

GLOBAL ALLIANCE FOR CHRONIC DISEASES

FROM EVIDENCE TO ACTION

**GACD
HYPERTENSION
PROGRAMME
REPORT**

Foreword

As the pace of global health challenges accelerates, so too must our ability to respond. These challenges include an aging global population, a geographic shift from rural to urban areas, the viral spread of commercial determinants of health, and a transition to a faster-paced life requiring greater convenience. One significant result is the merging of health burden's with resource-constrained countries catching up to wealthy countries on noncommunicable diseases (NCDs) such as cardiovascular disease, diabetes, chronic lung disease, and mental health. Now, as NCDs are the leading causes of morbidity and mortality around the world, they require the collective efforts of the global health community.

Hypertension - or raised blood pressure - is the leading risk factor for premature heart attacks and stroke, which translated into over 17 million deaths in 2015 worldwide. As the second leading cause of global disability, hypertension already affects over one billion people and is likely to reach over 1.5 billion people by 2025, if nothing is done to curb its incidence. Alongside these challenges, there are opportunities as the pace of innovation is also increasing. New models of collaboration and the burgeoning field of implementation science are also evolving to speed up the development of the most promising solutions in a race to tackle the world's leading cause of death.

Since 2011, with the United Nations Political Declaration on the prevention and control of noncommunicable diseases, the global health community has been building a unified response to NCDs. Then, the World Health Organisation developed its NCD Global Action Plan 2013-2020, of which a key goal is a substantial reduction in the number of people with hypertension. Global health research funders have also come together to address NCDs through the creation of the Global Alliance for Chronic Diseases (GACD) by using implementation research to find solutions for NCDs in low and middle-income countries and vulnerable communities within high-income countries. And, in line with the NCD Global Action Plan, GACD focused its first research call on hypertension, resulting in 15 funded projects in 17 countries around the world.

Today, this report will share the key results of the GACD Hypertension Programme, the lessons learned from its unique model of funding collaboration, and its overall efforts to build the next generation of implementation scientists with a focus on NCDs worldwide.

The World Health Organisation and the global health community welcomes this report as the first of many to come from the implementation science studies being conducted within the GACD Research Network. And in the process, we can accelerate the coordinated, evidence-based response to NCDs worldwide.

On a personal note, as the former Director of the Indian Medical Research Council and board member of the GACD, I am particularly pleased that this truly global initiative is starting to generate results that will be vital to the global response to NCDs.



Dr Soumya Swaminathan
Deputy Director-General
World Health Organization

Report authors:

Jordan Jarvis
Komal Bhatia
Gary Parker

Contributing authors:

GACD Secretariat and Funding Agencies
GACD Hypertension investigators

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Karim Berkouk	Pablo Perel
Catherine Law	Devarsetty Praveen
Jaime Miranda	Antonio Ribeiro
Rachel Nugent	Rajesh Vedanthan
Brian Oldenburg	GACD Joint Publications Committee
Mayowa Owolabi	UCL Health Creatives

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Executive Summary

The Global Alliance for Chronic Diseases (GACD) is a collection of the world's largest public research funders. The inaugural joint research programme of the GACD (Hypertension) was launched in 2012 with an investment of US\$23 million into 15 implementation science projects. The aim of the programme is to generate the scientific evidence to inform the implementation and scale-up of policies and programmes at local, national and regional levels to reduce the prevalence of CVD as a result of high blood pressure (BP).

This report outlines the findings from the GACD Hypertension Programme and the experiences of the first joint initiative to fund implementation science research on NCDs in low- and middle-income countries (LMICs) and vulnerable populations in high-income countries (HICs). The report discusses the scientific contribution of the GACD Hypertension Programme, highlights the capacity-building outcomes of this model, and addresses the broader benefit of the Programme to national health policies and the global NCD response.

Key study findings

Here, we feature the most important findings from the GACD projects in four key areas of NCD prevention and control (see the Project Map, p.10-13 for more detail on each project):

- Diagnosis & management
- Pharmacological prevention and management
- Health systems
- Prevention

Key findings of GACD Hypertension Programme

Diagnosis and Management of Hypertension	In Argentina, a community health worker -led multicomponent intervention significantly reduced systolic BP by 6.6 mm Hg and diastolic BP by 5.4 mm Hg compared with usual care over 18 months in patients with hypertension.
Health Systems	In Ghana, the addition of a nurse-led intervention for hypertension control led to a greater reduction in systolic BP than health insurance coverage alone, with a difference in reduction of 3.6mm Hg (p=0.021) at 12 months. In rural South Africa, strengthening community-based outreach services for management of hypertension did not reduce population levels of uncontrolled hypertension, but lay workers improved clinic functioning and overall attendance.
Pharmacological Prevention and Management	In Sri Lanka, treatment with a fixed-dose combination pill containing 3 antihypertensive drugs led to a significant increase in the proportion of patients achieving their target BP goal (70%) compared to usual care (55%) at 6 months.
Prevention	In China a school-based education programme was effective in not only lowering salt intake among children and their parents, but lowering their parents systolic BP by 2.3 mm Hg. In India, mean salt consumption exceeds the WHO recommendation of 5g/day. Population salt consumption practices offer an opportunity for a government-led national salt education intervention .

For GACD Funding Agencies:

Chapter 1 provides funding agencies a summary of the vital contribution of the Alliances, through the Hypertension Programme's 15 studies, focusing on how the Programme has laid the groundwork for future programmes to continue advancing implementation science for NCD research in LMICs.

From the Research Network, outputs from GACD projects were published in high impact journals, and 52% were in journals with above average influence in their field. In addition to project specific publications, researchers within the GACD Research Network formed a number of Working Groups that collaboratively developed outputs that cut across the various geographies, disciplines and contexts. Topics addressed include gaps in hypertension guidelines in LMICs compared to HICs, developing consensus measures for global research programmes and behaviour change strategies for reducing blood-pressure-related disease burden.

GACD Member Agencies benefit from new partnerships, joint funding opportunities and collaboration with other funding agencies, and greater visibility for their initiatives. Three distinct advantages of the GACD model according to Member Agencies include:

- Unique focus on implementation research and NCDs
- Flexible funding model taking into account each agency's requirements
- Commitment to linking research communities across LMICs and HICs.

GACD researchers also had several opportunities to develop their capacity in implementation science techniques. Over 300 researchers have been trained through GACD Implementation Science Workshops, with 70% of participants from LMICs.

For Researchers:

Chapter 2 details the GACD study findings which will add to the evidence base for the implementation and scale-up of policies and programmes to reduce of CVD as a consequence of high blood pressure. These results are summarised in the main report, in addition to this scientific output:

- The GACD Research Network is a platform for shared learning between research teams, engagement with funders, and collaboration during and beyond the Hypertension Programme.
- The GACD Working Groups enable researchers at various stages in their careers to jointly address important cross-cutting questions, themes and shared interests related to advancing NCD implementation research across diverse fields of interest.
- Early Career Researchers gained significant knowledge and skills in implementation science and NCD research, with opportunities for career development and progression through training and professional development within the GACD Network.

For Policymakers and Implementers:

Chapter 3 provides results produced by the Hypertension Programme to inform the implementation of policies to reduce the prevalence of CVD as a consequence of high blood pressure. Interventions that address salt reduction and multicomponent care, task-shifting showed effectiveness in reducing blood pressure across a variety of contexts:

- Salt-reduction interventions demonstrated the potential to achieve the WHO's target of 30% reduction in salt intake by 2025 in China, and contributed to the development of government proposals to tax salty processed foods in Samoa, among other findings
- Task-shifting interventions resulted in reduction in participant blood pressure - demonstrating opportunities for increasing access to care, freeing up physician time, improving system efficiency, and bringing new stakeholders together

Evidence produced by the hypertension studies have and can further be used to inform decision-making by governments looking to prioritize NCD interventions that best suit their needs and context. Implementation science offers critical value in examining whether public health policies and programmes are suited to the context and needs of the local population, enabling a crucial understanding of why interventions work or do not work in diverse contexts, as well as maximizing value for financial investments in health.

Partnerships and engagement between researchers and policymakers can facilitate the production of actionable evidence to support NCD prevention and control. Collaborations and engagement between governments and researchers have largely been successful through the GACD HT Programme, with mutually beneficial processes and outcomes between these reported across countries such as Fiji, Peru, India, Nigeria and Kenya, to name a few.

We describe how the GACD has made contributions toward closing the 'evidence to implementation' gap within a short time frame through direct engagements between researchers and policymakers, beginning at the early-career researcher stage.

For International Organisations:

In Chapter 4, we describe the outputs and outcomes of the broader GACD Network and how they have made valuable contributions to the 2025 global NCD targets and Sustainable Development Goal 3 for health. By providing new evidence they have bolstered health systems and preventive action, strengthened research capacity and knowledge sharing on NCD research.

The GACD has contributed to breaking down disease-focused research silos by providing opportunities for shared learning and collaboration between researchers from different disciplines and projects within the GACD Network, as well as through engagement with funders and policymakers.

In addition to the investments made in NCD research and in the GACD more broadly, the GACD Research Network serves as a valuable international pool

of diverse knowledge and expertise on achieving effective scale-up of interventions through implementation science research, research capacity building and evidence to inform policy and practice. This is evidenced by GACD Researcher contributions to local, national and global policy processes and tools, such as the WHO HEARTS Technical Package and WHO Implementation Research Guide.

Conclusion:

The results from the Hypertension Programme will inform the implementation of policies to reduce the prevalence of CVD as a consequence of high blood pressure. Not only are the findings of the studies promising, but they provide guidance on what works for whom, under what conditions and address issues of scalability in an equitable way.

Going forward, the GACD recognises the importance of people-centred research and interventions and the trend towards cross-cutting funding calls to move away from disease-specific models. The GACD Researchers Statement on Multimorbidity due for publication in Lancet Global Health on 9 November 2018 is a testament to this commitment. As a unique and dedicated contributor to realizing the Sustainable Development Goals toward better human health and well-being worldwide, the GACD looks forward to increasing engagement with diverse stakeholders with shared goals.

We have tailored each chapter to the relevant target audience and as a result, some sections of the report will be repetitive. Please find the chapter most suitable to your work.

Introduction

The GACD is an initiative that funds joint programmes into chronic diseases – which to date has included hypertension, diabetes, lung diseases and mental health.

Over US\$23 million was invested in the Hypertension Programme in 2012. Since then, the GACD has grown from 4 to 14 national and international funding agencies, representing more than 85 percent of all public research funding in the world. Together they promote implementation research for NCD prevention and control with interventions that are effective and scalable. In part due to the early successes in collaborating through the Hypertension Programme, the GACD has collectively committed well over US\$175 million to NCD implementation research.

Hypertension: a major global public health issue

Cardiovascular disease, including ischemic heart disease, heart failure, and stroke, is the number one cause of death worldwide, with 17.5 million lives lost every year.¹ Elevated blood pressure, is the top preventable risk factor leading to suffering and death from these conditions. Although hypertension claims more than 10 million lives every year - more than any other condition, or all infectious diseases combined - it can be controlled.²

While we have seen a decrease in hypertension across many high-income countries, the presence of raised blood pressure and subsequent disability and death from cardiovascular complications rose significantly between 1990 and 2015 worldwide.¹ Most of the increase was seen in low and middle-income countries (LMICs), where rates of hypertension continue to rise.³ Reasons for this increase include a range of factors, such as population and economic growth, ageing, and the inadequate prevention, diagnosis and control of hypertension.^{2,3} Inequity within countries is furthermore a concern, whereby vulnerable populations, such as aboriginal people in high-income countries, are often more likely to have hypertension and develop heart disease.³

Many studies have shown that hypertension is preventable, with its drivers being poor dietary habits and high salt intake, obesity, excessive alcohol consumption, and physical inactivity.⁴ Differences in prevalence across countries reflect context-specific factors already mentioned, but also; genetic, gender and sociodemographic determinants; as well as structural, policy, environmental and other systems level determinants.⁴

Analysis of global prevalence rates indicate that over a quarter of the world's population had hypertension in 2000, which show no signs of decreasing and will reach almost 30% by 2025.² Despite accessible, low-cost treatment, large studies show that this treatment only works for 1/3 of patients.³ Implementation research will bridge the clear gap between evidence on what works and the successful implementation of effective programmes.

Implementation science

We know that evidence-based practices can take many years to be implemented at scale, with an estimated average of 17 years for 14% of research findings to be translated into practice.⁵ Implementation research offers the chance to understand the causes of and approaches to reduce hypertension, and other conditions, as they occur in the real complex environments and communities that we live in. It can be defined as the “scientific study of the processes used to implement policies and interventions and the contextual factors that affect these processes.”⁶

Implementation science research seeks to improve health care by speeding up the use of research findings in policy and practice through identifying and overcoming implementation barriers in a particular context. This type of research is still quite new to population-based health programmes, and the GACD is playing a leading role in shaping and defining the methods and terminologies of this field.



Where it (usually) might take 15 years to generate new knowledge, now we can do it in 3 years due to collaborative nature of the programme. Yes, you have to work with others and there may be administrative hurdles, but collective generation of new knowledge is far better than doing it in isolation



Jaime Miranda,
GACD researcher

Box 1. Questions asked by implementation research include:

- Which policy or intervention is best for a new context?
- What is the best way to implement it?
- How can the target population be reached?
- What factors might affect implementation and adoption?
- How can the costs of implementation be minimized?
- How can uptake and health outcomes be improved?

Source: A guide to implementation research in NCDs, WHO, 2016

Box 2. Programme Objectives

- To develop a better understanding of key barriers at local, national and international levels that affect hypertension control and to consider how these implementation challenges can be overcome
- To understand how innovations for hypertension control can be introduced and scaled-up across a range of settings
- To identify what elements of systems most need to be strengthened to prevent hypertension and its consequences (e.g. stroke)
- To improve hypertension control rates while reducing disparities in hypertension control across population sub-groups



Each funded team must demonstrate how their research focuses specifically on the study of interventions that work; and work for whom; under what circumstances; and whether the interventions are affordable and adaptable. In addition, our implementation science focus also means that we are looking at what interventions are scalable in a sustainable and equitable way



Alain Beaudet, Past President of the Canadian Institutes for Health Research, May 2016



A unique contribution in the context of the shared global NCD agenda

With the 2011 United Nations Political Declaration on the Prevention and Control of Non-communicable Diseases (NCDs) and the incorporation of NCDs into the Sustainable Development Agenda, the world has committed to reducing the preventable burden of these conditions by 25% by 2025, or one third by 2030.

Along with the WHO Global Action Plan on NCDs 2013-2018⁸, there has been a groundswell of international guides, reports and documents to support countries in their efforts to achieve this ambitious goal, along with the voluntary targets to be adapted based on country contexts. For cardiovascular disease and hypertension, these include, but are not limited to:

- WHO Global Brief on Hypertension⁹
- WHO HEARTS Package²
- WHO Package of Essential Interventions for Primary Care¹⁰
- WHO SHAKE Technical Package for Salt Reduction¹¹
- The Lancet Commission on Hypertension Report⁴

The Lancet Taskforce on NCDs and Economics has highlighted that investment in cardiovascular disease prevention and treatment is critical to achieve two important Sustainable Development Goals targets, namely 3.4 on NCDs and 3.8 to achieve universal health coverage (UHC). Furthermore, the most recent WHO five-year strategic plan outlines six priority actions, which include the reduction of cardiovascular diseases, country support to implement the WHO best buys and good buys for NCDs, and to support national efforts to integrate actions to address NCDs and promote mental health into UHC and emergency and humanitarian responses.

Why this report?

This report outlines the findings from the GACD Hypertension Programme and explores both the experiences of the first joint initiative to fund implementation science research on NCDs with a focus on low- and middle-income countries and vulnerable populations in high-income countries.

This report was written in order to take stock of what GACD has accomplished to date through the Hypertension Programme, how the science and policy world has been informed by the GACD and its funded research, and the potential to improve the quality of life for those at risk of and suffering from hypertension. This is the first report of its kind to be developed by the GACD, since it was established in 2009, as the growing burden of NCDs began to ascend in the global health discourse. During its inaugural scientific summit in New Delhi that year, the GACD agreed to three initial priority research areas, starting with hypertension. We envision that this report, issued with the end of each research programme, will become the signature output of the GACD to share its results and reflect on its collaboration. This, in addition to the Annual Report, will enable all GACD stakeholders to better communicate about the work of the GACD and in the process reach a broader audience.

By providing reflections on this unique funding model, our experiences and the research findings, it is hoped that the learnings undergone by the member agencies of the GACD will inspire similar funding initiatives and provide a template for other global health stakeholders to join together in the NCD response worldwide.

Methods

This report used various data collection methods, including focus group discussions with researchers; key informant interviews; questionnaires to survey study principal investigators, early-career researchers, GACD Member Agency representatives, and members of the Board and Management Committee (past and present); a bibliometric analysis on scientific articles published by hypertension study teams; and literature and document review. In order to provide a holistic reflection on the evolution of the GACD over time, we sought input from the agencies who were involved in funding the Hypertension Programme, as well as GACD Member Agencies that joined after this first funding round. Further details on methods can be found on the GACD website.

How to use the report

It is well documented that the investment in NCDs is a small fraction of overall investments in global health, and even smaller when compared to the scale of the problem, lagging far behind other global disease areas.¹² Given this gap, we hope that the experiences and learnings from the first research programme of the GACD, will be of interest not only to the scientific community, but to a broad range of global health stakeholders seeking to accelerate action on NCDs.

