⁹ <https://www.ucancandu.com/>

³⁰ <https://www.ucalgary.ca/campaign/energize-campaign/student-experience/international>

In 2004, the Child Health Research Centre merged with the Genes and Development Research Group in the University Faculty of Medicine to create the **Institute for Child and Maternal Health**. Its focus: excellence in research and education in maternal,

newborn and child health. Dr. James Cross, the founding director, remembers that collaboration between ACH, the university and ACHF were essential ingredients to nurturing excellence. That same year the Dean of Medicine, Dr. Grant Gall, created four additional

research institutes with the goal of accelerating research and transforming care. The Calgary Health Region (now AHS) and University of Calgary were its signatory partners.

“The University of Calgary’s diverse research strengths in child health – from the molecular level through to population health – have always been an enormous challenge, and a major opportunity.” – Dr. James Cross, founding director, Institute for Child and Maternal Health

The new Alberta Children’s Hospital, built on UCalgary’s west campus, opened its doors in 2006 - the first free standing children’s hospital to be built in Canada in more than 20 years. Just across the street, the Child Development Centre opened in 2007, housing the west campus University Child Care Centre, and the Owerko Centre with research on neurodevelopment and child mental health. ACHRI was formally named in 2009 with a bold new strategy aligning UCalgary’s research plan and the Alberta Health Research and Innovation Strategy.

Five decades of community support helped establish: the first researchers and subspecialists in pediatrics, a dedicated children’s hospital on Richmond Road, a new children’s hospital on the University of Calgary’s West Campus, a dedicated pediatric research institute – ACHRI – and the Owerko Centre at ACHRI.

In 2000, there were 27 full-time, and 25 part-time pediatricians in Pediatrics. In 2008, Department Head Dr. Jim Kellner began combing North America for the best and brightest. These days Pediatrics has 400 members in 24 disciplines serving the needs of children, families and community as never before.

Today, ACHRI has more than 300 members who span nine Faculties across the university. Five decades of hard work,

partnership and strategic investments have led child health and wellness to this point. The history of child health and wellness maps out our unique strengths, and the undeniable opportunity we have in this next decade. Our Child Health and Wellness Strategy is designed not only to advance the goals of the University of Calgary Eyes High Strategy and the Strategic Research Plan, but also to transform outcomes for children, families and our community. We are building on a significant base of strength and an area of tremendous societal importance and impact. **We are well-positioned within the University and our community to build capacity and drive innovation that will have transformative impacts on the health of future generations here and beyond.**

“A unique strength we have at the University of Calgary is a critical mass of clinical scientists working within the Alberta Children’s Hospital and beyond. That dynamic, close-knit relationship between UCalgary and AHS offers us a stellar opportunity for transforming outcomes for children and families.” – Dr. Marinka Twilt, ACHRI Scientific Director – Clinical Research

Developing the Child Health and Wellness Strategy

Years of hard work and thoughtful consultation have culminated in this strategy: from the initial proposal (Fall, 2018) to cross campus and community consultations throughout 2019, researchers, community and thought leaders have guided the development of the Child Health and Wellness strategy closely aligned with the core principles of the University of Calgary 2018-2023 Research Plan, including **Matching Strength with Opportunities**, **Increasing Research Capacity** and **Driving Innovation**. (Figure 7).

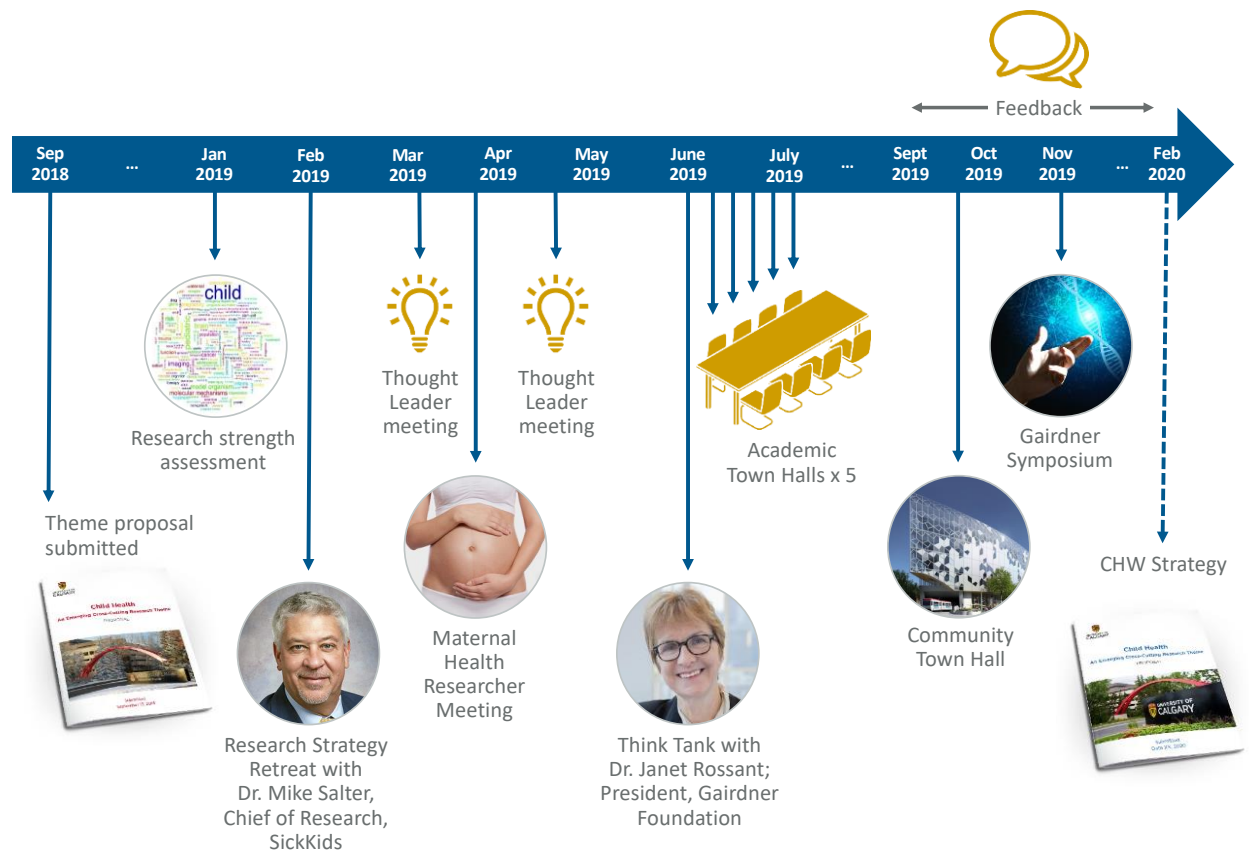


Figure 7: Roadmap for Child Health and Wellness (CHW) includes: research strengths assessments, academic and clinical thought leaders, grassroots town halls across campus and into the community, strategic advice from community leaders, as well as national child health research experts

Defining Strengths and Opportunities

Key milestones for Child Health and Wellness included **defining current areas of strength in child health and wellness**, including publications, citations and research investments (pages 9-12 above, Figure 3, Table 1) and **exploring the current capacity and gaps to address grand challenges** within

the broader child health research landscape. An essential milestone: an iterative consultation and engagement process with thought leaders across campus, six cross-campus town halls, and events

“Research in children is research in life trajectories.” – Dr. Janet Rossant, President of the Gairdner Foundation and keynote speaker at the 10th Anniversary Research Symposium and Celebration of ACHRI, May 2019



including research symposia and retreats. Another milestone: national leaders in child health research provided key insights for our strategy. Dr. Mike Salter, Chief of Research at SickKids Research Institute, provided valuable advice on internal strategic organization, emphasizing that we need to drive the science in child health and align ourselves with clinical and funding partners. Dr. Janet Rossant, President of the Gairdner Foundation, urged us to view child health research as life trajectory research and emphasized that many of the world’s major biomedical discoveries have had the biggest impact for children.

Mobilization and Engagement through Town Halls

More than 500 researchers attended five academic town halls in June 2019 with themes based on consultations and strengths analysis. Each town hall featured short talks from child health and wellness researchers across campus (**Figure 8**), outlining existing strengths, opportunities, and challenges. Small group discussions encouraged participants to design

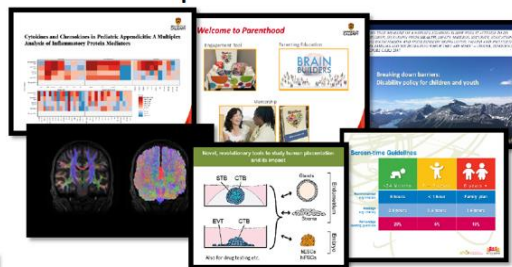
>600 participants



> 50 small group discussions



24 presentations



>70 grand challenge worksheets submitted



Figure 8. UCalgary Child Health and Wellness town halls connect experts and ignite ideas as never before

additional grand challenges and plans to address them. A community town hall in September 2019 brought together **140 attendees, including academics, clinicians, and 35 child and youth-serving community agencies to identify grand challenges in child health and wellness that could be addressed through research partnerships.** We analyzed data collected from all six town halls using qualitative thematic analysis, under the guidance and direction of Dr. Karen Benzies (Associate Dean Research, Faculty of Nursing; see **Appendix** pages 2-11). The broad child health and wellness community gathered in record numbers to collaborate on transformational plans for research (**Figure 9**).

