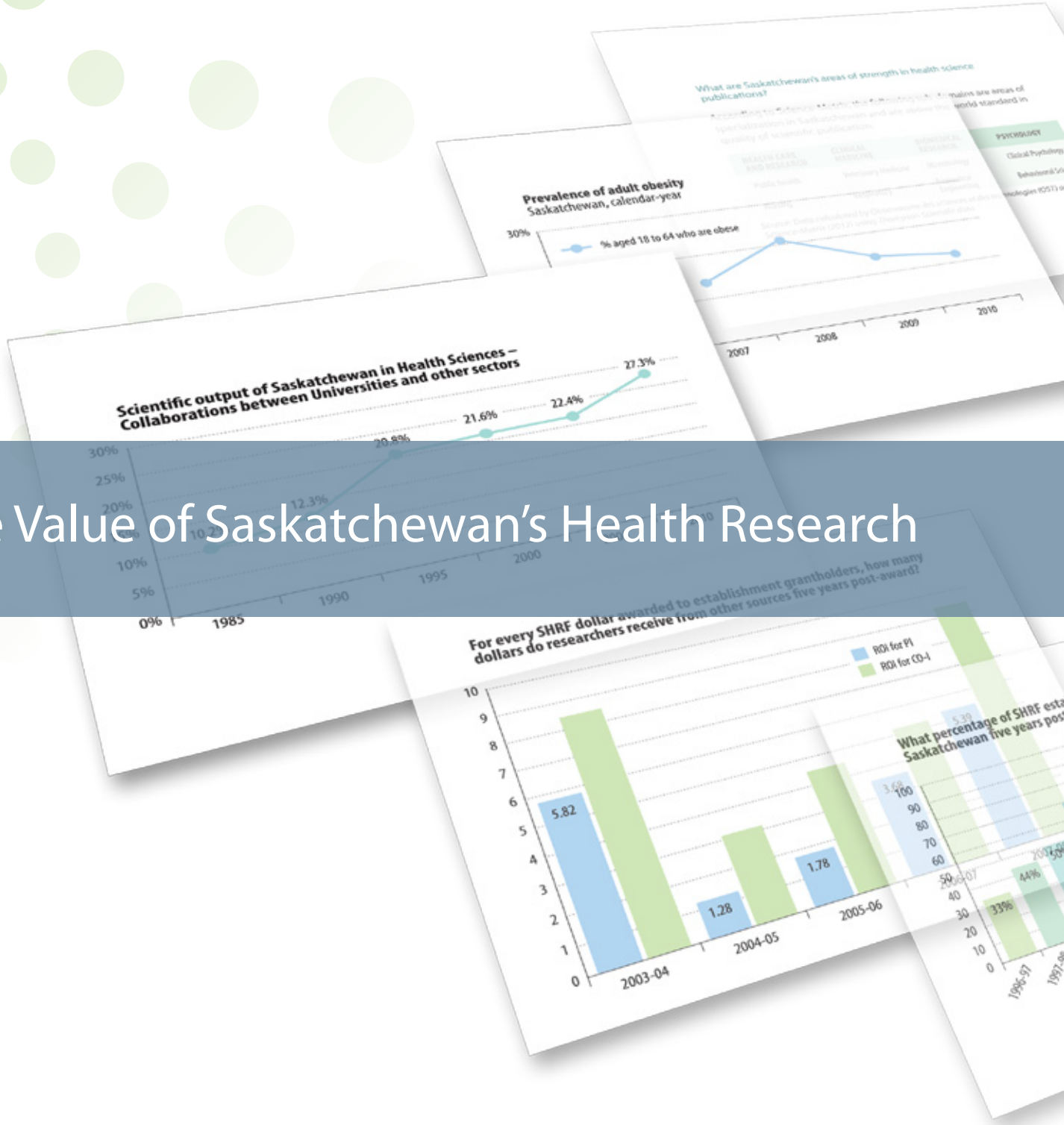
Measuring the Value of Saskatchewan's Health Research



SHRF
SASKATCHEWAN
HEALTH RESEARCH
FOUNDATION

www.shrf.ca

About SHRF

The Saskatchewan Health Research Foundation (SHRF) is the provincial agency that funds and facilitates health research in Saskatchewan. SHRF works in partnership with other organizations locally, provincially, and nationally to foster leading-edge research. This includes implementation of Saskatchewan's *Health Research Strategy (2004)*. Since its creation in 2003, SHRF has invested over $50 million into Saskatchewan's health research enterprise.

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Perspective

Health research is a valuable contributor to the knowledge economy. It creates intellectual capacity, builds institutional excellence, and has wide-ranging and long-term impacts on the health of people and communities. In Saskatchewan we recognize these impacts every year; in institutional changes, funding developments, decision-making, and intuitively. However, our province and SHRF are not alone in seeking ways to quantify the impacts being made from health research and through health research investment.

As a member of the National Alliance of Provincial Health Research Organizations (NAPHRO) and a contributor to the work of the Canadian Academy of Health Sciences (CAHS), SHRF has been participating in the dialogue aimed at developing metrics that capture the impact of health research and health research funding. It has not been an easy or quick task.

For SHRF, this report is our contribution to the ongoing evaluation of the impact of health research in Saskatchewan.