The report chapters are catered to diverse audiences, whereby the experiences and findings from the Hypertension Programme are presented in a way that would best address the needs and interests of each audience:

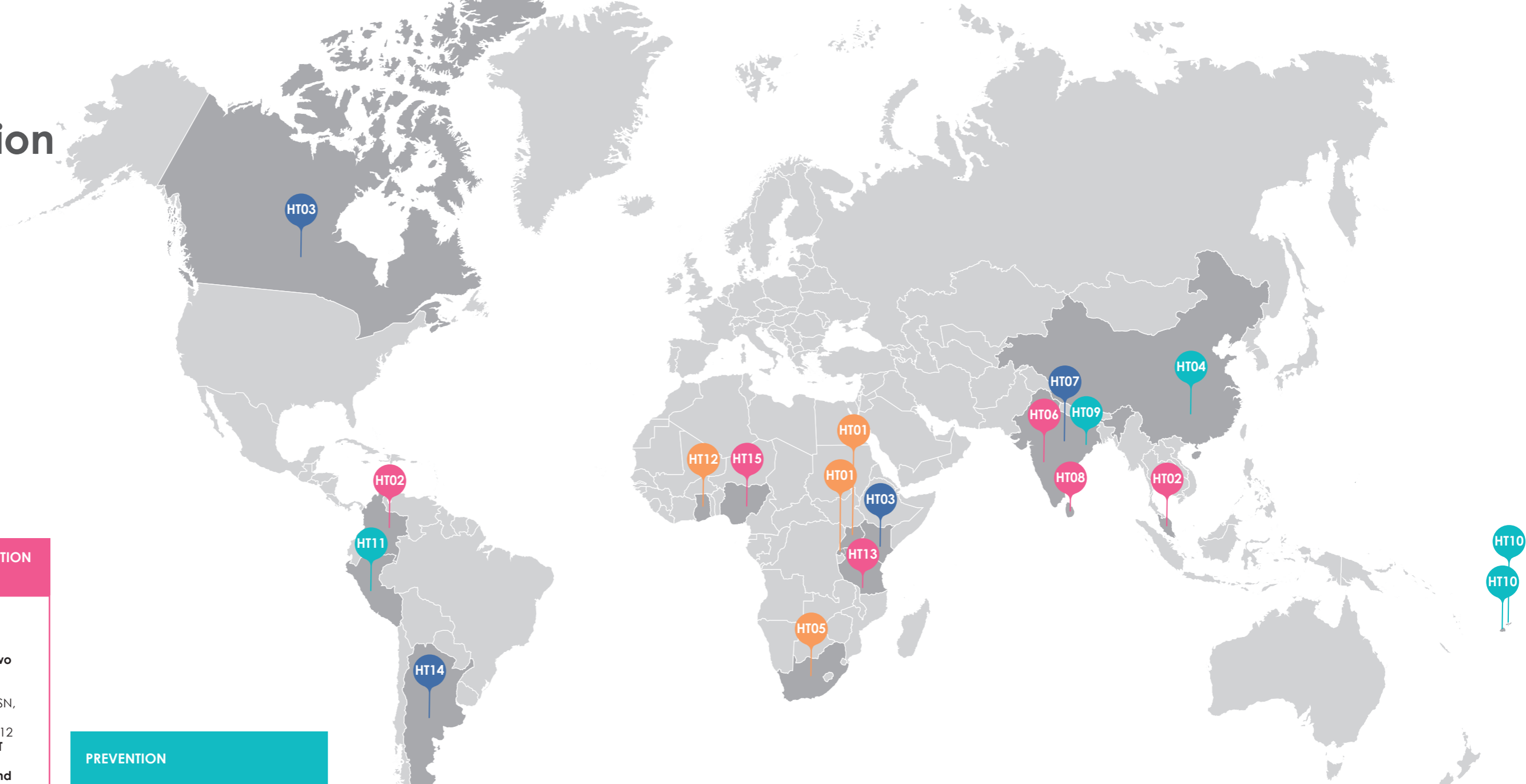
- Chapter 1 (Funding Agencies) discusses the scientific contribution made by the GACD Hypertension Programme as well as the experiences of GACD funders and researchers
- Chapter 2 (Researchers) highlights the Programme's role in building research capacity in LMICs and facilitating research collaboration with the GACD Research Network
- Chapter 3 (Policymakers and Programme Implementers) showcases the research findings and contributions of the GACD researchers to policy at local, global and national levels.
- Chapter 4 (International Organizations & Agencies) discusses the links between the GACD's work and the global NCD agenda

Within each chapter, you will also be directed to contents in other chapters, so as to gain a better understanding of the programme and the work that has been done. A summary of all 15 studies can be found on p.12.

We have tailored each chapter to the relevant target audience and as a result, some sections of the report will be repetitive. Please find the chapter most suitable to your work.



GACD Hypertension Project Map



PHARMACOLOGICAL PREVENTION AND MANAGEMENT

- HT02: HOPE-4: Developing an innovative strategy for hypertension detection, treatment and control in two middle income countries.**
Colombia and Malaysia
Funded by: CIHR, GCC, CSN, IDRC
Funding amount: \$ 1,431,012
- HT06: Improving the control of HT in rural India: overcoming the barriers to diagnosis and effective treatment**
India
Funded by: NHMRC
Funding amount: \$ 997,105
- HT08: Randomised control trial of early use of a simplified treatment regimen incorporating a half-dose, three-in-one blood pressure lowering pill vs. usual care for improving hypertension control in Sri Lanka**
Sri Lanka
Funded by: NHMRC
Funding amount: \$ 791,928
- HT13: LARK: Optimizing linkage and retention to hypertension care in rural Kenya**
Kenya
Funded by: NIH/NHLBI
Funding amount: \$ 2,104,519
- HT15: Tailored Hospital-based Risk Reduction to Impede Vascular Events after Stroke (THRIVES)**
Nigeria
Funded by: NIH/NINDS
Funding amount: \$ 2,216,772

PREVENTION

- HT04: School-EduSalt: A school-based education program to reduce salt intake in children and their families (completed)**
China
Funded by: UK MRC
Funding amount: \$ 1,187,014
- HT09: Developing the evidence base for a national salt reduction program for India**
India
Funded by: NHMRC
Funding amount: \$ 880,045
- HT10: Cost-effectiveness of salt reduction interventions in Pacific Islands**
Fiji & Samoa
Funded by: NHMRC
Funding amount: \$ 1,008,474
- HT11: Launching a salt substitute to reduce blood pressure at the population level in Peru**
Peru
Funded by: NIH/NHLBI
Funding amount: \$ 2,029,249

HEALTH SYSTEMS

- HT01: Utilizing HIV/AIDS infrastructure as a gateway to chronic care of hypertension in Africa**
Uganda, Rwanda and South Africa
Funded by: CIHR, CSN, GCC, IDRC
Funding amount: \$ 1,499,473
- HT05: Treating hypertension in rural South Africa: A clinic-based lay health worker trial to enhance community-based outreach services for integrated chronic care**
South Africa
Funded by: UK MRC
Funding amount: \$ 1,408,457
- HT12: Task shifting and blood pressure control in Ghana - a cluster-randomized trial**
Ghana
Funded by: NIH/NHLBI
Funding amount: \$ 2,117,296

DIAGNOSIS AND MANAGEMENT OF HYPERTENSION

- HT03: DREAM-GLOBAL: Diagnosing hypertension - Engaging Action and Management in Getting Lower Bp in Aboriginal and LMIC**
Canada and Tanzania
Funded by: CIHR, GCC, IDRC
Funding amount: \$ 1,915,264
- HT07: A smartphone-based clinical decision support system for primary health**
India
Funded by: NHMRC
Funding amount: \$ 897,234
- HT14: A comprehensive approach to hypertension control in Argentina**
Argentina
Funded by: NIH/NHLBI
Funding amount: \$ 2,083,675

Funding agencies

- CIHR – Canadian Institutes of Health Research
- CSN – Canadian Stroke Network
- FIC – Fogarty International Center (NIH)
- GCC – Grand Challenges Canada
- IDRC – International Development Research Centre, Canada
- NHLBI – National Heart, Lung, and Blood Institute (NIH)
- NHMRC – National Health and Medical Research Council, Australia
- NIH – National Institutes of Health, US
- NINDS – National Institute of Neurological Disorders and Stroke (NIH)
- SAMRC - South African Medical Research Council
- UK MRC – Medical Research Council, UK

Please note: Geographical boundaries are not perfect

Hypertension study findings

HEALTH SYSTEMS

HT01: Utilizing HIV/AIDS infrastructure as a gateway to chronic care of hypertension in Africa (Uganda, Rwanda, and South Africa)

Aim: To evaluate the effectiveness of active-case finding and to investigate the presence of cardiovascular disease risk factors in patients attending antiretroviral treatment services.

Design: Mixed-methods cross-sectional survey and qualitative study

Key formative results:

- About a third (31%) of people living with HIV attending healthcare facilities in Cape Town were found to have hypertension.
- Only a third of those with hypertension were aware of their hypertension diagnosis, and only about half of those on anti-hypertensive treatment were at target blood pressure control levels.
- Study demonstrates sub-optimal management of a highly treatable condition in patients regularly attending healthcare services.

HT05: Treating hypertension in rural South Africa: Strengthening community-based outreach services for integrated chronic care Aim: To reduce population levels of uncontrolled hypertension, especially in those individuals at greatest risk, by supporting and strengthening the management of hypertension in primary care clinics

Design: Evaluation study with a process evaluation and an RCT

Key results:

- No improvement in BP control among users of intervention clinics as compared with control clinics.
- Lay health workers improved clinic functioning, including overall attendance, and attendance on the correct day.
- Non-linearity between implementation process and outcomes at clinic level: variability in implementation and outcomes between sites likely a consequence of different levels of patient load and resources, nature of relationships and clinic management - clinics with high patient loads, had LHWs unable to complete all tasks.
- Strong management, skilled LHW, functional equipment and good relations, are essential for success in task shifting

HT12: Task Shifting and Blood Pressure Control in Ghana: A Cluster-Randomized Trial

Aim: To evaluate the comparative effectiveness of the implementation of the WHO package targeted at cardiovascular risk assessment versus provision of health insurance coverage, on blood pressure reduction.

Design: Cluster RCT

Key results:

- The provision of health insurance coverage alone and with task shifting, through nurse-led hypertension control using the WHO CVD Package, led to significant reduction in systolic blood pressure and improvement in blood pressure control among patients with uncontrolled hypertension. Combining the nurse-led intervention with the provision of health insurance coverage led to a greater reduction in systolic BP than health insurance coverage alone.

Abbreviations:

CVD – Cardiovascular Disease
 RCT – Randomized Controlled Trial
 BP – Blood Pressure
 HIV - Human Immunodeficiency Virus
 AIDS - Acquired Immune Deficiency Syndrome
 WHO - World Health Organization

Study status as of 1 September 2018

PREVENTION

HT04: A school-based education programme to reduce salt intake in children and their families (China)

Aim: To determine whether an education program targeted at primary school children could lower salt intake in children and their families.

Design: Cluster RCT

Key results:

- The intervention was effective in lowering salt intake: -1.9g/day among children and -2.9 g/day among adults.
- The effect on systolic blood pressure was -0.8 mm Hg in children and -2.3 mm Hg in adults.

HT09: Developing a national salt reduction program for India

Aim: The overall goal of this 3-year project is to develop the evidence base required to formulate a national salt reduction program for India.

Design: Mixed methods study: stakeholder survey, population survey, food survey

Key results:

- Salt consumption in India is high, with mean population intake well above the World Health Organization recommended maximum of 5 g/day. Intake was 9.45 g/day in Delhi and Haryana and 10.41 g/day in Andhra Pradesh.
- Several consumer behaviours related to use of salt during food preparation and consumption of salty products were related to actual salt consumption and therefore appear to offer an opportunity for salt education intervention.

HT10: Cost effectiveness of salt reduction interventions in Pacific Islands (Fiji, Samoa)

Aim: To evaluate the impact and cost-effectiveness of multi-faceted intervention strategies to reduce salt in the Pacific Islands.

Design: Formative research, and Before-and-After study

Key results:

- There was no change in mean population salt intake between 2013 (7.31g/day) and 2015 (7.50g/day) in Samoa
- Consumer surveys showed some positive changes for elements of knowledge, attitudes and behaviour.

HT11: Launching a salt substitute to reduce blood pressure at the population level (Peru)

Aim: To implement and assess the impact of an intervention using a salt substitute on blood pressure at the population level using a stepped wedge trial design.

Design: Stepped-wedge RCT

Key preliminary results:

- The mean sodium and potassium consumption were 4.4 g/day and 2g/day
- Introducing and promoting salt substitutes require creative strategies that need to acknowledge local explanatory disease models such as the strong association between emotional wellbeing and hypertension, give a positive spin to changing food habits, and resist the "common sense" strategy of information provision around the causal connection between salt consumption and hypertension
- Final results not yet available

DIAGNOSIS AND MANAGEMENT OF HYPERTENSION

HT03: DREAM-GLOBAL: Diagnosing hypertension - Engaging Action and Management in Getting Lower Bp in Aboriginal and LMIC (Canada and Tanzania)

Aim: To assess the effect of SMS messages on BP control in aboriginal people in Canada and rural Tanzania with hypertension.

Design: Evaluation study with an RCT

Key results:

- Results not yet available.

HT07: SMARThealth: A smartphone-based clinical decision support system for primary health care workers in rural India

Aim: To test whether an electronic clinical decision support system will assist non-physician health workers and doctors in making evidence-based management decisions to lower their patients' CVD risks.

Design: Stepped-wedge cluster RCT

Key results:

- Using the SMARThealth platform increased the detection of people with high CVD risk in the community.
- The intervention itself did not show a significant improvement in achieving the recommended BP target of SBP <140mmHg compared to those in the control arm (41.2% vs 39.2%).
- Discordance in risk scores driven by fluctuating BP values (due to normal variability and seasonal variations) resulted in low exposure of the intervention to the evaluation cohort (37.2%)
- Unanticipated seasonal variation in BP in the context of a stepped-wedge trial highlights the inherent risks of this study design

HT14: Comprehensive Approach for Hypertension Prevention and Control in Argentina

Aim: To test whether a comprehensive intervention program within a national public primary healthcare system will improve hypertension control among uninsured hypertensive patients and their families in Argentina.

Design: Cluster RCT and economic evaluation

Key results:

- A community health worker-led multicomponent intervention significantly reduced systolic blood pressure by 6.6 mm Hg and diastolic blood pressure by 5.4 mm Hg compared with usual care over 18 months in 1432 patients with hypertension.

PHARMACOLOGICAL PREVENTION AND MANAGEMENT

HT02: Developing an innovative strategy for hypertension detection, treatment and control in two middle income countries – Hypertension Outcomes Prevention and Evaluation: HOPE-4 (Columbia and Malaysia)

Aim: To evaluate whether the cardiovascular disease risk detection, treatment, and control programme can substantially improve hypertension control and overall Framingham Risk Score at 1 year.

Design: Formative research for a cluster RCT

Key preliminary results:

- Insights on barriers to hypertension detection, treatment and control: (1) at the individual and community, healthcare delivery, policy and governance, and environmental levels in Malaysia; (2) as areas for prioritization for policy and intervention to improve hypertension management in Colombia, such as training for health professionals on patient and health systems management issues, reduction or elimination of co-payments, among other barriers.
- Other findings from this study are still underway.

HT06: Improving the control of hypertension in rural India: Overcoming the barriers to diagnosis and effective treatment

Aim: To identify and explore potentially different barriers and knowledge gaps in the diagnosis, treatment and management of hypertension in both urban and rural regions of India.

Design: Mixed-methods study with observational and formative research, and pilot study

Key preliminary results:

- Training of health workers to understand hypertension, compared to no training, improved knowledge of hypertension and its risk factors by health workers by 70-90%.

HT08: Randomised Controlled Trial of early use of a simplified treatment regimen incorporating a half-dose, three-in-one blood pressure lowering pill vs. usual care for improving hypertension control in Sri Lanka

Aim: To investigate effectiveness, cost-effectiveness, and acceptability of Triple pill (Triple BP lowering therapy) compared to usual care for early management of high BP in Sri Lanka.

Design: Evaluation study with an RCT, economic evaluation, and process evaluation

Key results:

- Treatment with a fixed-dose combination pill containing low doses of 3 antihypertensive drugs led to a significant increase in the proportion of patients achieving their target BP goal (70%) compared to usual care (55%) at 6 months in this trial involving 700 patients.
- Use of such medication as initial therapy or to replace monotherapy may be an effective way to improve BP control.

HT13: Optimizing Linkage and Retention to Hypertension Care in Rural Kenya

Aim: To utilize a multi-disciplinary implementation research approach to address the challenge of linking and retaining hypertensive individuals to a hypertension management program.

Design: Formative research, cluster RCT, and cost-effectiveness analysis

Key results:

- 27 barriers to hypertension care were identified, grouped into individual (cognitive and emotional) and environmental factors.
- Barriers included access to medication from both supply and demand perspectives, costs of care, inadequate training and heavy workloads for nurses, the asymptomatic nature of hypertension as a barrier to seeking care, a lack of health education among the community, HIV stigma, as well as long distances to the nearest health facility, among other barriers.

HT15: Tailored Hospital-based Risk Reduction to Impede Vascular Events after Stroke – THRIVES (Nigeria)

Aim: To determine whether a culturally sensitive multipronged post-discharge intervention can significantly reduce blood pressure, enhance achievement of guideline recommended targets for risk factor control, and lower recurrent vascular events in Nigeria.

Design: Evaluation study with an RCT

Key results:

- The intervention resulted in a clinically significant reduction of systolic/diastolic blood pressure (>10mmHg and 5mmHg) only in the sub-group with a baseline BP of >140/90mmHg at 12 months.
- The remaining study findings are still underway.

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Chapter 1 Funding Agencies

Introduction

In this chapter we present and discuss the scientific contribution made by the Hypertension Programme, between 2012 and 2017. We highlight how the Hypertension Programme has paved the way for the GACD Research Network's role in advancing implementation science for NCD research in LMICs. Individual studies and their findings are profiled on pages 10-13. Other chapters discuss the Programme's role in building research capacity in LMICs (Chapter 2), researchers' wider contribution to policy at the global and national levels (Chapter 3) and the links between the GACD's work and the global NCD agenda (Chapter 4).

We surveyed GACD Member Agency representatives and project investigators on the Hypertension Programme for their views, to help us understand the major strengths of the GACD and what enables the network to thrive, and identify key areas for improvement.

KEY MESSAGE: A NUMBER OF INTERVENTIONS WERE SHOWN TO BE EFFECTIVE IN PREVENTING AND CONTROLLING HYPERTENSION

1. GACD Member Agencies benefit from new partnerships, joint funding opportunities and collaboration with other funding agencies, and greater visibility for their initiatives.
2. The impact of the GACD on Early Career Researchers' professional development was strongest in enhancing their knowledge and intellectual abilities, providing an opportunity to learn about implementation science in a collaborative network.
3. Publications from the Hypertension Programme indicates greater collaboration between researchers from LMICs on GACD Joint Publications, and a contribution to key areas within implementation science.

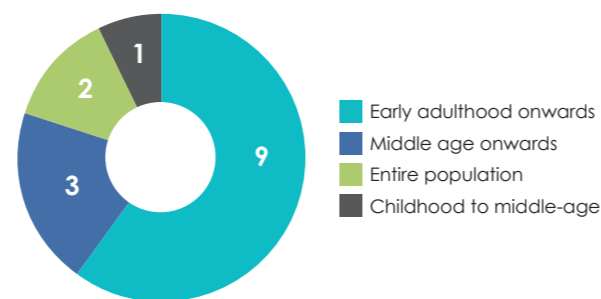
GACD contributions to NCD research and implementation science

While the results of some studies are not expected until late 2018 or early 2019, the study designs and approaches used highlight the range of research problems the teams addressed. Journal articles published by the 15 study teams between 2013 and 2017 demonstrate the high quality of scientific research output and extensive collaboration networks.

A key achievement of the Hypertension Programme's contribution is that the 15 studies target critical issues, locations and populations, and some incorporate multiple locations and populations within their research objectives.

