

WELCOME TO THE UQ CHILD HEALTH RESEARCH CENTRE

OUR VISION

Is to be internationally recognised as a centre of excellence in child health research that is driven by clinical problems and produces outcomes that directly improve the health of children. We aim to achieve this by working collaboratively and constructively with our partners in the Centre for Children's Health Research building: Queensland University of Technology (QUT) and Children's Health Queensland (CHQ).

OUR MISSION

- To undertake research that addresses important clinical challenges in the area of child health;
- To produce research outcomes that offer the opportunity for immediate translation to improvements in child health;
- To collaborate with QUT and CHQ child health researchers; and
- To contribute to education and training of child health researchers and practitioners.

Launched in 2015, the Child Health Research Centre (CHRC) brings together leading researchers to tackle global challenges in child and adolescent health.

Child Health is a critical area to invest research effort. Evidence is mounting that the environment around conception, during gestation and in their early years may determine a persons health throughout life. Research that aims to understand more about the health of children has the potential to prevent disease and disability before it even occurs.

UQ CHRC is composed of a number of research groups conducting research across the spectrum of health - from child nutrition, maternal health and neonatal health, burns and trauma, respiratory disease, environmental health, social and emotional wellbeing, cerebral palsy and rehabilitation, and more.

Our groups work collaboratively within the centre, across UQ, and alongside other industry, government and research partners to understand the factors that ensure health in chilldhood and to prevent and treat disease and disability.

Our collective vision is the same: to prevent disease and disability before it occurs, thereby giving children the gift of life-long health.



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Over **100 publications** in 2017 by researchers affiliated with CHRC



89 of these publications are **indexed in Web** of Science



75 of these publications are **indexed in Scopus**



In 2017 we welcomed **49 talented students** to our organisation



Our workforce consists **51% Academics** and 49% Professional staff



85% of our workforce are **female**



was supported by over \$537,359 in philanthrophic gifts and pledge payments





RESEARCH WITH IMPACT

Child health is a critical area to invest research effort with evidence mounting that a person's later health is heavily influenced by their health at conception, during gestation and in their early years of life.

Research that aims to understand more about the health of children has the potential to prevent disease and disability before it even occurs.

The UQ Child Health Research Centre draws research inspiration from our close ties with the clinical environment, and by listening to the needs of parents, clinicians, government bodies and industry partners.

UQ research has impact.
We create change
across the world,
every day.

MESSAGE FROM THE DIRECTOR

As I reflect on my first full year at the helm of the Child Health Research Centre, I feel privileged to be among a group of people who face their work with a dedication and drive I've rarely seen in other places. We might be one of the Faculty of Medicine's newest research centres, but our flourishing research program is going from strength to strength and supports more than 150 academic, research and professional staff across a number of research groups broadly incorporating paediatric nutrition, neonatal development and maternal health; burns and trauma; respiratory disease; children's environmental health; infectious diseases; child and youth mental health; cerebral palsy, brain injury and rehabilitation; and more.

I am very proud to report that the past year has been one of impact - packed with funding successes, educational events, PhD graduations and other activities that we're proud to hang our hats on. Outstanding examples include:

- The Queensland Cerebral Palsy Rehabilitation and Research group received \$2.49M over 5 years from the NHMRC to establish the Australasian Cerebral Palsy Clinical Trials Network (AusCP-CTN) Centre for Research Excellence (CRE). The goal of the CRE is to uplift earlier detection of cerebral palsy, fast track children to multi-site randomised clinical trials of new neuro-protectants, and to develop and test new interventions.
- The Developmental programming in Diseases Group were part of a multidisciplinary team who received \$1,368,724 from the Department of Health Drug and Alcohol Program to expand FASD services in Queensland and establishing diagnostic services in remote communities.
- We welcomed the commencement of nine new Research Higher Degree candidates in 2017, and were proud to celebrate the graduation of five PhD candidates
- Staff from the Children's Health and Environment Program worked with the Public Health Foundation of India to organise the 17th International Conference of the Pacific Basin Consortium in Delhi, India. With a theme of Environmental Health and Sustainable Development, the conference was used as a vehicle for the Indian launch of the Lancet Commission on pollution and health, which includes our own Professor Peter Sly as one of the commissioners. The Commission revealed the severity and underreported contribution of pollution on the global burden of disease and urges nations to reduce pollution to save lives and spur economic growth.

2017 was only our third year of operation, and a critical time for the Child Health Research Centre to cement its standing as a force in child health research and to plan for our future. To develop a comprehensive research strategy, the centre engaged an external consultant to review our current operations and to make some recommendations for the way forward. These recommendations urged us to:

- drive coordinated strategy and action among the major players in Queensland Child Health Research - most notably, those with whom we have partnered in the Centre for Children's Health Research facility adjacent to the Lady Cilento Children's Hospital at South Brisbane;
- work with our partners to increase the profile of child health research in Queensland:
- fill the talent pipeline for child health researchers and clinicians in Queensland to build leaders of tomorrow; and
- increase national competitive research funding for child and youth health.

Throughout 2018 and beyond, we look forward to implementing these recommendations and to building a sustainable, high profile centre for child health research that will make a real difference to the lives of children locally and globally.

In closing, I'd like to thank our research and professional staff for the hard work and dedication that led to so many highlights in 2017. I'd also like to say a very special thank you to our funders, collaborators, and last but not least - to all of those families who participated in our research studies. Without you – our research would not have been possible.

We look forward to an even more exciting 2018 and to continuing our mission to bring good health to children everywhere. I hope you enjoy reading about the activities of our research groups and our collective successes in the ensuing pages.

Best wishes. **Professor Karen Moritz** Director Child Health Research Centre





Led by Karen Moritz, Director of the Child Health Research Centre, the flourishing Developmental Programming in Disease research group spans UQ's Child Health Research Centre and School of Biomedical Sciences.

Our group seeks to understand how disturbances during gestation contribute to a fetus' increased risk of developing disease in adulthood. This research area seeks to identify organs and systems that are affected by prenatal insults and improve understanding of how to prevent or mitigate damage from occurring.

We work in the laboratory to develop preclinical models that mimic common prenatal insults, such as stress and alcohol exposure. The offspring's development is then carefully analysed - alongside the metabolic, cardiovascular, renal, reproductive, neurological and behavioural functions of the adult and offspring to understand the effects of these insults. We are particularly interested in how the kidney, placenta, heart, brain and ovaries of the developing fetus are impacted.