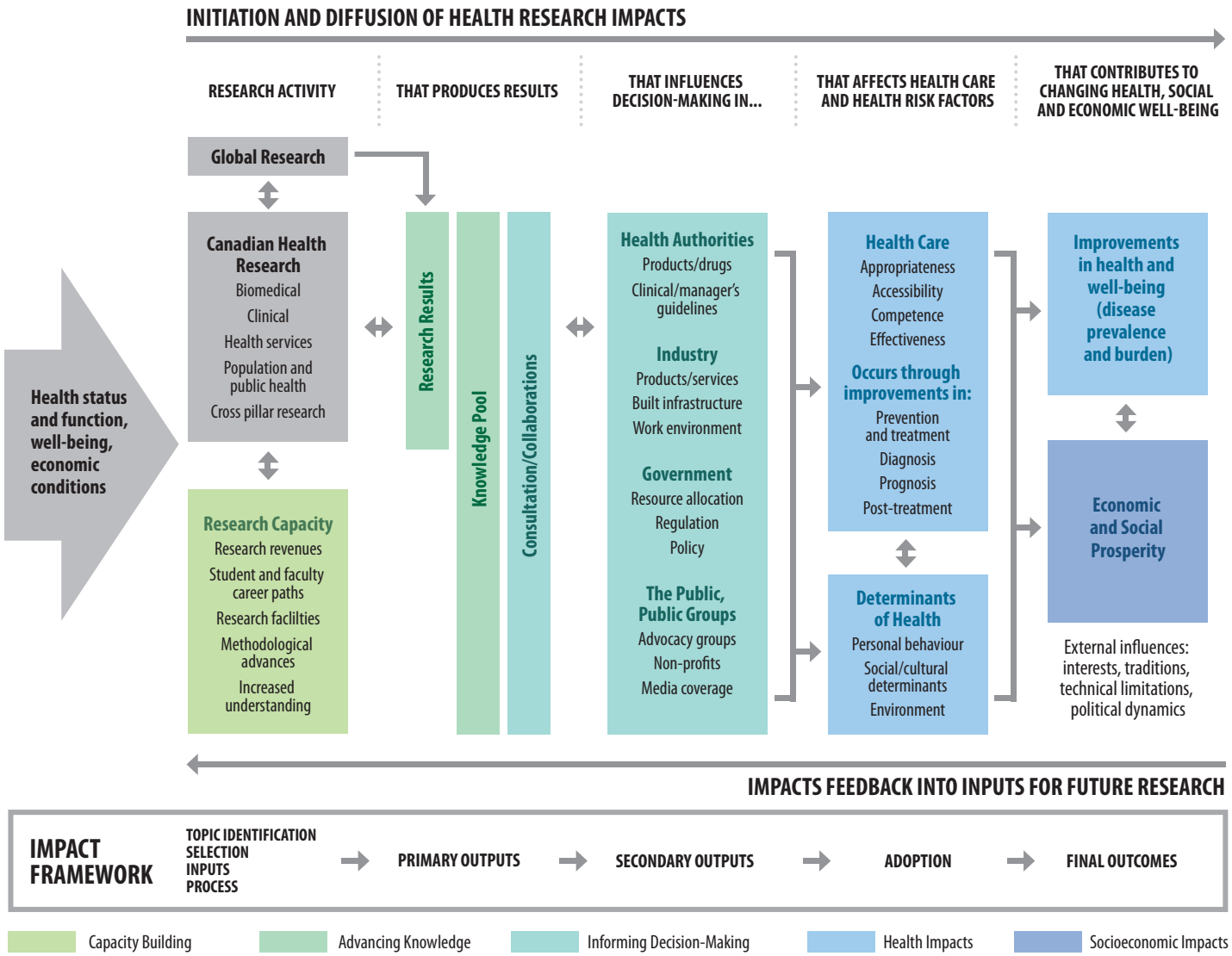
Understanding Impact

Given today's economic climate, increasing demands for public dollars, obligations for accountability and transparency, and the need to demonstrate the benefits of investments in health research, funders face unprecedented challenges in carrying out their mission and mandate. Making this process more difficult is the complexity of the research environment and the numerous metrics and indicators used to assess the impact of health research. To make sense of these issues, the Saskatchewan Health Research Foundation (SHRF) has worked with other health research funding agencies and the Canadian Academy of Health Sciences (CAHS) to develop a framework that measures returns on investment in health research. This framework builds upon the previous work done in 1996 by Buxton and Hanney (the payback model) that was adapted by the Canadian Institutes of Health Research (CIHR) in 2005. More specifically, CAHS was tasked in 2009 with developing a menu of indicators and to attempt to resolve the issue of attribution of research benefits. Through this framework, using a logic model approach, the impacts of health research can be tracked using indicators within five categories:

1. **Research Capacity** – e.g. personnel, additional research activity funding, infrastructure
2. **Advancing Knowledge** – e.g. research quality, activity, outreach
3. **Informing Decision-Making** – e.g. pathway from research to health outcomes
4. **Health Impacts** – e.g. health status, determinants of health, health system change
5. **Broad Economic and Social Impacts** – e.g. activity, commercialization, health benefits, social benefits

The CAHS framework works through how capacity in research produces knowledge that can influence decision-making, resulting in improvements to our health care, health, and economic and social well-being. In addition, the framework demonstrates how the impacts of research can influence future research.

Canadian Academy of Health Sciences Framework
Logic Model of Health Research Progression to Impacts



Source: The CAHS Impact Framework (2009)

This framework has been used in studies of research impact by CIHR and in other countries. These studies have shown that:

- impact is difficult to measure because impacts have no single identifiable cause;
- the lag between research and its full impact is typically many years;
- impact is the result of a whole innovation system, with multiple actors playing different roles, not the product of specific researchers or funding programs; and
- it is only possible to assess contributions of individual researchers or funding programs to research impact.

Methods

SHRF is the provincial funding agency for health research and the lead agency for implementing Saskatchewan's provincial *Health Research Strategy (2004)*. In 2009, a number of Canadian sponsors, including SHRF, supported the CAHS in developing a framework to measure the returns on investment of health research. In 2012, SHRF engaged in a process to examine the outcomes and impacts of SHRF-funded research, using the CAHS framework. SHRF asked an external consultant for an in-depth look at the outcomes and impact of Saskatchewan health research, including five case studies representing the province's health research priority areas.

In this study, primary informants were identified in five representative case studies. These primary informants were identified, as well as secondary informants who were related to the research and could provide insight on its impact. The data was collected and the results analyzed and reported using the CAHS framework.

The external consultant conducted 15 interviews with 22 informants, including five primary researchers who had received some form of SHRF funding in one of Saskatchewan's five health research-funding priority areas (i.e., specific population groups including seniors' health and Aboriginal Peoples' health, health systems and policy, determinants of health, public health and synchrotron-based health research).

Following are the findings from this study, including supplementary data on the corresponding impact category.

Building Research Capacity

Building research capacity has to do with the development and ability of individuals and teams to conduct research. Indicators are focused on: personnel (e.g., current capacity for research); additional research activity funding (e.g., success at attaining federal research dollars); and infrastructure (e.g., linking infrastructure to activity) (CAHS, 2009).

HOW ARE WE BUILDING HEALTH RESEARCH CAPACITY IN SASKATCHEWAN?

All five of the researchers in the study have taken on senior research group or faculty leadership positions.