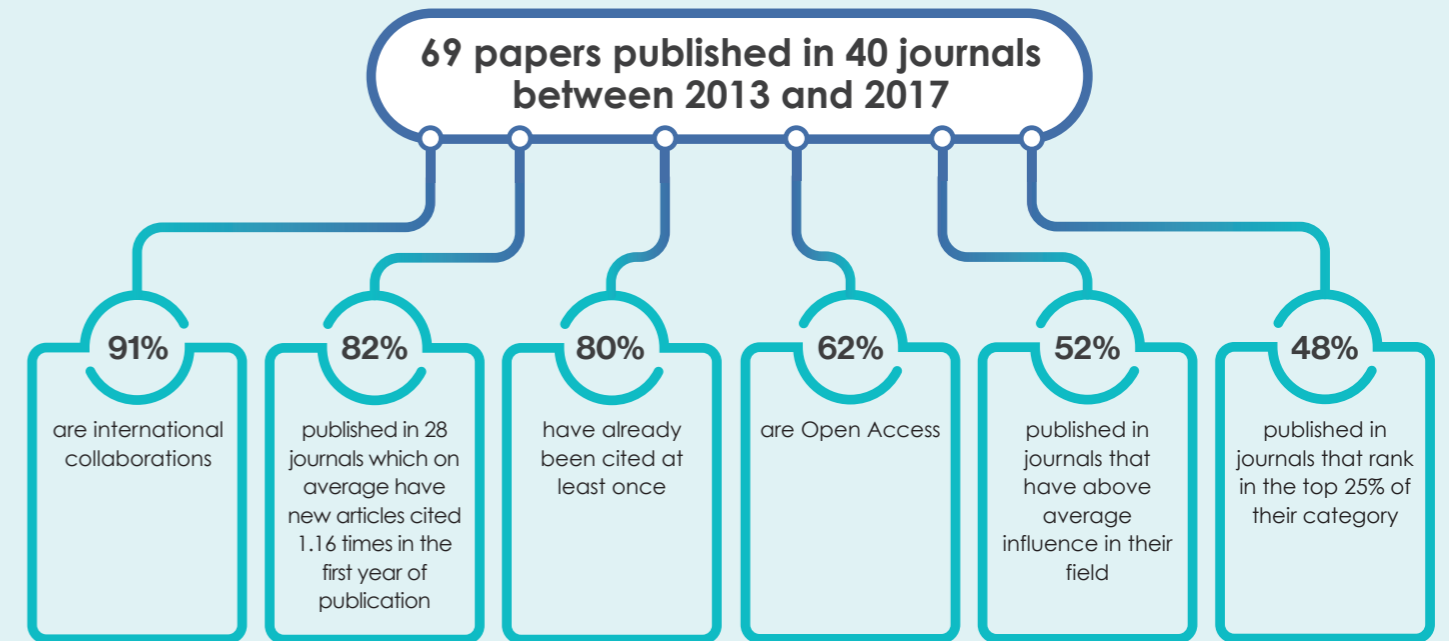
Nearly 3/4 of the 15 studies targeted groups with elevated blood pressure, a third addressed the needs of patients with poor quality of life due to CVD, and a quarter included those with organ damage as a result of hypertension. A third of the studies focused on healthy groups or whole communities. The combination of population-wide approaches and targeted research on high-risk groups within the same research programme fits well with the need to devise and implement strategies that meet the health needs of those with disease while preventing healthy populations from developing disease.

Age groups addressed in GACD studies



Scientific output and publications

Since 2013, the 15 projects have published 75 peer-reviewed journal articles, with more currently under review. A bibliometric analysis of 69 papers published between 2013 and 2017 highlights the scientific excellence, wide collaboration network and promising research impact of the scientific output from the studies.



Scientific output characteristics:

Most papers were published in fields allied most closely to hypertension and public health. Scientific contributions cut across several disciplines and subject areas, as shown in figure 1.

Figure 1. Top ten areas of scientific contribution and number of journal articles in each

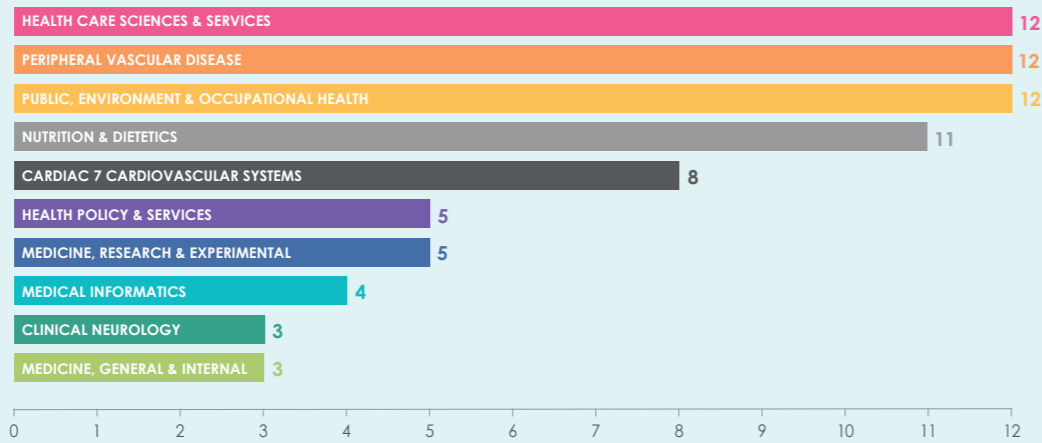


Figure 2. Journals in which more than one hypertension paper was published.

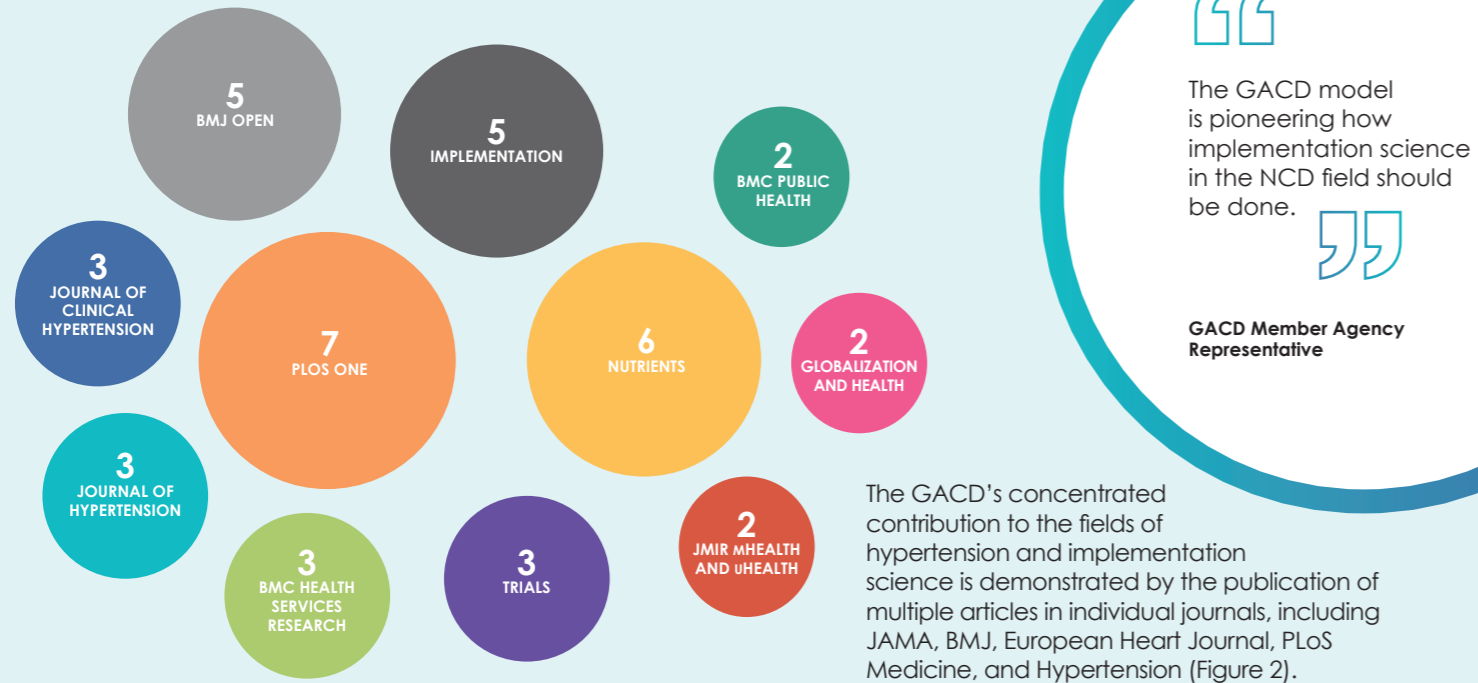


Figure 3. GACD publication subject areas of greatest impact (Category Normalized Citation Impact)



The average Category Normalized Citation Impact of the set of 69 papers is 1.36. This reflects the number of times that each paper has been cited per year (normalised for subject, year and type of publication). Papers published in some subject areas far exceed this impact (Figure 3).

The Hypertension Programme's scientific output represents a global network of researchers and the work of implementation scientists spread across 30 countries (Figure 4).

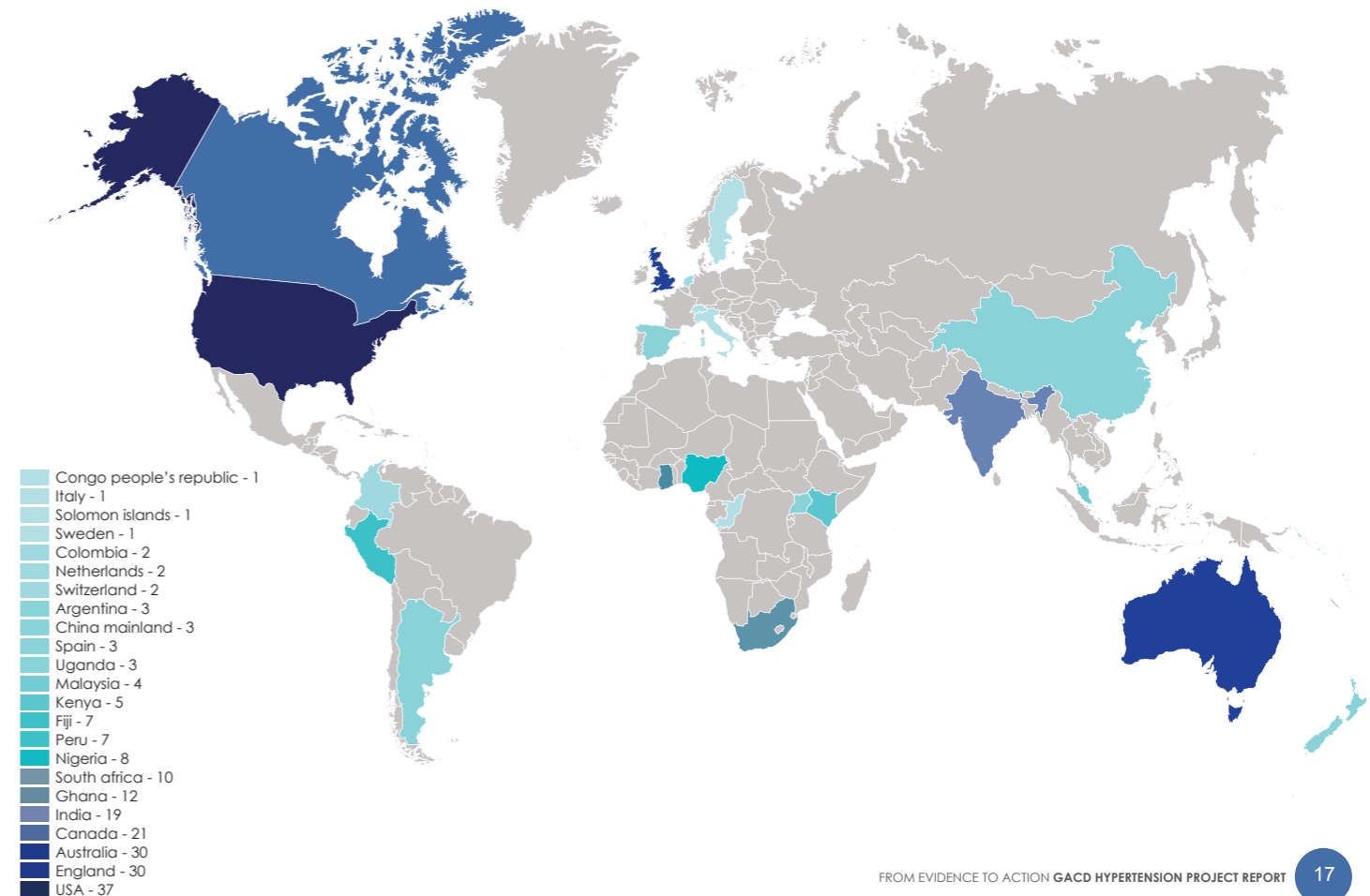


Partnering with institutions in other countries is a critical part of doing relevant and meaningful global research.



Hypertension Programme Researcher

Figure 4. Geographical (by institutional affiliation) distribution of authors listed in GACD HT journal articles



Box 1. GACD joint publications

Between 2015 and 2017, project teams collaborated on 7 peer-reviewed publications produced jointly by members of GACD Working Groups (see Chapter 3). Co-authored by 79 researchers from over 30 research institutes across the globe, these articles showcase the collaborative output facilitated by the GACD Research Network.

Three papers by the COUNCIL (Control Unique to CVDs in LMICs) Working Group addressed hypertension directly; one of these presented a systematic review of gaps in hypertension guidelines, another put forward a novel implementation cycle for CVDs in LMICs, and a third compared stroke prevention guidelines between LMICs and HICs (see Chapter 4).

Other joint publications included an overview of the Hypertension Programme, a summary of innovative approaches to hypertension and behaviour change strategies employed by study teams, and documenting the Programme's mission to develop standardised data collection methods.

The Task-Shifting, Concepts and Concepts, and Process Evaluation Working Groups are currently preparing manuscripts for publication, which will add further to the breadth of topics addressed by GACD joint publications.

See Notes and References (p. 51) for a list of GACD hypertension joint publications.

The GACD model: experiences and accomplishments

We asked GACD Member Agencies and investigators for feedback on the GACD model. Representatives from 10 agencies and researchers from 12 projects told us what works, what keeps them engaged, and what they think can be improved. We assessed the impact that the GACD Hypertension Programme has had on research capacity building in LMICs, and identified areas for more focused work in coming years.

“

The collaborations and creation of an NCD investigator international community is essential for the sustenance of their individual careers and for their impact at home.

”

GACD Member Agency Representative

“

GACD has provided opportunities for new or less experienced researchers to learn about implementation science, thereby expanding the global knowledge base.

”

GACD Researcher

Box 2. Collaboration between agencies within countries

The unique model of the GACD is based on several countries coordinating autonomous mechanisms to fund implementation research in LMICs. Increasingly, many HICs are expanding their Official Development Assistance (ODA) budgets to fund health-related research in LMICs, and national medical research bodies are extending their reach beyond their country's borders - an opportunity to build multi-agency partnerships. Argentina, until recently classified as an upper middle-income country, provides a striking example of cross-agency collaboration within the GACD.

Argentina's Ministry of Health (MINSAL - implementers) and Ministry of Science, Technology & Productive Innovation (MINCYT - research)

"Our goal is to build stronger and more rigorous, iterative research and development (R&D) processes that address problems of practice. We need to understand how research, development and innovation are linked and how we can better support this process, in this matter the context of GACD funding becomes a superb opportunity.

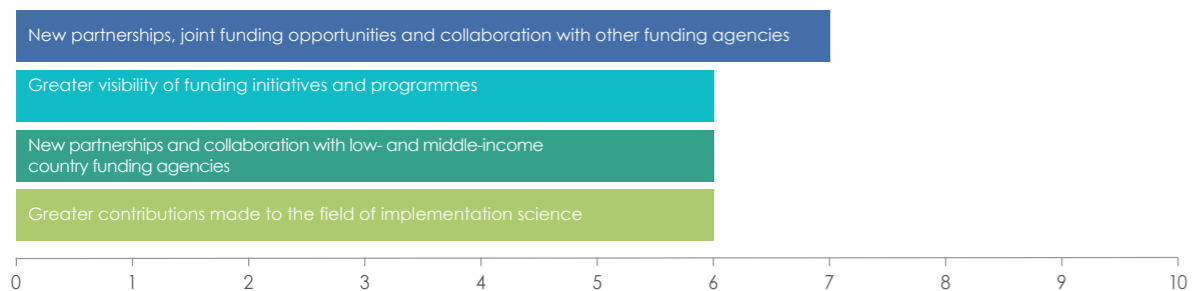
The marriage between research and development has its advantages and disadvantages, including high costs, long timescales, and uncertain outcomes. But a number of benefits outdo those hurdles: new products and practices, patents, benefits in the health population. Ongoing research also leads to new opportunities. Often chance discoveries open up whole new channels of research. GACD brings us the opportunity to benchmark our strategies to those of our fellow agencies to incorporate better practices to our health policy."

Daniel Gomez, MINCYT

Feedback from Member Agencies

GACD Member Agencies reported a largely positive experience in coordinating efforts to fund NCD projects. While some felt it too soon to evaluate the impact of funded projects, the perceived significance of jointly funding research and activities and the shared learning opportunities keep agencies engaged in the GACD.

Figure 5. What do national funding agencies say are the key benefits of joining the GACD?



An important achievement of the GACD has been the Joint Peer Review process initiated in 2014, after the Hypertension Programme funding had been awarded. Among other things, Joint Peer Review could increase efficiency, maximise the pool of available reviewers and experts and ensure a higher standard of review.

Box 3. Joint Peer Review: an interview with Professor Catherine Law

GACD caught up with Catherine Law, Professor of Public Health and Epidemiology at the UCL Institute of Child Health, and three-time chair of the GACD Joint Peer Review Committee.

Q: What is Joint Peer Review?
A: Peer review is a process where a group of scientists, and sometimes other experts, get together to assess the quality of applications that have been made for funding, or, alternatively, papers reporting the results of research. And Joint Peer Review is when different funding agencies decide to combine their process so that we all do this together.

Q: What does the GACD Joint Peer Review Process aim to achieve?
A: It aims to achieve a number of things. Implementation science is quite new as a science and so we're all learning how to do it. Funders are learning how to commission it, researchers are learning how to do it, and the users of research – the people who are going to put research into practice – are learning how to construct research questions, and then how to use the research results. And some of the funding agencies within GACD have been doing implementation research for a number of years, others, hardly at all.