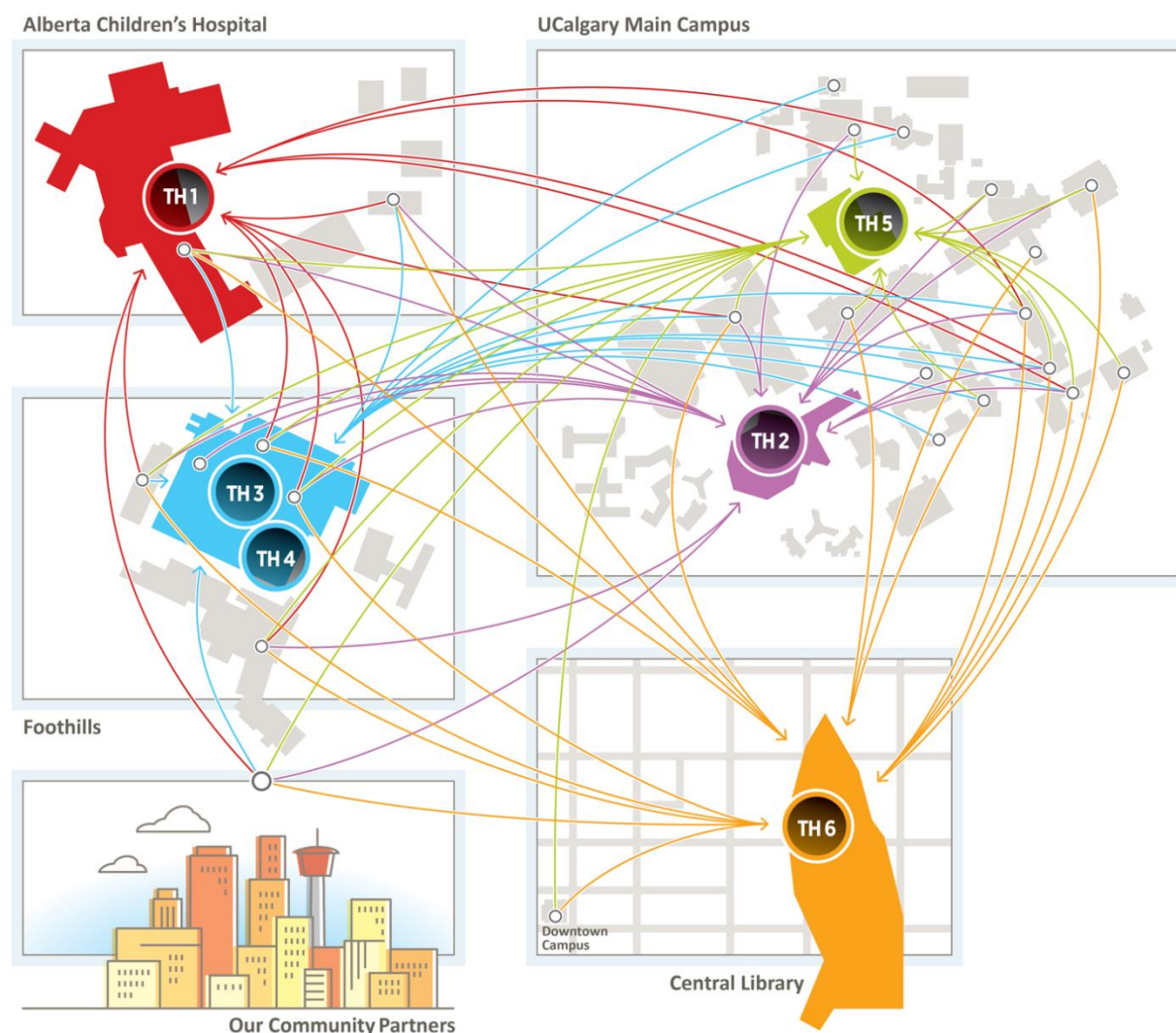


Figure 9. 640 participants attended six town halls in 2019. Town Hall 1: *Precision Child Health*; Town Hall 2: *Brain Development, Function and Mental Health*; Town Hall 3: *Maternal, Newborn and Child Health*; Town Hall 4: *Care Transformation for Child Health*; Town Hall 5: *Big Data and Social Determinants of Child Health and Wellness*; Town Hall 6: *Child Health and Wellness Community Town Hall*. Researchers, leaders and community partners across disciplines came together to share transformative plans for collaborative research.

Town hall attendees submitted more than 60 grand challenges on a diverse range of topics requiring researchers to join forces across disciplines. **Appendix Table 1** shows the top themes that emerged within each town hall, along with underlying resources and mechanisms needed to address these grand challenges.

The breadth of ideas derived from the Child Health and Wellness town halls are a testament to the creativity and passion of our Calgary Child Health and Wellness community and will fuel the research agenda for the Child Health and Wellness Strategy. There is more work to do as we further explore these grand challenges. Our response to these grand challenges is based on strengths and opportunities; it requires us to mobilize and equip our Child Health and Wellness community to address the pressing needs of children and families through research.

Restructuring ACHRI to support Child Health and Wellness

To better support Child Health and Wellness within focused areas of strength and opportunity, we have re-structured ACHRI (see Objective 2 below and **Figure 10**) to support this accelerated, outcome-focused agenda. The new ACHRI structure was presented to UCalgary leaders, key Child Health and Wellness partners, and ACHRI advisory committees. It was also reviewed and approved at the 2019 Annual General Meeting of ACHRI at the research retreat in Banff, attended by researchers from nine Faculties across UCalgary (see **Appendix** page 12 for more discussion on the relationship between ACHRI and the Child Health and Wellness strategy).

Where Strength meets Opportunity

Having gathered our strengths, identified the national and international research landscape, and heard superb advice from national experts, we are now ready to tackle grand challenges in Child Health and Wellness. Our community of Child Health and Wellness researchers is poised to take our priority areas to the next level. With children, families, and our community at the heart of our work, we can generate transformative discoveries and outcomes for children and families.³¹ We know that **focused Child Health and Wellness research collectives are greater than the sum of their parts.**



Figure 10: The UCalgary “strategic sweet spot” for success in Child Health and Wellness lies at the intersection of strengths, needs, trends and opportunities.

The strategic priorities of the Child Health and Wellness strategy are defined at the intersection of research strengths, community needs, and the broader context of trends and opportunities (**Figure 10**; see **Appendix** pages 13-16 for a broad scan of trends that impact child health and wellness). These priorities include: **Care Transformation for Children; Child Brain & Mental Health; Child Health Data Science; Childhood Cancer and Blood Disorders; Healthy Children, Families & Communities; Maternal & Child Health; and Precision Medicine & Disease Mechanisms.**

³¹ Fox, Paine & Sauterey. (2016) Citations increase with manuscript length, author number, and references cited in ecology journals. *Ecology and Evolution* **6**: 7717-7726.

Kliegl, R., & Bates, D. (2010) International collaboration in psychology is on the rise. *Scientometrics*, **87**: 149–158

Katz & Hicks. (1997) How much is a collaboration worth? A calibrated bibliometric model. *Scientometrics*, **40**: 541–554.

The Child Health and Wellness Strategy

Our Child Health and Wellness strategy addresses all the major tenets of UCalgary's 2018-2023 Research Plan.³² Our blueprint is designed to **match strengths with opportunities**, **increase research capacity** and **drive innovation** to address grand challenges in child health and wellness through seven distinct, but related Objectives (**Figure 11**). The Child Health and Wellness strategy will empower partnerships that drive deliberate and strategic knowledge creation to accelerate child health and wellness. It embraces all Child Health and Wellness researchers, irrespective of their faculty, department or institute. It is facilitated by the existing infrastructure of the Alberta Children's Hospital Research Institute – the only research institute in Southern Alberta focused on the early years of life.

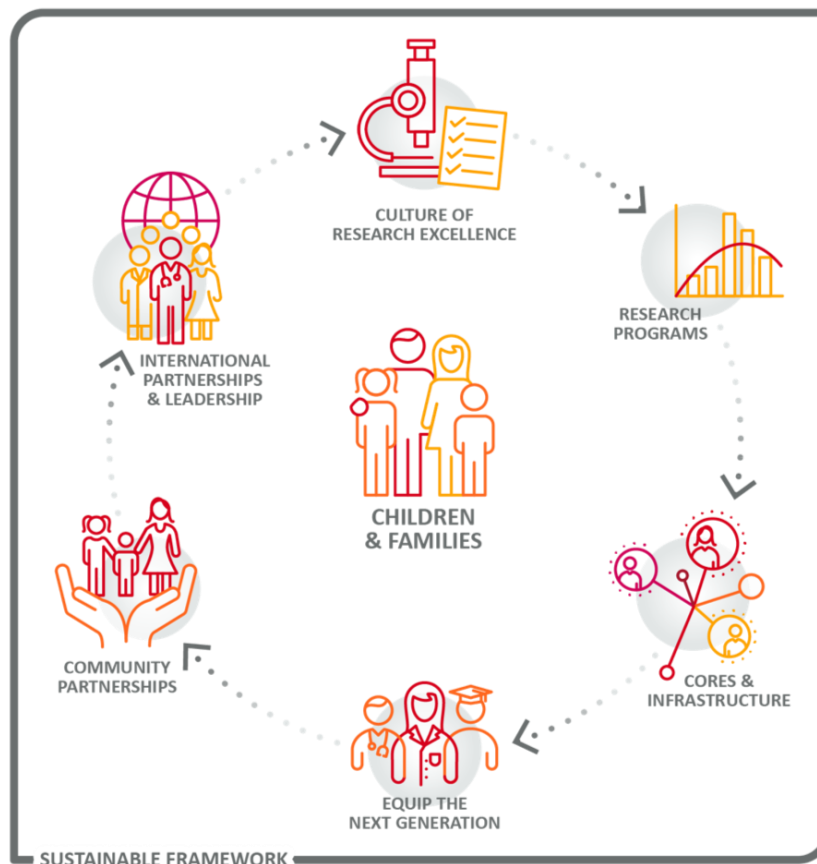


Figure 11: Children & Families are the starting point for the Child Health and Wellness Strategy, which includes seven major objectives: (1) **Research Excellence** - building culture and community; (2) **Research Programs** - driving science through strength-based foci; (3) **Cores and Infrastructures** - enabling cutting-edge research; (4) **Equip the Next Generation** - providing trainees and young researchers with knowledge, skills and tools to drive child health and wellness; (5) **Community Partnerships** - partnering with leaders and tools and community to address needs in child health and wellness through research; (6) **International Partnerships and Leadership** - investing in Child Health and Wellness researchers for international impact; (7) **Sustainable Framework** - building a durable framework to sustain Child Health and Wellness research. **Children and Families** are at the heart of our strategy.

³² <https://research.ucalgary.ca/research/research-plan>

Values and Goals

Our strategy is anchored in the following values:

- **Excellence** – accelerating the potential of our child health researchers, paving a superhighway to ‘create the future of child health’
- **Integrity** – including accountability and transparency - demonstrated by our leaders, researchers, staff, and partners
- **Child and Family Centred** – partnering with, and for, our children and families
- **Collaboration** – across disciplines and with our community. Working together to ensure our research efforts have lasting effects through co-creation of knowledge with children, families, and those who can apply the knowledge.
- **Innovativeness** – including social innovation and entrepreneurship. The communities we serve within Calgary and Alberta are known for their unique entrepreneurial spirit.
- **Equity, diversity and inclusion** – our diverse researchers, children, families and communities deserve equal access to opportunities.

Our five-year strategy is designed to progress towards four high-level ‘enabling’ goals.

We will enable our community of Child Health and Wellness researchers to:

1. Conduct **high quality, internationally-recognized** child health and wellness research for **children and families**
2. Become national and international leaders in **innovative and transformative** research from bench to bedside to backyard and back
3. Advance national leadership in **community-partnered, child and family-centred** health and wellness research
4. Lead **evidence creation, evidence-informed health promotion and policy development** to benefit children and their families in Alberta and beyond

Our goals will be enabled through **seven major objectives**, outlined in the following pages, each of which contain specific and actionable aims to be met over the next five years. As with any guiding strategy, the process of accomplishing our objectives will necessarily require refinement and adjustment as we move forward together as Child Health and Wellness Scholars and in partnership with stakeholders and champions of Child Health and Wellness.

Objective 1: Build a Culture and Community of Research Excellence

There is no set recipe for creating a culture and community of research excellence, but people are the key ingredients. Our people include children who are looking for a healthy future as well as those who invest their lives and careers to create new knowledge, advance science and improve health outcomes for these children and their families.

We are enabling a cross-disciplinary group of researchers through a visionary plan and generous investments by our community. This context attracts **members into a dynamic community of Child Health and Wellness researchers and scholars**. While access to exclusive funding opportunities represents a tangible benefit to membership, funding opportunities alone have no inherent 'cultural' value. However, the ways in which funding opportunities are socialized, distributed, and invested, and the criteria on which they are evaluated will foster a vibrant and collaborative research culture within our community. Our culture will be evident through our cross-disciplinary knowledge-sharing opportunities, communication and support for individuals and teams to advance and thrive within the academic context, the broader community and beyond.

Aim 1a: Invest in all stages of research training and careers (trainees to senior investigators to community collaborators), **all types of research activities** (discovery to translation to impact), **and in all phases of research** (pilot studies to publication to policy to practice). Funding opportunities made available through investment in this strategy will be **equitable** across the academy and will enable **inclusion** of key community collaborators and participants with **diverse** perspectives.

