Chanchlani Research Centre Impact Report 2019
Message from the Dean

From finding the genetic and environmental causes of common diseases to using new forms of technology to uncover the genomic, metabolomic and gut microbiomic signatures of future disease development, the advances of the Chanchlani Research Centre are having a significant impact across a broad spectrum of health care.

This is due to the support of the Chanchlani family, whose generosity enabled a wide variety of research aimed at unravelling the environmental and genetic causes of cardiovascular diseases prevalent within populations of varying ancestral origin, including South Asians who represent the fastest growing immigrant population in Canada.

This impact report provides snapshots of these successes as well as the Centre’s ambitious plans for the future. It also highlights our extraordinary calibre of trainees as well as the recipients of the Chanchlani Global Health Research Awards, including the most recent recipient, Camara Phyllis Jones, who recently gave an engaging presentation called Tools for Achieving Health Equity: Allegories on Race and Racism.

We remain tremendously proud of the work that is being undertaken in the Chanchlani Research Centre and deeply grateful for the support from the Chanchlani family that has enabled our many accomplishments. Their gift continues to fuel our progress, bolster the success of our talented young scholars and create a lasting impact on our local and global communities.

Paul M. O’Byrne, MB, FRCP
Dean and Vice-President, Faculty of Health Sciences
Dean, Michael G. DeGroote School of Medicine
McMaster University

“Our gift continues to fuel our progress, bolster the success of our talented young scholars and create a lasting impact on our local and global communities.”

– Paul O’Byrne

Pictured on the cover are some of the members of the Chanchlani Research Centre: top row, left to right, Priya Thomas, Gita Wahi, Pinaz Gulacha, Kathy Stewart, Sandi Azab, Carolina Stryjecki and Miguel Vazquez-Moreno. Pictured bottom row, left to right, Sonia Anand, Russell de Souza, Dipika Desai, Meera Shannuganathan and Amel Lamri.
Message from the Director

The formative gift from the Chanchlani family in 2011 has been integral in helping us understand the genetic and environmental causes of common diseases among diverse cultural groups, women and the socially disadvantaged.

As Vasu and Jaya had envisioned when our research centre opened nearly eight years ago, we have leveraged the resources, passion and influence of people of South Asian origin by engaging them in a program of research which address the health issues of diverse populations locally and around the world.

Throughout this report, you will read about our many collaborative research projects, including investigations examining why central obesity and diabetes are so prevalent among the South Asian population as well as our current undertakings, such as ‘omics-based nutrition research to better understand the connection between diet and health.

Meanwhile, we continue to provide innovative training to the next generation of health researchers who will continue to lead in these important areas of research.

We have made tremendous progress over the years, but I believe we have only just scratched the surface in realizing the vision of Vasu and Jaya Chanchlani. As we move forward in our exciting endeavours, I know there will be even greater successes as we remain committed to developing better treatments and knowledge surrounding the area of chronic diseases among populations of varying ancestral origin and the socially disadvantaged.

Sonia Anand, MD, PhD, FRCPC
Professor of Medicine & Epidemiology
Director of Population Genomics Program, Department of Clinical Epidemiology and Biostatistics
Celebrating eight years of impactful research

For nearly a decade, researchers in McMaster’s Chanchlani Research Centre have uncovered new insights and advances that are furthering the world’s knowledge of the genetic and environmental causes of common diseases. This highly engaged and collaborative research group has made tremendous strides in their work, with direct and tangible outcomes for diverse cultural groups, women and the socially disadvantaged.

The centre was established in 2011 thanks to an important gift by Vasu and Jaya Chanchlani, with support from McMaster University. This funding established the human and physical infrastructure required to undertake large-scale genomics projects related to chronic diseases.

The transdisciplinary group of researchers brought together in the Chanchlani Research Centre are involved in a wide array of initiatives investigating how genomics intersects with health. From studying the causes and development of heart disease, stroke, dementia and cancer through understanding the genetics of opioid addiction, the projects are innovative and push the boundaries of knowledge.