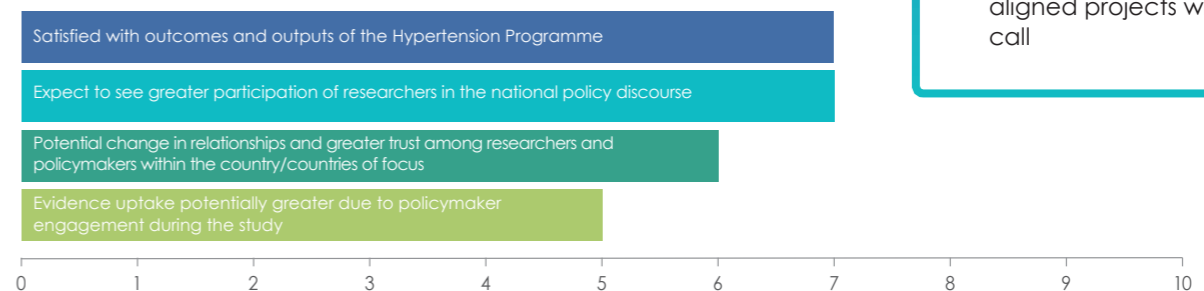
Q: What are the key strengths of JPR? And how do you think agencies benefit from it?
A: The first strength is being able to learn from each other. The second strength, particularly for agencies of countries where there has not been a lot of implementation science, they can see where they need to develop. They can identify training needs, methods they need to put in place among researchers in their research communities. And the third strength which hasn't yet been realised in the GACD, is that through Joint Peer Review it would be possible to choose a strategically aligned set of projects. At the moment funding agencies use scientific quality principally to prioritise, not assessment of strategic need. So they could do that through Joint Peer Review, if they wanted to.

There are benefits for researchers too. By different funding agencies agreeing sets of criteria for assessment, researchers can see that across the world, agencies are thinking alike about what's important in their research. And particularly for this type of research, we need to make it applicable across the world. This means that researchers working in Africa can have some confidence that the type of research they're doing is also acceptable to people working in the Pacific, or South East Asia.

Two unique advantages of the GACD model according to Member Agencies:

- Strong focus on implementation research
- Commitment to linking research communities across LMICs and HICs

Figure 6. What do member agencies think of the achievements and potential impact of the GACD Hypertension Programme?



KEY LESSONS FROM FUNDING AGENCIES

1. Increasing the productivity and visibility will require new approaches and strategic thinking beyond merely improving implementation of singular funding calls
2. The disease-specific focus of the GACD's first 4 funding calls conflicts with cross-cutting, population level approaches for addressing multiple risk factors favoured by some member agencies
3. There is room to improve the quality and quantity of interaction between GACD researchers and policymakers at the national level in order to increase evidence uptake
4. There is scope to use the GACD mechanism to fund strategically aligned projects within a funding call



Enabled us to gain important insights into some of the difficulties in undertaking implementation research in LMICs, and helped improve our own project. The benefits of the shared learning can't be underestimated



Hypertension Programme researchers



Feedback from GACD Researchers

Of the 12 project investigators surveyed:

- 12 felt that their interaction with the GACD Secretariat was valuable
- 11 will continue to engage with the GACD in the future.

Support for a virtual GACD alumni network, and additional interaction through the GACD Annual Scientific Meeting and Implementation Science Workshops was high.

Figure 7. Strengths of the GACD Hypertension Programme – researchers' perceptions (n=12)



Provided valuable opportunities to meet together in person as well as educational materials to expand the team's knowledge in implementation research.



Hypertension Programme researchers



Has been a pivotal project to consolidate our thinking and promote our implementation science work.



Hypertension Programme researchers



KEY LESSONS LEARNED FROM RESEARCHERS

1. Discussions on data standardisation across study teams did not occur until six months after successful projects had been awarded funding in 2012. This dialogue should take place earlier in the programme, or funding calls should stipulate the inclusion of consensus measures
2. Researchers would have appreciated more clarity and open discussions with funders on available options for continuing intervention delivery once the research infrastructure is withdrawn from sites



To some extent, the format of the workshop means that participants will share issues related to their projects organically, but the facilitators took care to make sure it was done in a productive way by designing activities with specific questions for discussion.



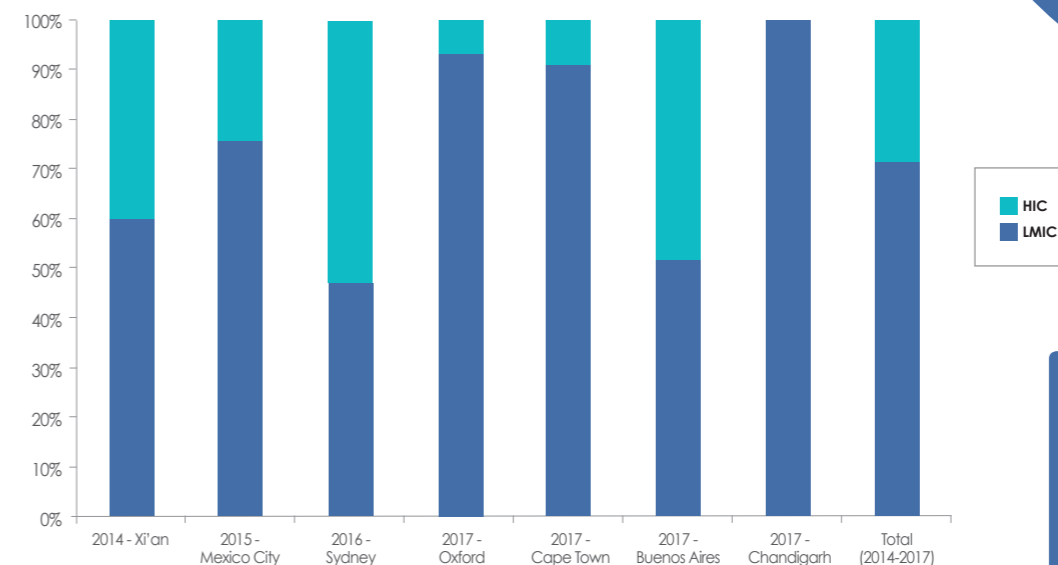
Implementation Science Workshop Attendee

Research capacity building in LMICs: what have we achieved?

Implementation Science Workshops

Since 2014, seven GACD Implementation Science Workshops have been attended by over 300 participants from largely academic and research organizations (75%), many of whom were part of GACD-funded projects, but also from government (6%), civil society (4%), global and regional alliances (7%) based in the location of the workshop. On average, 70% of participants at GACD Implementation Science Workshops have been from LMICs.

Figure 8. Country classification of attendees at GACD Implementation Science Workshops (2014-17)



Engaging, stimulating and efficient collaborations and partnerships that translated to the extensive scientific reviews and publication of papers on the need for incorporation of implementation and translatability scale in the development of pragmatic guidelines for CVD prevention, treatment and rehabilitation in LMICs



Hypertension Programme researchers



How can the GACD improve its Implementation Science Workshops?

1. Increase length of workshops to provide deeper understanding of scale-up
2. Clearer instructions on the purpose of preparatory work as a way to receive feedback and critical input from experts and peers.
3. A more comprehensive reading list for independent study



Collaboration between researchers from LMICs

An indirect marker of research capacity building in LMICs is the wide collaborative network listed in publications authored by researchers based in Africa, Asia and Latin America.

Figure 9. Collaboration network of GACD researchers from Asia Pacific (n=29 papers)

- 1 University of Michigan
- 2 University of Ottawa
- 3 McMaster University
- 4 Queen Mary University London
- 5 University of Oxford
- 6 University of London
- 7 St. John's Medical College
- 8 St. John's National Academy of Health Sciences
- 9 Deakin University
- 10 University of Sydney

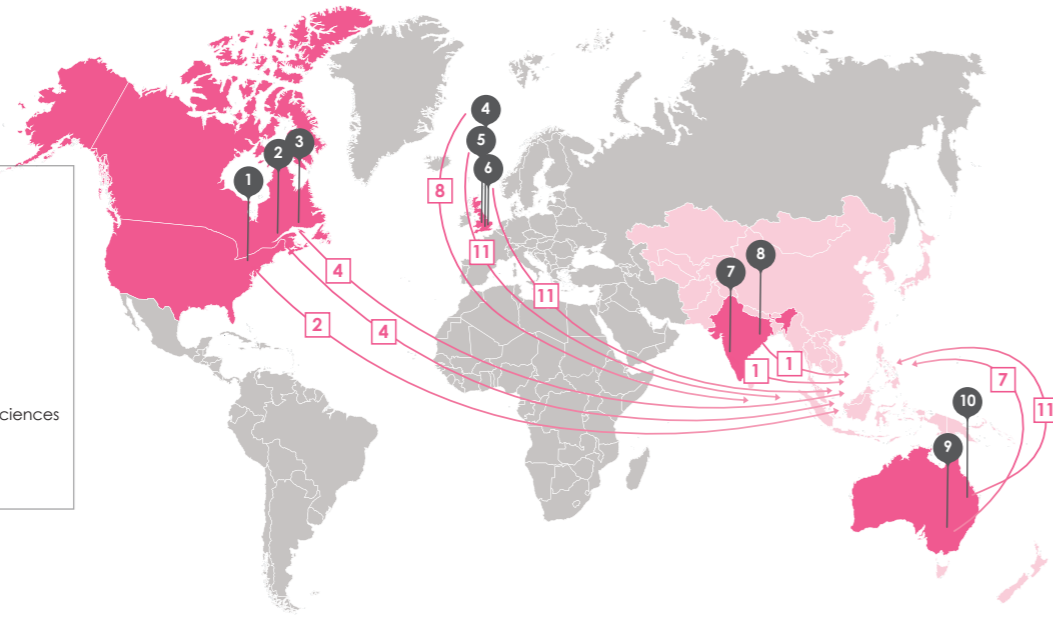


Figure 10. Collaboration network of GACD researchers from Africa (n=26 papers)

- 1 University of Illinois System
- 2 University of Illinois Urbana-Champaign
- 3 Loyola University Chicago
- 4 John Hopkins University
- 5 University of Ottawa
- 6 Pennsylvania Commonwealth System of Higher Education
- 7 Penn State University
- 8 New York University
- 9 Kwame Nkrumah University Science & Technology
- 10 South African Medical Research Council

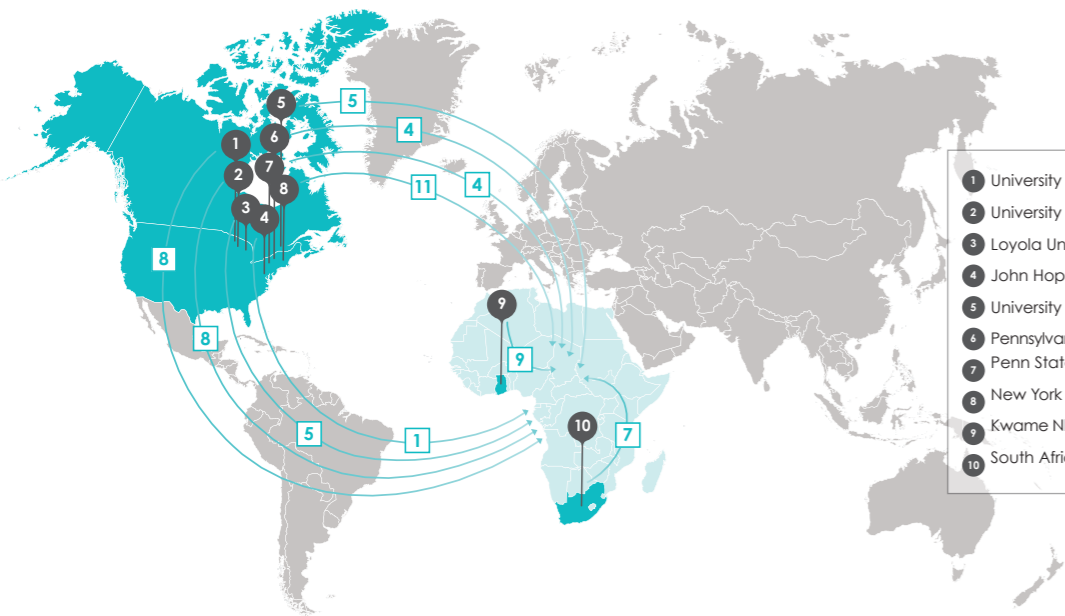
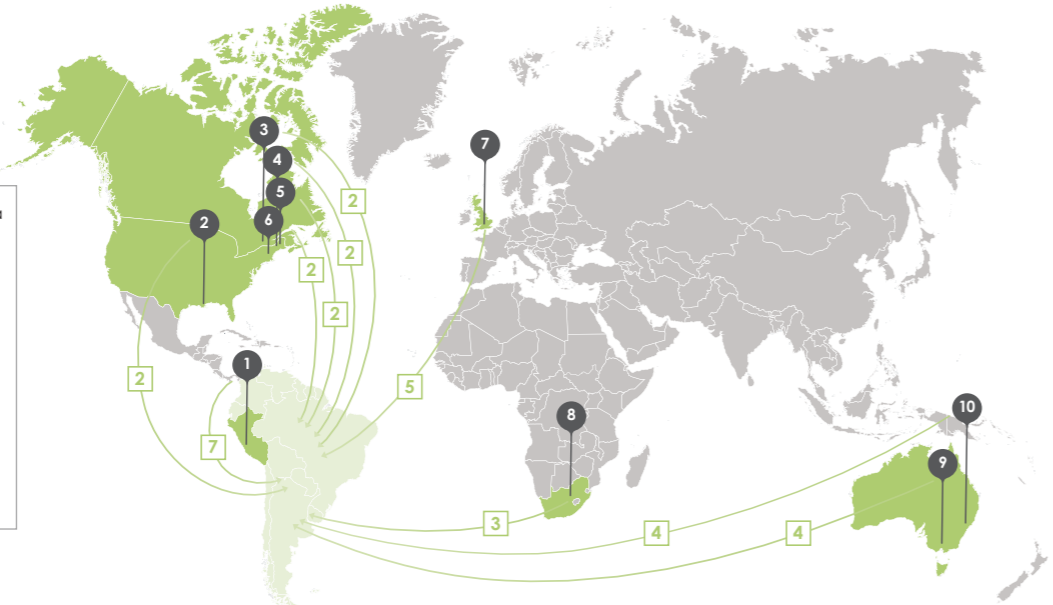


Figure 11. Collaboration network of GACD researchers from Latin America (n=10 papers)

- 1 University of Peruana Cayetano Heredia
- 2 Tulane University
- 3 Queens University - Canada
- 4 New York University
- 5 Icahn School of Medicine Mount Sinai
- 6 Johns Hopkins University
- 7 University of London
- 8 University of Witwatersrand
- 9 Monash University
- 10 University of Sydney



Nurturing the next generation of scientists: Early Career Researchers (ECRs)

Most hypertension project teams had research assistants or PhD students in the early stages of their research careers. The benefits of being part of the GACD Research Network added value to existing supervision provided within their projects.

10 ECRs tell us about how the GACD contributed to their career development...

4.5 years

Average time spent on GACD Hypertension project



100%

Authorship on at least one journal article



50%

Collaborated with other GACD projects



40%

Led to further job opportunities



30%

Helped apply for and obtain individual fellowship after the project



30%

Led to promotion or permanent position

GREATEST BENEFITS WERE ENHANCING:

- knowledge base
- creativity
- research techniques in NCD
- implementation science research

Where could GACD do more?

- Research governance
- Grant management
- Research organization

GACD meetings and workshops provided another arena for them to continue professional development through interaction with a global network of researchers, funders and local policymakers brought together by the GACD.



Wider impact of hypertension projects

Interaction with policymakers

Project teams engaged with policy and decision makers at various stages of the project cycle:

- Study development (7 projects)
- Intervention development (9 projects)
- Project implementation (9 projects)
- Evaluation (8 projects)

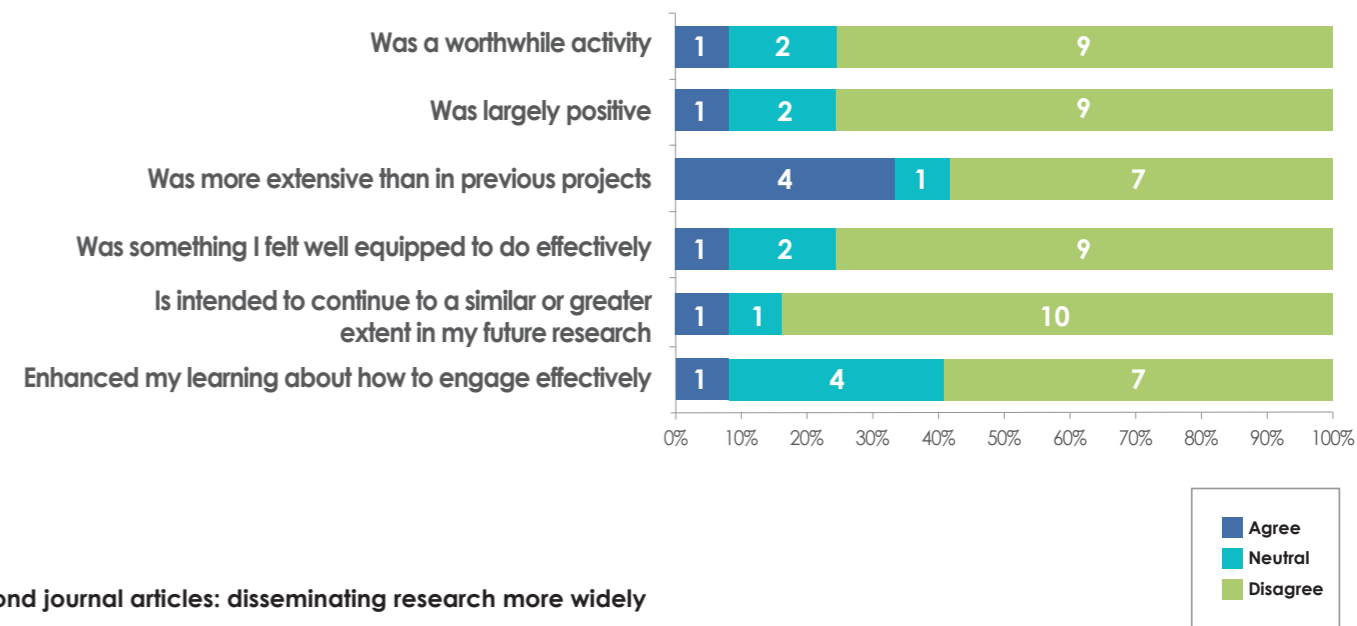
Researchers from 3 projects participated in advisory panels, and 4 were asked to sit on technical advisory groups.