Our work also goes beyond the laboratory, and we collaborate on clinical projects with researchers and clinicians at the Lady Cilento Children's Hospital and other hospitals and universities around Queensland and Australia. This collaborative work looks specifically at how the kidneys of babies and placentas of mothers are impacted by insults such as stress and alcohol.

Ultimately, our work aims to inform clinicians so they can help parents have healthier babies less likely to develop disease in later life. This can be achieved by making prospective parents aware of their behaviour and lifestyle choices, and how such choices may impact on a developing baby and their risk of disease in later life.

This kind of information will empower parents to prevent damage from occurring in the first place, and inform the development of interventions that can mitigate damage when an insult does occur.

HIGHLIGHTS

- The Fetal Aclohol Spectrum Disorder (FASD) conference: sharing knowledge with parents, health professionals and educators Thanks to funding from Brisbane Diamantina Health Partners and the National Organisation for Fetal Alcohol Spectrum Disorders, our Developmental Programming in Diseases Group hosted a FASD seminar in September. This seminar was a fantastic opportunity to bring together clinicians, researchers, parents, students and educators to draw attention to the disorder and to hear from experts on issues relating to diagnosis and management.
- Grant success to establish remote diagnostic services for Fetal Alcohol Spectrum Disorder Members of our team were part of a multidisciplinary consortium who were awarded over \$1 million from the Department of Health Drug and Alcohol Program to expand FASD services in Queensland with the establishment of diagnostic services in remote communities.
- **Expertise recognised by plenary engagement** Group director, Professor Karen Moritz was invited to give the plenary talk at the 7th International Conference on Fetal Alcohol Spectrum Disorder Research: Results and Relevance. in Vancouver. Canada in March 2017. Karen addressed the conference on "Long term chronic disease outcomes following prenatal alcohol exposure."
- Post-doctoral career awaits at Oxford We bid farewell to one of our recent PhD graduates, Dr Jacinta Kalisch-Smith who is now a post-doctoral researcher at Oxford University, UK. With her PhD focussed on the effects of alcohol on the placenta and developing fetus, Jacinta is now investigating the molecular mechanisms behind environmental causes of congenital heart defects.



The Queensland Cerebral Palsy and Rehabilitation Research Centre (QCPRRC) was established in 2007 to improve health outcomes for children with cerebral palsy and acquired brain injury. We operate across eight key research themes to address significant areas of need for infants, children, adolescents and adults with Cerebral Palsy, Acquired Brain Injury or Traumatic Brain Injury.

With strong links to the state-wide Queensland Paediatric Rehabilitation Service (QPRS) at Children's Health Queensland, strong funding support from government and philanthropic partners, and enthusiastic involvement in clinical trials from families of children with cerebral palsy, the group is going from strength to strength and is now the biggest research group within the Child Health Research Centre.

HIGHLIGHTS

Inaugural Chair in Paediatric Rehabilitation Paediatric neurologist, Associate Professor Karen Barlow brings a wealth of experience as a paediatric neurologist to take up the position of Chair in Paediatric Rehabilitation. Karen specialises in the neurobiology and treatment of post-concussion syndrome (PCS).

Major program grants advance early detection

and intervention Our team has been grateful to receive significant funding contributions from state and federal government toward two major research programs that will advance early detection of cerebral palsy or implement early intervention clinical trials. The Queensland Government awarded \$1.5M through their Advance Queensland Innovation Partnerships (AQIP) scheme, while the NHMRC awarded a further \$2.49M over 5 years to establish the Australasian Cerebral Palsy Clinical Trials

- **Celebrating NHMRC Project Grant Success** Senior Research Fellow, Dr Leanne Sakzewski was awarded two project grants from the NHMRC to commence in 2018. The Habitile study will test the efficacy of intensive rehabilitation for children with bilateral CP in intensive 2 week camps, assisted by collaborators from Belgium. The Participate CP study is a collaboration with McGill University, Canada, to test the efficacy of a behaviour modification, active leisure program to enhance children's participation in active sports and leisure activities.
- Fellowships for rising research stars Dr Katherine Benfer was awarded a prestigious National Health and Medical Research Council Early Career Fellowship to conduct a randomised trial of the Learning through Everyday activities with Parents Program for Indigenous families with infants at high risk of cerebral palsy. Dr Lee Barber was awarded a Queensland Government Advance Queensland Fellowship for his study "CP muscle-movement toolbox: expand early detection of cerebral palsy."
- Leader of the year Professor Roslyn Boyd was awarded Leader of the Year at the annual UQ Faculty of Medicine awards.

Network Centre for Research Excellence.



The Children's Burns and Trauma Research Group was established in 1999 by burns surgeon. Professor Roy Kimble and is now part of the UQ Child Health Research Centre. Our goal is to prevent children from sustaining traumatic injuries such as burns and to provide the best evidence-base for their treatment.

Our research aims to:

- identify ways to decrease the number of children with burns and traumatic injuries, and to implement these changes;
- provide scientific evidence for existing treatments and develop novel wound healing treatments for better care of children suffering from burns; and
- improve the lives of all children suffering from burns or trauma.

HIGHLIGHTS

Study shows parents' behaviour can help kids cope with pain

PhD student Erin Brown attracted media attention in 2017 for her work in demonstrating that playful distraction can trump kisses and cuddles to reduce a child's anxiety and pain during potentially painful burns dressing changes.

Study finds majority of children with scalds are not given correct first aid

PhD Student Jacquii Burgess conducted a survey of parents and caregivers of children aged 0-36 months who had drink scalds and were treated at the Lady Cilento Children's Hospital.

The survey found that more than two-thirds of toddlers burned in hot drink accidents were not treated with correct first aid. Given that hot drink scalds are the leading cause of childhood burns in Australia, with 74 per cent of these occurring in children aged under two, this information is expected to form the backbone of a future burns prevention campaigns.

PhD student wins coveted award

PhD student Christine Andrews was presented with the Australian Society for Medical Research's Postgraduate Student Researcher Award. Christine's work to improve data used to define standards use for burns and scalds earned her this well-deserved recognition.

Recognition for research prowess Our burns team have been awarded for their research prowess locally and globally in 2017, from PhD research awards at the Children's Health Queensland Research Symposium, through to awards at the Australia New Zealand Burns Association conference in Adelaide and European

Trauma Department at the Lady Cilento Children's Hospital busiest in Australia

Burns Association Congress in Spain.