Aim 1b: Ensure that child health and wellness researchers across the entire UCalgary campus can become Child Health and Wellness Scholars so that they can benefit from

funding opportunities made available through the Child Health and Wellness strategy. Other benefits of membership are less tangible but are arguably more important for promoting strong cultural cohesiveness. The importance of **networking** and **sharing information and ideas** through formal and informal interactions and events is essential. Networking is the mechanism through which many academic positions are secured, particularly for trainees. Sharing information and ideas leads to productive collaboration and refined methods and hypotheses, all of which work to produce more rigorous and impactful results.

Membership in a robust child health research community also provides opportunities for **professional development** (e.g. leadership and grant-writing), **mentorship** (e.g. for trainees and early career investigators), and child health-related **research supports**. Membership criteria for Child Health and Wellness Scholars will not require a strong academic track record, just a willingness and potential to contribute as

*As the facilitator of the cross-cutting Child Health and Wellness strategy, **ACHRI commits to welcoming all child health and wellness contributors including researchers, educators, quality improvement professionals, care providers and community leaders as Child Health and Wellness Scholars**, regardless of discipline, training or faculty. This commitment does not preclude researchers from membership in other institutes or centres. All ACHRI members are now considered full members and will have equal opportunity to access resources through the Child Health and Wellness Strategy.*

part of a team. Child Health and Wellness Scholars who hold a UCalgary faculty appointment are also considered Child Health and Wellness Researchers.

Aim 1c: Host, coordinate and support regular seminars, workshops, and events that bring Child Health and Wellness Scholars together, across disciplines and campuses, across career stages, and across areas of research interest. These include, but are not limited to:

- Annual Retreat (open to all Child Health and Wellness researchers, staff and trainees)
- Annual summer research symposium (featuring undergraduate, graduate and faculty posters and presentations)
- External Child Health and Wellness Research Program seminar series*
- Internal seminar series and journal clubs, including research-in-progress seminars*
- National or international meetings to advance and build collaborative research teams focused on Child Health and Wellness priorities
- Focused training workshops to support common needs amongst smaller groups of Child Health and Wellness Scholars (e.g. support for entrepreneurial STEM women to attend the 'From Lab 2 Fulfillment' workshop offered by 2016 Peak Scholar in Entrepreneurship, Innovation & Knowledge Engagement and 2018 ASTech Awardee, Dr. Orly Yadid Pecht, Professor in the Schulich School of Engineering)

** as determined by the needs of the seven research programs, Strategy 2 below*

Aim 1d: Provide dedicated Child Health and Wellness research support services in partnership with other UCalgary departments and units. These include, but are not limited to:

- Internal peer review coordination (in partnership with Research Services Office (RSO))
- Team grant development support (in partnership with RSO and Cumming School of Medicine's Office of the Associate Dean Research, and Associate Deans Research across campus)
- Navigation and advice for ethics applications
- HR process support for research staff and trainees
- Project set-up and budget management
- Transparent process and support for engaging with the Alberta Children's Hospital Foundation (ACHF), a partner that inspires community investment in child health and wellness research at UCalgary

Aim 1e: Provide mentorship support for early career Child Health and Wellness researchers. This requires close

collaboration with departments to ensure that members have appropriate career and specialty area mentors. Specifically, on behalf of the Child Health and Wellness strategy, ACHRI commits to coordinating detailed 2- and 5-year reviews for new faculty members, in partnership with each member's primary department.

ACHRI meets face-to-face with small groups of new members to highlight programs and support offered by ACHRI and the University of Calgary. This enables new members to have a personal connection with the Institute and each other. This is especially helpful for off-site clinical and community-embedded researchers.

Aim 1f: Create an internal communications strategy to foster community and amplify information sharing. The development of the Child Health and Wellness strategy in 2019 took a grassroots approach, including town halls to engage our passionate University community and beyond. The newly established, virtual, and cross-cutting network of Child Health and Wellness Scholars is enabled by strong communications and partnership between ACHRI and the University. Our communication strategy integrates ongoing community-wide electronic updates, focussed information exchanges around specific opportunities, and an annual gathering of the diverse membership of the newly established family of Child Health and Wellness Scholars.

Objective 2: Create Child Health and Wellness Research Programs at the intersection of strength, need, and opportunity.

The Child Health and Wellness strategic framework – where strengths, needs and opportunity intersect – will guide resource allocation and the investment of time and energy on new initiatives. To build these areas of focus into the fabric of the strategy, we are establishing each as a research program with a defined membership and a program director. Program directors will drive the research agenda within their program and ensure that their program contributes to broader initiatives within the Child Health and Wellness strategy as well as the larger Child Health and Wellness community, locally and globally.

Each program will develop or coordinate team-based grant proposals to address the major goals of the program (Grand Challenge Program Grants). By design, the programs are sufficiently focused to allow such projects to emerge, but broad enough to stimulate interdisciplinary collaboration. Every Child Health and Wellness researcher will choose one program as their primary affiliation. Researchers are likely to contribute to more than one program but their first choice program will serve as their research home base.

The following research programs, which have also been adopted as ACHRI's research programs, represent the current alignment of strength, need and opportunity in Child Health and Wellness:

- 1. Healthy Children, Families, and Communities:** Healthy children and families are the foundation of a healthy society. The goal of the Healthy Children, Families, and Communities program is to bring together and support scientists engaged in research to improve the health and well-being of Canadian children, youth, and families. Canada currently ranks 30th out of 38 OECD countries for children's well-being. Major threats to Canada's children include: intentional (e.g. child abuse, suicide) and unintentional injuries, mental health, poverty, infant mortality, obesity, inactivity, food insecurity, vaccine preventable illnesses, discrimination, and bullying. Policies to address these threats, and prevention strategies focused on the social determinants of health will drive program research activities. This work holds the greatest promise to improve child and family health and well-being in Canada and beyond.
- 2. Care Transformation:** This program will generate new knowledge and translate evidence into action within our health system to improve outcomes for children and families. To achieve these goals, the program will build and empower multidisciplinary and multi-sectoral collaborations within hospital, clinic and community health program settings. Its members contribute to the growth of an evolving health care system that engages children, families and health care practitioners; one in which the creation of knowledge is embedded in care and connected to advancing evidence-based improvements in health care delivery and health policy.

"Our learning health system and dynamic partnership with Alberta Health Services combined with our research strengths make us unique in Canada to transform care for our children. What a brilliant opportunity!" – Dr. Susa Benseler, ACHRI Director

- 3. Child Health Data Science:** This program will support the development and implementation of cutting-edge data science methods, including advanced big data

machine learning and statistical methods, and foster high-end computational resources to enable precision medicine for children. The program aims to collect, analyze, and integrate data from multiple sources to improve prevention, diagnosis, and treatment of pediatric diseases in direct collaboration with clinicians. It will also enable innovative research to address gaps in knowledge related to pediatric diseases.

4. **Precision Medicine and Disease Mechanisms:** This program applies advanced genetic, epigenetic, genomic, and other high-throughput technologies to decipher the molecular and cellular basis of normal development and childhood genetic disorders. Building on the diverse expertise of its members, its overarching goal is to build a centre of excellence to apply precision medicine to genetic diseases of childhood. This is achieved through cutting edge research using model organisms, advanced cell culture methods, high-level imaging, and bioinformatics. This program has several intercalated initiatives, notably KidOmics and Model Organism Research for Pediatric Health (MORPH), that use fundamental basic research to advance progress across the childhood disease spectrum by rapid translation of laboratory findings into clinical care.
5. **Maternal and Child Health:** This program will generate new knowledge and translate findings into improved mental and physical outcomes for mothers and their children at all stages of development. Its members conduct interdisciplinary research that spans fundamental research into fetal and placental development; understanding how events during pregnancy impact women and children's health in the short- and long-term; and how the health care system and communities can be strengthened to promote improved health and well-being of mothers and children in Canada and abroad.

The World Health Organization reports preterm birth complications as one of the five leading causes of death in children under the age of five. Did you know that, at 8.7%, Alberta has one of the highest rate of preterm birth in Canada?

6. **Child Brain and Mental Health:** This program's goal is to generate new knowledge and translate it into improved physical and mental health outcomes for children and youth. Members study brain development, neurodevelopmental and neurological disorders, brain injury, cognition, behaviour, and mental health. This is an interdisciplinary group with research spanning the full range of translation from bench to backyard, including cutting-edge molecular, genetic, neuroimaging, assessment and intervention techniques, in both model organisms and humans.
7. **Childhood Cancer and Blood Disorders:** This program is a collaborative initiative of ACHRI and the Arnie Charbonneau Cancer Institute. Its overarching goals are to advance understanding of the biology and sequelae of childhood cancers and blood disorders and to use existing and new knowledge to improve their diagnosis and treatment. Members include a highly integrated and interdisciplinary team of clinical investigators and scientists all contributing to one or more of the following three research areas: (1) understanding the cellular and molecular basis for childhood cancer initiation and progression; (2) innovating and testing new therapeutic approaches for the treatment of childhood cancer and blood disorders; (3) increasing the availability of well characterized patient-derived samples and experimental models of childhood cancer and blood disorders.

How do the seven programs interact with previously established, large-scale initiatives in Child Health and Wellness?

ACHRI, through its partnership with the Alberta Children's Hospital Foundation, supports ongoing research initiatives and centres with considerable collective impacts in their respective research areas. Particularly, the Owerko Centre and the Vi Riddell Centre for Pain and Rehabilitation have brought together focused, multidisciplinary teams to tackle neurodevelopmental disorders and youth mental health, as well as childhood pain and rehabilitation, respectively. Both centres conduct research spanning from basic mechanisms through to policy, integrate with clinical programs, and were established through transformative gifts from our generous donor community.

*All researchers within an existing centre or research initiative will join one or more of the seven Child Health and Wellness programs while still residing within their existing centre. As an example, many researchers who are part of the Owerko Centre will also find value as members of the Child Brain and Mental Health Program. **Our intent is that all Child Health and Wellness researchers will find a primary home within one of our seven newly established programs while also remaining free to contribute to these existing initiatives and centres, as well as to the activities of other research programs.***

Aim 2a: Drive transformative research within each program via Grand Challenge Program Grants.³³

Increasingly, the gaps in knowledge of greatest importance to society are large and complex, requiring the expertise of multiple disciplines. Such teams can be difficult to build and sustain, particularly without enabling organization, infrastructure, or investment. National and international competitions that fund research at this scale tend to award grants only to teams with established track records and a history of demonstrated success. **We need to support research teams as they build momentum to become successful on a larger scale or we risk widening the gap.** To address this need, we propose a new funding stream through the Child Health and Wellness strategy in partnership with the ACHF. This stream will serve to seed and develop integrated research teams focused on addressing specific grand challenges to transform child health and wellness. Grand challenge teams will operate under a common set of principles:

- Proposals developed by these teams will articulate a large-scale grand challenge (or a set of closely related grand challenges) that requires a **unified collective of multidisciplinary researchers** across UCalgary Faculties to achieve success
- Team proposals will **align with research priorities** of the Child Health and Wellness strategy – that is, they will tap into existing research strengths, address stated needs of the community (locally or broadly), and build on identified trends relevant to child health and wellness
- They will be evaluated based on criteria that include **impact beyond the academy**, similar to criteria used in program evaluation, but more specific to the research outputs and outcomes of the Grand Challenge Program Grant.