- **Infrastructure –** Dr. Gerdts's research institute has attracted international funding from the Gates Foundation as they do groundbreaking research at the Vaccine and Infectious Disease Organization (VIDO) facility.
- **Infrastructure –** Dr. Nichol participates in a synchrotron-imaging group, funded by SHRF, which is developing innovative methods to combine existing techniques for use in imaging strokes and cancers.
- **Infrastructure and personnel –** Each of the researchers and their teams have attracted national Tri-Agency funding.
- **Personnel –** Dr. Baxter-Jones has built a strong research program with graduate students and participates in a bone health research group funded by SHRF.
- **Personnel –** Dr. Morgan's group has gained international attention for its work in delivering health services to rural and remote populations and has used this delivery system for training dozens of graduate students.
- **Personnel –** IPHRC, now directed by Dr. Episkenew, has developed a strong network of existing and new researchers and Aboriginal communities to co-operate in community-based research.

"AT A STRATEGIC PLANNING LEVEL," SAYS EPISKENEW, "OUR VISION IS TO HAVE HEALTHY COMMUNITIES AND WE THINK RESEARCH IS THE MEANS TO THAT END. WE'D LIKE TO BE THE AUTHORITY THAT THE GOVERNMENT CONSULTS WHEN IT COMES TO ABORIGINAL HEALTH AND WE'D LIKE TO BE ABLE TO CONNECT THEM TO THE APPROPRIATE PEOPLE FOR POLICY PLANNING."

Attracting and retaining researchers

Researchers have stayed in Saskatchewan because:

- they found a supportive and collegial research environment here and they liked the province;
- Saskatchewan has facilities and research infrastructure (e.g., Canadian Light Source synchrotron, VIDO); and
- they value SHRF's role in attracting and retaining researchers. All five researchers received support from SHRF to either start or develop their research careers here in Saskatchewan.

Dr. Jo-Ann Episkenew

Director of the Indigenous Peoples' Health Research Centre (IPHRC)

Indigenous health research is key to improving health, especially in Saskatchewan where the Aboriginal population is increasing rapidly. The study of innovative and culturally appropriate Indigenous health solutions that translate into positive, real community impacts are critical to delivering healthcare in the future.

HEALTH NEEDS OF SPECIFIC POPULATIONS, WITH EMPHASIS ON ABORIGINAL PEOPLES' HEALTH

OUTCOMES:

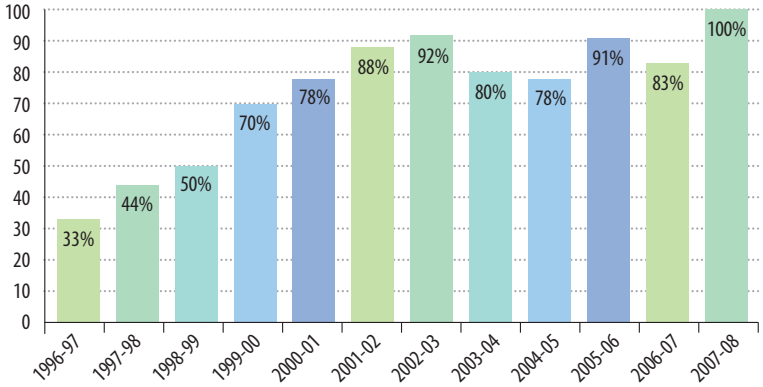
Since its creation in 2002, IPHRC's goal has been to build capacity for community-generated health research among Indigenous Peoples. Through mentorship, network building, and funding opportunities for students, communities and researchers. IPHRC is one of nine Network Environments for Aboriginal Health Research funded by CIHR – Institute of Aboriginal Peoples' Health, with additional funding from SHRF. It includes 24 researchers, most located at Saskatchewan's three universities. All the research funded by IPHRC must have an authentic partnership with at least one Aboriginal community. To date, IPHRC has contributed over $3 million to Indigenous Peoples' health research across the province through funding and grant opportunities for students, communities, and researchers. It has funded over 100 undergraduate and graduate students, 98 per cent of whom have been Aboriginal.

BUILDING RESEARCH CAPACITY EXAMPLE:

A study by IPHRC of 14 graduate students funded from 2007 to 2010 found that they are now engaged in research on tuberculosis, health and wellness, Métis health, oral history, Aboriginal women's health, and various other topics in physical and community health. Twelve of the students held academic-related employment related to their health studies.

Research Capacity Data

What percentage of SHRF establishment grantholders are still in Saskatchewan five years post-award?



Source: SHRF Five-year Follow-up Study (2012)

How many Saskatchewan researchers are addressing key health issues?

HEALTH ISSUE	NUMBER OF RESEARCHERS	PER CENT
Infectious Disease	66	10.8
Cancer	55	9.0
CVD and Obesity	40	6.5
Mental Health and Addictions	37	6.0
Respiratory Illness	28	4.6
Diabetes	18	2.9
Alzheimer's and Dementia	14	2.3
Arthritis	14	2.3
Stroke	8	1.3
Unintentional Injury	8	1.3

Source: Health Research Capacity in Saskatchewan: A Descriptive Report 2nd Edition (2012), SHRF

With which colleges/faculties/organizations are Saskatchewan researchers affiliated?

COLLEGE/FACULTY/ORGANIZATION	2012 FREQUENCY	2012 PER CENT
Medicine	181	29.5
Arts and Science	80	13.1
VIDO	29	4.7
Nursing	28	4.6
Pharmacy and Nutrition	28	4.6
Agriculture and Bioresources	27	4.4
Veterinary Medicine	24	3.9
Arts (U of R)	18	2.9
Engineering	17	2.8
Kinesiology	16	2.6
Kinesiology and Health Studies (U of R)	11	1.8
All other	154	25.1
Total	613	

Source: Health Research Capacity in Saskatchewan: A Descriptive Report 2nd Edition (2012), SHRF

Advancing Knowledge

Advancing knowledge indicators are primarily focused on bibliometric analyses and the activities of researchers. More specifically, advancing knowledge refers to the quality of research output, the activity or volume of research output, and outreach (CAHS, 2009).

HOW IS HEALTH RESEARCH ADVANCING KNOWLEDGE?

All five case study researchers and their teams have had involvement in public education and outreach.

- **Research output –** The researchers and teams in this study are highly productive. Since the year after first receiving SHRF funding, the five primary researchers have collectively produced:
  - 173 peer-reviewed publications;
  - 15 books or book chapters; and
  - six technical reports.
- **Research output –** These publications have been cited in 794 publications by other researchers, an indicator of the research impact of the primary researchers on other's research. The teams associated with the primary researchers have produced, in addition, 331 peer-reviewed articles, 57 books or book chapters, and 81 technical reports.
- **Outreach –** Two of the researchers have made major contributions to laboratory techniques and animal models.

