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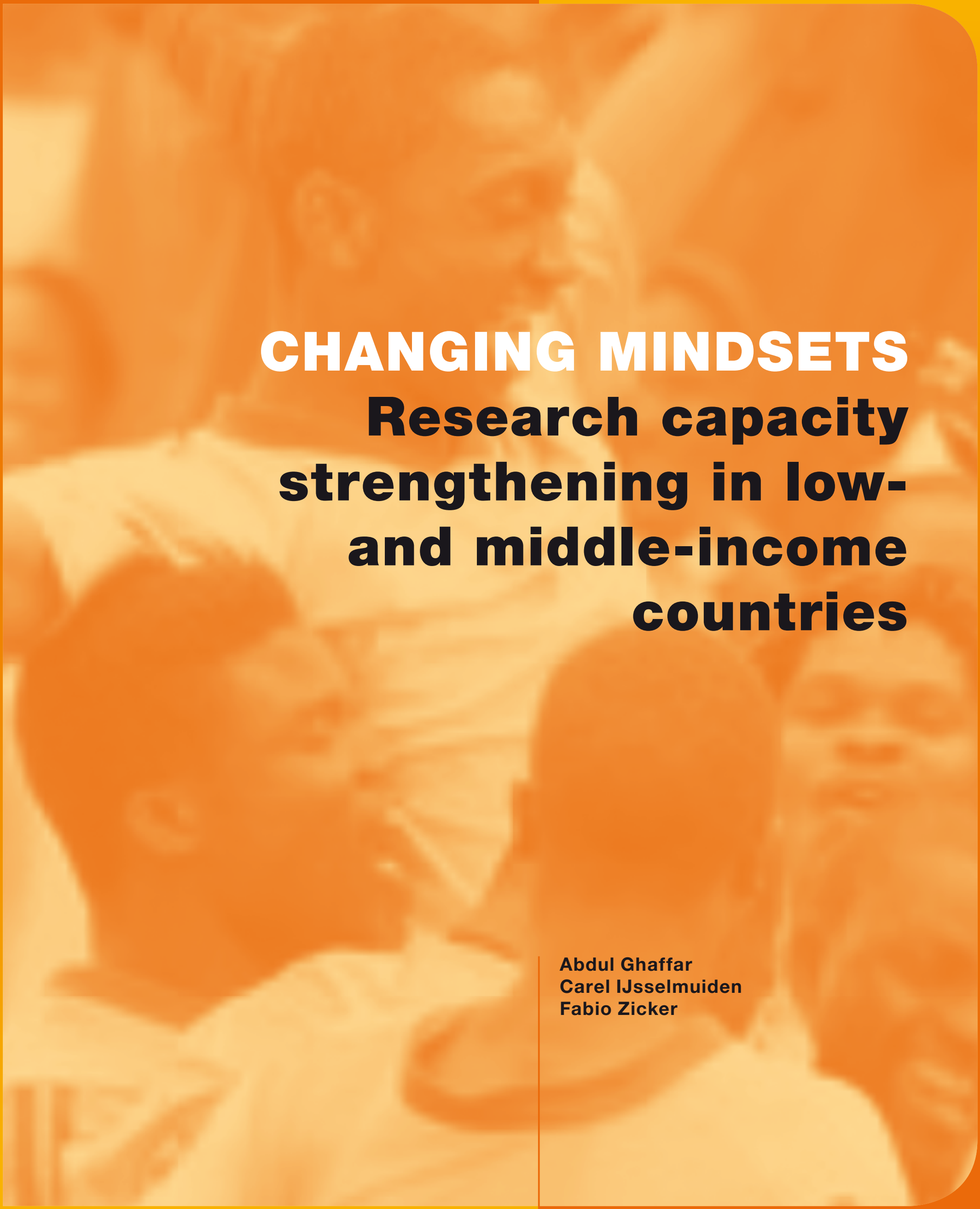

CHANGING MINDSETS

Research capacity strengthening in low- and middle-income countries

Abdul Ghaffar
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Fabio Zicker

Changing mindsets
Research capacity strengthening in low- and middle-income countries

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Table of contents

Tables

Figures

Acronyms and abbreviations

AECOM	Albert Einstein College of Medicine
AHPSR	Alliance for Health Policy and Systems Research
CEDEAO	Communauté Economique Des Etats de l'Afrique de l'Ouest/Economic Community of West African States
CESAG	Centre Africain d'Etudes Supérieures en Gestion
CIHR	Canadian Institute of Health Research
CHSR	Center for Health Systems Research, INSP
COHRED	Council on Health Research for Development
Danida	Danish International Development Assistance
DBL	Danish Bilharziasis Laboratory
DFID	Department for International Development (United Kingdom)
DEC	disease endemic country
DGIS	Directorate-General for International Cooperation – Netherlands
ENHR	Essential National Health Research
FIC	Fogarty International Center
FLACEIS	Latin American Forum of Ethics Committees in Health Research
FLASCO	Facultad Latinoamericana de Ciencias Sociales
FUNSALUD	Fundación Mexicana para la Salud
GRIPP	getting research into policy and practice
HEPNet	Health Economics and Policy Network
HEU	Health Economics Unit
HHS	(United States) Department of Health and Human Services
HINARI	Health InterNetwork Access to Research Initiative
HPSR	Health Policy and Systems Research
HRP	UNDP/UNFPA/WHO/World Bank Special Programme of Research, Development and Research Training in Human Reproduction
HSR	Joint Health Systems Research Project
IDRC	International Development Research Centre (Canada)
IHPP	International Health Policy Program
INCLEN	International Clinical Epidemiology Network
INCO-DC	International Cooperation with Developing Countries
INSP	National Institute of Public Health (Mexico)

ITRPH	International Training and Research in Population Health (now known as Global Research Training in Population Health)
JHSRP	Joint Health Systems Research Project
KFPE	Swiss Commission for Research Partnerships with Developing Countries
KT	knowledge translation
LMICs	low- and middle-income countries
MC	male circumcision
MeSH	Medical Subject Headings
MoH	Ministry of Health
NGO	nongovernmental organization
NHRS	National Health Research System
NIH	National institutes for Health (United States)
ODI	Overseas Development Institute
OECD	Organisation for Economic Co-operation and Development
OED	World Bank Operations Evaluation Department
PHSWOW	Public Health Schools Without Walls
R&D	research and development
RAWOO	The Netherlands Development Assistance Research Council
RCS	research capacity strengthening
REACH-Policy	Regional East African Community Health Policy Initiative
SAREC	Department for Research Cooperation, Sida
SEAMEO-TROPMED	Tropical Medicine and Public Health Centre network of the Southeast Asian Ministers of Education Organization
SHARED	Scientists for Health and Research for Development
Sida	Swedish International Development Cooperation Agency
TDR	UNICEF/UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases
UNDP	United Nations Development Programme
UNICEF	United Nations Children’s Fund
UNESCO	United Nations Educational, Scientific and Cultural Organization
WAHO	West African Health Organization
WHO	World Health Organization

Executive summary

In the spring of 2005, the Global Forum for Health Research, the Council on Health Research for Development (COHRED) and the UNICEF/UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases (TDR) agreed to collaborate on a project to define practical ways in which health research capacity strengthening (RCS) can be systematically operationalized to improve the performance of national health research systems, particularly in low- and middle-income countries (LMICs).

In August 2005, the first joint consultation was held at the Centre for Humanitarian Dialogue in Geneva, Switzerland. The consultation brought together 15 selected public health and development experts from all over the world, including representatives from the World Bank, INDEPTH Network, the European & Developing Countries Clinical Trials Partnership, several leading universities as well as the executive directors and senior staff from COHRED, the Global Forum and TDR.

The primary recommendation of the consultation was to commission analytical studies to further understand the subject and make health research capacity strengthening work for LMICs.

This publication is the result of those commissioned studies and the fruitful collaboration between three leading organizations, who are advocating and supporting research capacity strengthening efforts to improve the performance of national health systems.

Priority interventions for more effective RCS

For the past several decades, RCS in the health sector has primarily focused on individual training and skills development, with varying degrees of success. This chapter argues that there are a number of priority interventions possible to improve the effectiveness of RCS, at the core of which is the need for a change in the mindset of key stakeholders. The priority interventions, which are addressed in greater detail within the chapter, include:

- In addition to supporting individual RCS, focusing far more on supporting institutional RCS, which requires a change in the mindset of funders and other international organizations. Institutional capacity is critically dependent on access to core funding (i.e. secure, stable, on-going funding that covers the major operational costs of the institution, including salaries of some key staff). It is argued that funders should consider providing endowment funding to some institutions, which can be invested and the income used to provide core funding.

- Concrete action to promote the retention of skilled and experienced researchers in LMICs. This will require a range of interventions, such as improving conditions of service, job security, career pathways, opportunities for engagement with peers, etc., many of which again require a change in the mindset of funders (e.g. to allow the use of funds for salary top-ups and conference attendance).

- Increased collaboration between institutions within individual LMICs, which requires a mindset change within 'southern' institutions, given that at present, there is considerable emphasis on competing for resources. Collaboration is critical to enable larger, and better funded, research projects to be successfully undertaken, which may also contribute more substantively to informing health policy within a country. Another form of increased collaboration, that between researchers and users of research findings, is also required.

- Recognizing and then exercising the power that southern institutions have to address the perceived power imbalance in north-south research collaboration. Most funders require the involvement of local counterparts for research undertaken in LMICs by northern institutions. A mindset change within LMIC institutions can empower southern partners to insist on an equal partnership, with explicit capacity strengthening components.

These interventions build on the conceptual framework for RCS provided in the introduction and illustrate concrete examples of how to mobilize capacity beyond individual researchers and scientists.

Monitoring and evaluation of RCS

This chapter seeks to enhance the understanding of the role, contribution and impact of RCS on national health research systems, particularly in LIMCs. It aims to do this by examining the way in which RCS is understood and approached. A general overview of donor approaches to

RCS is followed by an analysis of materials related to and provided by six donor organizations, selected for review because they allocate significant funding to health RCS in LMICs and have considerable experience in RCS. The organizations that are examined in this chapter are:

1. The Special Programme for Research and Training in Tropical Diseases (TDR) (UNICEF, UNDP, World Bank, WHO)
2. The Department for Research Cooperation (SAREC), Sida (Sweden)
3. The Fogarty International Center (US National Institutes of Health)
4. The Wellcome Trust (United Kingdom)
5. Danish Bilharziasis Laboratory (DBL) Centre for Health Research and Development (Denmark)
6. International Development Research Centre (IDRC, Canada)

Using the information collected from these organizations, as well as a review of the literature, this chapter then discusses different ways in which RCS is (or might be) monitored and evaluated. More specific objectives that are raised and addressed include:

- establishing whether there are any tracking systems which enable the evaluation of the role, contributions and impact of RCS projects within a number of specified organizations;
- identifying, where tracking systems exist, how they work;
- identifying desirable indicators, procedures, systems which allow RCS evaluation.

RCS and the brain drain: where are we now?

The 10/90 Report on Health Research 2001–2002, which highlighted the importance of strengthening research capacity by increasing the number of highly capable investigators for health research (Global Forum for Health Research, 2002), led to the promotion and support of research and training programmes aimed at establishing a cadre of highly trained scientists and researchers in LMICs.

However, several conditions in host countries, for example, better standard of living and quality of life, higher salaries and job opportunities, access to advanced technology, and more stable political conditions, have given rise to a ‘brain drain’ of these highly trained or skilled scientists, who decide not to work in their own countries and migrate to, or simply stay after graduation, in developed countries, working for institutions outside their homelands (Castanos, 1998; Kupfer et al., 2004).

The concern over the brain drain is significant, particularly given the complex consequences that lead to or arise from such a migration of skill and knowledge. There is, for example, justifiable concern over the lack of policy governing the recruitment of talented human capital away from LMIC research institutions. Additionally, while emigration can lead to a loss with regard to the economy and capacity building (Adams Jr, 2003; Dugger, 2005), some economists have argued that financial remittances by expatriate scientists may contribute to their home country’s economy. While working overseas, international migrants may also have greater opportunity to contribute to scientific advancements of importance to their home countries and serve as mentors for other trainees.

Given the clear evidence that the magnitude of international brain drain has increased dramatically since the 1970s, both in absolute and relative terms, with more than 2.5 million highly educated immigrants from developing countries residing in the United States alone (US Census Bureau, 2002), this chapter attempts to analyse the state of the brain drain by:

- examining the causes that lead to high numbers of skilled researchers and scientists making the decision to emigrate to developed countries;
- analyzing the success and shortcomings of strategies to combat the brain drain;
- discussing potential tactics that governments, institutions and others involved in LMIC health development can use to offset the mass migration of researchers and scientists.