³³ See **Appendix**, page 17, for additional details on the Grand Challenge Program Grants

Objective 3: Create and support research core facilities and platforms to enhance productivity and impact

Advanced research programs require advanced research infrastructure. A well-rounded suite of research infrastructure allows our researchers to “gain traction toward excellence”³⁴. To support our seven Research Programs, we will create and build on a suite of cores and platforms. These horizontally-integrated platforms will support and enhance multiple aspects of our seven Research Programs. In principle, they should target areas of particular need for the Child Health and Wellness research community and gaps in the existing research infrastructure at UCalgary. By definition, **a research core or platform will serve more than one researcher**; it will also serve to increase research capacity through training opportunities, whether for students, staff, faculty, or external collaborators.

As we look to develop and expand on cores and platforms, our goal will be to meet the needs of our Child Health and Wellness researchers, regardless of Faculty or physical location. Currently, many of the cores and platforms supported by ACHRI exist within the Cumming School of Medicine and the Alberta Children’s Hospital by virtue of the associations of the researchers who have developed and primarily use these cores.

Cores and platforms are not all equal; they differ in the initial and ongoing investment required, level of complexity in operation and management, and in the breadth of researchers who benefit. Hockberger *et al*³⁵ provide insight into the requirements for successful management of core facilities within a complex academic setting. We will utilize their learnings and framework to ensure sustainability and flexibility of core resources to support high quality child health and wellness research as we work toward the aims outlined below.

Aim 3a: Encourage researchers to budget for use of local core facilities and platforms.

One of the major mechanisms by which we will support our core facilities and resources is via funding built into the Child Health and Wellness Grand Challenge Program Grants. Furthermore, we will promote use of core facilities through advertising available resources to the Child Health and Wellness research community, externally (where appropriate), and by encouraging all Child Health and Wellness researchers to include a budget for use of core facilities in external grant applications.

Aim 3b: Work with other Faculties/institutes/departments to harmonize cost-recovery and access and use policies.

Within the Cumming School of Medicine in particular, a number of core facilities offer overlapping equipment and services to researchers (e.g. several microscopy suites). On behalf of the Child Health and Wellness strategy, ACHRI will work with other institutes (e.g. HBI, Snyder, Charbonneau, McCaig) to advocate for combining units and/or budgets to enable cross-institute access to researchers to enhance sustainability and increase efficiency. We will also work with directors and leaders of core facilities and platforms to ensure they are in compliance with UCalgary policies and standards.

Aim 3c: Work with core facility and platform directors and faculty leaders to set and review sustainability targets.

While self-sustainability remains the gold standard for any core facility, this is not the reality for most core facilities. Most core facilities do well to achieve 50% cost recovery. We will work with

³⁴ CHW Scholar Dr. Wendy Dean

³⁵ “Building a Sustainable Portfolio of Core Facilities: a Case Study” *J Biomolecular Techniques* (2018) 29:79-92

directors and leaders of core facilities and platforms to decide on measurable and attainable annual targets for each facility that allow benchmarking against similar facilities, here and elsewhere. If associated metrics are not currently measured, we will support collection of these metrics.

Aim 3d: Determine and pursue licensing and commercialization opportunities with core facility and platform directors in partnership with UCalgary innovation ventures.

Certain core facilities and platforms will achieve some measure of sustainability through licensing and commercialization of products, processes, and/or methods. We will encourage all core facilities and platforms to maintain an asset list that can be shared with Innovate Calgary. Core facility and platform directors will be encouraged to pursue entrepreneurial training and networking opportunities through existing UCalgary innovation ventures.

Aim 3e: Consult with membership to assess need for new facilities, equipment, infrastructure and resources to benefit teams.

As part of our cross-cutting mandate to increase research capacity and drive innovation, we will regularly review and recommend new platforms that are needed to address grand challenges through the Grand Challenge Program Grants. Child health researchers have an excellent track record in obtaining large-scale funding for infrastructure. We will act on needs for new infrastructure expressed by Child Health and Wellness researchers by targeting large-scale funding opportunities such as the Canada Foundation for Innovation and Western Economic Diversification Canada.

Below is a non-exhaustive list of core facilities and platforms (existing and in development) that are needed to support Child Health and Wellness research. Items in bold represent facilities and platforms with specific Child Health and Wellness affiliations. Several of these core facilities and platforms exist in limited capacity will require investments in order to meet the growing needs of Child Health and Wellness research teams as they work to address prioritized grand challenges. Furthermore, we are cognisant of the potential need for core facilities and platforms to support research outside of the Cumming School of Medicine and will work with researchers in other Faculties to ensure that appropriate resources are accessible to Child Health and Wellness Scholars, regardless of Faculty.

- Animal facilities (i.e. Health Sciences Animal Resource Centre, Clara Christie Centre for Mouse Genomics, Experimental Imaging Centre)
- **Biobanks (e.g. Kids Cancer, Neurocritical Care)**
- Bioinformatics resources outside the Centre for Health Genomics and Informatics (e.g. Veterinary Medicine, Snyder Institute)
- **Biostatistics and methods support for big data management and analysis** (through partnership with UCalgary Biostatistics Centre - *in development*)
- **Cell culture and organoid platforms** (*in development*)
- **Centre for Health Genomics and Informatics (CHGI)**
- Clinical informatics and administrative data access support (through the Centre for Health Informatics and in partnership with **MyChild^{Alberta}** and **AHS data wayfinder service**)
- **Child and Adolescent Imaging Research (CAIR) program at ACH**
- Hunter Hub for Entrepreneurial Thinking
- International Microbiome Centre
- Knowledge Translation support (*in development* and in partnership with AHS Strategic Clinical Networks and Alberta's Strategy for Patient-Oriented Research SUPPORT Unit)

- Life Sciences Innovation Hub (in University Research Park)
- **MicroCT, Morphometrics and High Throughput Phenotyping**
- **Multiplexed Ion Beam Imaging (MIBI)**
- Omics platforms (e.g. **10x Genomics**, **Nanostring**, mass spectrometry for proteomics and metabolomics)
- **Optical imaging (microscopy suite)**
- Patient and Community Engagement Researcher Program
- **Pediatric clinical trial support** (*in development* in partnership with the Clinical, Health Services and Population Health Research Platform, the Alberta Children's Hospital, and the Department of Paediatrics)
- **Physiological monitoring equipment (e.g. mouse ECG)**
- **Research support** (pre- and post-award grant development and review, ethics and project set-up support; in partnership with Associate Deans Research and the Department of Paediatrics)

Objective 4: Equip and Foster the Next Generation of Child Health Researchers

Cross cutting training opportunities for trainees at all levels are critically important to develop a world class Child Health and Wellness program. The CSM institutes have developed superb training platforms; we will partner to integrate these efforts to build an innovative training environment with a focus on child health. Through generous, long-standing support from the ACHF, ACHRI's Research Training Platform – ACHRI Strategic Training and Education Program (STEP) has been investing \$900K annually in training the next generation of child health researchers. The STEP framework will be foundational to partnered training opportunities and funding for Child Health and Wellness trainees.

Building on the success of ACHRI STEP, the Child Health and Wellness training platform will provide competitive trainee funding awards, including graduate scholarships, postdoctoral fellowships, clinical research fellowships, undergraduate summer studentships, as well as travel awards and trainee small research grants. This is particularly important since funding envelopes for trainees are, at present, in decline: Alberta Innovates has terminated its major trainee funding program, which historically funded a third of child health research trainees and enabled us to build capacity; furthermore, local UCalgary publication awards, which supported trainee efforts to publish in open access journals, have also been declining, thereby limiting the potential impact of their research. An important goal within this objective is to enable trainees to publish and mobilize knowledge. Recognizing these changes in the trainee environment, we commit to making these opportunities available to our trainees.

The Child Health and Wellness training program will engage multiple partners across the University and beyond to provide training activities, such as workshops and events, to build competencies required to thrive in an increasingly complex and competitive research environment. These competencies will position Child Health and Wellness trainees to succeed in a challenging job market upon completion of their training. **Investment in our trainees ensures the future of child health and wellness research.**

Goals for the Child Health and Wellness trainee program:

Increase Research Capacity: Build and increase research capacity to support the Child Health and Wellness strategy, focusing on areas of strengths and priorities. This involves sustaining and supporting trainee excellence as well as creating new opportunities for Child Health and Wellness trainees.

Ensure Excellence in Training: Provide high quality education and training for students, fellows, and Child Health and Wellness research programs, which includes scientific knowledge, technical skills, transferable skills, professional development, and career planning.

Foster Community: Build a strong community of Child Health and Wellness scholars and trainees, and encourage interdisciplinary training and research opportunities; knowledge translation and mobilization; opportunities for outreach and collaboration among teams participating in the Child Health and Wellness initiative.

In keeping with our principles of building excellence and increasing research capacity, we propose the following aims to achieve our goals:

Aim 4a: Increase research and training capacity within Child Health and Wellness research priority areas. This aim includes several tactics:

i) Establish trainee recruitment programs in partnership with existing or emerging UCalgary recruitment initiatives: Child Health and Wellness trainee recruitment should be aligned with the UCalgary academic recruitment process to ensure the highest level of efficiency. Partnerships with existing UCalgary programs such as the Eyes High recruitment program will provide opportunities to access trainee talent outside of UCalgary and recruit excellent trainees for Child Health and Wellness research initiatives. Additionally, we will work with Graduate Science Education in the Cumming School of Medicine and other Faculties to explore creating areas of specific focus within existing graduate programs to foster Child Health and Wellness research. Recruitment and trainee placement will focus on interdisciplinarity, bridging gaps between basic, clinical and social sciences, and incorporating strong knowledge translation components throughout.

ii) Provide experiential learning opportunities to trainees: The Child Health and Wellness trainee platform will support development of strong, collaborative teams through existing and new partner links to offer opportunities for experiential learning. We will develop internships in-house and with industry and community partners. This will allow us to build up our own experts and retain them in staff/ service positions, providing stepping-stones to advance trainee careers. These internships can be service-based (e.g. biostatistical support), research support-based (e.g. writing grants/ IPR), or technical internships (e.g. genomics and other omics, advanced imaging, bioinformatics, data science). Partnered with the University of Calgary Biostatistics Centre (UCBC), we will build capacity around biostatistical and research support, and offer internships to trainees. Links with partners outside of UCalgary (industry, community agencies, governments and NGOs) will allow our trainees to apply their knowledge and skills in professional settings outside of academia.

Currently, training placements are available through Mitacs, My GradSkills, Career Services and other local UCalgary programs (e.g. partnership with IBM). We will build on these partnerships and establish child health-specific positions.

iii) Increase capacity via stipend/ salary support: Funding opportunities for graduate and postdoctoral trainees are becoming increasingly competitive. There are fewer funding opportunities available, which is compounded by institutional constraints (e.g. requirement for guaranteed stipend support) around trainee recruitment. By providing competitive funding support to trainees, we not only increase training capacity in child health research, but we also increase the quality of trainees and enable allocation of competitively-acquired grant funding. Importantly, Child Health and Wellness stipends enable trainees to be more competitive for external funding awards in the future.

iv) Increase capacity through external opportunities for program-specific or cross-cutting training grants (e.g. NSERC CREATE): These external programs help us to increase capacity through additional funding for trainee salaries. We will work with members to apply for dedicated training support grants to meet needs around capacity building. We will work with program directors to build capacity within each program and offer specific training opportunities to meet the needs of Child Health and Wellness researchers. This will promote building excellence across programs.