Researchers engaged with policymakers at various levels:

- Local level (projects)
- Regional (projects)
- National (projects)



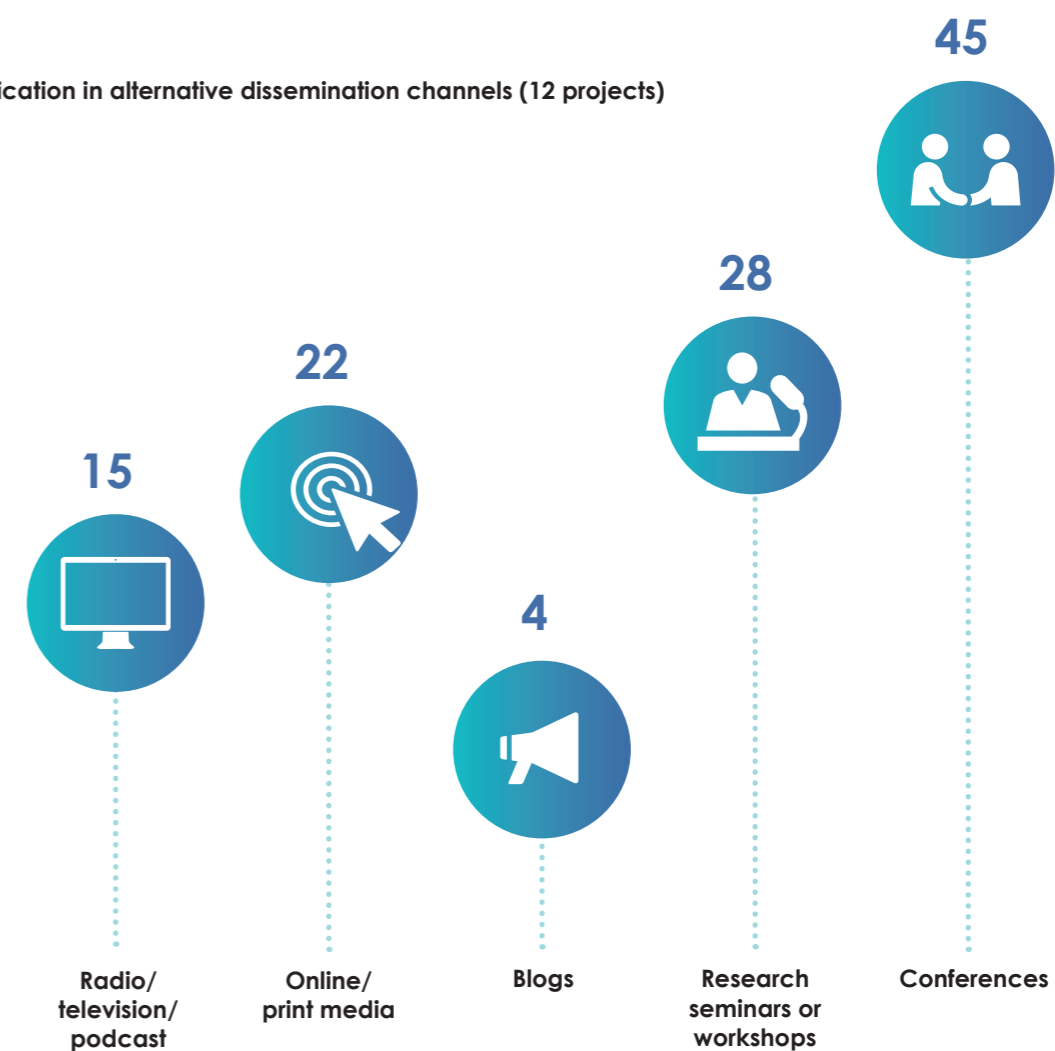
Figure 13. Researchers' views on policymaker interaction (12 projects)



Beyond journal articles: disseminating research more widely

Communicating research findings to non-academic audiences is becoming increasingly important to promoting the uptake of research findings to policy and practice. GACD researchers have been reaching out to wider audiences as their projects have taken shape and reached completion.

Figure 14. Publication in alternative dissemination channels (12 projects)



Chapter 2 Researchers

HIGHLIGHTS

1. The GACD Hypertension Programme's 15 studies have demonstrated a variety of interventions effective in preventing and controlling hypertension across a variety of contexts and expanded the use of implementation science in LMICs
2. The GACD Research Network provides a platform for shared learning between research teams, engagement with funders, and collaboration beyond the Programme cycle
3. Early Career Researchers gained knowledge and skills in implementation science and NCD research, with opportunities for career development and progression

Introduction

The GACD Hypertension Programme (2012-2017) provided an opportunity for 183 researchers to explore and advance the field of implementation science, while reaching beyond their disciplinary silos to work with governments, policymakers, civil society, and healthcare professionals to address hypertension in diverse settings.

In this chapter we showcase the ways in which GACD Researchers have used implementation research techniques in their projects and developed their understanding and knowledge of how to carry them out effectively. We also report on the many ways in which the GACD has contributed to researchers' career development: through the GACD Research Network's formal structure and informal culture of collaboration, enhancing Early Career Researchers' (ECRs) skills and knowledge. We also examine the gender balance on GACD Hypertension studies and Implementation Science Workshops.

The wider impact of the GACD Hypertension Programme is discussed in Chapters 3 and 4, and the strengths and limitations of the GACD model are discussed in Chapter 1.

Advancing implementation science and NCD research

Key findings of the GACD Hypertension Programme

The 15 studies can be broadly classified into four thematic areas of research on hypertension, covering a range of issues. The findings of some studies that have published their primary results contribute to the evidence base on bridging the NCD implementation gap in LMICs (Table 1).

Table 1. Overview of key GACD Hypertension Programme findings by thematic area (see Hypertension study findings, page 12)

Theme	Studies	Highlights of GACD Hypertension Programme
Diagnosis and Management of Hypertension	HT03, HT07, HT14	In Argentina (HT14) a community health worker-led multicomponent intervention significantly reduced systolic blood pressure by 6.6 mm Hg (95% CI, 4.6-8.6; P < 0.001) and diastolic blood pressure by 5.4 mm Hg (95% CI, 4.0-6.8 mm Hg; P < 0.001) compared with usual care over 18 months in 1432 patients with hypertension.
Health Systems	HT01, HT05, HT12	In rural South Africa (HT05), strengthening community-based outreach services for management of hypertension did not reduce population levels of uncontrolled hypertension, but lay workers improved clinic functioning and overall attendance. In Ghana (HT12), the addition of a nurse-led intervention for hypertension control using the WHO CVD Package to provision of health insurance coverage led to a greater reduction in systolic BP (-20.4 mm Hg, 95% CI -25.2, -15.6) than health insurance coverage alone (-16.8 mm Hg, 95% CI -19.2, -15.6), with a difference in reduction of 3.6mm Hg (p=0.021) at 12 months.
Pharmacological Prevention and Management	HT02, HT06, HT08, HT13, HT15.	In Sri Lanka (HT08), treatment with a fixed-dose combination pill containing low doses of 3 antihypertensive drugs led to a significant increase in the proportion of patients achieving their target BP goal (70%) compared to usual care (55%) at 6 months
Prevention	HT04, HT09, HT10, HT11	In China (HT04) a school-based education programme was effective in lowering salt intake among children (-1.9g/day, 95% CI -2.3, -1.6) and their parents (-2.9g/day, 95%CI -3.7, -2.2). The effect on systolic BP was -2.3 mm Hg (95% CI -4.5, -0.04) among parents. In India (HT09), mean salt consumption exceeds the WHO recommendation of 5g/day. Population salt consumption practices offer and opportunity for a government-led national salt education intervention.

Process evaluation

Process evaluation is an increasingly important component of implementation research on NCDs, and an invaluable part of research that involves trials of complex health interventions or seeks to change behaviours. GACD researchers contributed to the process evaluation and mixed-methods research literatures by comparing and documenting their approaches and findings across a variety of contexts. Their experiences are summarised in a forthcoming publication authored by members of the GACD Process Evaluation Working Group.

Seven projects (HT03, HT05, HT06, HT08, HT10, HT11, HT13) carried out process evaluations of their intervention components. These studies were conducted in different settings, using a range of interventions to address hypertension in South Africa, Tanzania, India, Kenya, Sri Lanka, Peru, Fiji and Samoa, and indigenous communities in Canada. All studies carried out their process evaluations using the same overall approach: they hypothesised how their intervention might work, and then set about examining whether or not it worked in that way over the course of the intervention. Several processes and stages of the intervention were evaluated, with each step contributing to researchers' understanding of their study results. The tools, concepts, and data collection activities were shaped by the theoretical approach of the evaluation.

Note: See Study Summaries on page X for study codes further details of each project. WHO: World Health Organization; CVD: Cardiovascular Disease; 95% CI: 95% Confidence Interval; BP: Blood Pressure



Building research capacity and supporting scientists' careers

A core principle of the GACD's work is to promote research excellence through collaboration and shared learning among scientists from across the globe, and to provide project teams with the support they need to achieve the aims of their research.

GACD Research Network and Working Groups

Engagement and interaction between researchers from different projects, countries, and institutions across the GACD Programmes is actively encouraged and supported through several Working Groups, an Annual Scientific Meeting, and additional Implementation Science Workshops throughout the year. These instances of interaction were viewed as positive and constructive opportunities by researchers, who often went on to work together on future endeavours with tangible outputs.

My interaction with other GACD researchers resulted in...



Joint (funding) application and publications with the Peruvian team (HT11)

Researcher, HT-14, Argentina

Dr Karen Yates from the Tanzania project (HT-03) is now a member of our Implementation Science Lab

Researcher, HT-12, Ghana



The cross-fertilization of knowledge and ideas within the network was a hallmark of the Hypertension Programme. Between 2015 and 2017 the Hypertension teams collaborated on seven joint publications that addressed gaps in NCD research and implementation science in LMICs. The papers were focused on research methodology, strengthening guidelines on controlling NCDs in LMICs, as well as summarising the approaches and strategies adopted by individual teams to tackle hypertension (See Box 2. Chapter 1). More than half of the Hypertension Researchers who joined the working groups reported that this interaction with colleagues led to subsequent collaborative projects.

The greatest interest for continued participation by researchers were in the joint publications (63.64%), process evaluation (54.55%) and the Task-shifting/How-to series (36.36%) working groups. One of twelve respondents wished to discontinue their working group participation due to a saturation in their existing commitments. All researchers surveyed reported the working groups to be meaningful ways to engage with other research teams, with 6 of 10 noting that it was a very meaningful engagement and 4 of 10 noting it was meaningful to some extent or somewhat.

Box 1. What did process evaluation research add to two GACD projects aiming to reduce population levels of uncontrolled hypertension?

HT-11: Launching a salt substitute to reduce blood pressure at the population level in Peru

The research team in Peru supplemented their stepped-wedge trial of a salt-substitution strategy with a process evaluation using a phenomenological research approach. The intervention was effective in reducing uncontrolled hypertension in the population, and the process evaluation highlighted that success could be attributed to two key factors: a high level of trust between researchers and communities which facilitated implementation; and the effectiveness of targeting women to deliver the intervention because they played a key role in preparing and cooking food for families.

HT05: Treating hypertension in rural South Africa: A clinic-based lay health worker trial to enhance community based outreach services for integrated chronic care

The project team incorporated a process evaluation of their pragmatic cluster randomized controlled trial in rural South Africa. The trial was not effective in reducing hypertension among users of primary care clinics in intervention areas. The process evaluation highlighted that despite a lack of effect on the eventual outcome, lay health workers had successfully strengthened primary care clinic functioning by improving and streamlining the appointment system, and by relieving the burden on nurses to carry out socially-oriented tasks. It also highlighted the variable levels of clinic management, patient loads, and equipment quality across study sites.

Table 1. GACD Working Groups and their outputs

Working groups	Aim	Publications
Joint publications	To improve the value-add of GACD research outputs by: (1) Identifying opportunities for dissemination of research outputs (2) Developing a joint publication and dissemination pipeline for GACD research outputs. (3) Developing and disseminating "GACD pragmatic guidelines" and solutions for hypertension in LMICs	Internal reporting template produced
Concepts and context	To describe the methods used to characterise and account for context incorporated in GACD studies at various levels. The group also aims to identify common methodological and analytical themes across selected projects and case studies for a manuscript on the topic	In progress
Data standardization	To develop a set of consensus measures to include in the GACD Data Dictionary, intended to serve as a resource on which researchers can draw, to enhance opportunities for cross site and combined analysis and expand collaborative opportunities	In progress
Task-shifting/How-to series	To describe the experiences and lessons learned from projects with a task-shifting component: the transfer of tasks to non-physician health workers with the aim of improving the functioning of clinics.	Under review
COUNCIL (COntrol UNique to Cardiovascular disease In LMICs)	To develop guidelines for individual and system level control of NCDs in developing countries. In the absence of specialised research, evidence and guidelines from LMICs, individual health personnel often apply available guidelines from HICs without consideration for local conditions.	4 papers published
Process evaluation	To produce a set of guidelines, structures and practices for process evaluation, as well as aspects to consider during protocol development, implementation, and analysis	Under review

Box 2. An opportunity for researchers to engage directly with funding agencies

Panel discussions, workshops and informal networking opportunities at GACD Annual Scientific Meetings (ASM) and Implementation Science Workshops facilitated direct interaction between funding agency representatives and researchers - benefiting both researchers and funders.

It gave funders greater understanding of individual research projects' successes and challenges, and enabled them to witness the GACD Research Network in action. Researchers had insight into funders' opinions and concerns about emerging global research priorities, and learned about research funding in other countries.

Over two-thirds of research teams felt that their engagement with funding agency representatives was valuable. Though one agency representative would like to see the GACD adopt new approaches to facilitating this interaction, as the ASM was too short to initiate and sustain meaningful discussion and networking.

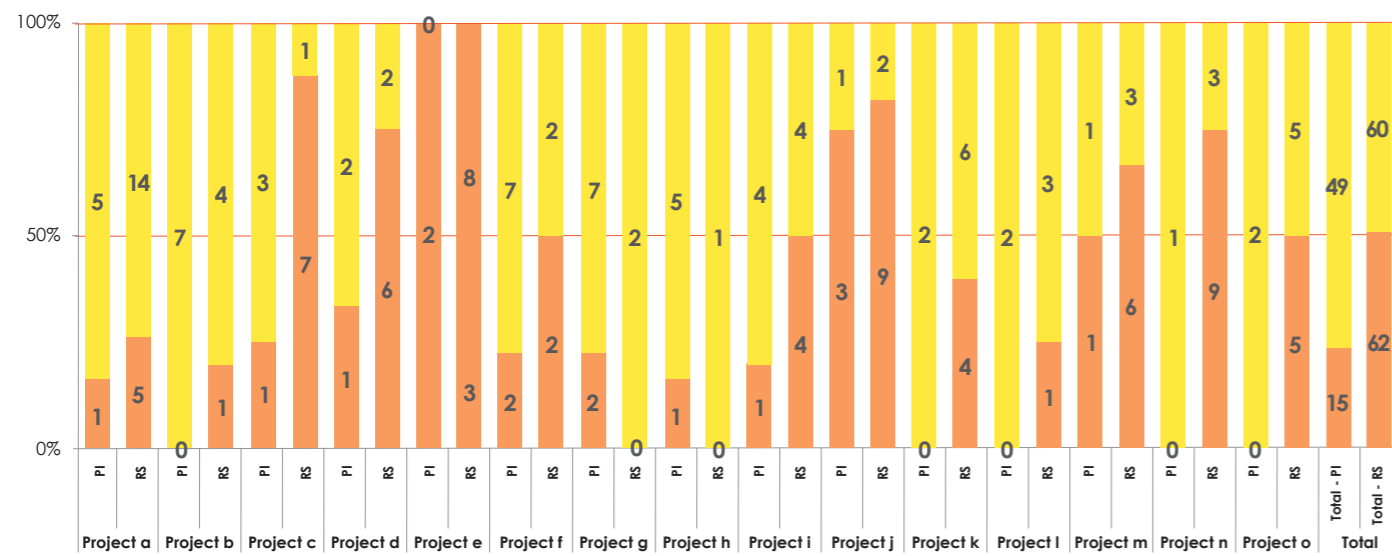
Gender in Global Health

Gender equity in the global health community is an emerging area to be improved. Recent initiatives such as Global Health 50:50 (www.globalhealth5050.org) to advance action and accountability on gender issues in global health organizations, and the sustained development of the Athena SWAN Charter for promoting gender equality in UK universities highlight its importance in scientific research. Funding organizations are becoming increasingly sensitive to the need to ensure that female scientists have equal opportunity and access to conduct research, and that no one is discriminated against on account of their gender.

We evaluated gender ratios on researcher teams across the Hypertension Programme using the GACD Researcher Database, and among participants of GACD Implementation Science Workshops from the attendance database. We also identified areas for further assessment, improvement and action.

The 15 teams included 183 project investigators and researchers, of whom 81 (44%) were female. The proportion of women listed as researchers or investigators ranged from 15% to 80%, with an average of 42% across the teams. There was a stark gender imbalance among the 64 project Principal Investigators – only 24% of listed PIs were female; a third of the 15 projects were led by all-male teams, and only one project was led by an all-female team (Figure 1). This likely reflects the broader issue of gender imbalance in cardiology and global health research across contexts. However, the GACD presents an opportunity to acknowledge and address issues of gender equality in global health research.

Figure 1. Gender balance on GACD Hypertension Programme project teams

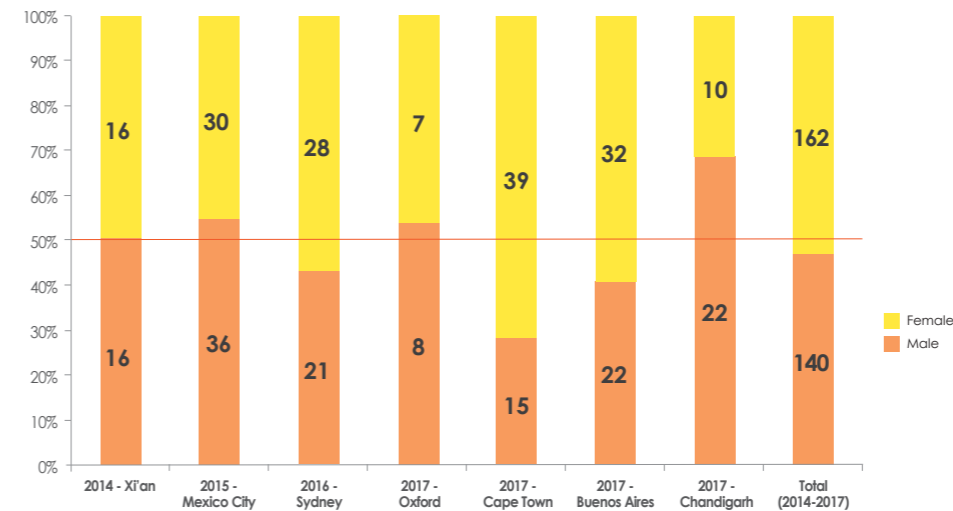


Note: Letters a-o refer to the 15 studies in random order. PI = Principal Investigator; RS = Research Staff

The gender balance among the 122 research staff (excluding PIs) was even – 51% of were female. However, while eight projects had more female than male research staff, two projects did not have any listed female researchers. The overall balance among non-PI researchers likely reflects more even gender ratios of younger cohorts of scientists. This is encouraging, and points to a role for the GACD to maintain and promote gender balance in its future Programmes and by continuing to build capacity in underrepresented group.

Overall, 54% of participants who attended GACD Implementation Science Workshops between 2014 and 2017 were female, with a wide range across locations (27% in Chandigarh and 72% in Cape Town, South Africa). This possibly reflects the gender ratio of local scientific communities in diverse locations who were encouraged to attend, and GACD researchers were from multiple Programmes.

Figure 2. Gender balance at Implementation Science workshops



How can the GACD get better at promoting gender equality across its programmes?

1. Invite feedback from GACD member agencies and researchers on how the GACD could address gender issues in the global health research community.
2. Assess gender ratio across GACD programmes and at the PI and researcher levels to understand patterns and trends.