It also reiterates the need not only for more strategies to combat the brain drain, but for more evaluation of the extent and contours of the problem itself.

Beyond research: RCS and the media

Research has increasingly become a multidisciplinary act, with a range of stakeholders now consulted throughout the process. Ministries, communities, nongovernmental organizations (NGOs) and even the private sector are becoming involved as more and more researchers have shed their academic parochialism to embrace and include other perspectives and needs.

Why, then, is the media so often excluded? While there is almost a universal concurrence that the media is an indispensable tool in the dissemination and publicization of research findings (see, for example, Grilli et al., 2002; Schwitzer et al., 2005; Entwistle & Watt, 1999), there is absolutely no concurrence on how the media might become a more active and dynamic player – not only in specific research projects but in overarching health research systems. As policy-makers were once conceived as simple users of research, the media is time and again relegated to the dissemination stage of research (see Nuyens, 2005; Hovland, 2005; Nolen & Volmink, 2006). In the literature and in toolkits, the media is portrayed as little more than a passive consumer of research, an audience for whom researchers must chop up beefy science into bite-sized portions.

This chapter aims to enhance the understanding of the role of the media in RCS, principally in improving the functioning and performance of national health research systems in LMICs. It explores the role of the media in relation to research and policy development in the case of clinical trials in Kenya and Uganda that showed that male circumcision was an effective preventative measure against HIV infection. Moreover, the analysis examines how the media took over once the findings were released, becoming ombudsman, counsellor, jury and even judge. Some of the issues that are addressed include:

- how the media can provide the non-scientific elements required to discuss and dissect health research in more public arenas;
- how the media provides accountability, by challenging research, synthesizing it and putting the findings in their overarching context;
- how evidence-based interventions can be moved, through public exposure, towards policy and programme activities.

This chapter also provides a series of lessons from which to base future action in energizing the research–media link.

RCS: views from the south

This chapter is intended to offer a view of RCS from those who are the intended beneficiaries of such initiatives. It contributes to the ongoing effort to provide opportunities to review RCS in relation to long-term development goals and to increase the alignment of RCS efforts with human resources planning and research system goals in LMICs.

The recent publication, *No development without research. A challenge for research capacity strengthening* (Nuyens Y, 2005), illustrates the need for such an approach insofar as, in reviewing concepts and practices of RCS, only six publications and one 'personal communication' out of 77 listed references are attributed to authors from developing countries. Moreover, if WHO staff members are excluded, only one article from the south remains among the given references.

Another illustration comes from two recent evaluations on 'general' capacity building. One, a review of donor practices commissioned by the Rockefeller Foundation (Whyte A, 2004), highlights the lack of a systematic framework for RCS even within donor agencies that insist on capacity building in their programming. The other, a World Bank Operations Evaluation Department (OED) report on capacity building in African World Bank programmes, resulted in similar conclusions: in a review of programmes worth US$ 900 million, no systematic framework nor coherent inclusion of RCS in programming were found (World Bank, 2005). What is problematic here is not only the demonstration of a dire need to develop far more explicit planning and implementation frameworks and evaluation criteria for RCS, but also that neither of these assessments specifically refers to the need addressed in the voices and expectations of the intended beneficiaries of RCS.

This chapter, therefore, aims to bring four views – from the 'south' and from someone who has worked extensively in capacity strengthening efforts with LMICs – into the conversation. These voices echo certain points raised in other chapters, while adding new perspectives on others.

12 priorities for action

Within each chapter of this report, the respective authors offer observations, recommendations and conclusions with regard to their topics. This final chapter, therefore, attempts to highlight some of the more comprehensive conclusions that can be drawn from the compiled discussions as well as priorities for action. It notes the common concerns that thread through multiple RCS critiques and posits what avenues require priority investments of not only resources, but also examination and evaluation, in order to ensure the full impact of RCS as an effective and essential component of all health and development programmes.

As most contributors attest in this report, a significant paradigm shift is urgently needed in order to align RCS with other health-related changes, and to move health research itself closer towards centre stage at the national level in LMICs.

There is an urgent need to move beyond the idea of RCS as primarily related to individual researchers, through the evident institutional capacity challenges, to a more comprehensive, holistic and demand-driven model of national research systems. Such a model genuinely engages policy-makers, government officials, the media, health-care professionals, private companies and insurers, patient advocacy groups, community-based organizations, and the general public, as well as the full spectrum of other social, cultural, civil society and faith-based institutions.

Introduction

Background

> *"Strengthening research capacity in developing countries is one of the most powerful, cost-effective, and sustainable means of advancing health and development."*
> (Commission on Health Research for Development, 1990)

The Commission on Health Research for Development strongly emphasized, in its 1990 report, the need to develop national health research to inform decision-making on health action. This was in recognition of the growing realization that the technological and scientific advances that were benefiting richer nations were not reaching the developing world (highlighted in the 1963 Geneva United Nations conference). International efforts to support science for development grew slowly. In 1970, Canada's International Development Research Centre (IDRC) was established and began to lead the way in helping to build research capabilities through projects that were not only located in developing countries, but also carried out by local researchers (IDRC, 2005). In 1975, the Swedish International Development Cooperation Agency (Sida) introduced research cooperation and became another leading player in supporting research for development (the Department for Research Cooperation (SAREC) was formed later, in 1995).

In health, two major international programmes to strengthen scientific capacity (both with disease or specific programme focus) were established as Special Programmes for Research and Training by the United Nations, WHO and the World Bank: the Special Programme for Research and Training in Tropical Diseases (TDR), and the Special Programme of Research, Development and Research Training in Human Reproduction (HRP). Bilateral institutions, such as the Danish International Development Assistance (Danida) and the Directorate-General for International Cooperation – Netherlands (DGIS), and foundations such as the Rockefeller Foundation, also began to embark on capacity strengthening programmes as part of scientific cooperation in health.

In 1990, the Commission on Health Research for Development not only highlighted the need for more country-specific health research for developing countries, but also identified research capacity strengthening (RCS) as key to meeting national knowledge requirements and to ensuring contributions by developing countries to the global fund of knowledge. Following that, the

Council on Health Research for Development (COHRED) was established in 1993, as a strong advocate for RCS as a development strategy.

Investment in RCS as a tool for development grew throughout the 1990s. In 1996, a WHO Ad Hoc Committee on Health Research Relating to Future Intervention Options made specific recommendations to support funding and capacity strengthening. Following this, the Global Forum for Health Research was established to advocate the narrowing of the '10/90 gap'[1], and the Alliance for Health Policy and Systems Research (AHPSR) was founded in 2000 to advocate for and support knowledge generation and research capacity to address needs of health system development.

In 2001, the Commission on Macroeconomics and Health (WHO 2001b) argued for larger investments in RCS as one of the most powerful, cost-effective and sustainable means of advancing health and development.

Research capacity and research capacity strengthening

To a large extent, the call made by the Commission on Macroeconomics and Health (WHO 2001b) for larger investments in RCS is now being met, with an increasing number of major donors seeing RCS as a priority within their programmes. However, there continues to be much discussion about what kind of capacity is important for research, and how best to strengthen it.

I. What is research capacity?

Health research capacity has been defined as the ability to identify problems, set objectives and priorities, build sustainable institutions and organizations, and identify solutions to key national health problems (Global Forum for Health Research, 2000). There are many RCS initiatives, at national and international level, all based upon a premise that countries – particularly low- and middle-income countries – currently have weak health research capacity. One (albeit crude) indication of this is the paucity of research reported in international journals by LMIC researchers.[2] Another is the shortage of research and development scientists in some (LMIC) regions compared with wealthier regions.[3] Yet there remains little understanding of how, and in what way, capacity is weak.[4]

In analysing capacity (and therefore capacity weaknesses), it is useful first to think about *whose* capacity (or the capacity of what) is important. While the importance of institutional and national capacity is starting to be understood, Morgan (2006) points out that some practitioners and analysts continue to see capacity mainly as a human resource issue to do with skill development and training at the individual level.

The next key issue to consider when analysing capacity is *what* capacity is important. The Health Research System Analysis Network within WHO developed a framework for describing and analysing national health research from a system's or integrated perspective (Sadana & Pang, 2003; Pang et al., 2003). The framework, which identifies the main goals of health research as being "the advancement of scientific knowledge and utilization of knowledge to improve health and health equity" (Sadana & Pang, 2003), identifies four functions of a health research system: 1) stewardship; 2) financing; 3) creating and sustaining resources; and 4) producing and using research.

So, according to the goals of health research, research capacity encompasses not only the capacity to *produce* research, but also the capacity to *use* and *demand* it, so that research knowledge may contribute to improvements in health and health equity. The process by which research is demanded, produced and used, described as the 'research to policy and practice cycle', includes four key steps (AHPSR, 2004):

- managing the research agenda: setting research priorities and allocating resources to them;
- producing evidence both through original research and a synthesis of existing knowledge;
- promoting the use of evidence through, for example, advocacy channels, and specific mechanisms designed to link producers and users;
- utilizing evidence in decision-making.

These four steps, then, which might fall loosely under 'producing and using research', are also key functions of the health research system. 'Research capacity' therefore encompasses a great many skills – including those associated with identifying national health research priorities, generating and disseminating knowledge from research, and getting that research knowledge into policy and practice. Among these functions, knowledge generation has traditionally been seen as the key to a healthy research system, leading to a neglect of the other functions. This is beginning to change. Capacity issues around getting research into policy and practice have received more attention in the last decade (see for example Stone et al., 2001; Crewe and Young, 2002). In addition, COHRED, among others, have begun to focus on capacity issues associated with research priority setting, although this function is still largely neglected in discussions on and initiatives for RCS. Indeed, Nuyens (2005) states that “hardly any investment has been made in developing and strengthening country capacities to transform research priorities into a research portfolio with specific research questions and proposals”.

The discussion above has examined the goals of health research, and the functions of a health research system, which sheds light on the range or scope of ‘research capacity’. But, given this very broad understanding of research capacity, what are the implications for our understanding of research capacity *strengthening*?

II. What is research capacity strengthening?

The concept of RCS is generally defined as the “process by which individuals, organizations and societies develop abilities (individually and collectively) to perform functions effectively, efficiently and in a sustainable manner to define problems, set objectives and priorities, build sustainable institutions and bring solutions to key national problems” (Global Forum for Health Research, 2004). An alternate definition proposed by Lansang and Dennis (2004) is an “…ongoing process of empowering individuals, institutions, organizations and nations to: 1) define and prioritize problems systematically; 2) develop and scientifically evaluate appropriate solutions and 3) share and apply the knowledge generated”. This review is informed by both these definitions. It is important to note that in this review we use the terms ‘research capacity strengthening’ and ‘research capacity building’ interchangeably, recognizing that they are in fact different. While the former suggests a strengthening of existing capacity, the latter may imply new organizations and strategies.

This definition incorporates the issue of levels of capacity or ‘sites of action’ in a micro-meso-macro way; it captures the notion of capacity being about an ability to perform functions and meet objectives; and it captures the fact that one of the purposes of research is to bring new or improved solutions to problems. The definition also reminds us that RCS is a *process* by which something *develops*. It is, therefore, about personal, organizational and institutional change at all levels of a society (Morgan, 1999). It is worth pointing out that capacity is about both *ability* and *power* to perform,[5] since such an elaboration leads to the understanding that capacity can be both *developed* and *released* within individuals, organizations and societies.[6]

An analysis of capacity within a system, and any subsequent attempts to strengthen that capacity, must appreciate the different levels (including individual, institutional and macro levels), functions and enabling variables within the system. Given the different functions contributing to the overall goal of improving health and health equity through the production and use of research, there are a large number of different actors or stakeholders involved in the health research system. These include the funders of research (e.g. national research councils, government aid organizations, private companies, philanthropic organizations and international health and research organizations); the producers of research (e.g. national research councils, research and development organizations, private companies, and international health and research organizations working in other countries); and the users of research (e.g. public sector health institutions, public and nongovernmental health providers, international health and research organizations, community and civic groups, and the general public) (WHO, 2001a). Other actors, who often mediate between the funders, producers and users of research, include advocacy organizations, knowledge brokers and the media, who 'filter' and 'amplify'[7] certain research evidence in certain ways in order to influence policy, practice and action.

This wide understanding of the health research system contributes to what is hopefully a more effective foundation for elaborating an RCS framework such as the one illustrated in the following section.