Aim 4b: Expand the current portfolio of ACHRI STEP to address needs of students and fellows. Provide value-added training to ensure our trainees are equipped with critical skills and competencies to succeed in both academic and non-academic careers. Core competencies include generation and application of scientific knowledge, technical skills, transferable skills, professional development, and career planning.

CSM has identified the following critical competencies, which are applicable to trainees in all Faculties: **generation of scientific knowledge, teaching and mentorship ability, collaboration, communication, and leadership and management skills.** ACHRI STEP will help Child Health and Wellness trainees to foster additional competencies – such as child-health-specific training, entrepreneurial training and other transferable skills – to ensure that they can succeed professionally, regardless of their career path:

- a. Child Health and Wellness-focused workshops, including through partnership with the Canadian Child Health Clinician Scientist Program (CCHCSP)
- b. Designated seminar series, journal clubs, research in progress (multidisciplinary and program-specific)
- c. Mentorship program

We will offer value-added programs to help trainees develop competencies to be competitive in and outside academia. We work closely with the Faculty of Graduate Studies, other Faculties, institutes, units and programs that support trainees to enhance the training experience for students and fellows in Child Health and Wellness.

Aim 4c: Fund excellence. We will create competitive award programs that will allow us to secure the best trainees and give our existing trainees a boost for attracting external funding. We will explore partnerships to leverage stipend/salary support, through programs such as CREATE grants, Clinical Research fellowships and the Canadian Child Health Clinician Scientist Program (CCHCSP). These activities will allow us to increase the level of scholarship of Child Health and Wellness trainees and ensure their future success.

Aim 4d: Develop and support training opportunities for faculty (especially junior faculty). We will create Child Health and Wellness training and career advancement opportunities in partnership with Faculties, departments, and programs such as CCHCSP. We will also promote designated workshops for specific subgroups such as mid-career researchers and health care professionals. Some of these training opportunities will involve entrepreneurial training workshops and courses, offered in partnership with UCalgary innovation ventures. Modified project-focused curricula will be offered to enhance the skillsets of clinical Child Health and Wellness researchers.

Objective 5: Foster partnerships with children, families, and communities to drive research

Child and youth serving agencies and community practitioners are on the frontlines supporting children and families. Their professional and lived experiences offer us invaluable insights into the most serious problems facing children today. **When we partner to co-create research we design questions targeted to the needs and strengths of our children and families.**

Co-designing research with children, families, community partners, and others, such as the Government of Alberta and the Public Health Agency of Canada, ensures we ask research questions that lead to new knowledge that is **relevant and implementable**. **Our community partners can rapidly mobilize that knowledge** and share it across networks they have been building and nurturing for decades. Whether we work in the Mosaic Primary Care Network, a laboratory in the Cumming School of Medicine, a vaccine clinic at the Alberta Children's Hospital, an after-school program at Boys & Girls Clubs, or a school board, we all agree evidence-based prevention and practice will **accelerate outcomes**.

Partnering also makes us provincially and nationally competitive. Funding agencies and community donors expect researchers to engage meaningfully with children, families, health system partners and community partners as never before. Knowledge translation is now integrated into grant applications – not simply as an add-on.

When we build community and child and family engagement into research plans, we increase our ability to attract provincial and national funding.

Alberta Innovates' Partnership for Research and Innovation in the Health System (PRIHS) 6 competition calls on researchers to *"Generate the evidence needed to identify and accelerate the spread and/or scale of evidence-based solutions that close care gaps to foster more efficient and/or effective use of health care resources."*³⁶

"From CIHR's perspective, accountability from the federal and provincial governments, as well as the public, makes it increasingly important to demonstrate the benefits of the investment of taxpayer dollars in health research by moving research into policy, programs and practice."
<https://cihr-irsc.gc.ca/e/45321.html#a2>

Our community-engaged research will integrate with local, provincial and national plans. Building on a rich history of engagement at UCalgary, the Child Health and Wellness initiative is deeply invested in engaging our partners. Community engagement, as defined within this strategy, establishes interactions between a researcher, a team, children and families and community partners for a research project, program or process.

"The engagement may take many forms including review and approval from formal leadership to conduct research in the community, joint planning with a responsible agency, commitment to a partnership formalized in a research agreement, or dialogue with an advisory group expert in the customs governing the knowledge being sought. The engagement may range from

³⁶ <https://albertainnovates.ca/wp-content/uploads/2020/01/PRIHS-6-Program-Guide.pdf>

information sharing to active participation and collaboration, to empowerment and shared leadership of the research project.”³⁷

Our work aligns with this Tri-Council Policy Statement, with the approach of the University’s Indigenous strategy, *ii’taa’poh’to’p*, as well as the Cumming School of Medicine’s response to Truth and Reconciliation, the *Indigenous Health Dialogue*. Expanding our portfolio of community-partnered Child Health and Wellness research allows us to walk the path of reconciliation: mindful and respectful of our local history, working to ensure that policies and practices respect Indigenous ways, and creating space for full circle engagement and dialogue with Indigenous communities.

Child Health and Wellness will align with UCalgary and AHS engagement to accelerate our impact. UCalgary is one of 16 post-secondary institutions participating in a national pilot to shape a Canadian framework in community engagement – guided by the Carnegie Foundation’s Community Engagement Classification®. The Carnegie Foundation defines Community Engagement as the collaboration between institutions of higher education and their larger communities (local, regional/state, national, global) for the **mutually beneficial exchange of knowledge and resources in a context of partnership and reciprocity.**³⁸

These important principles chart a course for the Child Health and Wellness strategy, allowing us to leverage and contribute to UCalgary’s national leadership in this arena. The **University of Calgary 2018 – 2023 Research Plan** also provides a guidepost for the Child Health and Wellness, emphasizing partnership with our community to **inform and empower our knowledge creation**, identifying **Knowledge Translation** as a critical platform for research, which will require further development to support Child Health and Wellness.

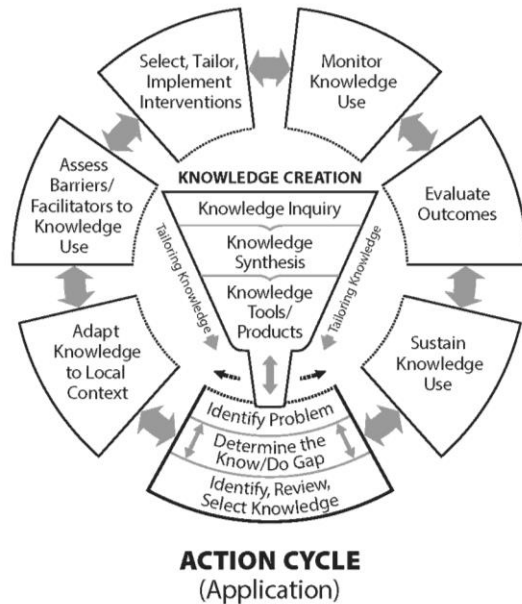
Our plan expands on this, **inviting children, families, and community partners to help shape research questions** that are deeply relevant on the front lines of policy and practice. As with UCalgary’s plan, the Child Health and Wellness blueprint emphasizes that knowledge translation is essential to all research - from bench to bedside into the community and back.

The Child Health and Wellness community engagement plan also aligns with Alberta Health Services’ framework in this realm. AHS’ mandate as a learning health system offers tremendous opportunities for research collaboration and better outcomes for the children and families at the heart of our work. AHS Strategic Clinical Networks (SCNs), particularly the Maternal Newborn Child and Youth SCN, are essential partners in accelerating impact through **“engaging stakeholders to identify meaningful, evidence-based opportunities for transformational change.”³⁹**

³⁷ https://ethics.gc.ca/eng/tcps2-eptc2_2018_chapter9-chapitre9.html

³⁸ <https://www.ucalgary.ca/provost/strategic-initiatives/carnegie-community-engagement-pilot>

³⁹ <https://www.albertahealthservices.ca/assets/about/scn/ahs-scn-amh-roadmap.pdf>



The transformational roadmaps articulated by the SCNs provide invaluable guidance for Child Health and Wellness planning, particularly how to scale up and spread the implementation of new knowledge. This process is critical to fostering better outcomes for children, families and communities. Sharon Straus and colleagues' dynamic "knowledge to action" framework is foundational to our approach (Figure 12).⁴⁰

Implementation Process: Knowledge Cycle

The Child Health and Wellness community engagement blueprint is durable, sustainable and outcome-oriented

Aim 5a: Work with partners to accelerate research and amplify outcomes

Child Health and Wellness researchers are undertaking scholarly activities across UCalgary and AHS with a diverse range of partners. Our dynamic relationships with community leaders, children, families, alumni, ACHF, child and youth serving agencies as well as system and sector leaders enable us to undertake robust, relevant research. **These relationships allow us to co-design research to accelerate outcomes and mobilize new knowledge as never before.** As we expand Child Health and Wellness research collaborations with industry, governments, and research teams across Canada, we will leverage the power of those networks to maximize the impact of our discoveries.

Aim 5b: Define the terms of engagement to foster clarity, efficiency and build trust

As we embark on partnered research projects we will begin with a shared understanding – a co-created agreement around the terms of engagement. **Project charters will allow us to define the collaborative relationship**, including roles and responsibilities. We will draw upon existing partnership agreements to inform project charters, including, for example, the (former) Southern Alberta Child and Youth Health Network (SACYHN) affiliation agreement, Owerko Memoranda of Understanding, and CUPS' frameworks for community-embedded research.

"Community engagement is about the willingness of researchers to stay at the table over time, and across the environment to support the shared agenda." – Dr. Suzanne Tough, Professor, Cumming School of Medicine

⁴⁰ Straus, Tetroe, Graham; "Knowledge Translation in Health Care: Moving from Evidence to Practice", 2nd Ed. 2013

Aim 5c: Reciprocal relationships are the cornerstone of community-partnered research

There is a diverse portfolio of community-engaged research already underway across Calgary and beyond. **The Child Health and Wellness strategy will support and build upon existing community-engaged research, and facilitate new connections between research and community partners.** Activities include: mapping out eco-system of existing community-partnered research; connecting researchers with one another, children, families and community partners; representing Child Health and Wellness research at community-led initiatives and conferences to enhance Child Health and Wellness visibility, grow our networks, fuel integrated research collaborations, and accelerate outcomes.

Aim 5d: Community partnership committee's advice and support ensure discoveries become measurable actions

An advisory committee of diverse community members will provide invaluable advice for research plans and projects. Benchmarks from partners will guide the composition of this advisory group including the Women's and Children's Health Research Institute (WCHRI) community committee, the University of Calgary Carnegie committee, relevant Strategy for Patient-Oriented Research (SPOR) committees (e.g. Child Bright⁴¹), and the United Way's Council of Champions. Potential members include those from system/sector hubs (e.g. Policywise), community partners with demonstrated strengths in knowledge mobilization, and agencies already deeply partnered with UCalgary/AHS on research (e.g. CUPS, formerly Calgary Urban Project Society).

Committee members will provide reviews of knowledge translation and stakeholder engagement components of research grants, particularly those invested in community-partnered research. These reviews will feed into the academic peer review process. This committee will also provide advice around knowledge translation and implementation strategies.

Aim 5e: Communications and Community Engagement activities spark new collaborations, celebrate and mobilize discoveries

We will invite community partners to relevant Child Health and Wellness events, trainings and grand rounds. We will also support researchers and trainees to attend community events to enhance relationships and support research goals. Leveraging existing resources, ACHRI will develop a living toolkit of resources to support researchers in community-partnered research. The Child Health and Wellness toolkit will include: products (templates, boilerplates, knowledge translation checklists) and people (database of graphic designers, videographers, social media gurus, knowledge translation experts).