Early Career Researchers in the GACD Network

How has the GACD contributed to the career development of early career researchers (ECRs) in the hypertension programme? Ten research assistants and PhD students from 9 hypertension studies shared their experiences with us.

ECRs spent an average of 4.5 years on GACD projects, providing several opportunities to engage and collaborate with other members of the Research Network. All ECRs published at least one peer-reviewed journal article during the project. Most joined at least one GACD Working Group, with those who participated in one or two reporting greater satisfaction from the experience than those who joined several. Five of ten ECRs collaborated with researchers from other GACD projects, and four of these collaborations resulted in peer-reviewed journal articles.

The perceived impact of the GACD on ECR's professional development was strongest in enhancing their knowledge and intellectual abilities. Working group discussions fuelled their interest in research methodology and behaviour change theory, exposed them to the importance of adopting an implementation science approach in collaborative initiatives, and gave them the opportunity to enhance their skills and focus on a key research area. ECRs also reported benefits in other domains of professional development, with notable positive enhancements to their personal effectiveness as researchers and ability to contribute to academic and non-academic debate through dissemination activities. As well as enabling them to succeed in obtaining individual fellowships, more than a third of ECRs felt that being part of the GACD Research Network had helped them progress in their careers through promotions or job opportunities.

How has being part of the GACD Research Network helped you advance your career as an Early Career Researcher?



“

It helped me obtain my PhD degree
Kim Anh Nguye, HT01, South Africa

It helped me apply for and successfully get an individual fellowship

Felix Limbani, HT05, South Africa
María Kathia Cárdenas, HT11, Peru
Johanna Otero, HT02, Columbia

”

ECR's feedback on GACD workshops and meetings



Participation in the implementation science workshops was another way of developing my skills and understanding (of) implementation science research. (The engagement) provided opportunities to informally consult other experienced researchers during the implementation period i.e. (for) paper review



Felix Limbani, HT05



ECR facts and figures

- Six of ten respondents worked as ECRs in LMICs.
- ECRs spent an average of 4.5 years on GACD projects, providing several opportunities to engage and collaborate with other members of the Research Network.
- All ECRs published at least one peer-reviewed journal article during the project. Most joined at least one GACD Working Group
- Participation in one or two working groups yielded greater satisfaction from the experience than participation in several.
- Five of ten ECRs collaborated with researchers from other GACD projects, and four of these collaborations resulted in peer-reviewed journal articles.



Knowledge and intellectual abilities



Knowledge and intellectual abilities

"Implementation (Science) workshops were a great help in terms of building knowledge and clarifying challenges with (other) researchers present"

"Being part of GACD, especially participating in working groups has enhanced my knowledge and skills in some of the respective focus areas i.e. task shifting, process evaluations"

Personal effectiveness



Personal effectiveness

"Being part of GACD network has indeed positively influenced my personal effectiveness as a researcher. Particularly, participating in ASM helped me to come up with mature and credible presentations worth presenting to seasoned researchers. This eventually impacted on how I organized and prepared my work"

How can the GACD better support Early Career Researchers?

1. The GACD Research Network did not have any direct influence on ECR's Research Governance and Organizational abilities - a missed opportunity to improve domain-specific skills (such as risk management, income generation, ethics and professional conduct) by harnessing the unique governance structure and collaborative environment of the GACD Programme.
2. Incorporating ECR participation and career development into formal programme objectives. Without this, access to training opportunities is not necessarily spread equitably across studies and regions. Including ECR capacity building into the blueprint and budgets of projects could prove more sustainable than an ad-hoc approach.
3. Ensuring that ECRs from LMICs are able to benefit from and maximize research training and support through the GACD Research Network, with access to additional skills building where necessary.

Research governance and organizational abilities



Research governance and organizational abilities

"The GACD Research Network did not directly influence (this domain). However, this was influenced (by) supervisors and senior researchers within our project team (who also are within the broader GACD network)"

"My involvement in the COUNCIL Initiative has had (a) positive impact on my broader engagement in contributing to science and dissemination"

"Being part of the GACD network made me notice the importance of partnership between different research groups and across disciplines"

Wider engagement and impact



Wider engagement and impact

"It gave me an initial view about how complex (it) is to do engagement, but also how fruitful and necessary"

Achieving wider impact through research

Chapters 3 and 4 present more detail on researchers' interaction and engagement with policymakers over the course of project cycles, and the policy relevance of their research for NCDs in LMICs, and the wider Sustainable Development Goals agenda, with examples from several of the 15 studies.

Data sharing

Researchers' spontaneity and enthusiasm for collaboration is evident in their attitudes to data sharing and active efforts to share data to strengthen the evidence base in their field. Several hypertension teams have already begun to share their project data for secondary data analysis, meta-analysis, and with study stakeholders to facilitate research uptake and decision-making. In the absence of mandates and formal structures, researchers have taken the initiative to derive more benefit from existing datasets.



Only **25%** of projects are required by funders to share their data

But **80%** intend to share data with other scientists and research stakeholder

And **60%** have already started sharing aggregated, disaggregated or process data

50% would support a central GACD Data Repository after all projects have published findings

However, a great deal of effort goes into harmonizing and standardising data collection on key concepts across projects and sites. This synchronised effort across a GACD Programme leads to a wealth of information that could be used to make valid comparisons across diverse settings, and also pool information for understanding an issue in more depth. Such a resource deserves a more systematic and formal structure to facilitate and sustain sharing of data with researchers beyond the GACD Research Network.

The GACD Research

Data Indexing Platform is intended to bring together metadata from all GACD projects after they have completed and published their results. Interested researchers can browse and search a list of variables spanning a range of measures, and approach project investigators or data proprietors for access and collaboration. As the first GACD programme, the hypertension projects have provided the metadata base with which to construct an online system for facilitating research partnerships and secondary data analysis. The platform can be accessed through the GACD website.

Case Studies: Influencing policy and practice at local and global levels

SUB-NATIONAL

Hosted by HT15 *the Ibadan Translating Research Evidence into Policy and Practice Forum (December 2017, Ibadan, Nigeria)*

Through the forum, the HT15 study team aimed to create awareness on the study's potential of serving as

- (1) a cost-effective post-discharge model for blood pressure management and recurrent stroke prevention in sub-Saharan Africa,
- (2) part of a scale-up strategy, and (3) a source offering a conceptual understanding of risk factors for stroke and integration of secondary prevention of stroke into stroke recovery program.

Who attended?

- 100 policy makers from the State Government of Oyo State, Ibadan
- Vice-Chancellors of Universities and Provosts College of Medicine, Chief Medical Directors of Teaching Hospitals, Civil Society Organizations and Media institutions



I am pleased to inform you that the (THRIVES) study is very appropriate and needful considering the increasing prevalence of stroke in our society. I wish to state that the Ministry of Health is highly interested and impressed with the research which is in line with our efforts to refocus on preventive healthcare



The Honourable Commissioner of Health,
through the Deputy Director,
Non-Communicable Diseases,
Oyo State Ministry of Health, Ibadan, Nigeria



INTERNATIONAL

(HT-06): Contribution to a practical global guide to implementation research & capacity building

Dr. Brian Oldenburg, a Chief Investigator for HT06 ('Improving the control of hypertension in rural India: Overcoming the barriers to diagnosis and effective treatment') collaborated with the WHO to develop 'A guide to implementation research in the prevention and control of noncommunicable diseases', which offers guidance and tools to support research on interventions recommended within the WHO Global Action Plan for the Prevention and Control of Noncommunicable Diseases 2013–2020.

Prof. Oldenburg has led the GACD's Implementation Science Workshop series, conducted alongside the GACD Annual Scientific Meetings, since 2012. These workshops are now rolled out more regularly at the request of GACD Member Agencies ahead of upcoming funding calls. As the field of implementation science has evolved since 2012, the workshops have transformed from a focus on training early-career researchers to dynamic forum for researchers at multiple levels of experience to continually develop their knowledge and skills in the field. The most recent workshop in Argentina in 2017 included over 72 researchers, both within the GACD Research Network and local Argentine researchers not funded through the GACD, creating new opportunities for capacity building and network development through the GACD.

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Chapter 3 Policymakers and Implementers

Introduction

Who should read this chapter?

- Policymakers and implementers at national and subnational levels
- Healthcare providers and public health programme managers



HIGHLIGHTS

What did the studies find?

- Salt-reduction interventions demonstrate potential to achieve the WHO's target of 30% reduction in salt intake by 2025 in China, and contributed to the development of government proposals to tax salty processed foods in Samoa, among other findings.
- The HOPE-4 (HT02) curriculum was adapted into a training manual as part of the WHO's HEARTS Technical Package.
- Task-shifting interventions reduced participant blood pressure - demonstrating opportunities for increasing access to care, freeing up physician time, improving system efficiency, and bringing new stakeholders together.

Experiences:

- GACD provides a platform for nurturing relationships and collaboration between policymakers and researchers, making contributions toward closing the 'evidence to implementation' gap within a short time frame.
- GACD supports national efforts to enhance NCD research capacity: 70% of GACD funding agencies note that GACD studies have achieved tangible policy and public health impact.
- **Building the actionable NCD evidence base:** GACD-funded projects contribute directly to the evidence base on actions to address NCDs through stronger health systems, preventive action, and better diagnosis and management.



Key questions for policymakers:



1. **How much** are diverse sectors or agencies in your country investing in implementation research and research capacity development for NCDs?
2. **What kind** of evidence do you require from implementation researchers in the context of your national NCD agenda? Do you have relationships with researchers conducting high-quality science in this domain?
3. Which **task-shifting strategies** or **health system interventions** are currently implemented or would you consider implementing in your country or district?
4. Which **salt reduction** or **behaviour-change strategies** are currently implemented or would you consider implementing in your country or district?
5. How can engagement with the research community (especially Early Career Researchers) in your country be a mutually beneficial endeavour?

This chapter provides an overview of the Hypertension Programme, as the inaugural GACD funded program. It highlights key findings from the hypertension studies and identifies achieved and what has been learnt.

The role of implementation research in achieving national goals and targets for NCDs

Policy and programmatic interventions aimed at reducing NCDs result in enormous benefits for the social and economic well-being of countries and improving population health¹³.

A primary aim of the GACD, as a network of researchers and an alliance of national and international health research funding agencies, is to provide policymakers and implementers with evidence to develop and scale-up strategies to improve health outcomes. Bridging the 'evidence-into-implementation (or action) gap' can reduce suffering, death¹⁴ and healthcare costs¹⁵, as well as setting countries on the path to achieving the global target of reducing NCDs and mental illness by 30% by 2030^{16, 17}.

Plenty of (NCD) policies have been drafted, but structures and resources to implement them are scarce. The challenge is not only to gain political support, but also to guarantee implementation, whether through legislation, norms and standards setting, or investment.

Co-Chairs of the WHO Independent High-Level Commission on Noncommunicable Diseases (17)

Highlights of the findings

GACD Hypertension projects made key contributions in four key areas of hypertension prevention and control, see study summaries (p.12).

Table 1: Summary of completed project findings

Diagnosis and Management of Hypertension	In Argentina, a community health worker -led multicomponent intervention significantly reduced systolic blood pressure by 6.6 mm Hg and diastolic BP by 5.4 mm Hg compared with usual care over 18 months in patients with hypertension.
Health Systems	In Ghana, the addition of a nurse-led intervention for hypertension control led to a greater reduction in systolic BP than health insurance coverage alone, with a difference in reduction of 3.6mm Hg (p=0.021) at 12 months. In rural South Africa, strengthening community-based outreach services for management of hypertension did not reduce population levels of uncontrolled hypertension, but lay workers improved clinic functioning and overall attendance.
Pharmacological Prevention and Management	In Sri Lanka, treatment with a fixed-dose combination pill containing 3 antihypertensive drugs led to a significant increase in the proportion of patients achieving their target BP goal (70%) compared to usual care (55%) at 6 months.
Prevention	In China a school-based education programme was effective in not only lowering salt intake among children and their parents, but lowering their parents systolic BP by 2.3 mm Hg. In India, mean salt consumption exceeds the WHO recommendation of 5g/day. Population salt consumption practices offer an opportunity for a government-led national salt education intervention .

In addition to the results previously summarised, we provide context on two types of interventions for hypertension prevention and control used in GACD Hypertension studies (see the full overview of study findings on p12):

Task-shifting to non-physician health workers

Salt reduction efforts

These have been explored in disparate country contexts and capture possible strategies to achieve outcomes through health systems, health behaviour change, or regulatory/legislative action.

Task-shifting to improve hypertension detection and management

Why task-shifting?

- Many countries have struggled with evidence gaps and obstacles in the implementation of such findings.

Evidence from the HT studies

Task-shifting for hypertension detection and care was investigated in eight of the fifteen GACD Hypertension projects and these targeted screening, referral to physicians, lifestyle counselling, and support for medication adherence²⁰. The studies have generated practical insights into the barriers and enablers to effective task-shifting, as well as some cost-effectiveness results, across study settings of Ghana²¹⁻²³, Argentina²⁴, Colombia, Malaysia and Canada²⁵, South Africa²⁶, India and Kenya²⁷.

Results from Ghana (see Box 1) and experiences shared from the HOPE-4 study in Malaysia and Columbia (see Box 2) demonstrate the opportunities that task-shifting offers in increasing access to care, freeing up physician time, improved system efficiency, and bringing new stakeholders together.

Relevant WHO NCD targets:

- A 25% relative reduction in the prevalence of raised blood pressure or containment of the prevalence of raised blood pressure, according to national circumstances.
- At least 50% of eligible people receive drug therapy and counselling (including glycaemic control) to prevent heart attacks and strokes.

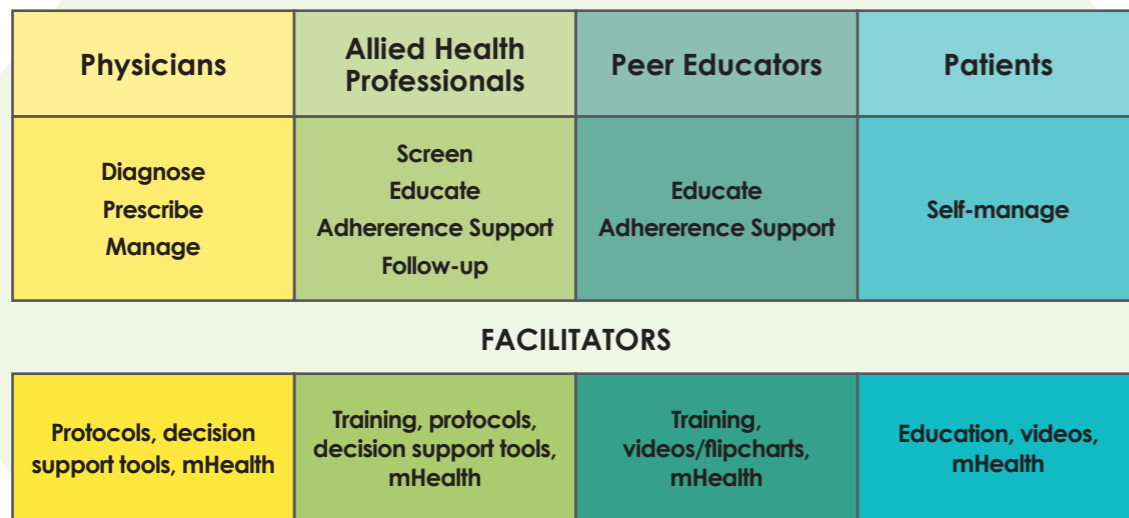


Figure 1. The process of task-redistribution for the management of hypertension adapted from the WHO's recommendations on task-shifting. (20)

Box 1. Nurse-led task shifting improves hypertension management and control in Ghana (HT12)

The TASSH study (HT12) provided important evidence on the effect of two systems-level strategies: the provision of health insurance coverage alone and with task shifting through nurse-led hypertension control using the WHO Package of Essential Noncommunicable (PEN) disease interventions, in reducing systolic blood pressure and improvement in BP control among patients with uncontrolled hypertension in a low-resource setting^{21,23,28,29}.

The intervention led to a greater reduction in systolic blood pressure than health insurance coverage alone.

The study involved a cluster randomized controlled trial conducted among 757 patients across 32 community health centres in Ghana.

Next steps recommended to scale up such a nurse-led strategy in sub-Saharan Africa:

- A cost-benefit analysis
- Policies that give nurses prescribing power to treat patients with uncomplicated hypertension, similar to current policy for HIV treatment

Understanding the context, process of implementation, stakeholder perceptions and sustainability of a task-shifting intervention for hypertension control

The TASSH study team identified key factors likely to influence the scale-up and dissemination of evidence-based CVD prevention activities:

- Thorough understanding of the benefits and drawbacks of the programme
- Participant awareness and understanding of the programme
- Understanding reasons for participating or not participating

If all nurses received even brief training in hypertension management and control, major public health benefits are likely to be achieved in low-income countries like Ghana.



Box 2. HOPE-4 (HT02) Study: Global collaboration and building partnerships across local contexts to achieve NCD targets

The non-physician health worker (NPHW) task-shifting training curriculum used in HOPE-4 was developed in conjunction with the WHO. The robust curriculum development, testing, and implementation processes put in place confirmed that NPHWs in diverse settings can be trained to implement measures for CVD prevention and control³⁰.

Impact of the collaboration between HOPE-4 researchers and the WHO:

- The HOPE-4 curriculum has now been adapted into a training manual for primary health workers (PHWs) as part of the team care and task-sharing element of the WHO's HEARTS Technical Package.
- The training manual will be provided as a template to adapt to country manuals to train PHWs in integrated management of CV risk factors

Continuous stakeholder engagement in Columbia and Malaysia

Policymakers, health care providers and patients were interviewed as part of formative research in Columbia and Malaysia³¹.

- This identified context-specific factors, such as traditional health beliefs (Malaysia) and fragmentation of provision (Columbia), and informed development of a multifaceted intervention package for CVD prevention in each country.
- Policymakers and community stakeholders are provided with regular updates by national study leaders in each country and will be involved in dissemination of the results of the study and associated process evaluations.



Reducing salt intake to
less than 5 grams per day
(about 1 teaspoon)

will save around
2.5 million lives every year



Box 4. A low-cost, cost-effective population-wide salt reduction strategy in India to prevent hypertension (HT09)

The HT09 study team produced important evidence that a multifaceted salt reduction programme for India, would prevent many cases of hypertension, strokes and heart attacks through low-cost and cost-effective means^{33,34}.

This would enable the country to make significant progress on its commitment to SDG Target 3.4 to reduce premature mortality from NCDs by one third.

Salt reduction and substitution

Why salt reduction?

As of 2015, 75 countries had strategies in place to achieve the salt reduction target³². New evidence from the GACD on innovative interventions for salt reduction in China, India, and Fiji and Samoa, and for salt substitution in Peru, offers novel insights and opportunities for governments to develop and implement such strategies to reduce hypertension.