III. A framework for capacity strengthening

The conceptual framework offered below is guided by the Hilderbrand and Grindle (1994) framework of organizational capacity and the framework proposed by Lansang and Dennis (2004) in terms of building health research capacity in developing countries.

Hilderbrand and Grindle (1994) take a broader view of capacity beyond the individual to include organizational capacity and the impact of the public sector, external environment and research networks on individual and organizational capacity. Research networks refer to a group of organizations jointly responsible for undertaking a particular activity and their performance can be constrained by four factors: 1) limited capacity within individual organizations; 2) lack of effective interaction and communication between organizations; 3) limited decentralization of decision-making power; and 4) failure to involve organizations that play critical roles within the network.

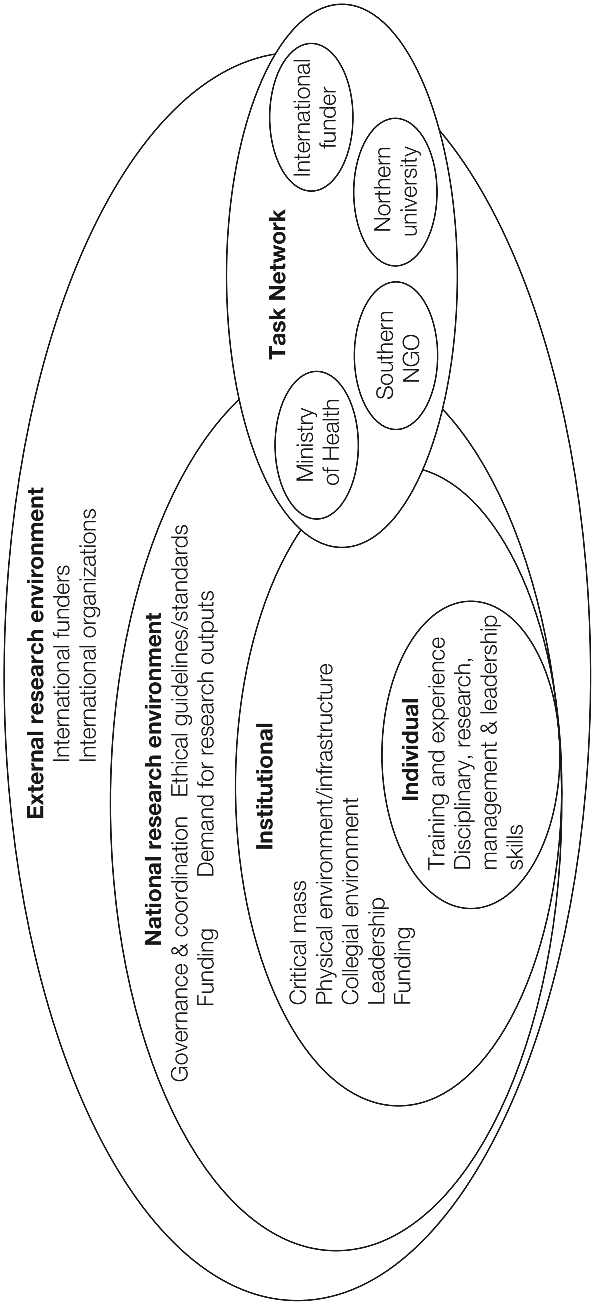
Similarly, Lansang and Dennis (2004) suggest the need to move away from a narrow definition, focusing on building a critical mass of trained researchers with the appropriate mix of skills, towards a multi-dimensional systems approach, which encompasses individual training, institutional development, national health research systems (e.g. national health research councils) and supranational health research bodies (e.g. the Global Forum for Health Research).

The conceptual framework (created by Diane McIntyre) encapsulates key elements of the aforementioned approaches (this is discussed in more detail in the chapter: Priority interventions for more effective RCS). Capacity strengthening is thus viewed in five dimensions (see Figure 1):

1. *Individual level*: encompasses technical disciplinary research capacity and software capacity (e.g. networking abilities, computer literacy).
2. *Institutional level*: strengthening organizational structures (e.g. research infrastructure), processes, management systems, physical environment, salaries, etc.
3. *National research environment*: nature of the health policy environment, presence of research councils, academic institutions and other research organizations.
4. *International research environment*: relationship with donors and other international and regional organizations, dependency on external funding, etc.
5. *Research networks*: mutual trust, respect, cooperation and information exchange among institutions and organizations involved in the network.

This framework takes the view that capacity strengthening is a long-term process which occurs in all five dimensions, not necessarily sequentially and often concurrently. Moreover, issues of governance, accountability and sustainability are also important. With regard to governance and

Figure 1: Research capacity conceptual framework



accountability, this is exemplified by concerns over ownership, rights and responsibilities in the context of international engagements, but is also relevant within organizations and the national research environment. In terms of sustainability, strategies which focus narrowly on the individual level (e.g. training) and ignore the gaps in organizational capacity (e.g. funding of institutional infrastructure) are arguably unsustainable.

Conclusion

Motivated by the growing interest that RCS has been receiving as more and more evidence arises linking national health research systems with development in LMICs, this report hopes to offer an assessment of the state of RCS by examining what accomplishments RCS programmes have given rise to. It also draws attention to challenges that continue to confront health researchers and policy-makers in the south and proposes innovations, in thought and practice, which may be critical for truly long-term success in the future.

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[1] The '10/90 gap' refers to the Global Forum's widely quoted proclamation that only 10% of the world's resources for health research are applied the health problems that affect 90% of the world's population.

[2] For instance, Paraje et al. (2005) found that more than 90% of the scientific publications on health topics in 4061 internationally recognized journals during the period 1992 to 2001 were produced by scientists in 20 (of the world's richest) countries.

[3] Nchinda (2002a) notes that comparative data on human resources (particularly including such specialities as social sciences) for different regions of the world are not easy to get, and tend to be incomplete, fragmented and biased. However, he presents United Nations Educational, Scientific and Cultural Organization (UNESCO) figures showing that whilst the European Union had 1.8 scientists per 1000 population, sub-Saharan Africa had only 0.4 and India only 0.1.

[4] Potter and Brough (2004) note that "as things stand, it is as diagnostically useful to say 'there is a need for capacity building' as to say 'this patient is unwell'". For further examination of the symptoms of, and discussion of some remedies for, capacity weakness for health policy and systems research (HPSR), see AHPSR (2007).

[5] One of the definitions for 'capacity' given in The New Oxford Dictionary of English (1998 edition) reads, "the ability or power to do, experience, or understand something".

[6] This is discussed further in Chapter 3 of *Sound Choices - Enhancing Capacity for Evidence-Informed Health Policy* (AHPSR, 2007).

[7] The functions of 'filtering' and 'amplification' of research evidence are discussed in *Sound Choices - Enhancing Capacity for Evidence-Informed Health Policy* (AHPSR, 2007).

Priority interventions for more effective RCS

Priority interventions for more effective RCS

Objectives and approach

This chapter is based on an extensive review of peer-reviewed studies and available grey literature on research capacity strengthening (RCS). The main focus is identification of factors that lead to success or failure while implementing primarily national, but also regional or global RCS programmes. The review focuses specifically on *research* capacity strengthening in the health sector, and includes all aspects of RCS, ranging from individual and institutional capacity strengthening to issues relating to research networks and the national and international environments, following the conceptual framework proposed in the Introduction. Table 2, presented at the end of the chapter, provides a summary of the key factors that facilitate effective RCS.

The review cannot be described as systematic in the sense of the Cochrane criteria, as the literature does not contain any randomized controlled trials or controlled before and after studies. Much of the literature is not based on formal evaluations of research capacity strengthening initiatives, but rather on document reviews and reflecting on experiences by those involved with RCS. Grey literature including monographs, case studies and reviews, were also an important source of information for this review.

Key inclusion criteria included limiting the review to those papers and reports published between 1997 and 2007. The review primarily focused on national experiences with particular emphasis on LMICs. Based on this, a total of 48 peer-reviewed articles were reviewed.

Information extracted was analysed within each of the dimensions of capacity presented in the conceptual framework (see Introduction). Key themes were identified within each dimension, with the emphasis once again being placed on highlighting key success factors and obstacles.

Development of capacity at the individual level

Human resource development is an essential building block for strengthening research capacity. The literature has largely tended to emphasize the development of technical and research capacity, focusing on graduate and post-graduate training. The emphasis on the hardware of human resource development has arguably led to a neglect of equally important issues including strategies for long-term retention and the development and nurturing of software skills (e.g. computer literacy, applying different and non-traditional channels of communication, networking abilities, the ability to engage with a diverse range of stakeholders, etc.). It is important to note that information technology (IT) capacity strengthening is often neglected in education and training. It is often presumed that trainees at a post-graduate level are already proficient in, for example, word processing packages, e-mail communication, web-based literature searches, etc. This is often not true and the ability of otherwise capable scientists is hampered by this lack of skills.

Hardware of human resource development

Building research capacity at the individual level encompasses two main areas of training. The first is knowledge and expertise in a particular discipline (e.g. epidemiology, reproductive health, etc.) and the second is capacity and skills in research techniques. Capacity in research techniques extends beyond exposure to different research methodologies to include the areas of grant writing and fundraising, managing research and resources, writing and disseminating research findings for different audiences (Andreano, 2000; WHO, 2001c).

The latter set of skills has been relatively neglected until recently. There is a growing emphasis among some international funders (e.g. the Special Programme for Research and Training in Tropical Diseases (TDR)) on first soliciting letters of intent, identifying those that hold particular promise and then hosting a proposal development workshop where support can be offered to each team. Through this ‘learning by doing’ process, proposals are produced that are more likely to be successful. In addition, the Alliance for Health Policy and Systems Research (AHPSR), the Council on Health Research for Development (COHRED), the Global Forum for Health Research and the International Clinical Epidemiology Network (INCLEN) Trust developed a set of training materials that focus on a range of these skills, such as ‘Leadership for health research’, ‘Setting priorities for health research’ and ‘Promoting the use of knowledge in policy and practice’. A series of training of trainer’s workshops were held to promote the use of these materials.

Lansang and Dennis (2004) argue that individual training lies along a continuum of increasing financial investment, which includes learning by doing (least expensive), graduate or post-graduate training, institutional partnerships and centres for excellence (most expensive). The main training approaches are learning by doing and graduate or post-graduate training, which can be undertaken separately, but opportunities for such training are also embedded within the creation of institutional partnerships and centres for excellence.

'Learning by doing', also commonly referred to as 'experiential learning' or 'on-the-job training', is often facilitated by apprenticeship and mentorship. Frequently, newly trained scientists lack the skills and often the confidence to apply their newly acquired knowledge to research. 'Learning by doing' provides an opportunity for skills enrichment through direct participation in research activities, allowing participants to apply their skills and at the same time derive useful insights from the experience.

At a regional level, this approach has guided much of the work of the Joint Health Systems Research Project (JHSRP) for Southern Africa which has focused on increasing national capacity for operational health research in more than 10 countries (Varkevisser et al., 2001). Training included providing participants with an opportunity to develop a research protocol based on actual health system problems they had experienced, conduct field work, analyse their findings, and finally apply their skills to report writing. Examples at a country level include the *Sumgayit Cancer Study* from Azerbaijan (Andruchow et al., 2005) and the *South African prison health study* (Reddy et al., 2002). In the former, following an environmental epidemiology training course, trainees in collaboration with other stakeholders developed and implemented the study. In the latter, senior researchers mentored junior researchers who in turn trained field staff.

An important strategy which combines 'learning by doing' with undertaking postgraduate training is the growing trend among LMIC research institutions to encourage staff to link their doctoral dissertation with a large-scale research project being undertaken within the institution (WHO, 2001c). This is particularly feasible where the research project is a collaborative initiative between northern and southern institutions and where co-supervision from both institutions is provided for the PhD candidate.

There are well-established post-graduate and post-doctoral programmes located in high-income countries, specifically targeting scientists from LMICs (Lansang & Dennis, 2004). Many of these programmes, and funding opportunities to participate in them, emphasize masters training. There is considerable unmet demand for doctoral level training by LMIC researchers, largely due to limited bursary support for doctoral programmes (McIntyre, 2000). Well-known post-graduate programmes which have made a substantial contribution to increasing research capacity in LMICs include those offered by research funding agencies such as the Wellcome Trust, the US National Institutes for Health and the Fogarty International Center of the US National Institutes for Health, etc.