Community partners will help amplify research findings through collaborative communications and social media strategies to mobilize knowledge and cultivate future collaborations. Communications plans include enhancing social media connectivity with key partners (guided by eco-system map). Child Health and Wellness communications will nurture and expand partnerships across UCalgary Faculties, Departments and Institutes, the ACHF, the Alberta Children's Hospital, AHS and the AHS Strategic Clinical Networks, and community partners to amplify stories of research and education with impact for children and families at forefront of all stories.

⁴¹ <https://www.child-bright.ca>

To reflect the growing Child Health and Wellness community, ACHRI's weekly newsletter will expand features on community impact, invite community partners to contribute articles, upcoming events and news, and encourage interested partners to subscribe.

We will invite community partners to co-present on shared research at UCalgary community engagement events (town halls, library events), and highlight community-partnered research at Child Health and Wellness events such as ACHRI's annual research retreat, Science in the Cinema, lectures and grand rounds.

Aim 5f: Introduce grants of varying scope and scale to foster community-partnered CHW research

We will introduce community-focused grants (similar to WCHRI's Clinical/Community Research Integration Support Program (CRISP) grants⁴²) to increase our capacity to do community-partnered research and maximize impact to meet community needs. The initial three-year term of these grants can be extended if additional knowledge translation will accelerate impact, and/or scope and spread.

Grand challenge research questions should arise at the intersection between key recommendations in current government reports, community-identified priorities (worksheets from Community Town Hall), and **quantifiable shared areas of concern for researchers and partners**. Preference will be given to proposals in the realm of prevention and promotion. Key features of community-partnered grants will include: community stakeholder/s as co-applicant/s; focus on local, tangible, and specific problems or gaps; resources allocated to community partner/s; **integrated knowledge translation** with a road-map for implementation shared by all partners; commitment from Principal Investigator to mentor young investigators and trainees in community-engaged practices.

Community-partnered grants, supports and program offerings are expected to evolve with input from our community committee, in keeping with the principles of co-creation and mutual benefit.

Aim 5g: Build the skills and culture to foster robust partnerships with community partners through training programs

We will identify existing knowledge translation and community engagement training opportunities and resources available to Child Health and Wellness researchers and trainees to create a **hub of support for community-engaged research**. Current resources in this arena include: Canadian Child Health Clinician Scientist Program knowledge translation sessions, social action hub for community led research (in development, Katrina Milaney, Community Health Sciences, Cumming School of Medicine), knowledge translation resources and consultations within AHS (Kelly Mrklas), training sessions offered by ACHRI, Cumming School of Medicine, and the University of Calgary, as well as provincial offerings such as Alberta Innovates' Patient Engagement and Knowledge Translation platforms.⁴³

Our eco-system map of community-engaged research will include champions of community engaged research. Mentorship activities will include: brown bag lunches for new / young researchers and trainees, and a peer-support/mentorship program to build capacity and skills for community engaged research.

⁴² <https://www.wchri.org/CRISP>

⁴³ <https://spor.albertainnovates.ca>

We can also build capacity by tapping into undergraduate and graduate practicum courses embedded within community settings. For example, Faculty of Kinesiology undergraduate students take credit courses embedded in schools and community agencies, working with newcomers, children and families. Psychology, Social Work, and other Faculties offer these practicums for a substantial number of students. **This is a significant benefit not only for our students, but also to our community partners.** While building understanding and empathy of community needs within our trainees, these practicum experiences also grow our capacity to co-create and nurture research with community partners.

Objective 6: Foster national and international partnership, leadership and research in child health

Our child health scholars are internationally recognized in their respective fields and we are immensely proud of their efforts and accomplishments. We will continue to recognize and invest in researchers who are leading and contributing to national and international child health research initiatives. The impact of their work is felt well beyond UCalgary.

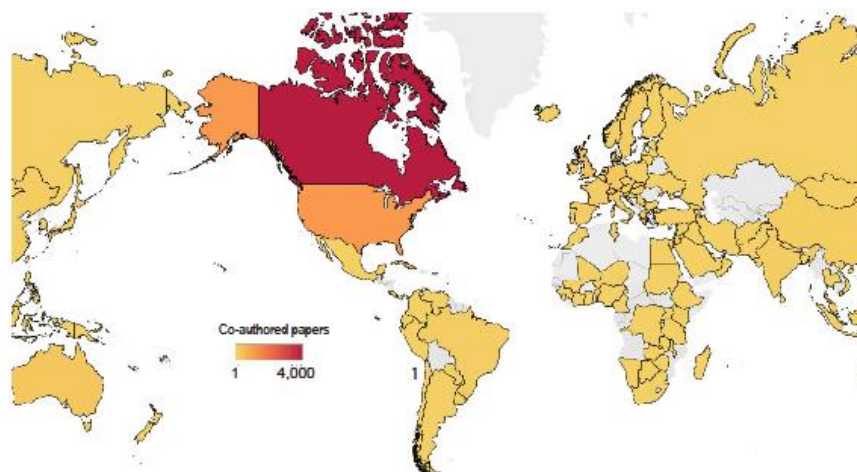


Figure 13. UCalgary child health researchers work with scholars across the globe. **This map illustrates the intensity of those collaborations.**

Aim 6a: Matching funds for large-scale national and international team grants

We will provide matching funds for external grant applications to enable UCalgary Child Health and Wellness researchers to be competitive for these awards. Matching funds will be prioritized for grants that fit the Child Health and Wellness research priorities.

Aim 6b: Funding support for trainees to participate in national and international research exchanges that align with strategic research priorities

Our trainees benefit from and contribute to child health initiatives across Canada and around the world. It is equally valuable for trainees from outside UCalgary to build skills and collaborative networks through placements here at the UCalgary. We will support trainees in diverse training experiences in Child Health and Wellness research teams across the globe.

Aim 6c: Support CHW researcher participation and leadership in international research initiatives

There are many ways in which Child Health and Wellness researchers contribute on the international stage. We will support members to join international research consortia, coordinate and present at international workshops and conferences, and participate in national and international working groups.

Dr. Debbie Kurrasch is supported by the France Canada Research Fund to study the mechanism of sugar craving in collaboration with researchers in France. Dr. Jiami Guo leads an international research effort to understand the developmental contexts of cilia signaling in the brain. Dr. Marie Claire Arrieta Mendez heads a global team to examine dietary-microbial interactions in the gut. Dr. Stephen Freedman led an influential clinical trial showing efficacy of oral ondansetron to promote rehydration in low- and middle-income countries.

Aim 6d: Work in partnership with UCalgary experts in global child health

Several of our members are making significant leadership contributions to global health initiatives such as *Mama Ntoto* to improve maternal, newborn, and child health in Tanzania. *SIM for Life* is another example. In 2016, a team in Uganda invited UCalgary researchers to team up on *Uganda SIM for Life*. Together, they trained 75 faculty facilitators, 642 medicine and nursing students, and launched a peer-to-peer practice program for 442 health care workers at 36 health centres between 2016 and 2019. This led to improved team performance, and accelerated resuscitations for newborn babies. These international initiatives are large, complex, multijurisdictional projects funded by several different sources. The benefits of these collaborations extend far beyond the projects themselves – to our students, researchers, and back into clinical care in our own community.

To maximize the potential for global impact, we will work in close partnership with those already engaged in global health research, particularly with the Cumming School of Medicine's Strategic Partnership and Community Engagement (SPaCE) office and with the Canadian Coalition for Global Health. To that end, we will propose work with SPaCE leadership/alumni to assess barriers in obtaining funding for capacity-building in global health as a first step toward addressing these barriers.

Objective 7: Create a sustainable framework of support for the Child Health and Wellness strategy

Child Health and Wellness researchers have enjoyed a dynamic relationship with the ACHF for more than four decades. Unwavering support from ACHF and trust in ACHRI has allowed us to successfully recruit national leaders and rising stars in the Child Health and Wellness community to the University of Calgary, and through **start-up funding**, they have undertaken outstanding child health research here. In the last five years, ACHRI has committed start-up funding to recruit 40 academics in partnership with several UCalgary academic departments, including 6 of 25 available 'P25' faculty positions. ACHF's investments into **matching and bridge funds** have allowed ACHRI to support UCalgary child health researchers in building and sustaining invaluable research ideas and programs. ACHF has also provided core funding for **operational staff**, research **training support** for graduate and post-doctoral trainees, as well as clinical research support. Through separate funds raised by ACHF (including endowed and spend-down research chairs, internal ACHRI-administered awards, ACHF-funded Child Health Grants), ACHRI researchers have initiated **major research programs and projects** with substantial outcomes in many domains.

All of this has led to a steady rise in our capacity for high quality research – as evidenced by publications and escalating successes in competitive external research funding competitions. Child health researchers across campus are now recognized as local and international leaders in precision health, brain development and function, child and adolescent mental health, health promotion through early life interventions, mechanisms of pregnancy and its outcomes, recognition and treatment of rare diseases, childhood inflammation, infection, and cancer - just to name a few.

So how do we sustain our upward trajectory, continue to build capacity and nurture impactful collaborations and partnerships across campus and with community? We will do this by: (1) optimizing ACHRI's organizational structure to foster **internal sustainability** to deliver on the Child Health and Wellness strategy; (2) ensuring the **sustainability of research** conducted by Child Health and Wellness researchers.

Aim 7a: Internal sustainability – ensuring proficiency, accountability, and efficiency⁴⁴

ACHRI has built a cohesive core staff team that includes administrative support; HR, financial, and program management expertise; communications and community engagement expertise and support; grant development expertise; as well as expertise in local research and funding process requirements. ACHRI staff work closely with departments and institutes across UCalgary, and the Alberta Children's Hospital to maximize efficiencies. We have established processes and guidelines for research investments and programs, ensuring feasibility within the existing UCalgary context and synergy with our partners at ACHF.

To match the growing needs of Child Health and Wellness researchers across campus and fill identified gaps in internal service delivery, we are regularly assessing our service offerings for Child Health and Wellness researchers in specific areas. Recently, we have hired additional **administrative support** for the seven programs described in Objective 2 and the expanded training program scope described in Objective 4. We anticipate a near-term need for

⁴⁴ Crafting and Executing Strategy: The Quest for Competitive Advantage, Concepts and Cases (2014). McGraw-Hill/Irwin (19th ed.). New York, NY

additional **operational research support** to serve the increasingly broad community of Child Health and Wellness Scholars (including impact evaluation support), as well as **expertise in financial management** to oversee specific components of the Child Health and Wellness budget and maintain a high level of financial accountability (administered through ACHRI and accountable to UCalgary's Vice President Research and the ACHF).

The culture of research excellence envisioned by this strategy is matched by a culture of excellence within the ACHRI team. This includes opportunities for staff to acquire, develop, and strengthen skills to facilitate and promote child health research (e.g. staff training in research evaluation and knowledge translation).