"THE REAL ADVANTAGE OF THE SYNCHROTRON IS THAT IT GIVES YOU A QUANTITATIVE MAP SHOWING WHERE DIFFERENT ELEMENTS ARE IN WHOLE TISSUES, WITHOUT DAMAGING THE TISSUE. NO OTHER TECHNIQUE CAN DO THIS,"

Dr. Helen Nichol

Leader of the Gene Expression Mapping Group at the University of Saskatchewan (GEMS)

GEMS uses the Canadian Light Source synchrotron to image tissues. It is an approach unique to Saskatchewan which links molecular biology to synchrotron medical imaging. Researchers insert DNA into cancer cells to make them take up iodine. Since iodine is opaque to x-rays, the cells enriched in iodine become visible. This enables them to follow the migration of metastatic cancer cells that grow on the lung and potentially image the effect of chemotherapeutic drugs in living animals over the lifespan of the animal.

SYNCHROTRON-BASED HEALTH RESEARCH

OUTCOMES:

Saskatchewan has metastatic cancer rates above the national average. GEMS imaging has the potential to be applied to many diseases and will garner interest from pharmaceutical companies to make drug testing and development better and more cost effective by imaging the same animal over and over again. The two techniques – iodine imaging of living animals and elemental mapping – are being linked together to investigate metal-based chemotherapeutics. While platinum (cis-platin) has been used for many years to treat cancer, other metal-based drugs can now be investigated at the anatomic and atomic levels as potential new anti-cancer agents.

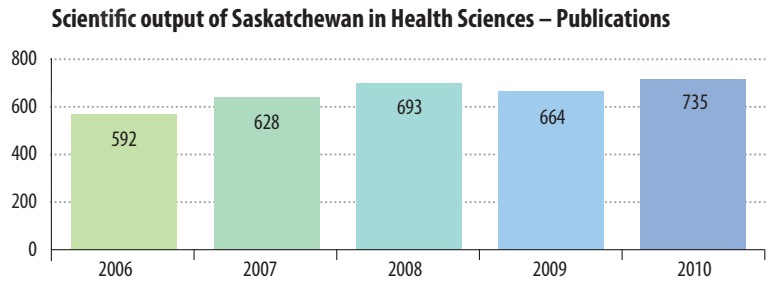
ADVANCING KNOWLEDGE EXAMPLE:

The formation of GEMS has a unique collaborative research group that includes synchrotron experts Dean Chapman, Graham George and Ingrid Pickering, cancer researcher Svein Carlsen, clinicians Michael Kelly and Raphael Guzman, neuroscientists Bogdan Popescu and Valerie Verge, molecular biologists Bill Roesler and Helen Nichol, and research associate Ken Gagnon.

In addition, members of the group who work at the Cameco MS Neuroscience Research Center are extending their use of synchrotron elemental mapping to provide insights into diseases with abnormal accumulations of metals in the brain like MS, Alzheimer's and Parkinson's.

Advancing Knowledge Data

How many scientific publications in the health sciences come from Saskatchewan researchers?



Source: Data calculated by Observatoire des sciences et des technologies (OST) and Science-Metrix (2012) using Thompson Scientific data

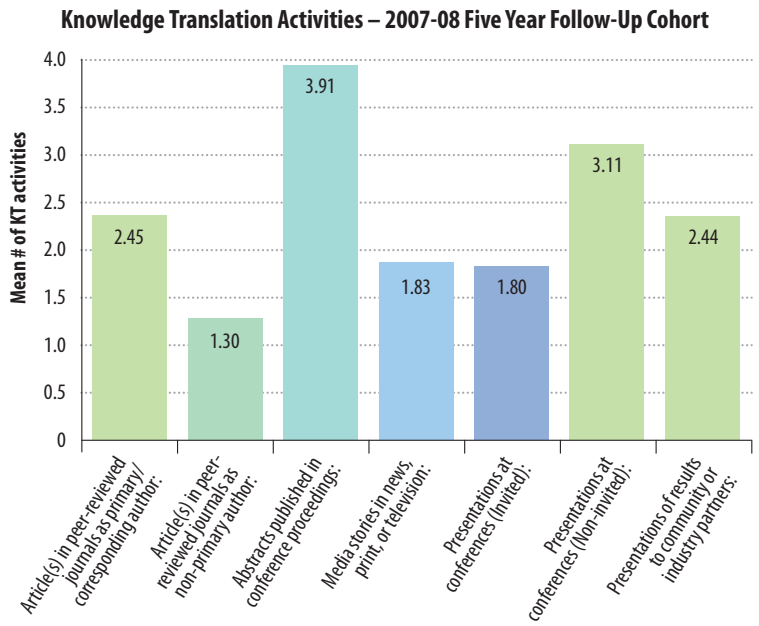
What are Saskatchewan's areas of strength in health science publications?

According to Science-Metrix, the following sub-domains are areas of specialization in Saskatchewan and are above the world standard in quality of scientific publication.

HEALTH CARE AND RESEARCH	CLINICAL MEDICINE	BIOMEDICAL RESEARCH	PSYCHOLOGY
Public Health	Veterinary Medicine	Microbiology	Clinical Psychology
Nursing	Respiratory	Biomedical Engineering	Behavioural Science

Source: Data calculated by Observatoire des sciences et des technologies (OST) and Science-Metrix (2012) using Thompson Scientific data

What knowledge translation activities do SHRF establishment grantholders participate in five years post-award?



Source: SHRF Five-year Follow-up Study (2012)

Informing Decision-making

Informing decision-making can take on many forms, from decisions based on a specific project or piece of evidence, to decisions based on a body of knowledge or evidence. It can be considered the pathway from research to potential health outcomes. Given that there are multiple types of decisions that are often based on multiple influences, proxy indicators are used as measures for this impact category. Indicators are focused on: health-related decision-making (e.g., health care, public health); research-related decision-making (e.g., research funding allocations, research policies); health products industry decision-making; and general public decision-making (CAHS, 2009).

HOW IS HEALTH RESEARCH INFORMING DECISION-MAKING?

Informing decision-makers and translating knowledge into action is difficult, even for the most senior of researchers. Three of the five research groups reported limited contact with and impact upon both clinical and policy decision-makers.