Historically, recipients have been trained in academic institutions in high-income countries, primarily in the United Kingdom and United States. It has been argued that this form of training has contributed to the 'brain drain', with the Global Forum for Health Research (2004) stating that, "higher education in itself was one of the principal conduits of permanent emigration." In addition, there is a growing recognition that training in high-income countries is costly, and that these programmes are not always relevant to the LMIC research context (Beattie et al., 1999). Although there is a more detailed review of the brain drain in the chapter: RCS and the brain drain: where are we now?, including an analysis of its effect and potential strategies to combat it, it is worth noting here briefly some of the programmes being instituted to focus training in LMICs.

In recent years, the pool of training institutions offering post-graduate training has widened to include several LMICs. The Public Health Schools Without Walls (PHSWOW) Project, funded by the Rockefeller Foundation in partnership with national ministries of health, was originally initiated in three African countries and later in Asia to build public health capacity in developing countries (Beaglehole & Dal Poz, 2003). More than 75% of the programme is field-based, allowing trainees to work in district health offices and ministry of health (MoH) programmes. This field work together with the involvement of the MoH ensures that the programme is closely aligned with health system priorities.

Another example of growing opportunities for postgraduate training within LMICs is that of the area of health economics, where the Centre Africain d'Etudes Supérieures en Gestion (CESAG) in Senegal and the

Health Economics Unit (HEU), University of Cape Town, South Africa, offer masters in health economics programmes serving Francophone and Anglophone Africa respectively (McIntyre, 2006). The CESAG programme enrols between 25–30 students annually, many of whom are from Senegal although there is increasing representation from other Francophone west African countries. The HEU trained 78 health economists between 1996 and 2005, of whom approximately 15% were South African and the rest were from other southern, west and east African countries including a small group from high-income countries.

Many LMICs have developed capacity for post-graduate training in epidemiology through INCLEN. These programmes have several benefits. They strengthen regional capacity for training, open up new opportunities for information sharing and collaborative research within the region and can potentially stem the brain drain to developed countries. In addition to increasing opportunities for post-graduate training within LMICs, there is also a need to develop more distance learning programmes (AHPSR, 2000).

Long-term retention

As noted earlier, brain drain either towards the private sector or institutions in high-income countries undermines RCS initiatives. While salaries are important, status and recognition, quality of the working environment and facilities, training and ongoing training opportunities are also important. This is illustrated in the case of a WHO/UNDP research capacity initiative in Azerbaijan (Andruchow et al., 2005). Junior researchers, who were recipients of training, could not be retained because of funding constraints. The institution depended on donor funds and was experiencing difficulties in fundraising. Moreover, there were poor prospects in terms of career growth, and the shortage of senior scientists meant that mentorship and support was limited. Unfortunately, this experience is common across research institutions in LMICs.

Nevertheless, the importance of securing an acceptable salary cannot be underestimated. It is not simply an issue of retaining a researcher within an institution but also of retaining their full-time inputs. There are thriving consultancy businesses in LMICs, funded by international organizations that are particularly interested in drawing on the skills and expertise of LMIC researchers who are very familiar with the local context. The lack of competitive salaries for researchers leads to consultancy work being an attractive avenue for additional income generation (Castillo, 2002). While consultancy to supplement research salaries may be a mechanism for retaining researchers, there is the potential for consultancy to become the primary activity with adverse consequences for delivering on the substantive projects of the research institution (McIntyre, 2006).

A fear of many LMIC scientists is that of not being able to retain their post once they enrol in post-graduate programmes and the availability of job opportunities upon graduation. Re-entry grants from the Special Programme for Research and Training in Tropical Diseases (TDR) provide a means for stemming this through enabling returning scientists to initiate independent research in their home institutions (Special Programme for Research and Training in Tropical Diseases (TDR), 1988). A comprehensive approach, particularly in establishing a conducive institutional environment (see next section) needs to be adopted if scientific expertise and experience is to be retained in research institutes.

One example of successful retention of researchers is the Centre for Health Systems Research (CHSR) of Mexico’s National Institute of Public Health (INSP), which approached the need to strengthen research capacity through three strategies: supporting the participation of junior researchers in international congresses and forums; academic leave to undertake PhD studies; and filling vacancies with highly qualified candidates.

Promising junior researchers accepted in highly ranked PhD programmes in-house, elsewhere in Mexico or abroad, are given paid academic leave for three years, with the signed commitment to return after successfully completing their studies for at least an equivalent period. INSP has the capacity to enforce this contractual obligation with civil suits thanks to government regulations. To date 10% of researchers enjoy this privilege.

INSP basic salaries have more than doubled in real terms in the past few years, making vacancies much more competitive. Furthermore, INSP regulations allow salary supplementation with external funds for up to 150% on top of federal competitive bonuses. CHSR policy is now to fill vacancies with up-front supplementation from ongoing projects and to procure at least 50% supplementation for junior researchers. The earnings policy is now advertised for each vacant post.

Thanks to these RCS strategies, the number of researchers with a PhD has increased in just over two years from 12 to 23, or 55% of the total staff. While no new posts have been created, the number of scientific publications has increased and all projects now include strategies to involve policy-makers.

Institutional capacity strengthening

There is growing recognition that institutional development is a critical but neglected component of overall RCS (AHPSR, 2000). For example, a recent report noted that "… the major challenge in reducing the growing gap between the scientific potential of industrialised and developing countries lies in effective institutional capacity building. However, it seems that most of the support given is bound to individual capacity building" (KFPE, 2001). Additionally, as noted by WHO (2001c): "Isolated programmes to create researchers without research system development will be ineffective since the researchers produced would not have stable career and job opportunities." In broad terms, the key features of good institutional capacity include having a critical mass of research and support staff, strong leadership, stable and sustainable funding and adequate physical infrastructure (Global Forum for Health Research, 2004).

Critical mass of staff

Clearly, it is not ideal for one or two researchers to work in isolation and a research institution requires a critical mass of research staff in order to be productive and sustainable. Where a critical mass does not exist, researchers will be overloaded (Chowdhury et al., 2000). Although it is difficult to be specific on what constitutes a critical mass, two issues are particularly important. First, as health research is often multidisciplinary in nature, it is important to have researchers from different disciplines or with different skills, within a research group (Ruffin & Flagg-Newton, 2001). Even where the group focuses primarily on research relating to a single discipline, it is important that the group contains a range of specific skills and areas of expertise. For example, a unit dedicated to health economics research requires some staff with a high level of econometric skills, some with skills in qualitative research, some who specialize in economic evaluations, others who specialize in health-care financing, etc).

Second, it is important to have researchers with different levels of experience. It is not an effective use of time for very senior researchers to undertake certain data collection activities, which may be more appropriately undertaken by less experienced staff. Conversely, it is critical that there are experienced, senior staff within the institution to mentor and support less experienced staff. It is important to achieve an appropriate balance in the experience mix of researchers within an institution. A solitary experienced researcher will rapidly become ‘burnt out’ from providing support to many less experienced researchers and ensuring that high-quality research is produced, as well as from lack of intellectual stimulation from not being able to routinely engage with equally experienced colleagues. Sufficient experienced staff is also important if PhD level training is to be supported by the institution. Even if a staff member is registered at a distant university, it is important to have staff within the institution who are PhD graduates and who can provide co-supervision support during the periods when the PhD candidate is located in the institution (e.g. for data collection and initial data analysis).

In addition to research staff, it is necessary that there are adequate administrative support staff. This ensures that researchers are able to devote their time to activities suited to their skills, rather than to endless administrative tasks, which enhances research productivity. Having staff dedicated to financial administration can also facilitate institutional financial accountability.

The ability to attract and retain a critical mass of competent research and support staff may be strongly influenced by the type of organization. For example, government institutions and universities often have rigid benefit package structures, whereas nongovernmental organizations (NGOs) and for-profit organizations are more flexible to determine their own salary packages and other conditions of service (Chowdhury et al., 2000).

Another issue related to having a critical mass within the context of institutional capacity, is the importance of a supportive and collegial environment which facilitates team work and regular engagement with one another. On the one hand, this requires an institutional environment where there is tangible concern for the welfare of the staff and their career development. On the other hand, this must be reciprocated by staff demonstrating a commitment to the institution, rather than simply to pursuing their own personal career and income generation goals. The issue of individual researchers undertaking consultancy work, which may be regarded as essential in order to supplement meagre researcher salaries (Castillo, 2002), can be divisive within an institution, particularly where senior staff are able to secure more consultancies than others, placing a greater burden on some staff to undertake institutional activities. It can also reduce the incentive to publish research findings, which reflects badly on the institution, as earnings from consultancies are far greater than salary increases that can be achieved through promotion within the institution (Castillo, 2002).

Leadership

A key feature of strong institutions that is frequently mentioned in the literature is that of the institution having a dynamic leader (Global Forum for Health Research, 2004; Andreano, 2000). As noted in a recent overview of RCS success factors: "Research capacity building efforts often revolve around 'outstanding' individuals as institutional development takes time" (Castillo, 2002).

In many institutions within LMICs, this leadership has been provided by an expatriate. A review of malaria research capacity in Africa found that over a third of research centres were headed up by an expatriate (Beattie et al., 1999). While there were insufficient LMIC researchers with experience and leadership potential when many of these institutions were established, this is not necessarily the case now. Thus, a key challenge for institutional capacity strengthening in LMICs is to explore why domestic researchers are not taking on these leadership positions. While conditions of service (especially remuneration packages) are probably insufficiently attractive in the context of the generous packages offered by the international organizations, other factors such as lack of status and recognition of these positions within their home country and in the international community are likely also to be important.

Infrastructure

Infrastructure requirements for research institutions include appropriate office, laboratory and other space. Having too many researchers crammed into a single office is not conducive to productivity and having staff members scattered between offices in different locations is not conducive to creating a collegial environment. Clearly, the availability of appropriate equipment, ranging from computers to sophisticated laboratory equipment, is also critical for research activities. It is not only the initial purchase of such equipment, but also its regular maintenance and upgrading, that is relevant. The most productive research groups are those that are relatively well equipped (Beattie et al., 1999).

Infrastructural constraints most frequently mentioned in the literature relate to communication infrastructure and access to information, particularly library resources (AHPSR, 2000; McIntyre, 2000; WHO, 2001c; Lansang & Dennis, 2004; KFPE, 2001). There have been a number of important recent initiatives that are contributing to easing information constraints. In particular, the Health InterNetwork Access to Research Initiative (HINARI) provides free or low-cost access to peer-reviewed journals for LMICs, while Scientists for Health and Research for Development (SHARED) facilitates the sharing of information on projects, researchers and organizations (Global Forum for Health Research, 2004). Nevertheless, these initiatives are only effective for those who have Internet access.

Communication is critical to successful research, whether this is to communicate with collaborators in other institutions working on a particular project, or with a wide range of peers globally who may be able to provide advice (e.g. on the development of methodological tools) or with those who will be the end users of research findings. Access to peer-reviewed literature (in the form of journal articles and books) as well as ‘grey’ literature (often located on web sites) is essential to research productivity in that it can save researchers from ‘reinventing the wheel’ and provide the scientific context within which to locate their research. Although there is considerable discussion about ‘bridging the digital divide’, Internet access remains a problem for many LMIC researchers.

Other aspects of infrastructure that are frequently ignored relate to general domestic infrastructure such as roads and electricity supplies (KFPE, 2001). In the face of irregular domestic electricity supply, stand-by generators are a key institutional infrastructure requirement for research facilities.

Ultimately, long-term investments by both national governments and external funders are needed to improve and maintain institutional infrastructure (Beattie et al., 1999).

Funding

The majority of research institutions in LMICs are largely or fully 'soft-funded', i.e. are funded through short- or long-term grants rather than having a permanent staff complement funded by a ministry of health, university or similar institution. Thus, funding is frequently a constant concern to research institutions.

The most vulnerable research institutions are those that rely primarily on short-term grants (Chowdhury et al., 2000; Andruchow et al., 2005), while the most productive institutions are those that have long-term financial support (Beattie et al., 1999). In the case of a predominance of short-term funding, senior staff often find a considerable portion of their time being consumed by writing proposals and frequent progress reports (McIntyre, 2000). This leaves limited time for conducting the research itself. Short-term grants, although they are useful for initiating the research activities of emerging researchers (AHPSR, 2000), seldom accommodate the time and financial resources required for strengthening the capacity of less experienced researchers (which is critical from an institutional capacity perspective) or for disseminating research findings. As noted by one review of RCS: "most funding schemes appear not to allow for or to foresee greater long-term support – an indispensable prerequisite for effectiveness in building institutional capacity" (KFPE, 2001). While long-term grants alleviate some of the abovementioned problems, they do not necessarily make explicit allowance for the RCS resources, whether this is to contribute to developing institutional or individual capacity. There is undoubtedly a need for explicit funding for developing institutional capacity (AHPSR, 2000).