“There is a need to understand the gut microbiota’s metabolism of the diet and contribution to human health through metabolites produced in the gut.”

— Jennifer Stearns
The Canadian Alliance for Healthy Hearts and Minds

The Chanchlani Research Centre’s Canadian Alliance for Healthy Hearts and Minds, or the “Alliance” for short, is a landmark national research study to understand the causes and the development of chronic diseases such as heart disease, stroke, dementia and cancer.

From 2013-2018, approximately 10,000 adult men and women from across Canada were invited to participate in the Alliance, provide blood samples and an MRI scan, as well as detailed information about themselves and their environments, and have their health followed.

This data has been assembled into an online map that contains data about connectivity as well as food, tobacco, and alcohol availability and price. The map is located at https://cvcdcontextual.mcmaster.ca/

Research undertaken by the Alliance has also found that Canadian First Nations communities with greater socio-economic advantages, educational opportunities, social support of family members and greater trust between community members, have lower cardiac risk factors. On the other hand, First Nations communities with difficulty accessing routine health care or affordable prescription medicines have a greater burden of cardiac risk factors.

The study is the first cohort study of First Nations communities across the country, and involved First Nation community members working along with academic researchers across eight communities in Canada.

“Understanding what factors protect some First Nations communities from having a high burden of cardiovascular risk factors and what places others at risk can help First Nations communities and governments develop short and long-term policies to improve health care access and outcomes for First Nations peoples. This is the primary objective of our study,” said Sonia Anand, principal investigator for the study.

The team was awarded $14 million from the Canadian Partnership Against Cancer and $2 million from the Heart and Stroke Foundation of Canada as well as funding from the Canadian Institutes of Health Research. Findings have been published in Cities and Health, the European Journal of Cardiovascular Imaging and the Lancet Planetary Health.

Genetics of opioid addiction

Researchers from the Chanchlani Research Centre have been involved in a research collaborative between the Ontario Addiction Treatment Center and the Population Genomics Program at McMaster to answer questions about the impact of genetic variants in response to methadone for patients seeking treatment for opioid addiction.

Coined GENOA (Genetics of Opioid Addiction), this study investigates different aspects of methadone response, including but not limited to continued opioid abuse, methadone dose, and methadone metabolism. Recently, GENOA received CIHR funding to continue its work.

“The primary goal of the GENOA research is to establish the genetic, biological and environmental influences on opioid addiction treatment response.”

— Zena Samaan

“The primary goal of the GENOA research is to establish the genetic, biological and environmental influences on opioid addiction treatment response,” says Zena Samaan, the lead researcher on the project. She says more than 3,000 participants have been recruited to the study. The goal is to recruit a total of 5,000 participants.
Indigenous birth cohort study

An Indigenous birth cohort study, led by Chanchlani researchers Sonia Anand and Gita Wahi, followed 300 Indigenous women and their offspring living on the Six Nations Reserve of the Grand River Territory, near Hamilton, to characterize the health challenges faced by the community, including gestational diabetes, other pregnancy-related complications and offspring health.

Results from this study have suggested that the amount of body fat that a person carries as an adult (a major risk factor for type 2 diabetes and heart diseases) may be set early in life by genes, and modified by food and activity choices. Researchers compared the percentage of body fat per kilogram of birthweight of Indigenous newborns to that of white Caucasian and South Asian newborns.

“Research suggests that major risk factors for type 2 diabetes and cardiovascular disease may be programmed early in life and influenced by both genetics and the environment,” says Wahi.

Healthy Roots project with Six Nations

Obesity, type 2 diabetes, and cardiovascular disease are highly prevalent among Indigenous people living in Canada. The high prevalence of these health issues can be attributed to an interaction between changes in the prosperity, dietary and physical lifestyle among Indigenous people in Canada over the last two generations.

“The Healthy Roots intervention shows great potential as a mechanism for improving physical health and restoring cultural connectedness and identity.”