Relevant WHO NCD targets:

- Reduce the average population salt intake by 30% by 2025
- A 25% relative reduction in the prevalence of raised blood pressure or containment of the prevalence of raised blood pressure



The problem: Excess population-wide salt consumption

- Salt consumption in Delhi/Haryana and Andhra Pradesh were approximately 9.45 g/day and 10.41 g/day, respectively— about twice the WHO – recommended maximum of 5 g/day.
- Excess salt consumption was found across urban and rural populations, all sexes and age groups, and across diverse groupings for employment and education levels.

Population knowledge and behaviours are amenable to intervention

- participants reported favourable knowledge and behaviours to minimise risks related to salt consumption.
- knowledge, behaviours and salt consumption patterns did not appear to differ based on level of education.

Action needed in the context of low industry compliance and unhealthy products

- Compliance with nutrient labelling among retail stores in Delhi and Hyderabad improved from 2010, but still remains low.
- Packaged food products were found to have high levels of sodium and no evidence was found that Indian packaged foods are becoming less salty.
- Healthiness of food and beverage products from India's 11 largest companies was found to be low, with substantial variation in the mean healthiness of product portfolios between companies.

Commendable government action to build upon:

The Food Safety and Standards Authority of India (FSSAI) developed guidelines in 2015 to decrease availability of foods high in fat, sugar and salt (HFSS) in and around schools through developing school canteen policies, regulating advertisements of HFSS foods to school children.



Box 5. School-EduSalt (HT04): China could achieve a 30% reduction in salt intake by 2025 through a population-wide education programme aimed at salt reduction^{36,37}

A primary school education programme could have substantial health and potential economic benefits if implemented across China – a country with over 270 million people living with hypertension^{35, 37}.

Salt consumption was found to be above the WHO-recommended maximum in both children and adults in the northern province of Changzhi

Salt intake was effectively lowered among kids and their families by incorporating lessons into the usual national health education curriculum over the course of one school term (about 3.5 months). Thus, these results should be broadly applicable to most schools in China.

These lessons focused on:

- the harmful effects of salt
- strategies to reduce salt intake
- messages on salt reduction to be delivered by children to their families

Salt reduction and iodine fortification at the population level:

A reduction in salt intake by about 25%, close to the WHO's target of 30% reduction by 2025, in Changzhi province did not compromise iodine status in children and adults. These findings provide strong support for the WHO's recommendations to reduce population salt intake.

Key take-away: The WHO's target of 30% reduction in salt intake by 2025 could be achieved in China if an education programme was implemented nationwide and is projected to have a large impact on reducing morbidity and mortality from cardiovascular disease.



Box 6. Salt reduction strategies in Fiji & Samoa: From evidence to policy and recommendations (HT10)

Policy aim: The research team in Fiji and Samoa (HT10) sought to introduce maximum levels for salt in foods through voluntary targets (in Fiji) and through food regulation (in Samoa).

Interventions: The WHO's framework for Creating an Enabling Environment for Salt reduction was used as the basis for multi-faceted intervention programs aimed at reducing salt in the food supply and increasing public awareness through media and community mobilization campaigns³⁸⁻⁴⁰.



Finding highlights:

- The intervention did not change population salt intake in either Fiji or Samoa, but did create widespread awareness of the importance of salt reduction for cardiovascular health (73%) and 75% of people surveyed had heard about the campaign.
- Salt reduction efforts had been mainstreamed into government programs but the voluntary targets and regulations for salt had not been implemented or monitored, so had little impact.
- Salt intake is above the WHO-recommended level in these regions.
- The Pacific Islands have some of the highest rates of diet-related diseases so have an urgent need to implement much-needed policies to lower salt in the food supply.

Engagement & collaboration between policymakers and researchers: a key to implementation, sustainability and evidence-informed policy

- The study was guided and coordinated by a technical advisory group, led by The George Institute for Global Health, with experts from the Ministries of Health (MOH), WHO, universities, and other national food and nutrition stakeholders.
- In-country research teams worked closely with the Health Ministries in implementing the projects and overcoming challenges affecting the projects, such as changing political environments, working across diverse sectors and engagement of the food industry.

Impact

- Study recommendations are being acted on through the new Fiji Nutrition and Food Security Policy and Framework 2018–2022 as well as the Fiji Action Plan for Nutrition.
- The project contributed to the development of government proposals to tax salty processed foods in Samoa

"This is a great project. We now know what the nations' salt intake is and we have structures and strategies in place to reduce it. It would be a shame now if it didn't continue. The work needs to be incorporated into the Wellness Centre and the FT-TAG {technical advisory} group needs to be mandated to oversee ongoing implementation." - Stakeholder, Fiji

The importance of process evaluation:

- The process evaluation demonstrated both the challenges and the added value of the research project.
- The changing political environment (elections), a natural disaster (Cyclone Winston), and the limited timeline of the intervention all contributed to low intervention fidelity and reach.
 - In Samoa, the time taken to establish regulation meant that the policy intervention wasn't implemented during the timescale of the project and the cultural attitudes towards food and feasting likely contributed to

the lack of intervention effect on salt intake.

- The study provided actionable evidence that people are eating well above the recommended salt levels in Fiji and Samoa,
- The intervention increased community awareness of the importance of salt reduction
- The study mainstreamed salt reduction efforts in governments and establishment of mechanisms to engage with the food industry in relation to food and nutrition in Fiji and increasing political readiness for regulation in Samoa.

Key recommendations:

1. Regular long-term monitoring of salt intake (using WHO STEPS) in relation to the WHO recommended salt target of less than 5g/day
2. More research on the impact of regulation in changing the food environment over the long-term and the most effective population behaviour-change strategies.
3. Increased capacity for strengthening and monitoring policy implementation in small island states, such as Fiji and Samoa.

What has the Hypertension Programme accomplished?

In addition to the production of valuable knowledge and evidence we asked GACD Researchers, Funding Agency Members, the Board and Management Committee about what they thought the GACD has accomplished through its first programme on hypertension.

GACD provides a much-needed global structure with resources from diverse health research funding agencies to facilitate and support the implementation of strategies to reduce preventable suffering and death from NCDs, widely reported and recognized to be inadequate on the path to achieving the global target of reducing NCDs and mental illness as described above.

Investment through international collaboration

Over US\$23 million was invested in the Hypertension Programme as 4 funding agencies came together for this first round of funding in 2012. In part due to the early successes in collaborating through the Hypertension Programme, the most recent GACD funding programme is committing well over US\$50 million to a broader call for research on intervention scale-up related to hypertension and diabetes.

KEY LESSONS LEARNED

With future funding opportunities often unclear, researchers are frequently concerned about sustainability of their work, opportunities for scale-up of effective interventions, and whether findings will be utilised and built upon. This could potentially affect how research projects are approached and their outcomes.



Evidence for NCD policy & action

The study summaries (p.12) highlight the evidence produced by each of the projects across diverse settings that have increased the knowledge base for national, regional and global action on NCDs.

Of 12 projects that responded, 8 have plans for scaling up their intervention (6 at national, 3 at regional, 3 at a global, and 1 at a local level) and the remaining 4 are exploring the potential for scale-up. Half of funding agency representatives surveyed said that a key impact of the Hypertension Programme was that evidence uptake was potentially greater due to policymaker engagement during the study. While enhanced local and national impact of research and translation of research into policy or practice in LMICs was viewed as a key benefit of engaging with the GACD, it was not the primary reason for remaining engaged for the majority of funding agency representatives (see Chapter 1).

Research capacity strengthening

Researchers reported improved capacity for high-quality health and implementation research in LMIC institutions and particularly among early-career researchers (see Chapter 2) related to the prevention and control of NCDs. Similarly, the ability to make greater contributions to the field of implementation science and to build research capacity in LMICs was one of the top reasons that funding agencies continued to engage with GACD. The GACD approach should therefore be of particular interest to governments who are interested in strengthening their national health research infrastructure and fostering collaboration between research and policy institutions.

KEY LESSONS LEARNED

Many LMIC researchers conduct research through collaboration with high-income country institutions, and the GACD's objective of strengthening researcher capacity in LMIC institutions will require sustained engagement and efforts to support cohorts of researchers over several Programmes.



Collaborations to move from evidence to action

When and how did decision-makers and researchers engage with each other?

Hypertension studies involved decision-makers at diverse stages of the project cycle (Figure 2).

Figure 2. Engagement with key decision-makers by study stage

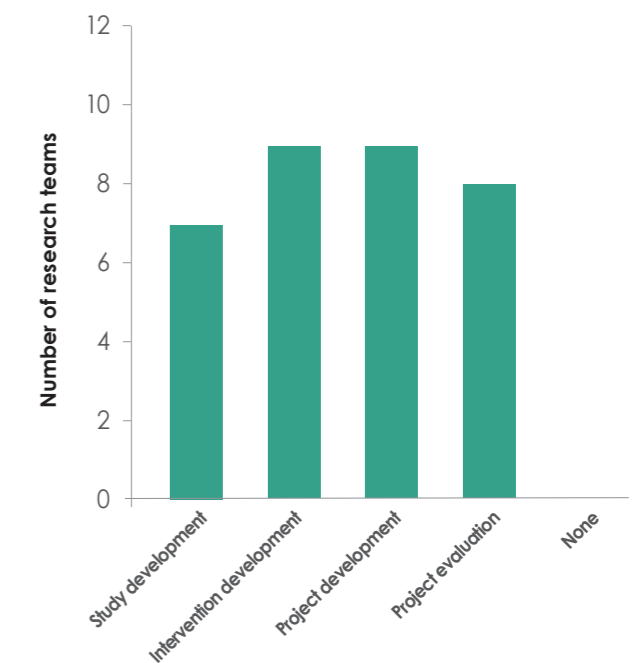
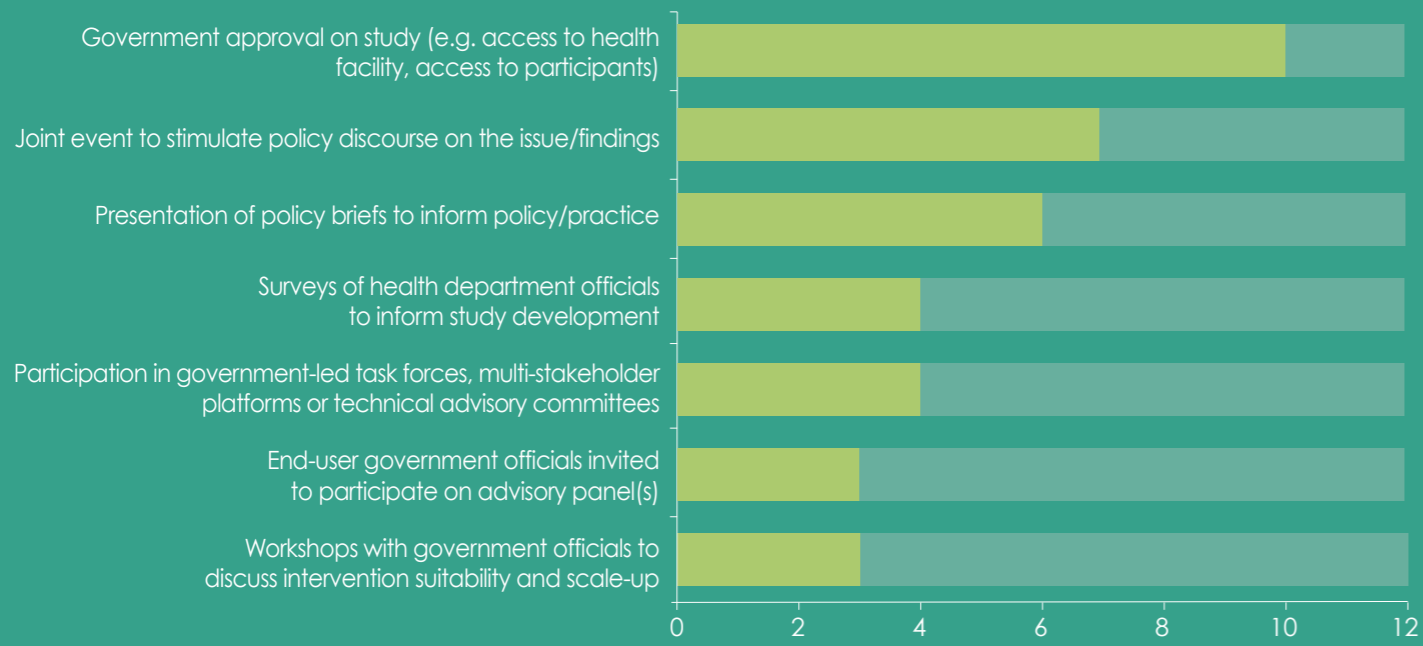


Figure 3. How did research teams engage with policy- and decision-makers?



The most common mechanism of engagement reported (see Figure 3) - seeking government approval for the study and inviting a discussion on the issue and findings - suggests that meaningful engagements between researchers and decision-makers could still be improved in many research teams. Although most study teams report positive and worthwhile interactions with key decision-makers (9/12 teams), 3 study teams reported either neutral or very negative interactions on such engagements. These reports suggest that more could be done to support study teams in facilitating meaningful engagement with decision-makers.

The case studies for salt reduction in India, Fiji and Samoa in this Chapter provide a few examples of how constructive and fruitful engagements played out during these studies and their outcomes.

Researchers from 7 of 12 surveyed teams reported greater interaction and more effective engagement with policymakers during their GACD hypertension project compared to research they have done in the past. Additionally, policy roundtables at Annual Scientific Meetings and workshops brought together researchers, Funding Agency representatives, and policymakers over several days each year to develop shared understanding of each other's priorities and interests. Funding Agency representatives reflected that the GACD model resulted in a change in relationships and greater trust among researchers and policymakers.



Is engagement with decision-makers beneficial for early-career researchers?

Early-career researchers reported positive effects of stakeholder engagement on their ability to attain wider impact through their work. This speaks to the importance of fostering strong relationships between policymakers and researchers, to both improve evidence-informed and sustainable implementation of NCD efforts and to encourage and build national research capacity.

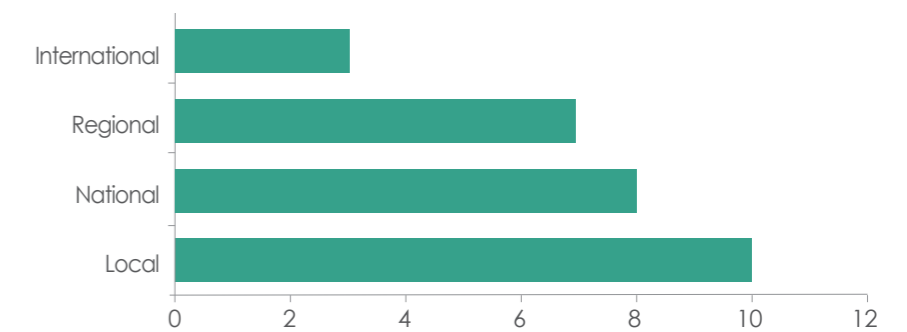
Where did most collaborations take place?

Collaborations between researchers and decision-makers have mostly been at the local and national levels (Figure 3). Researchers from various GACD projects reported real policy influence, as exemplified in the Case Studies (see p.42-43).

KEY LESSONS LEARNED:

- Most researchers' engaged with decision-makers in seeking study approval, and less around engagement in other ways. Further discussions with researchers and policymakers may enable a better understanding of what has worked, what has not, and why.
- Projects engaged primarily with decision-makers at local, national or regional levels. This has been key to building partnerships where they have most impact.

Figure 3. Levels at which researchers and decision-makers collaborated



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Chapter 4 International Agencies and Organisations

Introduction

Who should read this chapter?

- Representatives of United Nations Agencies and from other multilateral institutions, such as the World Bank
- Advocates, researchers and other experts from civil society organisations within mandates guided by the Sustainable Development Agenda

KEY MESSAGES

- These projects have had a demonstrable impact on the global NCD agenda through high-quality implementation research, translating global commitments into local action
- Outputs of the GACD Network have made contributions to Sustainable Development Goal 3 for health by contributing evidence to improve health systems and preventive action, strengthened research capacity and knowledge sharing on NCD research, and created new partnerships between 14 research funders and research institutes in 66 countries
- The GACD is a rich network of research expertise to inform and achieve contextually-appropriate scale-up of interventions that work.

This chapter provides a reflection on the contribution of the Hypertension Programme and the early experiences with the GACD model to the broader global health and NCD agenda. We highlight experiences from building and working with a global community of practice on implementation science for NCDs – the GACD Research Network.



The Hypertension Programme: contributions toward evidence and action for progress on global NCD prevention and control

A common message that has been continually emphasized in the global discourse on NCDs, particularly in the lead up to the third UN High-Level Meeting on NCDs in September 2018, is that the time is now overdue for national and local action on NCDs.

In addition to the actionable study findings produced by each of the studies (see p.12), the Hypertension Programme has created channels to support national efforts through the exchange of information on best practices and to support global dissemination of NCD prevention and control research in diverse local contexts. Such action was proposed to international partners in the WHO Global Action Plan for NCDs, along with the need to build alliances and initiatives for partnerships aimed at implementation, monitoring and evaluation of national and regional NCD action plans. Through the Hypertension Programme, collaborations between researchers and decision-makers have mostly been local (10 of 12), national (8 of 12) and regional (7 of 12), with less emphasis placed on engagement with international stakeholders (3 of 12) (see Figure 2, Chapter 3). This focus on local and national engagement of decision-makers has resulted in real policy influence (see Chapter 3).

With a Research Network of over 900, there are plentiful opportunities and immense potential to continue to improve implementation of evidence-based NCD solutions at local and national levels through the GACD, as well as strengthen avenues to hold governments accountable to their NCD commitments toward progress on the Sustainable Development Goals.

Box 1. GACD contributions on NCDs toward the Sustainable Development Goals

The six SDG strategic objectives to reduce NCD burden by 30% by 2030

The GACD contribution toward these objectives

1 To raise the priority accorded to the prevention and control of NCDs in global, regional and national agendas and internationally agreed development goals, through strengthened international cooperation and advocacy.

Joint research programmes between 14 national and international funding agencies, with researchers from over 250 research centres across low, middle- and high-income countries cutting across NCD research domains, with strong collaborations and engagement with policymakers, implementers and communities.

2 To strengthen national capacity, leadership, governance, multisectoral action and partnerships to accelerate country response for the prevention and control of NCDs.

Grants are structured to build in-country research capacity where it is needed and facilitate partnerships and mutual support between researchers and policymakers. For example, a programme implementer or policymaker is required to be a part of the study team applying for GACD grants.

3 To reduce modifiable risk factors for NCDs and underlying social determinants through creation of health-promoting environments.

Implementation research conducted to enhance understanding of local contextual factors and their influence on interventions to create health-promoting environments. Contextual lessons were incorporated directly into the intervention implementation. Across studies, common themes such as service provision, equipment or information, and stakeholder engagement, were found to describe how contextual lessons were incorporated into the intervention.

4 To strengthen and orient health systems to address the prevention and control of NCDs and the underlying social determinants through people-centred primary health care and UHC.