- All had some contact, but in general the primary researchers felt they did not have the time or skill to influence decision-makers, and that it was not the sole responsibility of a single researcher.
- The decision-makers we interviewed reported little contact with individual researchers. They reported that they relied on reviews and assessments of the body of research evidence on a topic as a whole, rather than the input or findings of individual researchers.

Some groups have had more contact with and impact upon decision-makers.

- **Health related decision-making –** Dr. Morgan's group has developed a decision-maker advisory council that meets with the research team during an annual summit.
- **General public decision-making –** Dr. Baxter-Jones' group has developed an online tool on bone development that has had tens of thousands of accesses.
- **Research related decision-making –** IPHRC is moving in the direction of increased contact with decision-makers through the engagement of a postdoctoral fellow in Aboriginal health policy and the law to work with the Johnson-Shoyama Graduate School of Public Policy on curriculum development in Aboriginal public policy education.

"WE'VE MADE A LOT OF PROGRESS OVER THE LAST DECADE. THE WHOLE EXPERIENCE HAS BEEN VERY TRANSFORMATIVE."

Dr. Debra Morgan

Researcher with the Canadian Centre for Health and Safety in Agriculture

Saskatchewan has a high proportion of seniors living in towns and villages, compared to cities. Seniors living in these areas have limited access to specialty services for dementia-related care.

Dr. Morgan leads a CIHR and SHRF-funded study aimed at improving the care of individuals with dementia in rural and remote Canada. A key project of this strategy was the design and evaluation of a special Rural and Remote Memory Clinic that uses videoconferencing and other innovations to improve access to diagnostic and treatment services. This clinic uses an interdisciplinary team to provide rural and remote dementia assessment, care, research, and training.

HEALTH SYSTEMS AND POLICY RESEARCH, INCLUDING QUALITY MANAGEMENT AND IMPROVEMENT TO PRIMARY HEALTH CARE, AND PATIENT-CENTRED CARE

OUTCOMES:

Since the clinic was launched in 2004, it has offered support to almost 1,000 family members and treated almost 400 patients. This clinic has drastically decreased the time required to provide diagnosis and treatment, doing in a single day what could take more than a year. In addition, using Saskatchewan's 179 telehealth centres versus travelling for follow-up appointments has saved patients considerable travel costs and time.

Dr. Morgan has been awarded an Applied Chair in Health Services and Policy Research, and is continuing to lead her team in developing additional strategies for increasing access to primary health care and specialized dementia care for Saskatchewan's seniors.

INFORMING DECISION-MAKING EXAMPLE:

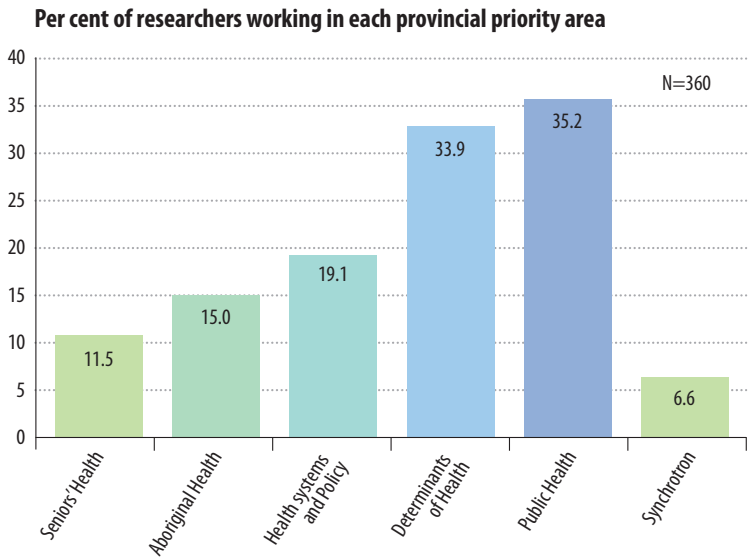
The clinic was launched in 2004 as a demonstration project under a five-year research grant. When funding ran out in 2009, the Saskatchewan Ministry of Health and Saskatoon Health Region agreed to continue funding. The clinic is a model of family-centred care, involving the patient's family and caregivers at all points.

The Alzheimer Society of Saskatchewan has now started a telehealth support program for spouses to ease the load on the clinical team, adopting a model that was implemented and evaluated by the Rural and Remote Memory Clinic team.

A Rural Dementia Action Research team has now been developed and implemented as a process to improve the health and quality of life of people with dementia and their families in rural and remote settings, through fostering brain health and the creation of dementia-friendly communities.

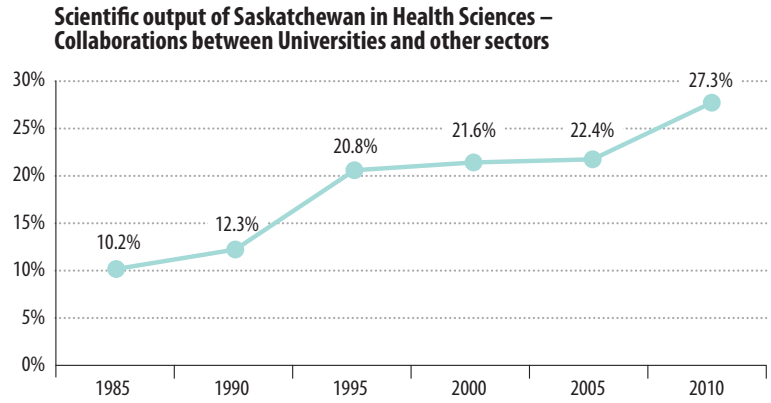
Informing Decision-making Data

What percentage of Saskatchewan researchers are working in each of the provincial health research priority areas?



Source: Health Research Capacity in Saskatchewan: A Descriptive Report 2nd Edition (2012), SHRF

What percentage of scientific publications from Saskatchewan are the result of collaborations between universities and all other sectors?



Source: Data calculated by Observatoire des sciences et des technologies (OST) and Science-Metrix (2012) using Thompson Scientific data

Health Impact

Health impacts can be measured in a number of ways; however, not all indicators of health have a direct link to research. The CAHS framework has followed the lead of the Canadian Institute for Health Information (CIHI) and split health impacts into three categories: health status (e.g., mortality, morbidity); determinants of health (e.g., behavioural, social and environmental); and health system change (e.g., accessibility, quality, and safety of service) (CAHS, 2009).