— Russell de Souza

To better understand this connection, Chanchlani researcher Russell de Souza and his team are working in partnership with Haudenosaunee community members and health care providers on the Six Nations Reserve of the Grand River Territory. Called the Healthy Roots initiative, this community-based dietary intervention aims to return Haudenosaunee peoples to a traditional diet in order to become healthy again. It is a 90-day challenge, in which participants adhere to a diet of traditional Haudenosaunee foods found in the territory pre-European contact.

“The Healthy Roots intervention has great potential to improve physical health and restore cultural connectedness and identity,” says de Souza. “Furthermore, if a return to traditional eating can improve mental health and one’s sense of community, the benefits may be even greater – and should be considered in future research. Equal partnership with community members is essential for us to understand this fully.”

An Indigenous Birthing Cohort (ABC) aims to identify the causes which lead to an increased risk of obesity among Indigenous infants in their first three years of life. In partnership with the Six Nations of the Grand River Birthing Centre, the team works with community members to learn about the traditional knowledge, beliefs, and priorities towards the health of children and their families. An award-winning video about this work can be seen at: https://youtu.be/EYvfcqGKAiw
Diet and ‘omics

A study called the Diet and Genetic Intervention Study (DIGEST), is testing the feasibility and impact of a dietary intervention where a controlled diet is provided to participants for a two-week period in order to determine the amount of change in gene expression and biochemical markers of inflammation in response to a healthy diet compared to a typical unhealthy North American diet. It is being led by Chanchlani researcher Russell de Souza.

A particular genetic variant, called 9p21, predisposes those who have it to heart disease. Researchers recently found that in carriers of this variant, the risk of heart disease may be “turned off” if individuals eat a diet high in fruits and vegetables. However, the reason for this gene-diet interaction is unknown. In DIGEST, researchers sought to discover how a healthy, or “anti-inflammatory”, diet interacts with the 9p21 gene to alter the risk of cardiovascular disease.

“With ‘omics-based nutrition research, we are working to understand the relationships between diet, individual genetics, health and disease. If we find that diet can tame bad genes, we hope that these experimental findings make their way into clinical practice, such that recommendations can be made for personalized nutrition or individualized diet,” explains de Souza.

A different group of metabolites change when people switched from an “unhealthy” to a “healthy” diet. “Understanding how these compounds change will allow us to better monitor eating patterns in populations, and help improve the confidence researchers have in measures of diet,” de Souza says.

Researchers are also applying for infrastructure funding to support the Centre’s ‘omics research and develop food storage facilities for future diet and health studies. In addition, evaluation of bacterial microbe composition in stool samples comparing people with high and low dietary fibre is underway.

“We are studying how microbes in the gut interact with the diet during infant development and in particular how diets higher in fibre are metabolized by the microbiome,” says Jennifer Stearns, lead researcher on this project. “There is a need to understand the gut microbiota’s metabolism of the diet and contribution to human health through metabolites produced in the gut in order to both inform personalized diets and develop specific and effective probiotic treatments for disease and health promotion.”

NutriGen Alliance

In a consortium of four birth cohorts, supported by a $2-million grant from CIHR, our team has characterized a mother’s nutritional choices while pregnant, finding it may influence her own health during pregnancy, as well as her baby’s development in the womb and during infancy.

Chanchlani researchers involved in this study include Sonia Anand, Russell de Souza, David Meyre, Joseph Beyene and Guillaume Pare. They are studying the interplay of genetics, maternal and infant nutrition, the infant gut bacteria and child health from 5,500 mom-baby pairs from four birth cohorts from across Canada, which include mothers (and families) across a spectrum of income levels, and ethnic groups.

Relevant to diverse and high-risk populations of Canada, the findings will help to inform dietary and health guidelines in pregnancy, and lead to the development of randomized clinical trials to test interventions to improve health outcomes of pregnant women and their offspring.

“With ‘omics-based nutrition research, we are working to understand the relationships between diet, individual genetics, health and disease.”