Research findings from a multi-site study on paediatric trauma care revealed that the trauma department at the Lady Cilento Children's Hospital is the biggest and busiest in Australia. These findings motivated the Day of Difference and Children's Hospital Foundation, to support two new positions: A Clinical Trauma Nurse Family Co-ordinator and a Trauma Social Worker.



The Children's Lung, Environment and Asthma Research (CLEAR) group was established in 2010 under the leadership of Professor Peter Sly who also leads the Children's Health and Environment Program group.

We conduct bench to bedside research that aims to understand the mechanisms underlying chronic childhood lung diseases such as asthma and cystic fibrosis. With research that spans a continuum from basic science, longitudinal cohort studies, clinical trials and translation of findings into clinical practice we work to delay or prevent lung disease, improve its clinical management and halt its progression as children transition to adulthood.

HIGHLIGHTS

Industry funding helps to improve treatment for children with cystic fibrosis

Our team was awarded \$237,735 by Gilead Sciences. Inc. USA for research that aims to understand how abnormalities in the immune responses of respiratory epithelium increase susceptibility for respiratory infections.

Grant helps us examine the underlying causes of lung disease in cystic fibrosis

A study examining Macrophages, the forgotten cells in cystic fibrosis lung disease was awarded \$972,210 by the Cystic Fibrosis Foundation Therapeutics Inc. USA in a bid to understand possible new treatments for children with cystic fibrosis.

Infrastructure funding boosts research precision

> Our team received more than \$135,000 from The University of Queensland's Major Equipment and Infrastructure grants for the purchase of specialist laboratory equipment that will address our needs for high nucleic acid quantification accuracy and precision within our research laboratory. The equipment will be situated at the Centre for Children's Health Research and will benefit other research groups in addition to our own.

Standardising the way we manage discharge for patients with cystic fibrosis Working in partnership with Professor Claire Wainwright, one of the Lady Cilento Children's Hospital's leading clinician-researchers, our team has been funded by the Children's Hospital Foundation to develop objective criteria for discharge when children with cystic

fibrosis are hospitalised for acute pulmonary exacerbation. By standardising discharge criteria, we hope to provide clarity for treating doctors, and peace of mind for families.

Putting immune function under the microscope

Gilead Ptv Ltd have made a substantial investment of almost \$500,000 to allow our team to address how innate immune cell function is impacted by direct acting antivirals and inhibitors in response to airway infections.



Led by Professor Peter Sly, the Children's Health and Environment Program (CHEP) aims to address the impact of environmental exposures on child health through a holistic approach to environmental health research and policy reform. Our research focuses on understanding early life mechanisms of disease and on improving risk assessment for environmental exposures - the process of estimating or measuring the magnitude, frequency and duration of environmental exposures - in children.

To address the devastating impact of pollution on health, the World Health Organisation (WHO) has established a global network of centres for children's environmental health, of which CHEP is one of the designated collaborating centres. In this role we carry out supporting activities for WHO's programs, work with development assistance agencies to implement programs that reduce pollution, and take a leadership role within our region.

HIGHLIGHTS

Second term as a WHO Collaborating Centre for **Children's Health and Environment**

CHEP was re-designated as a WHO Collaborating Centre for Children's Health and Environment commencing in 2017 for another four-year-period. This term will see us collaborate closely with the WHO Western Pacific Region and research taking place in the Pacific Islands.

Representation on the Lancet Commission on **Pollution and Health**

Professor Sly joined representatives from the United Nations Development Program and the World Bank as a Commissioner with the Lancet Global Commission on Pollution and Health - an initiative of The Lancet, the Global Alliance on Health and Pollution and the Icahn School of Medicine at Mount Sinai.

Supporting Environmental Health activities in our region

> Our staff worked with the Public Health Foundation of India to organise the 17th International Conference of the Pacific Basin Consortium in Delhi, India. With a theme of Environmental Health and Sustainable Development, the conference was used as a vehicle for the Indian launch of the Lancet Commission on Pollution and Health.

Contributed to WHO Reports Our team contributed to two WHO reports published in 2017 including the Inheriting a Sustainable World: Atlas on Children's Health and the Environment and Don't pollute my future! The impact of the environment on children's health.

CHILDREN'S NUTRITION RESEARCH CENTRE

ABOUT

Established in 1991, the Children's Nutrition Research Centre is one of Australia's leading paediatric nutrition research groups with a global reputation for research that improves the nutritional health of children and adolescents.

Our research is particularly focused on the influence of nutrition on a child's health during their first one thousand days of life - from preconception through to early childhood. Under this umbrella, we are conducting research in growth and development, infant and toddler nutrition, and gut health.

We also work alongside industry to provide high quality nutrition education and training to Health Care Professionals and educational resources for parents and educators. This enables us to translate our research knowledge into practice, and to support clinicians and families to give children the best nutritional care, optimise the health of sick children, and prevent later disease onset through poor diet.

HIGHLIGHTS

New collaborations to influence policy, health practice and family behaviour

Group leader, Professor Peter Davies was made the inaugural Chair of the Early Life Nutrition Coalition at a launch at Parliament House, Canberra on 4 December. The Coalition is an affiliation of professional, academic, advocacy, corporate and healthcare groups that seeks to promote the importance of early life nutrition as a long term preventative health measure to healthcare professionals, parents and adolescents. The launch attracted national media coverage and the Coalition has been tasked to provide a policy paper to the Federal Minister for Health and Sport, the Hon Greg Hunt, by the end of 2017.

- Supporting health professionals with the facts The centre developed fact sheets for healthcare professionals on the topics of Cow's Milk Protein Allergy, The Benefits of Breastfeeding, Infant Colic, Introducing solids to infants and Reflux. The fact sheets are published on the Child Health Research Centre website at: www.child-healthresearch.centre.uq.edu.au/health-professionals/ nutrition-and-infant-feeding-fact-sheets.
- The Children's Nutrition Research Symposium 03 In October 2017, we hosted our annual Education symposium – a one day event that attracted more than 100 healthcare professionals from across Queensland and interstate. The event focused on the use of pre-and pro-biotics in childhood nutrition in health and disease and communicated the novel research taking place within our centre.
- **Graduating students** Dr Anna Joy Samidurai and Dr Paula Smith-Brown were awarded their PhDs at the end of 2017 for work that aimed to determine the iodine status of Queensland Children and the associations with diet and thyroid function; and the developmental origins of microbiota, body composition and diet in 2-3 year old Australian
- Hard work reaps rewards for star nutrition student

children.