An issue related to the length of grants is continuity in funding support; institutions who receive regular support from one or more funders are in a far stronger position than those who constantly have to seek support from new funding sources. Not only does this create funding insecurity, it requires the research institution to constantly learn about a whole new set of accounting and reporting requirements as each funder has their own, frequently complicated, set of requirements.

An issue of growing importance, particularly in relation to the sustainability of research institutions in LMICs, is the balance between domestic and external funding sources. Many LMIC institutions have been heavily dependent on external donor funding (Varkevisser et al., 2001) which can have two undesirable effects. First, this has sometimes resulted in the research agenda being driven by external donors rather than an institution's research being designed to meet nationally determined priorities (Chowdhury et al., 2000; WHO, 2001c). Second, donor funding can be unreliable in the long-term, e.g. donors may revise the list of countries that they regard as priorities for support. It has been recommended that 5% of foreign aid for the health sector should be devoted to research and that 2% of national health budgets are devoted to research (Global Forum for Health Research, 2004). However, neither of these targets has been achieved. From a sustainability perspective, it is critical that particular emphasis should be placed on achieving the target for national research funding.

The most important funding issue in relation to institutional capacity strengthening is for research institutions in LMICs to achieve some financial stability and certainty. This generally implies that the institution must at least have some 'permanent' core funding, i.e. some funding that is constantly available to cover the costs of at least some research and support staff. This allows flexibility to leverage additional short- and long-term grants to fund other staff and fieldwork activities and allows for time to be devoted to RCS activities. There are broadly two ways in which permanent core support can be provided. The first is where the larger institution (e.g. ministry of health or a university) within which a research group is based employs a core of researchers (and support staff) as permanent staff members. The potential difficulties with this approach relate to the implications for the independence of the research group (see later) and the fact that there may be differences in conditions of service between 'permanent' and 'soft-funded' staff, which can create intrainstitutional conflict.

The second mechanism for core funding support, which has considerable potential but has been under-utilized to date, is that of creating endowments. An endowment is a large, lump-sum contribution which is invested, and from which interest or related revenue can be used but the initial capital contribution is never touched. From a sustainability perspective, it is necessary that investments are actively managed in order to maximize revenue, to reinvest a portion of the annual revenue so that revenue grows over time to accommodate the effects of inflation and to ensure some stability in the revenue streams. It is unclear why endowments have not been used more extensively, as checks and balances can be built in (e.g. if the institution has to close down for any reason, the original capital contribution can be returned to the funder) and endowments can reduce repeated applications for funding from the same institution. The Global Forum for Health Research has recently advocated for the greater use of endowment funds, by external donors and with matching or equal funding from national governments, as an important mechanism for improving funding stability (2004). Certainly, it appears that endowment funding has been important in the case of at least two of the most well known LMIC health-related research institutions.

In order to attract and sustain endowment, grant and other funding, a research institution must have adequate financial management capacity. This is essential both for the efficient use of limited resources and to promote accountability to funders (AHPSR, 2000). Without timely and transparent reporting to funders, it is unlikely that an institution will be sustainable.

Other issues

Two final issues of relevance to institutional capacity are that of independence and collaboration. The institutional location (e.g. within a ministry of health or a university) and the 'ownership' type (e.g. public or government, nongovernmental, private-for-profit organization) influences the actual and perceived independence of a research institution. For example, if a research institution is a government institution, it may be subject to considerable political pressure while a private-for-profit organization which is linked with key private health sector stakeholders may be regarded as biased. As indicated previously, reliance on donor funding can also adversely affect independence, particularly in relation to research agenda setting. Lack of independence can be detrimental; a key factor identified as contributing to RCS failure is strong external (usually political) influences on the running of the institution (Global Forum for Health Research, 2004). Independence can in turn influence an institution's relative attractiveness to potential future employees and funders. For example, the fact that the Fundación Mexicana para la Salud (FUNSALUD) is seen as independent has been important in attracting continued funding support.

Collaboration between research institutions may also be important in relation to institutional capacity (McIntyre, 2000; Ruffin & Flagg-Newton, 2001). For example, while a single institution may have a small critical mass of researchers, they may be unable to undertake large-scale, long-term research by themselves. This can limit their ability to compete effectively for funding opportunities that could be of great benefit to their institution. However, if this institution were to collaborate with another nearby research institution, there may be greater likelihood of success (McIntyre, 2000).

Finally, as noted by Castillo (2002): "Strong research organizations do not necessarily remain strong. There are peaks and troughs in any organization's lifespan, making capacity development a never-ending task."

National research environment

Demand for health research

The most frequently cited issue relating to the national research environment is that of a lack of demand for research and research findings (AHPSR, 2000; Akhtar & Khan, 2000). There are various factors contributing to this lack of demand. One factor is that there is little appreciation of the value of research and its potential to contribute to policy development (Chowdhury et al., 2000). In turn, there is a range of factors that may underlie this. For example, if research is not seen as responding to national priority issues, which may be partly due to the predominance of donor funding and hence donor-driven research agendas (Chowdhury et al., 2000), it is unsurprising that research findings are not valued. Where research is recognized as valuable, this may be undermined by the relatively high turnover of senior health officials and policy-makers in many LMICs, whereby those who are sensitized to the usefulness of relevant research are regularly lost to the system (Aleta, 2000; Varkevisser et al., 2001). Thus, the key strategy that has been used to stimulate demand, namely to sensitize senior officials and policy-makers to the potential benefits of research, must be seen as an ongoing rather than a one-off strategy.

A critical factor contributing to the lack of demand is that many "countries do not have an environment or a culture conducive to health research" (WHO, 2001c). Akhtar and Khan (2000) further indicate that in "a socio-cultural milieu that actively discourages the questioning of authority, and an educational system where learning is mostly by rote and asking questions is taboo, the potential for enquiry fails to develop." This points towards the importance of the political context within a country, which is also identified by Chowdhury et al., (2000) who note that within the African context in particular, there has been a reluctance to undertake research on politically sensitive issues and a "pragmatic appreciation of the limited value of policy research in authoritarian states" (Chowdhury et al., 2000). However, the political context can have the opposite effect if there are strong civil society groupings. For example in Latin America, universities and NGOs are the dominant health policy and systems research institutions and their involvement in research is specifically related to their desire to "campaign on issues that political regimes were unwilling to address" (Chowdhury et al., 2000).

The consequences of a lack of demand for health research are potentially debilitating for individual researchers and for research institutions. If there is limited demand for research outputs, few health researcher posts will be established and thus there will be limited job opportunities. For researchers in existing posts, they will rapidly become disillusioned that none of their research findings are taken forward and implemented either in clinical practice or health systems and policy settings, which will adversely impact on the retention of research capacity (Chowdhury et al., 2000).

To develop a more conducive environment for research and create a national health research culture requires extensive, long-term interventions which include: promoting enquiry in high schools; incorporating research practices in tertiary education; raising the profiles and recognition of researchers; establishing appropriate research career pathways; and stimulating demand for evidence to support policy development WHO, 2001c). Although not documented in the literature, it is possible that the recent emphasis on evidence-informed decision-making in the health sector is already having a beneficial impact on the demand for health research. It may also be necessary to pay particular attention to disciplines that have traditionally lacked a research culture, such as nursing (Cooke & Green, 2000).

Domestic funding

Limited demand for health research will exacerbate domestic research funding constraints. If the potential value of research and research findings is not recognized, national decision-makers will not regard the funding of research as a high priority. As indicated previously, it has been proposed that at least 2% of national health budgets be devoted to research, but this target is far from being reached (Global Forum for Health Research, 2004). The availability of domestic research funding also clearly limited by the size of national health budgets themselves. Many LMICs have relatively low levels of government spending on the health sector, particularly in countries which are in conflict situations (Johnson et al., 2005). Some countries in Latin America, have introduced a specific tax to raise funds for the national health research system (Lansang & Dennis, 2004).

Improved availability of domestic funding is critical not only in relation to the sustainability of research capacity (Andruchow et al., 2005), but also in terms of ensuring that research is appropriate to the national context (Lansang & Dennis, 2004). There can be a vicious cycle of over-dependence on donor funding, a donor-driven research agenda with research findings that are not seen as relevant to the country and adverse consequences for domestic demand for and funding of research, reinforcing a dependence on external funding. Alternatively, there can be a virtuous cycle of domestic funding and/or a focus on research that is regarded as a national priority, research findings that contribute to health services and health policy within the country, translating into increased demand for research and a greater commitment to domestic funding of research.

Coordination

An effective national research environment can be promoted through improved coordination, both in relation to setting research priorities and in coordinating research funding, particularly from external sources. Such coordination has been greatly facilitated by the Essential National Health Research (ENHR) strategy, which is a mechanism whereby researchers, decision-makers and community representatives jointly identify the national priorities for health research within an individual country. The ENHR plan can then be used to guide the use of limited domestic resources and to empower national researchers and decision-makers in discussions with external funders (COHRED, 1990).

International research environment

The scope and terrain of international health and research has undergone dramatic changes over the past decade. In addition to the traditional players – the international health and research organizations (e.g. WHO), the bilateral donors (e.g. EU, IDRC, DFID), national funding agencies (e.g. Wellcome Trust, National Institutes of Health) and foundations (e.g. Rockefeller, Kellogg) – the field has expanded to include new players with more diverse institutional structures (e.g. public–private partnerships). Arguably one of the most influential new players is the Bill and Melinda Gates Foundation, the world's largest philanthropy which is currently responsible for funding health programmes across the globe, and which has initiated a number of global public–private partnerships (e.g. Global Alliance for Improved Nutrition, Global Alliance for Vaccines and Immunisations). In addition, the Gates Foundation has endowed academies of science in Nigeria, South Africa and Uganda with US$ 20 million to strengthen their capacity in providing policy-makers with evidence-informed advice (Dickson, 2005). The role of the private sector has expanded also through the creation of partnerships with international health agencies (e.g. Roll Back Malaria with WHO), academic institutions and NGOs (Reich, 2002). Alongside these has been the growth of health research networks, operating both internationally[1] and regionally[2].

These changes in the international health and research landscape have several important implications. Firstly, the balance of power and influence has been reconfigured (Buse et al., 2005). Reich (2002) comments that "…the rules of the game for public–private partnerships are fluid and ambiguous", thereby raising concerns of accountability and governance particularly in the context of high donor dependency of LMIC research institutions. Secondly, these changes herald an unprecedented flow of resources towards health and health research. The Global Forum for Health Research (2004) estimated that approximately US$ 56 billion is spent annually on health research by both the public and private sectors, although concerns remain in terms of the mismatch between disease burden and resource allocation. Thirdly, and of most relevance to this paper, are the implications of this for research capacity in LMICs. As Buse et al. (2005) remark, "For governments, particularly those in low- and middle-income countries, managing this cacophony of inputs in the political system is a difficult business." One view of this, is that in addition to undermining national sovereignty, it also plays a role in fragmenting and duplicating research capacity building (Sitthi-amorn & Somrongthong, 2000). In 2005, the Swedish International Development Cooperation Agency (Sida) reported that in Tanzania there were over 71 different research contracts with the Ministry of Health by as many countries and large research organizations (IJsselmuiden, 2007). Plainly, there is a need for recipient countries to coordinate the funds of donors which are aligned more closely with health research needs (WHO, 2001c) and that there should be "… 'joining forces' in order to be in a position to make long-term commitments by building 'funding consortia'" (KFPE, 2001). KFPE (2001) also argues that there is also a need to treat "… research as a key element in all development processes, and by giving research and higher education a much more prominent role in development assistance".

As indicated previously, donor dependency has in some instances meant that research agendas have been shaped by the priorities of donors, which do not always coincide with those of the recipient country (Chowdhury et al., 2000; WHO, 2001c). It is not surprising then that the relationship between donors and research institutions in LMICs has sometimes been described as 'scientific colonialism' (Binka, 2005(a); Costello & Zumla, 2000; Jentscha & Pilley, 2003; Nurse & Wight, 2007). Nurse and Wight (2007) outline a typology of the various forms that the relationship between donors and LMIC research institutions can take, a brief outline of which is below.

Table 1: Relationship models between donors and research institutions

Models	Nature of relationship
Parachute	Expert is an expatriate and the research agenda is determined by the donor. Foreign researchers control the research design and implementation with some participation from local researchers but often in a subordinate role.
Consultancy	Research is designed and implementation is controlled by the external researchers and institutions, however there is more involvement of local researchers who can provide lower professional fees, local knowledge and access to networks.