Good governance is also an essential requirement to sustain the Child Health and Wellness strategy. A commitment to good governance is a commitment to accountability. Our proposed governance structure builds upon existing governance processes within ACHRI. Good governance begins with ACHRI Directors as well as Program and Centre Directors sharing operational oversight of the Child Health and Wellness strategy with accountability to the Child Health and Wellness Executive Committee and, ultimately, to the UCalgary Vice President Research (see **Appendix** page 18 for draft governance structure). The value we place on transparency is reflected in our governance structure and processes; transparency is essential to establishing trust within our child health research community and with our partners and stakeholders. Good governance is bi-directional and includes ongoing consultation and engagement with members. This approach allows us to meet the needs of our research community, and therefore, accelerate outcomes of research for the children, families and communities we serve. Bi-directional governance also means processes for regular monitoring and reporting on the progress of our members, as well as processes for reporting to internal and external stakeholders. Of course, good governance is also critical for efficiency – so that recommendations and decisions are made in a timely manner.

Good governance and accountability are also demonstrated through the operational best practices we are developing to manage investments in child health and wellness. We will create activity-based budgets to accommodate the funding allocations outlined in the preceding objectives and in **Table 2** below. Activity-based budgets will reflect research activities that match the goals set by each project holder and respective teams of researchers and collaborators. ACHRI will build upon its strong track record of financial management; we will provide regular **analytics-based reporting** to monitor spending trends and budget variances for approved projects. We will also ensure that new projects are initiated in a timely and feasible manner through forecasting and budgeting support. When institutional policies do not fit with the changing landscape, we will advocate for change.

ACHRI's core team **manages space and infrastructure** on behalf of its members, always looking for ways to optimize use of the resources with which we are entrusted. We will continue to provide this support to Child Health and Wellness researchers, working in partnership with other Institutes and Faculties to ensure all Child Health and Wellness researchers have a good environment in which to conduct research.

Aim 7b: External sustainability – matching strengths to opportunities

Excellent communication with external partners and stakeholders provides a critical link to external sustainability, though its impact is often hard to measure. Relationships are built through communication. Awareness of local child health research initiatives can be an incentive

for future investments by the broader community. A connected community is a supportive community and relationships outlast funding timelines of individual projects. Much of our communication is done in partnership with UCalgary and ACHF. We will continue to refine our communications strategy to promote our Child Health and Wellness research community and the impact of its discoveries using our diverse framework of communications mechanisms and resources.

Knowledge translation is a specific form of communication that focuses on synthesizing and disseminating evidence to stakeholders and those who put knowledge into practice, regardless of where on the pipeline that evidence lies, from fundamental discovery to results from large populations. Our researchers need **expertise in knowledge translation** throughout the entire research eco-system.

We will **leverage investments** in child health and wellness made by our partners to maximize impact; excellent research should continue far beyond the life cycle of any one particular grant. We will:

- support **external team grant applications** that match our strategy research priorities to sustain research initiated by ACHF investments, through grant development expertise and matching funds
- develop **cost-recovery models** and pursue **external contracts** for core services
- **partner with AHS**, through Strategic Clinical Networks, to operationalize evidence-based research findings that are ready to scale up and/or spread
- partner with the Hunter Hub for Entrepreneurial Thinking, Innovate Calgary, WELab, and other innovators to **pursue commercialization and entrepreneurship opportunities**
- explore opportunities for **endowment** with our funding partners to foster long-term sustainability

Investing in a Child Health and Wellness Strategy

With guidance from several Child Health and Wellness stakeholders, we have developed a comprehensive plan for investment to support the Child Health and Wellness strategy. This plan includes continuing investment in all of the areas ACHRI has previously supported, while also proposing new areas of investment to enable our child health research community to drive science forward. **Table 2** describes specific areas of investment to support individual objectives – in reality, many of these investments support multiple objectives. The Child Health and Wellness strategy will be funded through generous collaborative support from the University of Calgary, our partners at ACHF and externally through partnerships and philanthropy. Initial funding provided by the University of Calgary to develop this strategy has allowed us to meaningfully engage across campus, and with child and youth facing community agencies. The University of Calgary has committed \$1 million to help launch the Child Health and Wellness strategy, while ACHF has committed \$15 million – the ACHF Research Excellence Fund – to fuel its execution.⁴⁵

We recognize that the proposed investment areas summarized in **Table 2** require even more than what has already been committed. However, we are inspired by our generous community and believe that proposed areas of strategic investment demonstrate our readiness to turn future investments into accelerated outcomes for our children and families. **Investment in our child health and wellness objectives are investments in the future.**

⁴⁵ Reference letter from Saifa Koonar, President/CEO ACHF to Dr. Ed McCauley, (former) VPR

Table 2: University of Calgary Child Health and Wellness Strategy: Investments and Impacts

Strategy		1) Build a culture & community of research excellence	2) Create research programs to match priorities	3) Create and support child health research cores & platforms	4) Equip and foster the next generation of child health researchers	5) Foster partnerships with children & communities to drive research	6) Foster international partnership, leadership and research	7) Create a sustainable support framework
Investment	Staff scientists	Faculty recruitment* <ul style="list-style-type: none"> Start-up Endowed chairs* Bridge grants* Matching funds* Seed grants <ul style="list-style-type: none"> High risk, high reward 	Grand Challenge Program Awards <i>(administered through ACHRI Programs)</i> <ul style="list-style-type: none"> Program-prioritized grand challenges 	Partly funded via Grand Challenge Program Awards : <ul style="list-style-type: none"> Advanced technologies and research facilities Training and service support Best practices (equitable access, metrics for success) 	Competitive stipend support* <ul style="list-style-type: none"> Stand-alone and partnered trainee support Training courses, seminars, travel* Experiential learning	Community-partnered grants <ul style="list-style-type: none"> Including KT, evaluation and QI Publication grants	International trainee support <ul style="list-style-type: none"> Internal and external Consortium membership International research leadership development	Core funding to support: Leadership* <ul style="list-style-type: none"> ACHRI Directors Program & Centre Directors Staff* <ul style="list-style-type: none"> Research support Communications, KT & Community engagement Training program management Finance Admin
	Impacts							
		<ul style="list-style-type: none"> Enhance team grant success Sustain research productivity Drive science Drive innovation Transform care Increase international reputation 	<ul style="list-style-type: none"> Address specific knowledge gaps Create teams to improve grant success Transform care 	<ul style="list-style-type: none"> Enable cutting-edge research Enhance grant success Increase publication impact Drive recruitment Transform care 	<ul style="list-style-type: none"> Train HQP Increase and sustain research capacity and productivity Enhance community partnerships Increase industry partnership 	<ul style="list-style-type: none"> Enhance community partnerships Increase industry partnership Transform care Accelerate knowledge application into practice Accelerate use of evidence into policy 	<ul style="list-style-type: none"> Increase and sustain research productivity Drive science Transform care Increase international impact and reputation 	Provide/ foster: <ul style="list-style-type: none"> Leadership Strategy (priority setting) Communication Sustainability Coordination Collaboration External partnerships Impact evaluation

* denotes areas of current CHW investment by our funding partner ACHF; these investments have catalyzed major advances in child health and wellness over the past 10 years and will continue to provide foundational support for child health and wellness over the coming years

Measures of Success: CHW Evaluation Framework

Research teams have a social obligation to deliver on the goals in their research proposals. Current trends place a greater emphasis on metrics and outcomes for research projects and programs. It is critical that funders and institutions see the return on their investments. Funding agencies now routinely require funded researchers to report on metrics as indicators of money well-spent. Academic departments require researchers to demonstrate productivity in order to advance their careers.

How will we know if our Child Health and Wellness strategy is successful? By the collective impact of the people, programs, platforms, partnerships and activities in which we invest. Impact is defined and measured in several domains and on several levels.

Greenhalgh *et al*⁴⁶ offer several definitions of research impact. Research can have:

- **academic impact** – demonstrable contribution “to advances, across and within disciplines, including significant advances in understanding, methods, theory and application”⁴⁷
- **health impact** – “changes in the health functioning of individuals (physical, psychological, and social aspects of their health), changes to health services, or changes to the broader determinants of health”⁴⁸
- **social impact** – “changes that are broader... and include changes to working systems, ethical understanding of health interventions, or population interactions”⁴⁸
- **economic impact** – “the benefits from commercialization, the net monetary value of improved health, and the benefits from performing health research”⁴⁸

The University of Calgary has tools and resources to help us collect metrics to measure academic impact. For example, UCalgary’s institutional subscription to SciVal facilitates benchmarking and visualization of research performance for individuals or groups - curated based on data from Scopus. Institutional Tableau dashboards (along with underlying data) are useful for tracking individual-level external research investments, publications and collaboration amongst UCalgary Child Health and Wellness researchers.

We expect all of the objectives within this strategy to have impact in more than one domain. Impacts can be produced and measured on multiple levels, including individuals, groups, platforms and infrastructure, and specific activities. **To help guide evaluation of the CHW strategy, we have adapted the Canadian Academy of Health Sciences (CAHS) Framework**,⁴⁸ which offers metrics and measures for all relevant domains and impacts at all levels. This framework also considers impact in capacity-building and informing decision-making, both highly relevant for this strategy. Also of note, the CAHS Framework includes metrics to **assess all of the dimensions of quality emphasized in the Alberta Quality Matrix for Health**, which is widely used throughout AHS.

⁴⁶ Greenhalgh, *et al*. “Research impact: a narrative review” *BMC Medicine* (2016) 14:78

⁴⁷ Research Councils UK Pathways to Impact (<http://www.rcuk.ac.uk/innovation/impacts/>)

⁴⁸ Canadian Academy of Health Sciences: Making an Impact, A Preferred Framework and Indicators to Measure Returns on Investment in Health Research; available at https://secureservercdn.net/166.62.107.204/cpp.178.myftpupload.com/wp-content/uploads/2011/09/ROI_FullReport.pdf (accessed January 30, 2020)

Metrics for individual objectives related to specific areas of impact are outlined below. No one model is ideal because evaluation is, and should be, an iterative process; Child Health and Wellness researchers and community partners will design and implement novel indicators and analysis to measure their work on an ongoing basis. The majority of indicators to assess impact are quantitative and provide little information to help measure well-being. **We recognize that assessing research impact is much more than numbers and statistics.** There will always be room for narrative accounts of impact. **In the end, our Child Health and Wellness strategy aims to tell the story of a child whose future is healthier through research.**