Prior to her graduation in December 2017, PhD candidate Paula Smith-Brown was awarded the Australia/New Zealand Nestle Nutrition Institute Young Investigator Award and the South East Asia Pacific Rim Young Investigator Award for her paper titled: "Mother' secretor status affects development of children's microbiota composition and function: A pilot study". Paula has since graduated and hopes to continue her work exploring the influence of microbiota on body composition in children.



CHILD AND YOUTH MENTAL **HEALTH RESEARCH GROUP**

ABOUT

Led by the newly appointed Chair of Child and Adolescent Psychiatry, Professor Christel Middeldorp, the Child and Youth Mental Health Research Group aims to improve outcomes for families with children and adolescents with psychiatric disorders. The group hopes to achieve this by investigating risk and protective factors for the development and persistence of childhood and adolescent mental health symptoms, and through the development and evaluation of new treatment and prevention programs.

HIGHLIGHTS

New Chair of Child and Adolescent Psychiatry brings together mental health clinicians and researchers

Psychiatrist, Professor Christel Middeldorp, has come from the Netherlands to accept a role as Chair of Child and Adolescent Psychiatry that spans our centre, the Child and Youth Mental Health Service (CYMHS), and Children's Health Queensland Hospital and Health Service (CHQ HHS). Her research interests involve the role of genetic and other familial influences on the development and persistence of psychopathology across the lifespan.

Group leader wins international award Our group's success was highlighted in 2017 when Professor Middeldorp was presented the American Academy of Child and Youth Psychiatry international scholar award.

Study contributes to the discovery of genes associated with Attention Deficit Hyperactivity Disorder (ADHD) Professor Middeldorp is co-chair of EArly Genetics and Lifecourse Epidemiology

(EAGLE) – a large consortium involving researchers from around the globe. In collaboration with other large groups, EAGLE's data underpinned a study which discovered 16 genetic regions associated with childhood ADHD.

CAPICE project trains students in psychiatric genetics

Professor Middeldorp also coordinates the CAPICE Project (Childhood and Adolescence Psychopathology: unravelling the complex etiology by a large Interdisciplinary Collaboration in Europe). Established in February 2017, CAPICE takes PhD students from across Europe and trains them in psychiatric genetics using data from the EAGLE consortium. For more information see: http://www.capice-project.eu/index.php





POLLUTION IMPACT ON GLOBAL BURDEN OF DISEASE UNDERCOUNTED

Diseases caused by pollution were responsible for an estimated nine million premature deaths in 2015, a global report has found.

University of Queensland researcher Professor Peter Sly said the figure represents 16 per cent of all deaths worldwide.

"If you look at this from a public health policy perspective, that's more than AIDS, tuberculosis and malaria combined, and more than 15 times more than all wars and other forms of violence," Professor Sly said.

"Children are at high risk and even low dose exposure in utero and early infancy can result in disease, disability and death in childhood and across the lifespan."

Professor Sly is a Commissioner with the Lancet Global Commission on Pollution and Health, an initiative of The Lancet, the Global Alliance on Health and Pollution and the Icahn School of Medicine at Mount Sinai, which today released its final report.

"The key messages are that pollution has a major impact on health, particularly in low and middle income countries, and it actually costs more to do nothing than to implement proven solutions.

Professor Sly, who is Director of the Children's Health and Environment Program, said pollution is not widely recognised as a health problem in Australia, but there is a body of research which suggests that it is.

"There are peer-reviewed studies which show that exposure to pollutants causes higher levels of respiratory illnesses and impacts foetal growth," he said.

"While we are not Beijing or Delhi, we can still measure and demonstrate health impacts of pollution on the Australian population, and water contamination from firefighting foam is just one recent example."

The Commission, which includes representatives from the United Nations Development Program and the World Bank, has found that reducing pollution presents an incredible opportunity to save lives and grow economies.

"Many of the pollution control strategies have proven cost-effective in high and middle income countries, and are ready to be exported and adapted by cities and countries at every level of income," Professor Sly said.

"The report urges countries to include pollution planning into their planning processes, and asks for support from development assistance agencies to design and implement programs that reduce pollution and save lives."

WOMEN URGED TO GIVE UP ALCOHOL BEFORE CONCEIVING

Women who consume alcohol around the time of conception could be putting their male offspring at greater risk of obesity in later life.

Researchers from The University of Queensland's Child Health Research Centre investigated how alcohol exposure affected the just-fertilised egg, in one of the first studies to look at alcohol in preconception rather than during pregnancy.

Women should give up alcohol before conceiving. Centre director Professor Karen Moritz said PhD student Emily Dorey's research using animal models found that exposure to alcohol around conception made male offspring more likely to seek a high fat diet more often as they aged.

"We found that exposure to alcohol resulted in male offspring having a sustained preference for high-fat food, which indicated the reward pathway in the brain was altered by alcohol exposure around conception," she said.

"Surprisingly we found alcohol exposure at this time had no effect on alcohol preference in offspring of either sex later in life."

Professor Moritz said rats involved in the study consumed the equivalent of four standard drinks each day from four days before mating to four days after mating.

In a related study, Centre researchers found male offspring exposed to alcohol at conception had five per cent more body fat than those whose mothers had not consumed alcohol.

It found males exposed to alcohol were also more likely to have higher abdominal fat mass, which could lead to health problems such as type 2 diabetes, heart disease and some cancers.

Professor Moritz said the study also found both male and female offspring were more likely to suffer from fatty liver when exposed to alcohol at conception.

"Our results highlight that alcohol consumption, even prior to a fertilised egg implanting in the uterus, can have lifelong consequences for the metabolic health of offspring," she said.

The research is published in the Journal of Developmental Origins of Health and Disease and the American Journal of Physiology

Between 1 January 2017 and 1 January 2018 Media coverage for CHRC reached a cumulative audience of 1,341,598 people.





Book Section (1)

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Your contribution, large or small, will help us prevent disease, improve diagnoses and outcomes, and develop better treatments for a broad range of childhood illnesses.

Donor contributions make it possible for us to:

- fund vital research projects;
- purchase much-needed research equipment;
- support talented students through PhD scholarships;
- provide a stable source of early career funding for new PhD graduates; and
- attract accomplished senior researchers to UQ to drive world-class research in our own backyard.

Medical and biomedical research projects within the Faculty have already led to life-changing discoveries with global impact.

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THE CAMPAIGN TO CREATE CHANGE



QUEENSLAND PAEDIATRIC INFECTIOUS DISEASES LABORATORY

The Queensland Paediatric Infectious Diseases Laboratory (QPID) is an independently funded joint Children's Hospital Queensland and University of Queensland benchtop laboratory group with a clinical infectious disease focus.