Models	Nature of relationship
Twinning	Occurs when the funding agency requires north–south collaboration and partnership between research institutions as the basis for an award. Although issues of unequal power relations persist, there tends to be some collaboration and shared responsibility. Common in longer-term and university related projects.
Corporate	Provision of research services by a corporate entity. Limited scope for institutional capacity development since the focus is often on individual staff development.
Overseas field unit	Establishment of externally funded overseas sites by northern based research agencies (Costello & Zumla, 2000). Often specialized medical research units that work locally and regionally and collaborate with international research units which also shape the research agendas. Focus on in-house and individual training and limited scope for institutional development. Implementation, publication and copyright held within the organization (e.g. Wellcome Trust in Kenya).
Multilateral agency	Occurs between United Nations development agencies, the regional offices and local and foreign researchers. Results in global programmes where the regional or local office facilitates mostly external researchers or finds a local counterpart. Also results in small-scale, locally controlled projects involving principally the regional office and local researchers.
Capacity development	Often associated with philanthropic foundations and certain bilateral donors (e.g. Swiss Development Agency) which have explicit policies that promote ownership and promote stronger research and institutional capacity development. Also focus on supporting more innovative research projects, which if successful might be later funded by bilateral and multilateral agencies with larger budgets.

Source: Nurse and Wight (2007)

Clearly, the more traditional forms of funding (e.g. parachute and consultancy) are least favoured, not least because of the limited potential for institutional capacity strengthening. Costello and Zumla (2000) adapted the Swiss Commission for Research Partnership with Developing Countries (1998) guidelines with insights from their own experience into four broad principles which should guide north–south partnerships: "1) mutual trust and shared decision-making; 2) national ownership; 3) emphasis on getting research findings into policy and practice; and 4) development of national research capacity".

The Ghanaian–Dutch Collaboration for Health Research and Development is an example of a partnership where the recipient country (i.e. Ghana) defined its own research agenda through a consultative process with technical and advisory support from the Dutch partners (Gyapong J & Pfori-Adjei, 2007). Mutual trust and shared decision-making guide the partnership. Partnerships based on mutual respect and trust cannot be built through short-term collaborations and are often encouraged and cultivated through long-term associations. For instance, Sida's bilateral research cooperation with the United Republic of Tanzania and Mozambique has extended over 25 years and has undergone tremendous changes in terms of focus and scope. Clearly, experiences such as this provide valuable insights, but unfortunately there is a dearth of information which documents the evolving nature of north–south collaborations. It has been recommended "that published and unpublished reports on collaborative research projects include more detailed accounts of the north–south collaborative arrangements and their management, ethical and financial aspects (Maina-Ahlberg et al., 1997).

Research networks

Research networks are possibly one of the most important aspects of effective and sustainable RCS initiatives, but receive insufficient attention in the literature. At the national level, there are two key types of research networks: engagement between researchers, particularly across institutions; and engagement between researchers and the users of research findings.

National level: researcher engagements

There is a disturbing lack of engagement between researchers within individual countries, and even within individual institutions (e.g. between different research groups or departments within a university or between different directorates within a ministry of health) (Aleta, 2000). National collaboration and networking is critical for RCS (Ruffin & Flagg-Newton, 2001) from a number of perspectives, including:

- efficient contributions to individual RCS (WHO, 2001c) (e.g. improving the skills of researchers in disseminating research findings to policy-makers could be promoted through activities such as 'writing skills workshops' which draw participants from a range of research institutions rather than only one institution);
- contributing to institutional RCS (e.g. creating a forum for leaders of health research institutions, where they can share their experience and support each other in developing institutional management and leadership skills);
- determining a research agenda to ensure that research efforts are directed to national priorities;
- maximizing research outputs and outcomes, by sharing information on which institutions are undertaking what research, which will reduce the potential for wasteful duplication of efforts and optimize the use of scarce resources (Chowdhury et al., 2000, WHO, 2001c);
- promoting multi-disciplinary research through interchange among researchers in different disciplines currently working in isolation on the same health or health system issues, and addressing some of the critical mass constraints within individual organizations (Chowdhury et al., 2000);
- increasing the potential for attracting large multicentre health research funds WHO, 2001c).

Given the range of potential benefits of national collaboration, why does it occur so infrequently? Two key obstacles to more effective linkages of health research institutions are the lack of willingness to share information and the lack of willingness to share resources (WHO, 2001c). This is frequently engendered by the limited funds available for health research and the perceived need to compete for these resources solely for one's own institution. Competition for research funding between national institutions is in some cases actively encouraged by funders. This in turn leads to a reluctance of individual researchers to share ideas and information with 'competitors' as this might place them at a disadvantage in the competitive process. There is, thus, a need to actively promote a culture of interinstitutional collegiality, where collaboration, rather than exclusively competition, is actively promoted. However, it must be recognized that interinstitutional collaboration requires time to develop and is based on mutual trust and respect. Very often, collaboration develops around key individuals, for example where two individuals, who have mutual trust and respect for each other's work and located in different institutions, initiate a collaborative research project. The project itself then exposes others in each institution to collaborative processes. Positive experiences on an initial collaborative research project can promote long-term collaboration on a range of initiatives.

National level: researcher—user engagements

The current emphasis on 'getting research into policy and practice' (GRIPP), arising from the recognition that there is limited value in undertaking research if its findings are not utilized, highlights the importance of promoting routine engagements between researchers and users of research (Lansang & Dennis, 2004). Very often, users are seen as simply being those who would implement health system or service changes arising from research findings, such as policy-makers, health-care managers and/or clinicians. However, there is a broader research user group that should also be considered, namely the general public, the media and similar stakeholders (Global Forum for Health Research, 2004). The chapter: Beyond research: RCS and the media, looks at the way in which the media, a non-traditional RCS partner, can and is being used to stimulate demand for research and evidence-based policy-making.

There are many factors that influence the process of GRIPP. Research dissemination activities are clearly important, with researchers justifiably being accused of publishing their research results in inaccessible formats (e.g. journals to which users have little access), using overly technical language and having little understanding of policy processes and the importance of framing research findings in a way that can facilitate their incorporation in decision-making (AHPSR, 2004). Some institutions, such as the Centre for Health Systems Research (CHSR) of Mexico's National Institute of Public Health, have gone further to draw on specialized communication skills. CHSR recently established a Knowledge Management Unit (KNU) to broker knowledge between researchers and users. While research is communicated in an accessible way, there is also an emphasis on ensuring that the evidence is presented in a way that convinces readers of the scientific rigour of the research. The relative openness of decision-makers to using research findings to inform decisions is also important.

In addition to initiatives to develop the skills of researchers in communicating research findings to different user groups and to develop the skills of users in interpreting and effectively using research results, strengthening engagements between researchers and users is a frequently used strategy. For example, the International Health Policy Program (IHPP) that provided substantial financial support to a limited number of LMIC research institutions, required each IHPP research project to involve a policy-maker counterpart, usually from the national ministry of health (Andreano, 2000). Many funding organizations, such as the Canadian IDRC, require researchers to include users (whether policy-makers or civil society organizations) in the research team (Varkevisser et al., 2001). The effectiveness, or not, of this strategy for GRIPP has not been systematically evaluated. Another approach has been to promote routine engagement between researchers and policy-makers and health managers through a capacity strengthening network.

International research networks

One of the key RCS success factors identified in the literature is the existence of a scientific linkage to another (stronger) institution in the south or in the north (Global Forum for Health Research, 2004). However, such linkages, particularly between northern and southern institutions, are as frequently identified as an obstacle to RCS. Whether regional or global linkages are a success factor or an obstacle to RCS depends fundamentally on the nature of the relationship between the institutions.

The key features of successful collaborative relationships between institutions in high-income countries (the north) and in LMICs (the south) include:

- The research focus of the collaboration must address issues that are jointly identified by the partners (Nchinda, 2002a), are of common interest to them, meet complementary needs and provide mutual benefits (WHO, 2001c).
- At least one of the scientists from the partner institution in the LMIC should have demonstrable competence in the research subject area in

order to have a balanced partnership and to minimize any superior-to-inferior relationships. As such, the research leaders of the two partnership groups should have similarly high scientific qualifications and should feel mutual respect for one another (Nchinda, 2002a).

- There should be mutual trust and shared decision-making between the partners (Costello & Zumla, 2000; Reddy et al., 2002). Mutual trust can only be developed over a period of time. To develop this trust, transparency and full engagement in decision-making by both partners, as well as a common philosophy about the nature of research collaboration, are essential (Reddy et al., 2002).
- Ownership and leadership of the overall research project must rest with the national (LMIC) partner (given that north–south partnerships almost always exist in order to undertake research focused on issues within the southern country) (Costello & Zumla, 2000; Reddy et al., 2002; Bates et al., 2006).
- There should be clearly defined areas of research or responsibilities for each partner (Nchinda, 2002; Bates et al., 2006). This ensures that there is adequate scope for both partners to contribute to the research programme. It is often useful to develop an institutional agreement, which outlines the respective roles of each institution (Reddy et al., 2002).
- There should also be an equitable distribution of financial resources between the partners. Ensuring an adequate and fair share of resources for the LMIC partner is one of the key challenges of north–south collaboration, not least of all because of the relatively higher researcher salaries and large overheads in northern institutions. “On average, one third of the value of grants which ostensibly support north–south partnerships in research is consumed by the northern administrator institution as a levy for *operational* costs” (Chowdhury et al., 2000).
- There should be an explicit commitment to developing national (LMIC) research capacity (Costello & Zumla, 2000).
- There should be frequent communication between the partner institutions. While limited financial resources make frequent partner meetings difficult (Nchinda, 2002), using several modes of communication (such as conference calls, Skype calls and electronic communication) facilitates regular communication. This may require investment in improved communication infrastructure within the southern partner as an explicit part of the collaboration.

While the majority of cross-country partnerships have taken the form of north–south collaboration in the past, there is growing interest in south–south collaborations as research capacity in LMICs expands. As noted by Beattie et al. (1999), "Mechanisms to support linkages within developing regions are also required to allow sharing of regional resources and expertise". These partnerships are viewed commonly as offering a more equal partnership, partly because southern institutions which have experience unsatisfactory north–south partnerships are likely to be more sensitive to the needs for truly collaborative partnerships. However, it is possible that one southern partner may dominate and the same problems that exist in some north–south collaborations occur. Therefore, the above list of strategies for promoting acceptable and sustainable research partnership apply equally to north–south and south–south collaborations.

Strengthening south–south collaborations

South–south collaborations between middle-income countries are increasing and are extending to areas of science and development beyond traditional international trade negotiations. For example, the India-Brazil-South Africa Dialogue Forum includes a focus on intellectual property and access to medicine, traditional medicine, and research and development (R&D) on vaccines and pharmaceutical products to address national health priorities.

Although there is relatively limited documented experience to date, south–south collaborations between middle-income countries (e.g. Brazil, India, South Africa and China), with comparatively stronger health research systems, and low-income countries, and among middle-income or low-income countries themselves, hold the potential for leveraging resources and expertise. Middle-income countries can play a pivotal role as a source of expertise and resources towards supporting low-income countries in developing their health research capacity. These collaborations can occur in two ways: firstly, through direct collaboration between countries within and across regions and secondly, through facilitation by regional and disciplinary-specific networks which span LMICs across regions (e.g. INCLEN, INDEPTH, COHRED, Child Health and Nutrition Initiative, Initiative for Cardiovascular Health). Although many networks tend to provide small grants and seed funding, they are able to leverage significant resources through their partnerships with the scientific community, universities and research institutions in LMICs, international research institutions, donors, foundations, United Nations bodies and policy-makers. A key programme area of many networks is the support of research and institutional capacity in LMICs, with the result that only projects which demonstrate a commitment to capacity strengthening are funded. Some initiatives such as COHRED directly support research capacity initiatives (e.g. COHRED supports the Young Researchers Support Programme initiated by the Kazakhstan School of Public Health which provides young scientists with an opportunity for continuous training (COHRED, 2007)). Networks supported by the Global Forum for Health Research have also supported regional efforts to map research capacity in LMICs in specific areas of public health (e.g. mental health, child health). Such initiatives are critical in identifying research capacity gaps and areas for more focused capacity strengthening efforts.

Conclusions

This chapter does not aim to summarize all the key findings (see Table 2 for a summary of the key factors facilitating effective RCS), but instead focuses on what we believe are the priority interventions to improve RCS. At the core of these priorities is the need for a change in the mindset of key stakeholders in terms of how RCS should be approached and implemented.