— Russell de Souza

Working with Philip Britz-McKibbin, a professor in the Department of Analytical Chemistry, the researchers put diet under a microscope, to view the millions of tiny compounds that foods become after they are digested and metabolized; a field known as “metabolomics”. They found that a group of metabolites changed when people switched from a “healthy” to an “unhealthy” diet. A different
Vision for the future

Since the establishment of the Chanchlani Research Centre, several studies have provided greater insight into the genetic and environmental causes of common diseases among diverse cultural groups, women and the socially disadvantaged. Moving forward, the Centre has established focused areas that aim to build on prior investigations/observations, and better understand the intersection of genomics and culture on human health.
Community-based projects for South Asians

Type 2 diabetes and heart disease have become major public health burdens in South Asian women in recent decades. A study from the Chanchlani Research Centre aims to address this growing health concern with studies examining how maternal health behaviours, genetics and other *in utero* exposures in South Asians may contribute later in life to the development of type 2 diabetes and heart disease.

“This breakthrough study, called the South Asian Birth Cohort study (START), is significant because it suggests South Asian women who minimize their risk of gestational diabetes and avoid excessive weight gain in pregnancy may help to prevent diabetes in their own children,” says lead researcher Sonia Anand.

Anand, and her colleague Milan Gupta, a cardiologist from Brampton, Ontario, are working with collaborators in Canada and the St. John Research Institute in Bangalore, India on this innovative research study. The study has received funding from the Canadian Institutes of Health Research, the India Council of Medical Research and the Heart and Stroke Foundation of Ontario.

The study involves two birth cohorts: South Asians in southern Ontario and another in urban and rural India.

Key findings to date include:

- In comparison to white Caucasians, South Asian newborns have a lower birth weight yet more body fat – so called “thin-fat” and an increased waist circumference. This occurs despite South Asian mothers having double the rate of gestational diabetes (GDM) – an exposure which is usually associated with increased birth weight.
- Conversely, Indigenous newborns also born to mothers with a high prevalence of GDM have a higher birth weight.
- The paradox is both the South Asian and Indigenous offspring of GDM mothers have an increased risk of type 2 diabetes as adults.
- In the United Kingdom, the “thin-fat” phenotype persists into the second generation of South Asian immigrants which suggests that some causal factors of low birth weight and GDM are not imminently changed by a new environment.
- Observational data from the START cohort has enabled the design of a dietary intervention aimed at preventing GDM in South Asian mothers, called DESI-GDM.

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“The study examines maternal health behaviours, genetics and other *in utero* exposures in South Asians.

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– Sonia Anand

Anand
The effect of commuting time on cardiovascular health

The McMaster Chanchlani Research Centre is leading a new study that examines cardiovascular risk factors in South Asian truck drivers, whose long hours and time on the road increase cardiovascular risk. This is the first study of its kind to explore health perceptions and behaviors of truck drivers in Canada focusing on their cardiovascular health.

The purpose of this mixed-methods study is to develop a better understanding of the needs and health beliefs of South Asian truck driver population regarding their cardiovascular health. Trained interviewers will conduct semi-structured qualitative interviews with South Asian truck drivers based in southern Ontario using an ethnically-sensitive lens. Researchers will then analyze qualitative interviews, and identify emergent themes to better understand the knowledge, attitudes and practices of truck drivers with regard to their cardiovascular health. Findings from these interviews will be used to develop strategies to reduce cardiovascular risk among South Asian truck drivers.

“Talking with the people affected by the occupation helps us better understand their priorities, and meet their needs for screening, prevention, and health promotion in a way that resonates with them,” explains lead researcher on the project Russell de Souza and his student Pinaz Gulacha. They are joined by Susan Jack and Sonia Anand on this project.

“Working on this project will provide us an opportunity to look at this community from a cardiovascular health-oriented perspective.”