The group has been working closely with clinicians at the Royal Children's Hospital, and now the Lady Cilento Children's Hospital (LCCH), for over 25 years. QPID has positioned itself to employ cutting edge molecular testing to improve the diagnosis, and therefore early management, of serious infectious diseases in children.

These techniques have also been used to discover and characterise new viruses, to better understand the epidemiology of infectious diseases, and to support ongoing research and clinical trials with key partner organisations.

QUEENSLAND CHILDREN'S TUMOUR BANK (QCTB)

The Queensland Children's Tumour Bank (QCTB) is an openly accessible paediatric tumour tissue bank. The facility aims to support research that will ultimately improve outcomes for children with cancer. The QCTB collects and processes patient samples in a dedicated facility and disseminates specimens to collaborators, the scope of which would be beyond the capabilities of most individual research laboratories.

The facility is located in the Centre for Children's Health Research building, adjacent to the Lady Cilento Children's Hospital. Material is collected from all types of solid tumours, as well as "liquid tumours" such as leukaemia. In addition to traditional ways of storing tissue, such as snap-freezing, the tumour bank also specialises in the long term banking of live tumour cells. There are specimens available (in a range of formats) from more than 980 paediatric patients with a diverse range of cancer types (such as leukaemia, lymphoma and solid tumours from a range of organs).

CHILDREN'S HEALTH QUEENSLAND HOSPITAL AND HEALTH SERVICE

Children's Health Queensland is a specialist statewide hospital and health service dedicated to caring for children and young people from across Queensland and northern New South Wales.

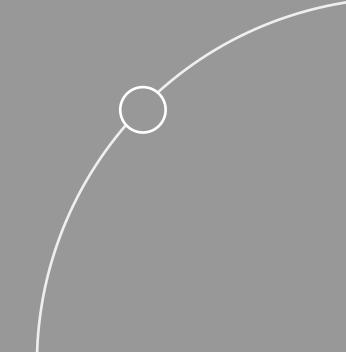
We are committed to collaborating with all of our healthcare partners, most importantly families, to ensure we consistently deliver safe, high-quality patient and family-centred care.

A recognised leader in paediatric healthcare, education and research, Children's Health Queensland delivers a full range of clinical services, tertiary level care and health promotion programs.

CHILDREN'S HOSPITAL FOUNDATION

The Children's Hospital Foundation (CHF) helps sick children by funding life-saving medical research, investing in vital new equipment, and providing comfort, entertainment, support and care for children and their families.

CHRC is thankful for the support from CHF throughout 2017.





RESEARCH INCOME

Research income secured in 2017 by CHRC researchers as primary investigator totalled \$5,889,529

Project Title	Granting Scheme	Total Amount Approved	Investigators
Addressing Needs for High Nucleic Acid Quantification Accuracy and Precision in Child Health Research	UQ Major Equipment and Infrastructure	\$135,333	*SLY, Peter *BIALASIEWICZ, Seweryn & *FANTINO, Emmanuelle
Advancing Cerebral Palsy in Queensland	Queensland Government Advance Queensland Innovation Partnerships	\$2,397,851	*BOYD, Roslyn N; COLDITZ, Paul B; Rose, S.; SMITH, Anthony; Scuffham, P. & Edwards, P.
A randomized, double-blind, placebo-controlled, parallel group study to evaluate the efficacy and safety of dupilumab in children 6 to <12 years of age with uncontrolled persistent asthma	Sanofi-Aventis Australia Pty Ltd	\$182,272	*SLY, Peter D
A study of the viruses that cause gastroenteritis in young children	The Children's Hospital Foundation	\$295,584	*LAMBERT, Stephen
BDHP - Maternal and Child Health Theme	Brisbane Diamantina Health Partners - Metro South	\$66,000	MORITZ, Karen; CLEGHORN, Geoffrey J &LITTLEWOOD, Robyn A
Community-based parent-delivered early detection and intervention for children at high risk of cerebral palsy in a low-resource setting: a randomised control trial	Cerebral Palsy Alliance	\$82,500	*BENFER,Katherine A; *BOYD, Roslyn N; Novak, I.; Khan, N.; Morgan, C. & *WHITTINGHAM, Koa L
CP Muscle-Movement Toolbox: Expand early detection of cerebral palsy	Advance Queensland Research Fellowships	\$438,171	*BARBER, Lee A
Developing objective criteria for discharge following hospitalization for acute pulmonary exacerbation in cystic fibrosis.	The Children's Hospital Foundation	\$87,416	*SLY, Peter D & WAINWRIGHT, Claire E
GUM Lite Follow Up Study	Nutricia Research Foundation	\$50,000	*DAVIES, Peter S W & *HILL, Rebecca J
Harnessing Neuroplasticity to Improve Motor Performance in Infants with Cerebral palsy: a Pragmatic Randomized Controlled Trial (NHMRC Project Grant administered by the University of Sydney)	University of Sydney	\$1	*BOYD, RoslynN; Novak, I.; Morgan, C.; Badawi, N.; Spittle, A.; Dale, R.; Kirby, A.; Hunt, R.; *WHITTINGHAM, Koa L & Pannek, K.
Inflammatory airways disease in children with a focus on cystic fibrosis	The Children's Hospital Foundation	\$440,000	WAINWRIGHT, Claire E
Macrophages: the forgotten cells in CF lung disease	Cystic Fibrosis Foundation Therapeutics Inc	\$972,210	"SLY, PeterD; WAINWRIGHT, Claire E; BELL, Scott C; "FANTINO, Emmanuelle; WARE, Robert S & Bosco, A.
Molecular mechanism of defective anti-inflammatory responses by macrophages in cystic fibrosis (CF)	Australian Cystic Fibrosis Research Trust	\$11,000	*TARIQUE, Abdullah A
QPID Travel Grant	The Children's Hospital Foundation	\$5,500	*TOZER, Sarah
Quantifying the effect of intramuscular botulinum toxin A therapy on calf muscle spasticity, structure and function in children with cerebral palsy	Physiotherapy Research Fellowships	\$45,592	*OBST, Steven J
The association between yogurt as a complementary food for infants and growth, body composition and faecal microbiota development	Yogurt in Nutrition	\$41,465	*SMITH-BROWN, Paula & *DAVIES, Peter S W
The Friends Project: optimising social competency in youth with acquired brain injury and cerebral palsy	Motor Accident Insurance Commission	\$142,412	SAKZEWSKI, Leanne; Hilton, N.; Gilmore, R.; McIntyre, S.;Smithers-Sheedy, H.; Williams, T.;Sarandrea, A.; Davis, E. &Laugeson, E.
The impact of direct acting antivirals and inhibitors of host innate immune cell signalling (macrolide, SYK, PAD4) on innate immune cell function in response to infection of airway epithelial cells.	Gilead Pty Ltd	\$496,223	*SLY, Peter D & *FANTINO, Emmanuelle