Implementation research conducted to better understand how health systems can be strengthened and local patient and provider needs to effectively deliver interventions for primary care. Researchers engaged with Ministry of Health representatives and programme implementers during GACD training workshops, policy roundtable events and throughout their research projects to this end.

5 To promote and support national capacity for high quality research and development for the prevention and control of NCDs.

Emphasis on strengthening capacity of LMIC researchers and the GACD Research Network provides an 'interactive lab' to address research challenges collectively and promote their work through a global audience

6 To monitor the trends and determinants of NCDs and evaluate progress in their prevention and control.

Implementation research in complex real-life ecosystems can provide new insights into trends, determinants and provide evidence on progress for NCD prevention and control



The value (of the GACD) is in having a formal structure (needed) for collaboration and discussion. There was fruitful discussion early on around harmonization of methods, measurement, and implementation science. The intangible benefits are immense. (The) GACD brought together lots of different scientists from various fields under one umbrella, with the added benefit of standardized measurement of the outcome



Tara McCready,
GACD Researcher

Global experiences through the Hypertension Programme

A global community of practice for NCD research

The GACD facilitates joint activities involving all funded research teams, with the objective of identifying commonalities across research studies, sharing knowledge and adapting successful approaches within a culturally relevant and practical context.

Project teams reported that the most valuable aspect of the GACD Research Network was the formal platform given for sharing and consolidating knowledge across diverse research topics. These include the design, implementation and evaluation of various CVD interventions to effectively reduce the hypertension burden across diverse contexts, as well as methods and approaches for conducting high-quality implementation science. Teams noted similarities in the experiences across hypertension studies in different countries that enabled them to collectively brainstorm and iterate solutions to research challenges.

Networking and cross-promotion of diverse research projects through a global network of support were also reported as key benefits by researchers, with most projects reporting very successful (6 of 11) or somewhat successful (3 of 11) collaborations between different country institutions. In Chapter 1, further details are provided on scientific outputs, joint publications and the wider impact of the hypertension projects.

With a goal to build a new and vibrant global community of practice for NCD research, the GACD Research Network has brought together implementation researchers working across Diabetes, Lung Diseases and Mental Health programmes launched in 2014, 2016 and 2017 respectively. With the conclusion of the Hypertension Programme, researchers reported that their most constructive engagements were within the Hypertension Programme itself, but many also noted useful engagements with researchers from other disease-focused areas. As the GACD is responding to Member Agency and researcher calls to move beyond research on single diseases, this may be an opportunity to further strengthen and enable a truly diverse NCD research community of practice.



We identified similar challenges with conducting implementation science in our various settings and began to brainstorm possible solutions



GACD Researcher

Shared contributions toward the field of implementation science

The Hypertension teams jointly explored and pioneered many new ideas, methods and concepts in the relatively young field of implementation science over the course of these projects. Both researchers and agencies felt it is in many ways too early to measure the overall impact that the GACD has had in shaping this field of research (more in Chapter 2).

1. Breaking down disease-specific research silos through GACD Working Groups

GACD working groups are unique in that they enable researchers at various stages in their careers to come together to address important cross-cutting questions, themes and shared interests related to advancing NCD implementation research. These have been a pivotal mechanism to facilitate ongoing collaborations across projects, diseases, and contexts. Table 1 (p28) provides an overview of the working groups and their outputs to date.

The interactions between working group colleagues led to other joint projects and endeavours in over half of the participants (6 of 11), and 73% (8 of 11) believed such joint projects would emerge in the future.

Box 2. COUNCIL Initiative: Control UNique to Cardiovascular diseases In Low- and middle-income countries

Made up of over 75 global experts from the GACD Research Network, the COUNCIL initiative convened to review the relevant existing CVD treatment and control guidelines in LMICs and to draw together information to structure and develop pragmatic guidelines and implement them using innovative/pragmatic techniques and channels.

Assessing current hypertension guideline needs

Through the 2011 Political Declaration, governments committed to the "development and use of evidence-based guidelines" for NCDs. Systematic reviews published by this group demonstrate the dearth of hypertension guidelines, or guidelines not accessible through online sources, across LMICs. Many LMIC guidelines did not specify the level of evidence or address how to manage multiple chronic conditions. Additionally, stroke prevention guidelines across LMICs were limited, and where they existed often lacked in rigor and a strong evidence base, took the form of brief summaries, or were not fully accessible.

"Hypertension guidelines are necessary for proper and adequate prevention, early detection, evaluation, treatment and control of hypertension. However, they must meet basic criteria including validity, reliability/reproducibility, clinical applicability, clinical flexibility, socioeconomic and ethical-legal contextualization, clarity, multidisciplinary process, scheduled review and rigorous dissemination plan. Unfortunately, none of the available guidelines meet all of these criteria".

(Owolabi, Miranda, et al. 2016)

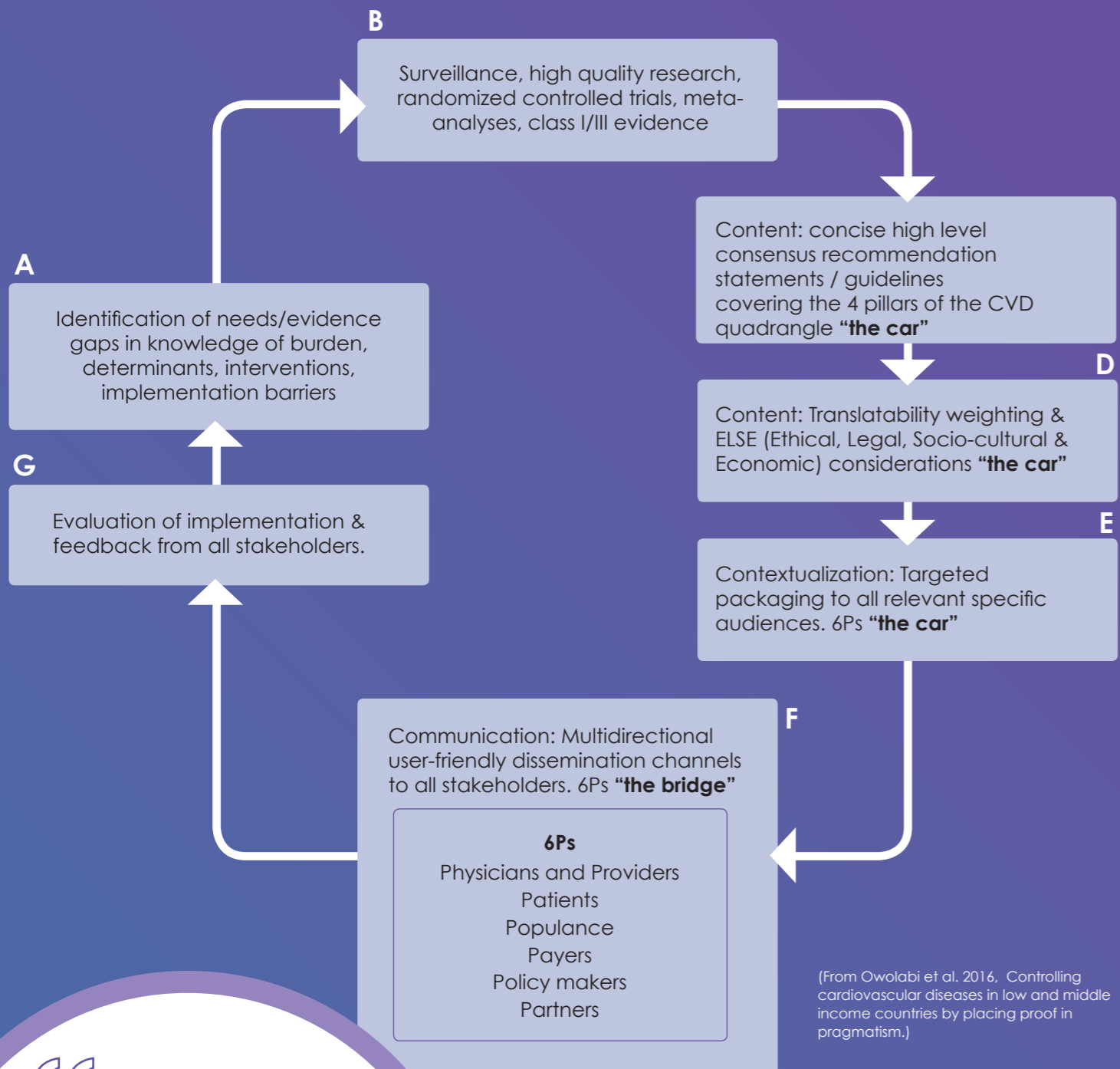
A pragmatic guide for implementing context-relevant guidelines

CVD control therapies and interventions that are proven to work in high-income countries may not be pragmatic for LMICs. With a relative paucity of locally conducted research, care providers may look to the available evidence base from high-income settings even though the patient needs, as well as socioeconomic, structural and political contexts are wholly different.

Implementation of practice guidelines is often a challenge, for two main reasons: (1) they may not be effectively communicated with the key stakeholders that will put them into practice and (2) they are developed based on what is deemed the strongest available evidence-- generally from clinical trials that test one thing at a time, which often poorly consider the implementation in the reality of complex ecosystems.

The COUNCIL group developed a novel guideline implementation cycle, which offers a blueprint to holistically deploy CVD solutions despite limited resources. The cycle offers a map from the generation of new evidence in complex implementation environments, to processes for guideline development, contextualisation, stakeholder engagement, communication and feedback. A translatability scale has also been proposed by the group to grade expected ease of implementation of various elements of guidelines, with recommendations for resource-limited settings.





(From Owolabi et al. 2016. Controlling cardiovascular diseases in low and middle income countries by placing proof in pragmatism.)

“The COUNCIL Initiative, among others... (resulted in) engaging, stimulating and efficient collaborations and partnerships that translated to the extensive scientific reviews and publication of papers on need for incorporation of an implementation and translatability scale in the development of pragmatic guidelines for CVD prevention, treatment and rehabilitation in LMICs.”

GACD Working Group participant

Contextualizing COUNCIL with a commitment made by governments in the 2011 Political Declaration:

“According to national priorities, give greater priority to surveillance, early detection, screening, diagnosis and treatment of non-communicable diseases and prevention and control, and to improving accessibility to safe, affordable, effective and quality medicines and technologies to diagnose and to treat them; provide sustainable access to medicines and technologies, including through the development and use of evidence-based guidelines for the treatment of non-communicable diseases, and efficient procurement and distribution of medicines in countries; and strengthen viable financing options and promote the use of affordable medicines, including generics, as well as improved access to preventive, curative, palliative and rehabilitative services, particularly at the community level...”



2. Shared learnings and new opportunities through Annual Scientific Meetings

Through the Annual Scientific Meetings (ASM), most recently hosted in Buenos Aires in 2017, GACD research teams and funding agencies meet to develop and discuss opportunities for joint activities, share best practices and learn about new ways of engaging policymakers. Similar to the working group experiences reported, early-career researchers, particularly those from LMICs, strongly emphasized the importance of the ASMs as a platform to learn from various research groups and diverse study approaches for their own research projects.

“Some of our (study intervention) components were a direct result of having gained new insights from the GACD workshops.”

Hypertension Programme researcher

“Workshops on implementation research were very useful and a great experiences to share with others and to replicate in other contexts.”

Hypertension Programme researcher

Box 3. Policy & Knowledge Translation Roundtables: Getting from science to policy and practice

At each of the Implementation Science Workshops, the GACD has hosted roundtable events entitled “Moving research from policy to practice”. These roundtables bring together researchers, policymakers, programme implementers and funding agencies to discuss effective knowledge translation from the perspectives of these key stakeholders. The roundtables to date have included representatives and key decision-makers from the Public Health Foundation of India, the Indian Council of Medical Research (ICMR), the European Commission, Australia’s National Health and Medical Research Council (NHMRC); Chief Director of NCDs Non-communicable diseases at the National Department of Health, South Africa; the South African Medical Research Council (MRC), the Heart & Stroke Foundation of South Africa; Directorate of Health Promotion & Control of NCDs, National Ministry of Health, Argentina; the U.S. National Institutes of Health (NIH), São Paulo Research Foundation (FAPESP), as well as GACD researchers with expertise in knowledge translation. This provides a unique space for researchers to interact with and better understand the priorities, interests and experiences of both research funding agencies and policymakers. Such understanding may improve both efforts for knowledge translation and policy influence, as well as inform applications and proposals for research funding to better align with the requirements of funders and the research needs of policymakers.

Capacity building for research: a necessity to address NCDs and achieve the Sustainable Development Goals

Fostering research partnerships across institutions in HICs and LMICs enables knowledge sharing and capacity building in a unique and critical way for NCD research, with particularly noteworthy benefits reported in both research outputs and skills and knowledge by LMIC researchers and early-career researchers.

Bringing up a new generation of NCD researchers:

- Most ECRs joined at least one GACD Working Group, and collaborated across GACD Hypertension projects. Notably, their engagement often led to peer-reviewed publications - an important tool for career progression.
- ECRs engaged directly with study participants, policymakers and local government officials and civil society organizations, and reported positive effects of engagement on their ability to attain wider impact through their work (e.g. engagement with media led to collaborative production of an educational video for the study)

Beyond north-south collaboration: knowledge flows both ways

Going beyond north-south collaboration, the GACD has created a space where knowledge can flow both ways, and has provided pluralistic opportunities for scientists to contribute equally across contexts through dialogue and mutual learning. Further information on North-South and South-South collaborations can be found in Chapter 1.

“

GACD is so novel because it allows an “interactive lab” where you can speak with other researchers as challenges arise, you don’t have to wait until the next scientific meeting.

”

Hypertension
Programme Researcher



“

It has given us a lot of international recognition and put us on the radar. And locally it has given us the chance to have other conversations with people that are important... We have been asked to sit on the national committee on salt/reformulation, making us a group of people to be listened to, with credentials that are internationally recognized.

”

Jaime Miranda,
GACD Researcher



Where next for the GACD?

What has the GACD Hypertension Programme achieved?

The coordinated funding mechanism and shared platform of the GACD Research Network offer national funding agencies the opportunity to invest in high quality research, reducing the time it would take to achieve these individually. The Hypertension Programme has been a crucible for research capacity building in LMICs, particularly by inspiring early career researchers to develop their knowledge and skills in implementation science. Using a range of innovative strategies and working within an extensive collaboration network, GACD Hypertension researchers have made several contributions to implementation science methodology, filled important knowledge gaps on NCDs in LMICs, and produced scientific output with promising impact. The results produced by the Hypertension Programme serve to inform the implementation of policies to reduce the prevalence of CVD as a consequence of high blood pressure. Not only are clinical results of the studies promising, but they provide guidance on what works for whom, under what conditions and address issues of scalability in an equitable way.

In addition to the scientific outputs produced, the GACD Network provides researchers with numerous opportunities to develop their capacity for implementation science through trainings held in various locations around the world, participating in collaborative projects and platforms for engaging with funders, policymakers and programme implementers. Partnership and engagement with stakeholders and policymakers at the national level is a catalyst for translating knowledge into action in contexts where it matters most.

Outputs and outcomes of the broader GACD Research Network have made valuable contributions to the 2025 global NCD targets and Sustainable Development Goal 3 for health by contributing evidence to improve health systems and preventive action, strengthened research capacity and knowledge sharing on NCD research.

What are the key learnings for the GACD's future work?

The Hypertension Programme has been a crucial learning experience for the GACD and its member agencies. So far, the GACD has not harnessed the full potential of its coordinated mechanism, including the possibility of funding a strategically aligned set of projects within a call. The disease-specific focus of the GACD since its inception has conflicts with some agencies' preference for cross-cutting, population health approaches to NCDs and a shift in thinking towards addressing multiple conditions in an integrated fashion. Interventions that are proven to work in particular contexts raise additional questions about the sustainability of implementation and the capacity to scale up effectively.

5th GACD Joint Call for proposals: meeting the challenge of scaling up interventions

The 5th GACD Joint Call for proposals on scaling-up evidence-based interventions at the population level for the prevention or management of hypertension and/or diabetes opened in May 2018. It takes the GACD's work to the next level, aiming to extend the use of implementation science approaches to fill gaps in knowledge on scale-up of interventions.

By encouraging proposals that address concurrent diabetes and hypertension, this call also reflects an awareness of the reality of NCDs: that individuals and populations often face multiple chronic health issues at the same time. Tackling co-morbid conditions and their shared risk factors effectively is thus a research priority in LMICs.



What strategies are required for effective scale-up at the system level?

How can barriers to scale-up and sustainability of interventions be overcome?

What are the ethical issues related to scale-up?

Is scale-up of effective and affordable interventions effective and affordable?

GACD researchers publish statement on NCD multi-morbidity in LMICs

"The GACD Research Network believes that a greater focus on multi-morbidity is overdue and necessary to successfully improve global health outcomes"

There are several unanswered questions at the intersection of NCDs and infections that have short and long term implications for human health and society. In order to reduce the burden of multi-morbidity in LMICs, the GACD Multi-Morbidity Working Group, comprising researchers from across the GACD's four programmes, believe that strategic realignment in policy awareness and a focus on multi-morbidity, health systems research aligned with Universal Health Coverage, and research funding mechanisms that nurture collaboration across disease and disciplinary silos are essential in order to achieve a shift towards healthy active ageing.

The future of GACD

Reflecting on the experiences of last six years, the GACD recognises the important trend towards patient-centred research and interventions. The GACD Researchers' Statement on Multimorbidity, highlights this, moving away from disease specific models and towards downstream causes of disease. Additionally, the GACD seeks to make it easier for funders, policymakers and researchers to interact and collaborate.

The GACD will continue to interact with each of the target audiences for whom the report has been written:

Funding agencies

The GACD will deepen current partnerships with research funders, developing multi-agency co-funding opportunities beyond the health sector. The GACD will provide cutting-edge support to build national research infrastructure in local contexts, such as a task force on implementation science, recently launched in Japan. The GACD will also build capacity through training events, disseminating collaborative research models and engagement with national ministries, and partners such as the WHO, World Bank and UN...

Researchers

GACD researchers become GACD alumni once their projects end and are encouraged to use GACD network events, trainings, and working groups as a platform for their new initiatives.

Policymakers

The GACD approach on evidence to policy and practice will be useful for governments interested in strengthening their national research infrastructure and fostering international collaboration between academic institutions and individual researchers alike. The GACD Network will develop a 'rapid response' team for enquiries from policymakers and implementers for swift input on evidence-based practice.

International organisations and agencies

The GACD will continue to lead on research on NCDs in LMICs and provide forums for researchers, funders, civil society and advocacy bodies at GACD training and policy sessions, high-level UN meetings, the World Health Assembly, and other relevant events.



GACD Hypertension Programme

Joint Publications



Peiris D, Thompson SR, Beratarrechea A, Cárdenas MK, Diez-Canseco F, Goudge J, et al. Behaviour change strategies for reducing blood pressure-related disease burden: findings from a global implementation research programme. *Implement Sci.* 2015 Nov 9; 10:158.



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