— Pinaz Gulacha

“Working on this project will provide us an opportunity to look at this community from a cardiovascular health-oriented perspective using mixed-methods (quantitative and qualitative) analysis as truck driver health is not currently getting the health research focus it deserves in Canada” says Pinaz Gulacha, a Masters student working under the supervision of de Souza.
Breaking the cycle of diabetes and heart disease

In a South Asian Birth cohort study, researchers have shown that one in three South Asian women in Ontario develop a form of diabetes in pregnancy (GDM). In these women, a poor quality of diet increases the chances of developing GDM by about 60 per cent, and about 13 per cent of GDM cases in this population could be prevented if one’s diet quality was improved. Building on these findings, researchers conducted a qualitative study of barriers and facilitators to healthy eating that are encountered by pregnant and recently pregnant South Asian women and health care providers living and working in the Peel region. They developed a dietary intervention aimed at preventing GDM.

Lead investigator Russell de Souza received $80,000 in funding support from the Population Health Research Institute and Hamilton Health Sciences to conduct a pilot trial of a better diet among pregnant South Asian women living in Peel, and demonstrated the feasibility of delivering health coaching and step tracking in Peel region. He finds this project exciting “because we are translating findings of a study into an intervention in a population that stands to benefit most from it. We hope that by doing something early, we can break the cycle of diabetes and heart disease in both mother and baby.”

Intimate partner violence in South Asian families

Intimate partner violence (IPV) is described by the Centers for Disease Control and Prevention (CDC) as “physical violence, sexual violence, stalking and psychological aggression (including coercive acts) by a current or former intimate partner.”

Representing a major public health problem, the World Health Organization (WHO) estimates that across WHO regions, one in three women will experience intimate partner violence in their lifetimes. One particular ethnic group vulnerable to higher rates of IPV are South Asians; however, most research to date has focused on white Caucasians, African Americans, and Latina populations.

“This project will serve to fill current gaps in the literature and help develop an understanding, especially among ethnic minorities, of the role of cultural or social norms on the prevalence of IPV.”

— Priya Thomas

Research into IPV among South Asians living outside of the Indian subcontinent is limited. Sonia Anand has teamed up with other McMaster researchers with expertise in this area including Susan Jack, School of Nursing, and Harriet MacMillan, Department of Psychiatry.

The primary aim of this study is to explore the shared perceptions and beliefs about IPV held by South Asian women of childbearing age (18-40 years) living in the Peel region and to describe and document identified factors that facilitate, constrain, and sustain IPV in this population.

“This project will serve to fill current gaps in the literature and help develop an understanding, especially among ethnic minorities, of the role of cultural or social norms on the prevalence of IPV,” says Priya Thomas, a Masters student working under the supervision of Anand.
Chanchlani Global Health Research Award and Lecture

Each year, the Chanchlani Research Centre celebrates an outstanding scientist in the field whose research impacts global health through the Chanchlani Global Health Research Award. Created by the Chanchlani family and McMaster University in 2012, the scholar is selected by an internal committee in conjunction with the Global Health Program led by Andrea Baumann, Associate Vice-President of Global Health at McMaster.

“We have had an outstanding calibre of recipients of the Chanchlani Global Health Research Award who have provided a wide breadth of engaging and informative talks,” Baumann says.

In 2012, the inaugural Chanchlani Research Award was presented to Madhukar Pai, Associate Professor of Epidemiology at McGill University and his wife Nitika Pai, Associate Professor of Medicine at McGill University for their research related to the control and treatment of tuberculosis and HIV in low income countries. During their lecture, they each presented research findings from their respective fields and hosted a roundtable discussion for MSc Global Health students and alumni and Health Research Methods students.

The late Hans Rosling – known for his very animated lectures – gave the Chanchlani Global Health Research lecture on Feb. 24, 2014. Named one of the World’s 100 Most Influential People in 2012 by Time magazine, the international health professor passed away in 2017. His Chanchlani lecture was focused on sustainable global development.
Professor Ab Osterhaus, virologist and head of the Department of Virology of the Erasmus MC Rotterdam, presented *From Zoonosis to Pandemic in a Changing World.*

His 2015 lecture discussed the links between zoonosis – or infectious diseases of animals that can naturally be transmitted to humans – and pandemics in our changing world. Osterhaus is a world-renowned virology professor from the Netherlands.