Research income secured in 2017 by CHRC researchers as a collaborative investigator totalled \$33,000

Project Title	Granting Scheme	Total Amount Approved	Investigators
Airborne transmission of microorganisms among persons with cystic fibrosis	Queensland Institute of Medical Research	\$33,000	THOMSON, Rachel; Bell, S.; *KIDD, Timothy J; *SLY, Peter D; Morawska, L. & WAINWRIGHT, Claire E

Total value of active grants (excluding those grants awarded in 2017 awards) secured by CHRC researchers as the primary investigator totalled \$17,053,965

Project Title	Granting Scheme	Total Amount Approved	Investigators
NHMRC Training (Postdoctoral) Fellowship: Optimising outcomes for Cerebral Palsy: RCT of a parenting intervention.	NHMRC Training (Postdoctoral) Fel- lowship	\$257,441	WHITTINGHAM, Koa L
Gastroenterology, Food Allergy and Intolerance	Research Donation Generic	\$21,389	*HILL, Rebecca J; Harb, T. & Wilson, K.
Improving the physical and psychological healing of children with burns and trauma	Children's Health Foundation Queensland	\$2,389,750	KIMBLE, Roy M; KENARDY, Justin A; *DE YOUNG, Alexandra C; *TYACK, Zephanie F; Cuttle, L. & *GRIFFIN, Bronwyn R
A randomized controlled trial of effects of early life exposure to general anaesthesia on neurobehavioural outcomes in children with cystic fibrosis (CF)	NHMRC Project Grant	\$572,727	*WAINWRIGHT, Claire E; Davidson, A.; Armstrong, F.; SALVADO, Olivier; Robertson, C.; Byrnes, C. & Cooper, P.
CHF: Professorial Fellowship	Children's Health Foundation Queensland	\$1,249,600	*DAVIES, Peter S W
Clinical and psychosocial changes over late childhood and adolescence and early life determinants of long term clinical outcomes in cystic fibrosis	NHMRC Project Grant	\$1,135,570	*WAINWRIGHT, Claire E; *GRIMWOOD, Keith; *SLY, Peter D; Tiddens, H.; Rogers, G.; Massie, R.; Robertson, C.; Cooper, P.; Byrnes, C. & Vidmar, S.
Longitudinal studies of infant feeding and outcomes in contemporary Australian children	Research Donation Generic	\$151,500	*DAVIES, Peter S W
Prevention of asthma in young children via immunostimulation	NHMRC Project Grant	\$651,059	*SLY, Peter D; Holt, P.; Holt, K.; Strickland, D. & *HANTOS, Zoltan
The A-PHIRST study (Australasian Paediatric Head Injury Rules Study): a prospective observational study comparing existing paediatric minor head injury clinical decision rules	QEMRF Project Grants Scheme	\$327,831	*ACWORTH, Jason P; *PHILLIPS, Natalie T & GILHOTRA, Yuri
The Association between Gut Microbiota Composition and Adiposity in Young Children and their Biological Mothers	Nutricia Australia Pty Limited	\$68,467	*DAVIES, Peter S W
Travel and tropical medicine research	Research Donation Generic	\$11,000	LAU, Colleen L
Antiviral defects of the airway epithelium associated with wheeze and atopy in children	NHMRC Project Grant	\$636,894	*SPANN, Kirsten M; *SLY, Peter D; *FANTINO, Emmanuelle & Collins, P.
A RCT of the impact of the first BoNT-A treatment on muscle structure and function in children with cerebral palsy	Cerebral Palsy Alliance	\$215,014	*BARBER, Lee A; BOYD, Roslyn N; LICHT- WARK, Glen A; Elliott, C. & Graham, K.
Evaluation of the effectiveness of the 13-valent pneumococ- cal conjugate vaccine on pneumococcal serotypes causing pneumonia in children (NHMRC Project Grant administered by UNSW)	University of New South Wales		*LAMBERT, Stephen; Jaffe, A.; Snelling, T.; Gilbert, G. & Wong, M.
International Collaboration to Improve Respiratory Health in Children (INCIRCLE)	European Respiratory Society - Clinical Research Collabo- rations	\$64,935	*SLY, Peter D & *HANTOS, Zoltan
NHMRC Early Career Fellowship (Peter Doherty Biomedical): Efficacy of interventions for equinus gait in children with cerebral palsy	NHMRC Early Career Fellowships	\$309,434	*BARBER, Lee A
PREDICT Outcomes to inform services for children with Cerebral Palsy	NHMRC Partnership Projects	\$774,450	BOYD, Roslyn N; *DAVIES, Peter S W; ZIVIANI, Jenny M; Trost, S.; BARBER, Lee A; WARE, Robert S; Rose, S.; WHITTINGHAM, Koa L; WHITTY, Jenny; BELL, Kristie & BROOKES, Denise S
The effects of soft tissue lengthening on calf muscle mechanics, gait and function in children with cerebral palsy: Implementation of novel muscle mechanics measures into clinical practice	Queensland Health	\$52,742	*BARBER, Lee A
Understanding burn injuries in Aboriginal and Torres Strait Islander children: treatment, access to services and outcomes (NHMRC Project Grant administered by the University of Sydney)	University of Sydney	\$212,630	KIMBLE, Roy M; Ivers, R.; Holland, A.; Clapham, K.; Lo, S.; Daniels, J. & Hendrie, D.
Abnormal lung iron homeostasis in cystic fibrosis (NHMRC Project Grant administered by QIMR)	Queensland Institute of Medical Research		WAINWRIGHT, Claire E; Reid, D.; ANDERSON, Gregory J; Lamont, I.; BELL, Scott C & Frazer, D.
Immune recognition of upper airway microbiota in early life as a determinant of respiratory health in children	NHMRC Project Grant	\$1,088,362	*SLY, Peter D; LAMBERT, Stephen M; Hales, B.; *FANTINO, Emmanuelle; KAPPLER, Ulrike; Holt, P.; Grimwood, K. & SLOOTS, Theodorus P
Improving translation of intensity and quality of upper limb rehabilitation provided by occupational therapists to children with unilateral cerebral palsy: A cluster randomised controlled trial	NHMRC Early Career Fellowships	\$220,252	*SAKZEWSKI, Leanne