Initiation and Spread of CHW Research Impacts

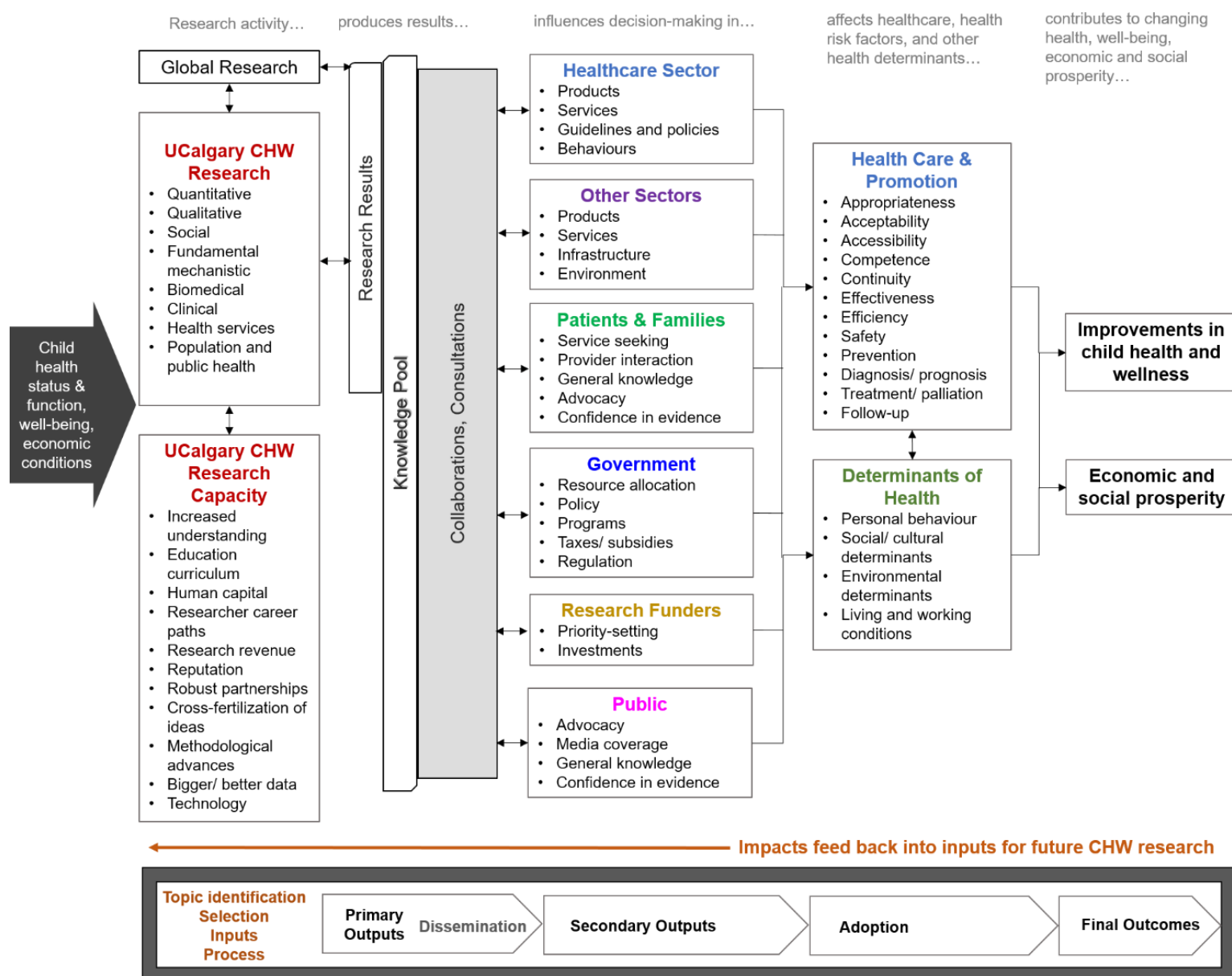


Figure 14: Adapted Canadian Academy of Health Sciences Framework for evaluation of impact

Objective 1: Evaluating our Culture and Community

In assessing whether we have created a culture and community of Child Health and Wellness research excellence, our purpose is two-fold; we want to **enhance opportunities for Child Health and Wellness researchers to have impact** and **remove barriers** to their success. This purpose is inherent throughout our objectives, extending to Child Health and Wellness research programs, trainees, partnerships and collaborations. Impact indicators will be assessed at the individual and group aggregate level.

Impacts of individual researchers will be captured in a modified annual Child Health and Wellness Researcher evaluation that is complementary to reporting required by UCalgary departments (e.g. Annual Report Online). We request from each Child Health and Wellness Researcher on an annual basis: (1) an updated CV, (2) highlights of recent successes, (3) barriers to impact. In addition to publications and external grant successes, our impact framework values outputs such as building capacity, engaging with children, families and the broader community, as well as leadership (internal and external) activities.

Metrics for collaborative teams include:

- Enhanced submissions to team grant funding opportunities
- Enhanced funding success of existing and new multidisciplinary collaborative teams
- Advanced training opportunities provided within research teams
- Effective partnerships with Child Health and Wellness stakeholders, including AHS, community agencies, other sectors (e.g. industry), and policymakers
- External reputation (the extent to which UCalgary Child Health and Wellness researchers are recognized by external researchers, experts, and leaders)
- Contributions to and participation in external Child Health and Wellness-relevant consortia and networks

To maximize impact through collaboration and interdisciplinary teams, we propose the following S.M.A.R.T.⁴⁹ goal: to double the number of investigators from Faculties other than the CSM who are engaged as Child Health and Wellness scholars.

Objective 2: Evaluating Research Programs and Program Investments

Research Programs are designed to exist in five-year terms. In year four of each term, each of the seven programs will be assessed for progress towards their overall goals. Assessment metrics for programs include many of the same metrics as Objective 1, with additional considerations below.

- Collaborative publications and citations within and across programs
- Trainee and student integration into research programs
- Child, family, and community participation in research program activities
- External awards and recognitions of program members, including trainees
- Commercialization activity and industry collaborations
- Education course additions and curricula changes that support research programs
- Uptake of new care pathways and novel interventions in the healthcare system

⁴⁹ S.M.A.R.T. – Specific, Measurable, Achievable/Attainable, Relevant, Time-bound

- Policy changes influenced by work of Child Health and Wellness research program members
- Public awareness of research conducted through the research programs (public events, media coverage, community and child and family involvement on research committees and panels)
- Community practice changes guided by research evidence

At the conclusion of each review, the Child Health and Wellness Executive Committee will assess whether the program should continue as is, recommend revisions to meet its goals, or propose a new area of thematic focus to meet program goals. This will allow the scientific focus of the Child Health and Wellness strategy to evolve as the internal and external conditions change.

Program investments, exemplified in the Grand Challenge Program Grants, will be evaluated based on a common set of criteria, similar to criteria used in evaluation of our research programs (listed above), but more specific to the research outputs and outcomes of the award.

Objective 3: Evaluating Cores and Platforms

Core facilities and service platforms exist to serve the needs of research programs and are critical for building capacity within the Child Health and Wellness strategy. We will work with directors and leaders of core facilities and service-based platforms to set measurable and attainable targets that allow benchmarking against similar facilities and platforms, here and elsewhere. We will set targets in the following areas, as appropriate to the nature and capacity of the facility:

- Publications and technical reports authored by core facility/ platform service personnel
- Publication acknowledgements of core facilities/ platform services
- Projects supported (internal and external)
- Personnel trained (internal and external)
- Growth rate (absorptive capacity)
- Annual cost-recovery (% of annual budget) and source
- Successful grants that include use of core facility/platform

Objective 4: Evaluating Success of our Training Program

The Child Health and Wellness training program is central to ensuring the Child Health and Wellness strategy today, and into the future. Over the next five years, we will double the number of Child Health and Wellness trainees supported by competitive scholarship and fellowship awards (S.M.A.R.T. goal). We will conduct an annual review of Child Health and Wellness trainees to continuously improve support. Trainee metrics will closely match those for Child Health and Wellness researchers and include career tracking post-training.

The Child Health and Wellness training program will be evaluated in five-year terms. For each aim, metrics of success will be developed *a priori*, using the CAHS Menu of Preferred

Indicators and Metrics of Impact.⁵⁰ Results will be benchmarked against other UCalgary strategies and external initiatives focussing on child health, using comparable indicators wherever possible. Training program leaders will decide on measurable and attainable benchmarking targets. Results and proposed modifications will be shared with Child Health and Wellness research program directors and governance committees to continuously improve Child Health and Wellness trainee experiences and the quality and capacity of our program.

Objective 5: Evaluating Community Impact

Feasibility is key in community-partnered research. We need unique and tailored measures when assessing community-engaged research, knowledge mobilization and translation. We will be guided by others in developing these measures, including the Canadian Academy of Health Sciences, CIHR, Research Fish, Alberta Innovates' SPOR, and Community-University Partnership for the Study of Children, Youth, and Families (UAlberta).

While academic publications, conferences and book citations are essential measures of academic impact, we will also incorporate additional measures to assess the impact of our research with community partners. Examples of these measures include: evidence briefs, literature reviews, technical reports, presentations to stakeholders and boards; Memoranda of Understanding; community-partnered grant applications; papers co-authored with community partners. Process and feasibility measures will be important for community-partnered research projects. Measures of success for community-engaged research include: we work together to generate evidence that informs policies and guides best practices; our research asks and answers questions to help the most vulnerable, at-risk families and children in our community; community partners drive research questions, and stay motivated to sign onto ongoing research with us.

We will learn from a decade of community-embedded research within UCalgary's Owerko Centre to implement such measures of impact and outcomes for our Child Health and Wellness strategy. A Child Health and Wellness community committee will also help design appropriate measures for community-partnered research.

Objective 6: Evaluating National and International Research Impact

Many of the same metrics used to evaluate individual researchers and collaborative research programs provide indicators of national and international research impact. These include:

- Success of external national and international team grant applications involving Child Health and Wellness researchers as PI's or co-investigators
- Trainee participation in national and international research exchanges
- Membership and leadership of Child Health and Wellness researchers in national and international research consortia
- Participation and leadership of Child Health and Wellness researchers in national and international workshops, conferences, and working groups

⁵⁰ Canadian Academy of Health Sciences, Panel on Return on Investment, 2009. https://www.cahs-acss.ca/wp-content/uploads/2011/09/ROI_FullReport.pdf

Objective 7: Evaluating Child Health and Wellness Sustainability

We will assess our capacity to support our community of Child Health and Wellness scholars on an ongoing basis by listening to and responding to the needs of Child Health and Wellness researchers – always anchored in the priorities, values, goals and objectives mapped out in this plan. Internally, we will continue to track all funding requests: internal grants, matching, bridge, and one-off funding requests. Through other non-duplicative reporting mechanisms (e.g. annual member CV updates, annual research progress reports), we will establish leveraging metrics. This will allow us to track chronological pathways and networks from investment to impact on several levels. Tools such as *SciVal* and existing *Tableau* dashboards will help us create and visualize these attribution pathways or networks. We will ensure that support staff are skilled in the use of tools to track and visualize research impacts.

Finally, we will also collect qualitative impact narratives to provide insights far beyond the numbers and statistics. We are well-equipped to tell stories of the impact of research on children, families, caregivers, healthcare providers, schools, clinics, and community groups and will continue to leverage our story-telling expertise to support this Child Health and Wellness strategy.

Final words

UCalgary's first-ever Child Health and Wellness strategy is designed to drive transformational outcomes for children and families in our community and beyond. Child health and wellness researchers are a passionate group, with diverse skills and perspectives. As we learn from the knowledge and lived experiences of children, families and community partners, we will address the challenges of child health as never before. Our dynamic culture of collaboration across the University of Calgary, the Alberta Children's Hospital, Alberta Health Services and in partnership with the community allows us to tackle the complexity of those grand challenges. We have all of the ingredients for success: a **critical mass** of stellar researchers; the **generous support** of our community; and **integration of research** with organizations that care for children and their families.

Integration is foundational to the CHW strategy: building on the UCalgary Strategic Research Plan; integrating and accelerating UCalgary's strategic research themes; contributing to UCalgary's blueprint for equity, diversity and inclusion; aligning with UCalgary's Indigenous strategy, *ii' taa'poh'to'p*, and CSM's promise for social accountability through the *Indigenous Health Dialogue*; amplifying Alberta Health Services' commitment to patient and family engagement through a learning healthcare system; leveraging UCalgary's burgeoning framework for innovation; and, following the path of UCalgary's community engagement blueprint, partnering with community agencies and leaders to address the most critical threats to child health and wellbeing today.

This is the perfect time to take child health and wellness research at the University of Calgary to the next level. The impact? **Better health and wellbeing of children and their families here and around the world.**

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Our children, families and community partners