First, while the importance of *building institutional capacity*, and linked to this *securing core funding* for operations and staffing for long term sustainability, is increasingly being recognized, it still suffers from lack of priority in RCS efforts. Thus, there is an urgent need to change the mindset of funders and other international organizations away from supporting individual RCS and towards supporting institutional RCS, within which individual RCS efforts can occur.

Core funding may allow LMIC institutions to be more discerning in their engagements with other institutions. As noted earlier, the nature of collaborations between northern and southern institutions has often been seen as unequal, with the northern collaborators frequently deciding and driving the research agenda. Core funding may potentially empower LMIC institutions to negotiate more favourable terms of engagement, allowing for a more equal partnership.

The next question is then how can core funding be secured? Once again, a change in mindset may be of value. In particular, *endowments* which provide a stable source of funding have proved to be extremely valuable to academic institutions in high-income countries in boosting their quality of teaching and research. RCS funders should identify reasonably well-established research institutions in LMICs which are 'soft-funded', without permanent core support, and provide them with endowment funding.

Depending on the size of an endowment, this could take different forms. For example, an endowment may be established to cover the major components of core funding (e.g. a number of researcher and administrator salaries, upgrading of computers every five years etc.). Alternatively, smaller endowments could be used to establish prestigious posts, such as an institutional directorship or chair. This would play an instrumental role in attracting and retaining leading scientists and researchers, thereby bolstering the institutional capacity for teaching, research and generating additional funding.

The second key RCS area that should receive priority attention is that of *retention of skilled and experienced researchers in LMICs*. If this is to be addressed, there should be transparent and explicit discussions on what is required to retain staff. Issues about core and sustainable funding raised above are critical, but in addition, the issue of conditions of service must be addressed. For example, funders should consider greater flexibility in allowing their funds to be used for salary top-ups (i.e. over and above the official salary scale within a given institution, which are generally very low in LMICs). It may also be necessary for other staff benefits – such as conference funding – to receive favourable consideration, as opportunities to make conference presentations to international peers is regarded as an important benefit for researchers. A further issue that requires more exploration is the role of networks in promoting retention through providing a supportive collegial environment across institutions and countries, which can be important in overcoming isolation.

Third, there is also a need for *mindset change within southern institutions*. In particular, there is often very limited collaboration between institutions within a country working on similar issues. Instead, competition between institutions around areas of research and for funding prevails in many contexts. Collaboration can overcome critical mass limitations; for example, while a small research institution may only be able to undertake very small scale projects that have limited impact, by collaborating with one or more domestic institutions they could jointly undertake more substantive and policy-relevant research. In addition, while there is frequently limited capacity within a single academic institution to offer specialized post-graduate programmes (e.g. in epidemiology or health economics), collaborating with another domestic academic institution could make this feasible.

It is also necessary for a mindset change in relation to researcher–user interactions within LMICs. While initiatives such as ENHR have attempted to bridge the divide, it is necessary for more long-term engagements between researchers and users to be pursued. This requires a change in mindset on the part of researchers; for example, accepting that it is important to secure user views on research priorities, and that engaging with users can improve researchers' understanding of policy and implementation processes, thus improving the relevance and usefulness of their research outputs. At the same time, a change in mindset of users is also required; for example, accepting the researchers may be able to make important contributions to evidence-informed policy-making.

Finally, there should be a change in the mindset of southern institutions in relation to the perceived power imbalance in north–south collaboration. In particular, southern institutions should recognize the potentially powerful position that they occupy in that most funders require the involvement of local counterparts for research undertaken in LMICs by northern institutions. While at present some southern institutions continue to allow themselves to be used as data collectors, recognition of the fact that northern institutions require their involvement can empower southern partners to insist on an equal partnership, with explicit capacity strengthening components.

While numerous specific recommendations could be put forward for improving the effectiveness of RCS initiatives, this review suggests that none are more important than changing the mindsets of all relevant stakeholders.

Table 2: A summary of key factors that facilitate effective RCS

Individual level	
Senior researchers	**Junior researchers**
Research skills and competencies • Training and experience in research methodologies • Experience in writing and disseminating research findings • Experience in communicating research to a range of users at a national and international level • Experience in managing large-scale research and research resources	*Research skills and competencies* • Training and building experience in research methodologies • Opportunity for writing and disseminating research • Exposure to communicating research to different users • Opportunities for managing small research projects and research resources
Technical skills and competence • Training (PhD) and expertise in core area of research • Post-doctoral and re-entry grants • Exposure to ongoing training and skills upgrading	*Technical skills and competence* • Training (masters degree) in core area of research • Opportunity for postgraduate training (e.g. masters or PhD) • Opportunity for ongoing training and skills upgrading
Other • Management and leadership abilities to support junior researchers • Opportunities for interactions and networking with peers in scientific community • Recognition and status within national and international research community • Opportunities for career growth • Opportunities for undertaking consultancy work if salaries are not deemed adequate (but with limits)	*Other* • Computer literacy • Ability to communicate via non-traditional modes of communication (e.g. e-mail) • Support in building confidence to interact with others in national and international research community • Opportunities for interactions and networking with peers in scientific community • Defined career pathways

Institutional level

Critical mass of staff

- Mix of research staff with different levels of experience and expertise.
- Critical mass of senior level researchers to ensure that support of junior researchers is shared and to provide opportunities for engagement among peers
- Good administrative support which relieves researchers of administrative responsibilities

Leadership

- Strong scientific track record in managing large scale research
- Ability to fund raise on a large scale both nationally and internationally.
- Respected by staff in the organization, nationally (by fellow researchers and users (e.g. policy-makers) and the international research community
- Ability to engage with the national and international research community
- Vision of long term growth of organization

Funding

- Secure permanent core funding (e.g. endowments)
- Greater reliance on national funding (i.e. reduced donor-dependency)

Infrastructure

- Access to research infrastructure (computers, laboratory equipment, Internet access, e-journals etc.)
- General infrastructure (roads, access to stand-by generators and other amenities to ensure regular domestic electricity supply)
- Adequate office space and organization which facilitates staff interactions.

Clear retention strategies

- Clearly defined career pathways and opportunities for growth
- Continuous education and training
- Mentorship and supervision of junior staff
- Re-entry opportunities for staff embarking on post-graduate studies in other institutions
- Stable and acceptable salaries
- Opportunities for networking and collaborations with other research institutions
- Open and collegial working environment which encourages engagement and interactions between staff

National research environment

- Leadership in setting research agenda in collaboration with national research institutions and international research and donor community
- Ear-marked government resources for health research and/or innovative schemes for funding health research which contributes to creating a stable national research fund
- Policy-makers value and demand health research as important for evidence-informed policy

International research environment

- Of foreign aid, 5% is dedicated to health research
- Recipient countries effectively and systematically coordinate donor funds which are aligned to health research needs
- Partnership between donor and recipient country moves away from traditional models (e.g. parachute, consultancy, overseas field unit) towards capacity development which emphasizes national ownership, mutual trust and shared decision-making
- Partnerships between recipient countries and donors (bilateral, multilateral, foundations) reflect and respond to the changing nature of international health funding

Research networks

- Increased and improved national collaboration among individual researchers and research organizations – sharing of knowledge and resources
- Improved and on-going relationship between users and researchers through capacity strengthening networks and involvement of users in the research team
- North-south research collaborations are ‘true’ partnerships based on mutual trust, transparency and open communication
- The allocation of funding between northern and southern institutions are equally shared and reflect ‘true’ partnership and shared decision-making
- Increasing number of south-south and interregional collaborations and networks which emphasize capacity development through post-graduate training, staff-exchange programmes, on-the-job training and internship programmes

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[1] For example, the Council on Health Research for Development (COHRED), International Clinical Epidemiology Network (INCLEN), the Special Programme for Research and Training in Tropical Diseases (TDR) and the Special Programme of Research, Development and Research Training in Human Reproduction (HRP).

[2] For example, the Network on Equity in Health in Southern Africa (Equinet) and the Tropical Medicine and Public Health Centre network of the Southeast Asian Ministers of Education Organization (SEAMEO–TROPMED).

Monitoring and evaluation of RCS

Monitoring and evaluation of RCS

Objectives and approach

This chapter begins with a brief review of RCS approaches in general, and examines how health RCS is approached specifically by the six key organizations reviewed. It also examines how these organizations track their RCS initiatives. Through an evaluation of both the literature, and the way in which RCS activities are currently tracked, and guided by interviews with key informants, this chapter draws out some key messages for improving the way in which we approach RCS monitoring and evaluation. Finally, it builds on these key messages to propose a framework, and some examples of indicators, which might further enable RCS evaluation and the development of more specific indicators.

I) Donor approaches to RCS

Interest in RCS for development has grown both generally, and in the health sector specifically, since the early 1970s. In health, this has been pushed by the work of COHRED, the Global Forum for Health Research, and AHPSR, which are strong advocates for RCS and for health policy and systems research.

A mapping of RCS initiatives conducted for the Overseas Development Institute (ODI) in 2001 revealed (through Internet search, telephone and e-mail discussions) 49 organizations with "strengthening southern research capacity" described in their mission statements or high-level objectives (Young & Kannemeyer, 2001). Six (12%) of these were specifically in health, although others supported research in overarching topics such as governance, management and policy[1]. The mapping revealed that the most common activities engaged in by the 49 RCS organizations are:

- networking (70%)
- training (62%)
- research partnerships (56%)

It is likely that the number of organizations involved in RCS initiatives is now higher, as interest in this area continues to grow.

Approaches to RCS have evolved – albeit slowly – as donors have reflected on lessons learnt over the years. Whyte (2004) presents an overview of historic trends in donor support and the evolution of ideas about capacity building among donors from 1960 to 2003. The development of ideas about what works was slow partly because many initiatives were not systematically monitored or evaluated. As a result, 'brain drain' in the 1970s and '80s, led to the emigration of thousands of LMIC scholars to north America and Europe, (Whyte, 2004; Nchinda, 2002a). The need to strengthen the universities and other organizations from which individuals came became increasingly apparent. Donors began to respond in a number of ways,[2] including:

- Giving re-entry grants to enable a returning trainee to initiate independent research in his/her home institution (see Special Programme for Research and Training in Tropical Diseases (TDR), 1988), and/or supplementing researchers' salaries (Halstead et al., 1991; Mervis & Normile, 1998).
- Developing the 'sandwich model' PhD, where trainees from LMICs receive training and support from a stronger foreign university, but conduct their research in their own country (this has been supported particularly in the area of tropical diseases, for instance by the Special Programme for Research and Training in Tropical Diseases (TDR), Danida, SAREC and DFID).
- Encouraging networks at the national, regional and global levels to try to reduce the intellectual isolation faced by new researchers in LMICs (encouraged and supported by the Special Programme of Research, Development and Research Training in Human Reproduction (HRP), the Special Programme for Research and Training in Tropical Diseases (TDR), INCLEN[3] and others). WHO, the United States National Institutes of Health (NIH) and others have also supported the development of electronic communication facilities to assist in networking.
- Developing formal research networks for training and collaborative work (between research groups and institutions in the south) – encouraged and supported by the Special Programme of Research, Development and Research Training in Human Reproduction (HRP), the Special Programme for Research and Training in Tropical Diseases (TDR), INCLEN and others.

- Developing 'twinning arrangements' and research partnerships between institutions in the north and south, and between institutions in the south, to pool the resources and strengths of the institutions for the greater benefit of the weaker institutions (supported by the Special Programme for Research and Training in Tropical Diseases (TDR), RAWOO[4], NCCR North-South[5], NUFU[6], INCO-DC[7], NIH, DFID and others).
- Increasingly, supporting universities in the south to both conduct research and deliver training for new researchers, rather than bringing students to the north for study (e.g. DBL, Sida/SAREC, IDRC).

Programme evaluations by donors have helped us to develop an improved understanding of what factors are important for strong research capacity at the institutional level. Many of these factors are covered in the previous chapter, including: good leadership and autonomous management, including the ability to negotiate appropriate compensation policies (salaries, allowances and fringe benefits) for the researchers; adequate and appropriate infrastructure and budget; and sufficient technical equipment and supplies, including electronic communication facilities.

The importance of an institutional, rather than individual focus in RCS is now widely understood. Some donors (like Sida/SAREC and the Dutch Ministry of Foreign Affairs[8]) have started to look beyond the institution to take an explicitly *national* focus through seeking to strengthen links between higher education and research, and between research and society in general, and through strengthening the links between research and national policy. However, evidence on how best to strengthen research capacity at the national level is scarce and points raised in this chapter will hopefully expand the framework and potential for national capacity building.

The remainder of this section turns to look in a little more detail at six key organizations involved in health RCS in LMICs to examine their approaches to RCS and the kinds of activities they support.