Parenting Acceptance and Commitment Therapy 'PACT': innovative, web-based support for families of children with Cerebral Palsy	Cerebral Palsy Alliance	\$165,000	WHITTINGHAM, Koa L; BOYD, Roslyn N & SHEFFIELD, Jeanie K
Prevention of paediatric hot beverage scalds	Wound Management Innovation CRC	\$50,416	KIMBLE, Roy M & *WATT, Kerrianne
Prospective randomised trial investigating the use of stratamed and strataderm in children following burn injury	Stratpharma Swit- zerland	\$140,000	KIMBLE, Roy M & *STOCKTON, Kellie A
REACH: Randomised trial of EArly Rehabilitation in Congenital Hemiplegia	NHMRC Project Grant	\$939,039	*BOYD, Roslyn N; ZIVIANI, Jenny M; SAKZE- WSKI, Leanne; Novak, I.; Badawi, N.; PANNEI Kerstin; Elliott, C.; Greaves, S.; Guzzetta, A. & WHITTINGHAM, Koa L
The effect of asthma control during pregnancy on markers of airways inflammation and lung function in the offspring (NHMRC Project Grant administered by The University of Newcastle)	University of New- castle	\$298,016	*SLY, Peter D; Mattes, J.; Murphy, V.; Collison A. & Robinson, P.
Accelerating early detection of Cerebral Palsy and fast tracking to Early Intervention	Queensland Health	\$109,108	*BOYD, Roslyn N
Australian Cerebral Palsy Clinical Trials Network (Aus- CP-CTN): optimising interventions and effective services for children with cerebral palsy	NHMRC Centres of Research Excellence	\$2,624,287	BOYD, Roslyn N; Novak, I.; Wallace, E.; Bada wi, N.; Fahey, M.; Rose, S.; COLDITZ, Paul B; ZIVIANI, Jenny M; Elliott, C. & Stott, N.
Children's Health and Environment Program	The Children's Hospital Foundation	\$165,000	*SLY, Peter D
Early life exposures and chronic disease: mechanisms and preventative strategies	NHMRC Research Fellowship	\$851,980	*SLY, Peter D
Identifying red flags for feeding difficulties and nutritional status in children and young people with cerebral palsy.	Nutricia Research Foundation	\$210,977	*BELL, Kristie; *BENFER, Katherine A; *DA- VIES, Peter S W & *BOYD, Roslyn N
Impact of Streptococcus pneumoniae on innate immune response to respiratory viral infections	UQ Fellowships	\$201,769	HENNINGHAM, Anna; KAPPLER, Ulrike & *SLY, Peter D
Linking childhood asthma and obesity through macrophages	RL Cooper Medical Research Foundation Limited	\$24,725	*FANTINO, Emmanuelle; *HILL, Rebecca J; *DAVIES, Peter S W & TARIQUE, Abdullah A
Molecular microbiology and epidemiology of respiratory infections in children	The Children's Hospital Foundation	\$165,000	*BIALASIEWICZ, Seweryn & *TOZER, Sarah
Neurorestorative Rehabilitation in Cerebral Palsy	NHMRC Research Fellowship	\$687,975	*BOYD, Roslyn N
Preparing Parents for paediatric Medical Procedures	Brisbane Diamantina Health Partners - Queensland Universi- ty of Technology	\$9,626	KIMBLE, Roy M; BROWN, Erin A; KENARDY, Justin A; *GRIFFIN, Bronwyn R; *DE YOUNG, Alexandra C & *WHITTINGHAM, Koa L
Developmental programming: mechanisms and interventions	NHMRC Research Fellowship	\$675,810	MORITZ, Karen M

Total value of active grants (excluding those grants awarded in 2017 awards) secured by CHRC researchers as a collaborative investigator totalled \$2,016,053

Project Title	Granting Scheme	Total Amount Approved	Investigators
Microbiota of the human sinuses: Its role in health and disease	Garnett Passe/Rodney Williams Memorial Foundation	\$375,000	CERVIN, Anders & *BIALASIEWICZ, Seweryn
Investigation of the role of oxidative stress in pulmonary disease in ataxia-telangiectasia	The A-T Children's Project	\$77,234	LAVIN, Martin F; YEO, Abrey J; *SLY, Peter D; KRAUSE, Lutz & SINCLAIR, Kate
Protecting growth restricted newborn brains by reducing inflammation	Royal Brisbane and Women's Hospital Foundation	\$44,000	COLDITZ, Paul B; WIXEY, Julie A; *SULLIVAN, Susan M & LAI, Melissa M
Mothers' and their Children's Health study: understanding disparities in health and health service utilisation among Australian families	NHMRC Project Grant	\$669,042	MISHRA, Gita D; "DAVIES, Peter S W; DOB- SON, Annette J; SLAUGHTER, Virginia; Loxton, D.; Hesketh, K.; TOOTH, Leigh R & Koupil, I.
Protection against Herpesvirus super-infection	NHMRC Project Grant	\$589,492	STEVENSON, Philip & *DAVIS-POYNTER, Nicholas J
Evaluation of a new paediatric multidisciplinary weight management service	UQ Collaboration and Industry Engagement Fund - FirstLink	\$15,000	WALKER, Jacqueline L; CAPRA, Sandra M & *DAVIES, Peter S W
Expansion, evaluation and sustainability of a new paediatric multidisciplinary weight management service	Children's Health Queensland Hospital and Health Service	\$23,550	WALKER, Jacqueline L; Littlewood, R.; CAPRA, Sandra M; *DAVIES, Peter S W & KYNASTON, Jennifer A
Biomonitoring early life exposure to plastic products in Australia and assessing health consequences (NHMRC Partnership Project administered by Murdoch Childrens Research Institute)	Murdoch Childrens Research Institute	\$142,690	MUELLER, Jochen; Ponsonby, A.; *SLY, Peter D; Vuillermin, P.; Symeonides, C. & Carlin, J.
Determining operating parameters for removing or inactivating helminths during wastewater treatment	CSIRO	\$80,046	BOND, Philip L; TOZE, Simon; SIDHU, Jatinder & *JAGALS, Paul



SEARCHING FOR TREATMENTS FOR CHILDHOOD'S 'SILENT INJURIES'

Concussions sustained in high-profile contact sports have raised awareness of the major health issues surrounding adult brain injuries.