HOW IS HEALTH RESEARCH IMPACTING HEALTH?

All of the researchers in this study commented on how their research will make a difference in the prevention of ill health.

- **Determinants of health –** Dr. Baxter-Jones' work on the positive effects of childhood physical activity on adult bone mass contributes to the awareness and possible prevention of bone fractures later in life.
- **Determinants of health –** Dr. Episkenew and her group have helped develop tobacco cessation materials with the Lung Association for use with Aboriginal youth.
- **Health status –** Dr. Gerdts's vaccine innovations have a large potential impact in improving the health status for both infants and the elderly. As he has noted, "our research is all about developing new vaccines, so the prevention of disease."
- **Health system change –** Dr. Morgan's research group has built close links with Regional Health Authorities to deliver specialized health clinics in rural and northern areas. Dr. Morgan's group also has developed and continues to update best practice guidelines for diagnosis of memory loss.

"OUR WORK IS PROBABLY MORE RELATED TO PUBLIC AWARENESS. WE HAVE TO INCREASE PEOPLE'S AWARENESS THAT BONE HEALTH CAN BE COMPROMISED BECAUSE CHILDREN AREN'T BEING ACTIVE. PEOPLE ALREADY KNOW THEY HAVE TO BE MORE ACTIVE – NOW WE HAVE TO CONVINCE THEM TO CHANGE THEIR BEHAVIOURS."

Dr. Adam Baxter-Jones

Leader of the Saskatchewan Growth and Development Study (SGDS) and the Pediatric Bone Mineral Accrual Study (BMAS)

Dr. Baxter-Jones studies children's bone growth and development using longitudinal growth studies. He leads two CIHR-funded longitudinal studies of childhood growth and development: SGDS which began in 1964, and BMAS which began in 1991. The second study has been following approximately 200 children since 1991 and is one of the most comprehensive long-term databases in the world on bone development in the mid-childhood to early-adult years.

Many new studies only compare the physical development of an active child with an inactive one of the same age. The children are typically followed for only a year or two, mainly because long-term studies are expensive and time-consuming. The value of the Saskatchewan studies is their reach into the past, the subjects of the first growth study now being in their 50s, and those from the bone study in their 30s.

Dr. Baxter-Jones currently leads a SHRF-funded bone imaging health research group based at the University of Saskatchewan.

DETERMINANTS OF HEALTH STATUS, INCLUDING EARLY CHILDHOOD DEVELOPMENT AND THE PREVENTION AND UNDERLYING CAUSES OF CHRONIC AND LIFESTYLE DISEASES

OUTCOMES:

His recent research indicates that active pre-teens and early teens have much greater bone mass when they reach the age of 25 to 27. The studies have found that physical activity in childhood also lays the structural groundwork for strong muscles, tendons and ligaments later in life. Additionally, it can impact oxygen uptake and anaerobic capacity.

The BMAS study has found that the amount of muscle mass affects a child's bone mass. Exercise causes buildup of the muscle and interacts with the adjacent bone, boosting bone density.

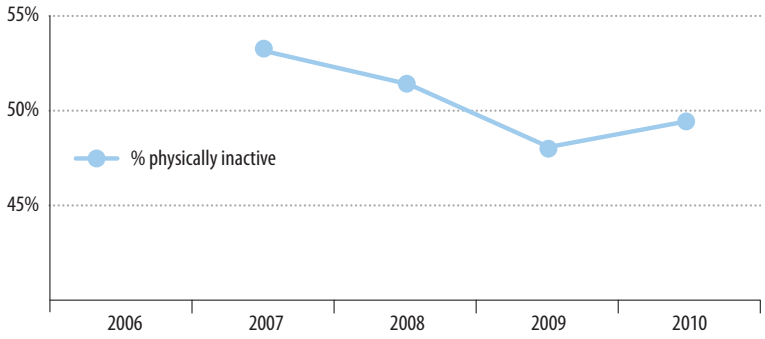
HEALTH IMPACT EXAMPLE:

The research has shown that inactivity can adversely and irreparably alter a child's body for life. According to Dr. Baxter-Jones' research group, more than half of Canadian children aged five to 17 aren't active enough for optimal health and development.

It worries Dr. Baxter-Jones that 26 per cent of Canadian children aged two to 17 are considered overweight or obese, leading to concerns of an osteoporosis epidemic in middle-aged adults. According to the research, children have a window of opportunity for establishing bone mass for later life – a process called "banking bone". The more bone the body can lay down during that period of time, the more bone has been "banked", which should reduce the risk of osteoporosis later in life.

Health Impact Data

Percent of residents reporting they are physically inactive
Saskatchewan, calendar-year

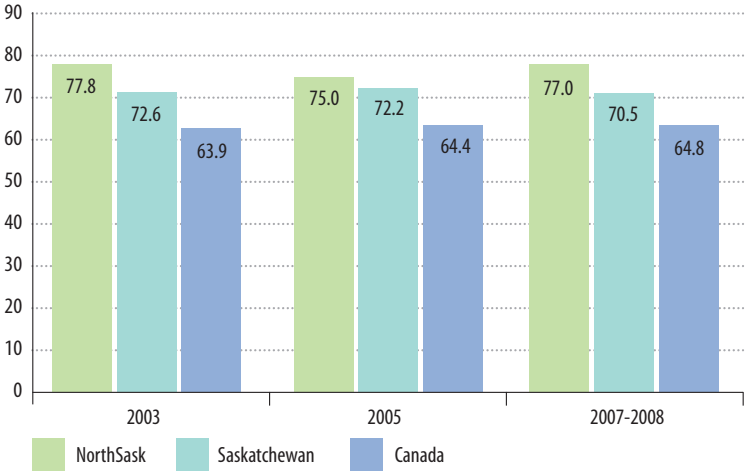


Source: Qualityinsight.ca, Health Quality Council, (accessed 04-2013)

Prevalence of adult obesity
Saskatchewan, calendar-year

Source: Qualityinsight.ca, Health Quality Council, (accessed 04-2013)

Sense of community belonging
Off-reserve, northern Saskatchewan, Saskatchewan, and Canada, 2003 to 2007-2008



Source: StatsCan (CCHS-Health Indicators), Northern Saskatchewan Health Indicators Report 2011.