John Ioannidis, C. R. Rehnborg chair in Disease Prevention at Stanford University and professor of medicine and health research and policy, presented a lecture titled *Improving Research Practices: A Global Challenge.*

In his talk, Ioannidis surveyed the current status of research practices, examining how these affect the utility of scientific research in biomedicine and beyond. He also explored the pros and cons of suggestions that have been made for improvements, taking into account the current and future global landscape of research.

Camara Phyllis Jones, senior fellow, Satcher Health Leadership Institute and Cardiovascular Research Institute, presented the most recent Chanchlani lecture titled *Tools for Achieving Health Equity: Allegories on Race and Racism.*

Dr. Jones’s talk explored the ways in which racism contributes to health disparities. In her work, she examines the impacts of racism on the health and well-being of the nation. She seeks to broaden the national health debate so that it includes not only universal access to high quality health care, but also attention to the social determinants of health, including poverty, and the social determinants of equity, including racism.

Vikram Patel, co-founder and former director of the Centre for Global Mental Health at the London School of Hygiene and Tropical Medicine, presented a talk titled *The Black Dog: Why We Don’t Care.*

Although depression is one of the leading causes of the global burden of disease, there is little action by global or national policy makers to implement the interventions which are known to help people recover. This lecture considered the assumptions and myths which underpin this inaction and the knowledge base which addresses these. The lecture proposed the necessary steps for the global health community to address one of the most neglected health conditions of our times.

Dariush Mozaffarian, MD DrPH-Tufts University, Jean Mayer Professor of Nutrition and Medicine, Dean of the Friedman School of Nutrition Science & Policy, presented *A Global Perspective In Preventing Cardiometabolic Diseases: From Discovery To Policy.*

In this talk, Mozaffarian discussed the growing epidemic and global burden of cardiometabolic diseases including diabetes and cardiovascular disease, which are a leading cause of death in low- and middle-income countries. His presentation focused on the critical role of nutrition in tackling these global health issues.
The Chanchlani Research Centre is an ideal training ground for students in statistics, epidemiology, and medicine, such as Sujane Kandasamy, who is conducting her doctoral research under the mentorship of Sonia Anand. In 2018, Kandasamy received a Vanier Canada Graduate Scholarship, the Government of Canada’s most prestigious award for doctoral students.

Sujane says the Centre has allowed her to build a transdisciplinary research team to develop, create, and test the impact of an innovative multi-media-based knowledge translation intervention designed for pregnant South Asian women and their primary health care providers.

“Dr. Anand always has the best interests of her trainees at heart and goes above and beyond to ensure they receive the most out of their training programs,” she says.

Sujane adds that Anand and the Chanchlani Research Centre have been an inspiration to her in many different facets of her life. “The expertise of the researchers, staff, and trainees at the Chanchlani Research Centre motivates us to be the best we can be. The welcoming environment, access to various resources, opportunities to mentor junior students, professional development opportunities, and chances to attend and participate in scientific meetings and conferences has helped me hone the array of skills required to lead a successful career in academia.”

Sujane’s research focuses on knowledge translation, which essentially means taking findings from research and making it available to people and organizations who can put it to practical use.

“Right now, I’m working on finding the most effective ways to communicate information about gestational diabetes for South Asian communities (women, families and primary care providers) and perinatal health knowledge for Indigenous populations (women, families and midwives),” she says.

“I’m working with two birth cohort studies that are led by my supervisor, Sonia Anand: the South Asian Birth Cohort (START) and the Aboriginal Birth Cohort (ABC), to develop tools that will address knowledge gaps in a way that’s equitable, sustainable, useful and wanted or needed. By making information available based on best practices and according to what these cohorts want and need, we hope to find a targeted way to reduce conditions like gestational diabetes.”

She is also working with partners at Six Nations to develop behaviour change communications tools, that might be used by midwives in a birthing centre.
Pictured at the 2019 Chanchlani Research Lecture, from left to right are: Sonia Chanchlani, Jaya Chanchlani, Camara Phyllis-Jones, Tina Chanchlani and Sonia Anand.