There has been significantly less public discussion about how such injuries impact the developing brain.

A fall in the playground or a knock playing sport are common causes of concussion for children and adolescents.

There are usually no outward signs of injury, and most kids recover guickly and are back to normal within a month

However, for up to a quarter of such injuries, recovery is much slower and symptoms linger.

This 'post-concussion syndrome' can result in serious headaches, impaired concentration and changes to mood and sleep patterns, which can impact schooling and other aspects of life.

Paediatric neurologist Associate Professor Karen Barlow started out researching severe traumatic brain injuries.

"Much to my surprise, 90 per cent of referrals to the program were children with post-concussion syndrome," she says.

"They eventually recover, but it can take a very long time. This sparked my passion for investigating better treatments for post-concussion syndrome."

Associate Professor Barlow has moved to Brisbane from Canada to take up a joint clinical and research appointment.

Her time is shared between treating traumatic brain injuries at Lady Cilento Children's Hospital, and pioneering research to improve the care and outcomes for these patients.

She looks forward to working with Queensland's paediatric brain injury rehabilitation program and establishing links throughout Australia and overseas.

As Associate Professor Barlow explains, for young people with post-concussion syndrome, there are currently few evidence-based treatments.

"We have moved on from the old 'rest in a dark room' approach, and understand that a healthy diet, regular sleep and a return to exercise need to be part of the recovery process."

"There is a lot we can do without drugs, but some children will need medication."

The paediatric neurologist is analysing results from a small clinical trial into the use of melatonin for post-concussion syndrome.

"Melatonin is a hormone produced in the brain with analgesic and neuroprotective properties," she explains.

"It also has a good safety profile, which makes it a good candidate for use in young people."

Raising awareness of the syndrome is another priority.

Her team at the University of Calgary developed a website and electronic tools to guide parents and teachers through the recovery process.

"We wanted to provide a clearer pathway for managing these children, who have no outward signs of injury, but can be really struggling and not feeling themselves."

It is hoped a modified version will be piloted in Brisbane.

This story is featured in the Summer 2017 edition of UQMedicine Magazine.





CHRISTINE ANDREWS - A CAREER CHANGE WITH A DIFFERENCE

After 15 years as a veterinarian, Christine was ready for a new challenge - so she undertook a PhD in paediatric burns.

The 2017 Australian Society for Medical Research's Queensland award winner was looking to diversify her career options and use her science background to conduct worthwhile research.

Now, research by this mum-of-two is guiding future scald prevention strategies and she hasn't even graduated yet.

"I was particularly drawn to child health research after having my own children.

"Around our homes, there are so many opportunities for young children to get their hands on hot water, and unfortunately for some, they can be badly burned.

"What my work is about, is really trying to prevent burn injuries rather than necessarily the treatment side of things.

"The scald injury prediction data, which comes from the 1940s, is actually inaccurate and needs re-evaluating. "So that's really where my role is coming in.

"It's kind of a bit cheeky because you get to do something for yourself that's really interesting and you get to explore that side of things.

"But the benefit is that you then actually, hopefully, through your work, get to make some positive changes.



"I've really enjoyed my time doing research. I think perhaps because I've come to it at a more mature age, so I have already had another career and I have worked in another field.

"It still feels like a real privilege to come and do research and actually just have time to really delve deeply into one particular topic."

Christine Andrews is one of seven early career researchers profiled for UQ's 2017 Research Week. To meet the other researchers and learn more about higher degrees at UQ, visit the Research Week page: medicine.uq.edu.au/maynestream/research-week







In April 2017, I visited Stockholm, Sweden supported by a CHRC RHD Student Travel Fellowship and Faculty of Medicine RHD Travel Scholarship.

I joined fifteen others from around the world to attend the initial training course for a new measure of hand function for children with cerebral palsy, called the Both Hands Assessment (BoHA).

The BoHA is a key measure in my PhD study which examines the development of self-care and hand function in children with cerebral palsy.

The BoHA workshop was conducted over 2 ½ days. The certification process following the workshop involves scoring cases, videoing yourself administering the assessment, writing a reflection, and receiving feedback on these components.

Attending the training promoted opportunities for future collaboration with the researchers from the Karolinska Institute, Sweden,

The visit also promoted the translation of this new tool into practice, as plans are being made for the researchers from the Karolinska Institute to visit Brisbane in 2018 to provide training for clinicians to use the BoHA in clinical practice.

As a recipient of the 2017 Child Health Research Centre travel fellowship I was supported to travel to Budapest, Hungary to spend three weeks with two members of my PhD supervisory team.

In doing so, I was afforded dedicated time with my supervisors to undertake crucial discussions and work on my PhD project and thesis.

This dedicated time provided direct and daily access to my supervisory team and the biomedical engineering team from the University of Szeged with whom I have been collaborating with during my PhD studies.

This time together facilitated the drafting of a manuscript and the successful submission of my thesis in December 2017.

In addition to working with my supervisory team in Budapest, the funding provided from the CHRC allowed me to attend the European Respiratory Society International Congress in Milan.

Presenting my PhD findings at the largest meeting of respiratory professionals was a fantastic opportunity to gain valuable feedback from world leading experts in the field of paediatric respiratory medicine.

This valuable experience and feedback was translated into my PhD outcomes and thesis.



2017 RHD STUDENT TRAVEL **FELLOWSHIP RECIPIENTS**



Ly Luong, PhD Candidate

The CHRC fellowship allowed me to attend a workshop and training course in December 2017 in Ho Chi Minh city, Vietnam.

We did have a very successful workshop on Climate change, air pollution, and Health in Vietnam with participation of experts from Vietnam, Australia and Japan Universities.

I presented a part of my PhD research "Evaluating the effects of atmospheric environment on Children's health in Hanoi, Vietnam" which received valuable feedback from participants.

In addition, the fellowship supported me to attend three related training courses:

Modeling air pollution to evaluate its impact on human health:

Estimating ground level PM2.5 and other air pollutants using satellite remote sensing to assess the impact of air pollution on hospitalisation in a multi-provinces study; and

Using climate model to assess risk of hospitalisation and mortality relation to temperature, flood and drought.

These courses provided me some new tools for further studies of environmental health, especially for Vietnam where we lack the air monitoring data and we need to learn to extract data from other sources like modelling and satellite.