Broad Economic and Social Impact

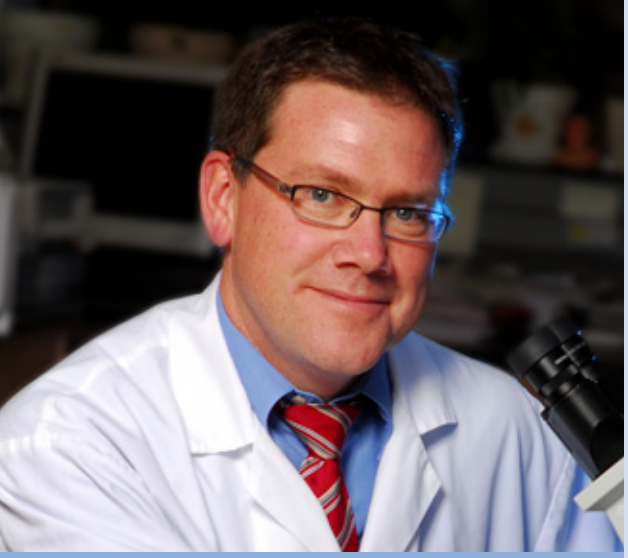
Socioeconomic impacts could be considered the most difficult impact category to link to research. Many actions need to take place and factors be considered before economic and social benefits of research can be realized. The CAHS framework categorizes socioeconomic indicators into four groups: research activity (employing people in health research); commercialization (spinoff companies); health benefits (direct cost savings); and social benefits (socioeconomic status) (CAHS, 2009).

HOW IS HEALTH RESEARCH CREATING BROAD ECONOMIC AND SOCIAL IMPACTS?

In general, researchers underlined that economic impacts take a long time to develop. It takes 10 years, for example, for a new human vaccine to go from lab to market. In her interview, Dr. Episkenew talked about taking the long view on the social and economic impact of IPHRC's work, "So it's not like we have quick results like, 'Wow, we discovered a cure for diabetes!' It's more complex."

- **Health benefits –** All the researchers identified potential economic impacts of their research, mainly through improved health and reduced health care costs down the road.
- **Research activity –** The presence of a strong health research enterprise in a local economy can in itself have a profound impact. For example, the return on investment from establishing a scientist's research program can have on average a four to one return (i.e., for every SHRF dollar awarded, the researcher attains four dollars from external sources of funding).
- **Research activity –** According to SHRF's *2012 Capacity Report*, Saskatchewan Directory of Health Researchers attained funding amounting to 310 million dollars between 2005-06 and 2010-11. A significant amount of dollars was used to do the research and employ students, research assistants and post-doctoral trainees.
- **Commercialization and Social benefits –** It has been suggested that with the presence of special research infrastructure (e.g., Canadian Light Source Synchrotron, Intervac) comes higher paying jobs, resulting in a higher tax base and a highly sought knowledge economy.

"WE ALWAYS TALK ABOUT THIS RESEARCH CLUSTER," SAYS DR. GERDTS, WHO IS ALSO A PROFESSOR IN THE WESTERN COLLEGE OF VETERINARY MEDICINE. "VIDO IS NEXT TO VETERINARY MEDICINE AND THE CANADIAN LIGHT SOURCE SYNCHROTRON FACILITY, DOWN THE STREET FROM AGRICULTURE AND BIORESOURCES, AND JUST ACROSS THE CAMPUS FROM MEDICINE. FOR THE PURPOSES OF OUR RESEARCH, IT IS AMAZING THE DIFFERENCE IT MAKES TO HAVE ALL THE COLLEGES HERE."



Dr. Volker Gerdts

Associate director of research at the Vaccine and Infectious Disease Organization (VIDO) and manager of the Neonatal Immunization Group (NIG)

Dr. Gerdts has been funded by SHRF through our establishment grant program as well as having served as supervisor to several SHRF postdoctoral fellows. As part of a CIHR and Gates Foundation-funded VIDO project, Dr. Gerdts has worked on mucosal membrane vaccine delivery systems, the use of new adjuvants to increase vaccine effectiveness, and the development of animal models for testing immunization effectiveness.

PUBLIC HEALTH, INCLUDING INFECTIOUS DISEASES AND FOOD AND WATER SAFETY

OUTCOMES:

Because a newborn's immune system isn't fully developed, babies are immunized several times between two and six months of age. It isn't possible to wait until their immune systems are fully developed as they need protection from diseases like whooping cough much earlier in their lives.

NIG is investigating three approaches to improving immune response. The first dispenses vaccines to the fetus during pregnancy. A second option applies a single multi-use vaccine early in the life of the newborn. The third approach is maternal immunization where the vaccinated mother transfers antibodies to her newborn through her breast milk.

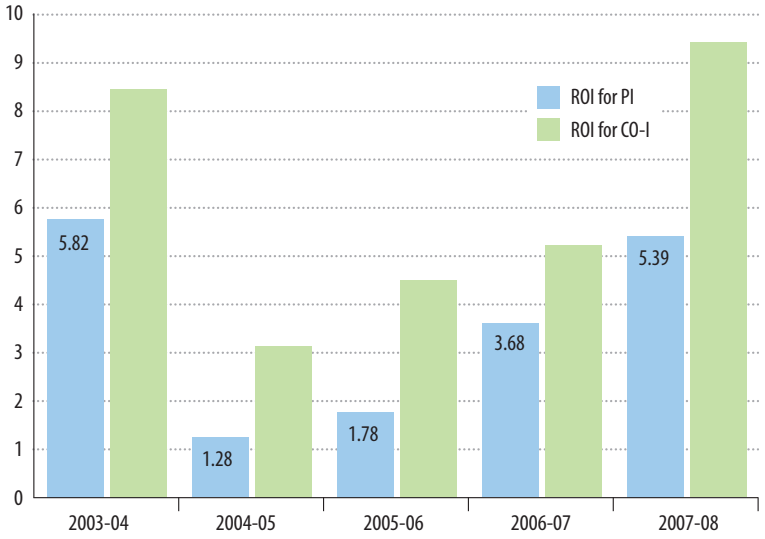
BROAD ECONOMIC AND SOCIAL IMPACT EXAMPLE:

Dr. Gerdts reported that an economic impact analysis commissioned for VIDO showed that VIDO funding had a long-term return on investment of 20 to one.

The global impact of a vaccine platform based on a single immunization either before or shortly after birth, despite being 15 – 20 years away, would have a huge impact. The platform has the potential to vaccinate against diseases like pertussis, respiratory syncytial virus, tuberculosis, hepatitis C, HIV, malaria, and even E. coli outbreaks.

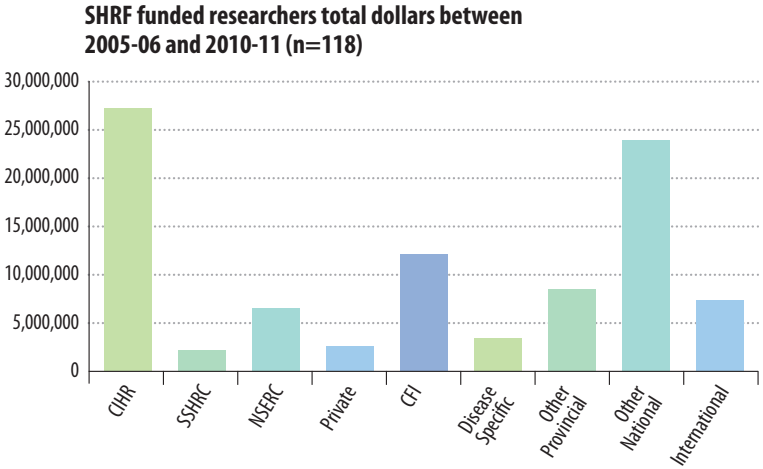
Broad Economic and Social Impact Data

For every SHRF dollar awarded to establishment grantholders, how many dollars do researchers receive from other sources five years post-award?



Source: SHRF Five-year Follow-up Study (2012)

How many dollars do SHRF-funded researchers receive from other funding agencies?



Source: Health Research Capacity in Saskatchewan: A Descriptive Report 2nd Edition (2012), SHRF

Commentary

The CAHS framework assists in understanding the research cycle. Capacity in research produces knowledge that can influence decision-making which results in improvements to our health care, health, and economic and social well-being. In addition, the framework demonstrates how the impacts of research can influence future research. Our commentary focuses around four areas: observations; facilitators and barriers to impact; making an impact; and conclusions.

Observations

There were two main variations between the case studies that affected impact: basic versus applied research, and the success of team leaders in building links to decision-makers.

1. The type of research was directly related to the policy and health system impact. Basic research, such as synchrotron research, had a much more distant relationship to both policy and health system impact than did applied health services research – and therefore also had a longer-term and more diffuse payoff for the investment. Similarly, investment in capacity building, as with IPHRC, has a longer-term and more diffuse payoff than direct investment in specific research projects.

2. The teams had varying success in solving the puzzle of linking to decision-makers in both clinical and health system policy decision-making. This was related to the success of the research team leader in making connections to and integrating decision-makers into the research work at the clinical, health system, and health policy-making levels. This integration, when successful, comprised not only knowledge translation of research results to decision-makers, but participation of decision-makers in setting the agenda of research through identifying the problems they wanted solved.

Facilitators and Barriers to Impact

Primary informants identified the following facilitators that impact their research:

- SHRF's group-building grants, creation of research groups and networks;
- good research collaborators in Saskatchewan, postdoctoral fellows, and graduate students;
- strong mentoring and support for research;
- long-term networks and relationships between researchers and decision-makers;
- money; and
- collaborators and connections to the health system.

Primary informants identified the following barriers that impact their research:

- non-research expectations (teaching, administration) and lack of time;
- a need for a long-term focus on research from government; and
- researchers' lack of understanding of how decisions are made in large organizations.

Making an Impact

Similar to other Canadian and international studies, attribution of health impacts to specific research is impossible, there is a long lag from knowledge production to health impact, and health impact is the product of a research and innovation system, not of any one researcher. The major implications for facilitating future impact are:

- innovation is a slow, patient process; and
- enterprise-based on research is possible, but it is built upon a long, hard slog of creating a body of research knowledge, and then the skill of innovators in turning that into usable products and services.

Knowing this, how do we do a better job creating impact?

…for research funders and policy makers

SHRF needs to continue to support young researchers, teams and networks.
Many of the things SHRF is doing are effective. The strategies are working. These strategies include funding establishment grants, research chairs, and research groups.

Researchers also need support for knowledge translation.
Researchers need help, support and mentoring about how to link to the clinical and policy worlds for knowledge translation and for input on the problems the health system needs solving. This area should be explored for future investment. It is an area of work in which researchers are not necessarily trained or expert. One resource worth noting here is SHRF's *Health Research in Action: A Framework for Building Capacity to Share and Use Health Research (2007)*. This document could be used as a resource to better connect all users and contributors of health research and health research outcomes to a knowledge translation process that encourages proactive and continual communication of research activity and outcomes.

…for researchers

Research is a team enterprise.
Research is a team, not a solo, enterprise. It takes time to build the team – five to 10 years – but the effort pays off.

Successful teams are interdisciplinary.
Successful teams are made up of researchers who bring different skills and perspectives to the team in novel and innovative combinations.

Leaders build successful research groups.
Leaders build groups. Successful teams draw on the skills of all team members, but they are based around a research leader with people skills to build and keep the team together, and with a long-term vision of what the team can accomplish.

Busy clinicians can participate in research teams.
It is possible as a clinician to participate in research as part of a team, despite the pressures of clinical practice. Two busy specialist clinicians described how being invited to be part of a research team led by a research scientist allowed them to participate in research without having to actually build their own research team and support infrastructure. The clinicians valued the interaction with other scientists and the opportunity to have student trainees work with them.

Conclusions

This SHRF-led study is one of several attempts to use the CAHS framework to measure the value of health research. Overall, the findings from these case studies were similar to those of previous attempts to measure research impact from provincial, national, and international perspectives. As other studies have found, attribution of a specific health impact to a specific piece of research is impossible in most cases. Again, as other studies have found, time lags from knowledge production to health impact are measured in years, if not decades. And finally, as other studies have found, health impact is the product of a whole research and innovation system, not of any one researcher or research team.

The change towards the encouragement of teams and networks as the basic structures for research began a decade ago and now is paying off in research productivity and impact. The keys are research leadership, relationships, mentoring and collaboration, combined with early career start-up funding for researchers and network/group funding to build competitive, effective research teams.

The Tri-Agency funding world, in particular CIHR, is very competitive. The province has proven it is capable of excellence and has developed strong teams that successfully compete for funding on the national and international stages.

World class researchers and students have chosen to live and work in Saskatchewan. It is here that they are finding solutions to health issues affecting Saskatchewan residents, Canadians, and populations from around the world.

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