Special Programme for Research and Training in Tropical Diseases (TDR)

The Special Programme for Research and Training in Tropical Diseases (TDR) is an independent global programme of scientific collaboration focusing on a range of major infectious diseases. It operates within a broad framework of intergovernmental and interagency cooperation. It was established in 1975, and is cosponsored by the United Nations Children's Fund (UNICEF), the United Nations Development Programme (UNDP), the World Bank and WHO.

Mission:

To foster an effective global research effort on infectious diseases of poverty in which disease endemic countries (DECs) play a pivotal role (TDR 10 year vision and strategy, launched July 2007 (Special Programme for Research and Training in Tropical Diseases (TDR), 2007b)).

Major strategic functions:

- **stewardship** for research on infectious diseases of poor populations;
- **empowerment** of researchers and public health professionals from disease endemic countries moving beyond traditional research training to build leadership at individual, institutional and national levels so countries can better initiate and lead research activities, develop a stronger presence in international health research and effectively use research results to inform national/regional policy and practice;
- **research** on neglected priority needs that are not adequately addressed by other partners This focuses on three research functions:
    a. foster innovation for product discovery and development
    b. foster research on development and evaluation of interventions in real life settings
    c. foster research for access to interventions.

"The Special Programme for Research and Training in Tropical Diseases (TDR) has a pipeline of RCS activities according to the needs of each country. For the least developed countries, there is a focus on training of individuals and strengthening of institutions, and on provision of information. For more developed countries, the focus changes to partnerships. Finally, for advanced developing countries, there is an emphasis on utilization of the capacity already developed in these countries, especially on good practices. TDR works on the principle that, to achieve long-term outcomes, what is needed are comprehensive capacity building programmes that provide continuing professional development, support, and an enabling environment, rather than scientific training alone" (Special Programme for Research and Training in Tropical Diseases (TDR), 2005b).

TDR's new 10 year strategy (launched July 2007) (Special Programme for Research and Training in Tropical Diseases (TDR), 2007b), which emphasizes 'empowerment' and getting research into policy and practice, aims to build on their previous 30 years of working in RCS. This development has partly been prompted by the focus by TDR and its donors on impact, and the need to prove that their RCS is having a public health impact.

RCS is both explicit (TDR has an RCS unit, with an earmarked budget and projects), and embedded in its programmes – "everything we do is RCS, and we try not to waste any opportunities – even if a scientific research project is being funded in the north, then we will try to bring in a fellowship for someone from the south" (interview).

Programmes:

TDR's tradition has been to work through grants:

- training grants
- re-entry grants
- fellowships
- research grants for projects and programmes.

They also support networks (teaching and research) and partnerships (north–south and south–south), and work to support the research 'environment', for instance with:

- the strategic initiative for developing capacity in ethical review, which helps build in-country human subjects protection programmes, and is a way to measure and provide accountability for the quality and effectiveness of ethical review worldwide;
- a training programme for effective project planning and evaluation in biomedical research (a four-day training course, with a train-the-trainer course and manual).

Scale:

TDR's annual budget in 2007 is approximately US$ 50 million. It aims to increase this to US$ 80 million by 2013 (Special Programme for Research and Training in Tropical Diseases (TDR), 2007a). Currently, about 30% of that is earmarked for the RCS unit and its projects, although RCS is also embedded in other initiatives and projects (interview). However, TDR is undergoing structural change in line with its new strategy and it is harder, in the forecast budget breakdown, to categorize funding specifically for RCS (Special Programme for Research and Training in Tropical Diseases (TDR), 2007a). In the published *Approved Programme Budget 2006-2007* (Special Programme for Research and Training in Tropical Diseases (TDR), 2005a), the reported operations budget for 'cross disease: capacity building' is just over US$ 7.6 million, although this is unlikely to capture all RCS spending.

DBL – Institute for Health Research and Development, Denmark

DBL was established in 1964 as the Danish Bilharziasis Laboratory. From an initial focus on the control of schistosomiasis, DBL's profile developed and it became a broad cross-disciplinary and intersectoral institution with a wide range of activities and research interests. In January 2007, DBL merged with the Faculty of Life Sciences, University of Copenhagen, and adopted its new name 'DBL – Institute for Health Research and Development'. DBL receives its core funding from Danida (Danish Ministry of Foreign Affairs).

Mission:

To contribute to the improvement of public health conditions in developing countries through research and research-derived activities by focusing on selected, poverty-related health problems.

Strategic aims:

- to generate and disseminate new knowledge, methods and tools for use in the promotion of health and the prevention and control of disease;
- to build research capacity and capacity for integrated disease control at institutions and in networks, primarily in Danida programme countries, but also in Denmark.

Capacity building objectives:

- to support PhD and Masters studies, courses, workshops and seminars, and to strive to build institutional capacity addressing management, infrastructure and social capital;
- to contribute to capacity building in a Danish context, by supporting Danish PhD and Masters students and through staff contributions to relevant development study programmes at Danish universities.

DBL's strategy focuses on three broad areas: research, RCS, and knowledge management. Knowledge management is about strengthening evidence-based health planning, implementation and monitoring in the south. RCS is therefore both explicit as one of three main strands of work, as well as embedded within the other two strands; "[DBL] hate to see a project without student or southern involvement since it is a missed opportunity for RCS" (interview).

DBL's approach has generally moved from supporting individuals through research training, to supporting institutions in a more holistic sense – "unless you are supporting institutions, you are wasting money" (interview). When thinking about institutional capacity strengthening, they think in terms of four 'capitals':

- human resources
- 'tangibles' (infrastructure, tools, equipment, etc.)
- managerial capital
- social capital (Is it the right institution? Is it well connected? etc.)
- (interview).

Their programme focuses on a number of 'strategically selected' partner institutions and networks, following detailed needs assessments and long-term collaborative agreements.

Individuals are nominated for training by the supported institutions, and are preferably registered in universities in the south. Since DBL's institutional support is strongly focused on getting research into policy, they support MoH research institutions in a broad way, so as to build their support structures – this includes helping with ethical committee development, access to literature and management courses. They stress that RCS must be 'anchored' in national structures – something which, in the field of tropical diseases, has been facilitated by the input of large amounts of funding (e.g. from the Bill and Melinda Gates Foundation) (interview).

A new target for DBL includes district MoH officers, for whom they have provided a 'light' research methodology course, again targeting the use of research findings, raising the profile of research for development, and trying to strengthen priority setting at the district level. They have also developed guidance for desk officers in bilateral organizations, helping them to see the role of research, understand it, and assess research priorities (interview). These strategies can help to increase research capacity at the national level as demand for research is integrated into the policy-making process.

Programmes within the RCS strand of work include:

- support for Masters and PhD students;
- support for courses and workshops, held and jointly organized by partners in the south (topics include research methodology, statistics, methods issues related specifically to tropical disease research, health research ethics);
- disease control capacity building initiatives;
- general capacity building (of institutional, managerial and social capital) provided to networks, research institutes and centres, universities, and MoH;
- professional and financial support of networks and research collaborations (particularly south-south).

Research and knowledge management strands include RCS work through, for instance, the provision of support for workshops, support for research partnerships, provision of research advisory services, and the promotion of the use of research for health development in the south.

Scale:

DBL estimates that they spend approximately US$ 3 million on RCS each year (interview). The 2006 annual report states that their income for the year was a little over US$ 7.15 million.[9] Of this, 34.6% (approx US$ 2.5 million) was spent on capacity building in the south, 36% on research, and 6.5% on knowledge management (DBL, 2007).

Fogarty International Center (FIC), United States National Institutes of Health (NIH)

The Fogarty International Center for Advanced Study in the Health Sciences (FIC) is the international component of the National Institutes of Health (NIH), and was established in 1968. NIH, in turn, is part of the United States Department of Health and Human Services.

Mission:

FIC addresses global health challenges through innovative and collaborative research and training programmes and supports and advances the NIH mission through international partnerships (FIC web site).

The NIH mission is "science in pursuit of fundamental knowledge about the nature and behaviour of living systems and the application of that knowledge to extend healthy life and reduce the burdens of illness and disability" (NIH web site).

FIC's programme objectives include a focus on capacity development through the creation of regional 'centres of excellence', the building of interdisciplinary skills, and the promotion of alliances and partnerships (FIC, undated).

FIC works largely through partnering institutions (usually a United States institution with a foreign institution). Programmes last about five years. Training is a key aspect of their capacity strengthening work, and is both short-term (around 3 months) and long-term (anything over 6 months).

Increasingly, this education is being conducted in LMICs, rather than in the United States. Funded research is almost always done in LMICs, using the 'sandwich' model of PhD training. Increasingly, the funds are being granted directly to the LMIC institution (interview).

In addition to developing an institution's human resource capacity, FIC provides some additional support, such as 'core courses' in, for example informatics, ethics and grant writing. However, FIC acknowledge that more core support is needed. In the future they hope to help create 'centres of excellence'. They do not support physical infrastructure (interview).

Programmes include:

1) *Research grants,* including:

- Fogarty International Research Collaboration Award (FIRCA), which fosters international partnerships between NIH-supported United States scientists and their collaborators in LMICs.
- Global Research Initiative Program for New Foreign Investigators (GRIP), which promotes productive re-entry of NIH-trained foreign investigators into their home countries by providing partial salaries to the researcher returning home and support for research projects.
- Other collaborative and capacity building projects, including on 'brain disorders in the developing world', and tobacco and health research.

2) *Research training grants*, including in the areas of HIV, infectious diseases, population health, informatics, and clinical, operational and health services research.

3) *Multilateral Initiative on Malaria*, a global alliance of organizations and individuals concerned with malaria, aiming to "strengthen and sustain, through collaborative research and training, the capability of malaria endemic countries in Africa to carry out research required to develop or improve tools for malaria control" (MIM web site).

Scale:

In 2005, FIC made over 400 awards – 83 directly to foreign institutions. They spent US$ 32 million on training (and another US$19 million on research) (interview). For the 2007 financial year, FIC currently budgets approximately US$ 50.1 million for grant awards (FIC, 2007).

Wellcome Trust, United Kingdom

The Wellcome Trust is an independent, privately endowed charity, established in 1936. It has one trustee – the Wellcome Trust Limited, a company limited by guarantee registered in the United Kingdom. The Trust is governed by a board of governors, with decision-making authority on grant applications delegated to various funding committees.

Mission:

To foster and promote research with the aim of improving human and animal health (Wellcome Trust 2008).

Strategic aims:

1) advancing knowledge: to support research to increase understanding of health and disease, and its societal context;
2) using knowledge: to support the development and use of knowledge to create health benefit;
3) engaging society: to engage with society to foster an informed climate within which biomedical research can flourish;
4) developing people: to foster a research community and individual researchers who can contribute to the advancement and use of knowledge;
5) facilitating research: to promote the best conditions for research and the use of knowledge;
6) developing its organization: to use its resources efficiently and effectively. The United Kingdom will remain the principal base for its research activity.

RCS objectives:

Under strategic aim 4, objective 4.2 reads:

> *"To stimulate research capacity building to address priority areas of science, or career gaps, by developing tailored training and career initiatives"* (Wellcome Trust, 2008).

The Wellcome Trust has traditionally focused on the 'people elements' of research – "supporting the best people to do the best research" (interview) – with the hope that those people then go on to build teams of researchers who continue to grow. Their research awards account for full direct costs, and tend to be generous, to allow research project related tools and equipment to be purchased. This helps to strengthen capacity within the institution. Additionally, their 'Major Overseas Programmes' incorporate elements of institutional and national RCS (interview).

Programmes (relevant to LMICs) include: (interview; Wellcome Trust web site)

- grant schemes
  - research project support for United Kingdom/Ireland researchers, or international researchers who have a significant track record of Wellcome Trust funding;
    - programme grants (longer term funding)
    - project grants
    - flexible travel awards.
  - equipment and resources – support for up to five years for United Kingdom/Ireland researchers, or those with a significant track record of Wellcome Trust funding, to establish or maintain technology, biomedical resources or equipment;
  - support at different levels on a 'career pathway', including junior, intermediate and senior fellowships specifically for public health and tropical medicine researchers in LMICs. Fellowship applicants must be within 'eligible host institutions'.
- major overseas programmes in Kenya, Malawi, and South-East Asia (Thailand and Viet Nam), which are based on international partnerships, but integrated within the developing country research/medical/policy infrastructure "to ensure close juxtaposition of research and application".

A new initiative specifically for RCS – Health Research Capacity Strengthening (HRCS) Initiative, Kenya and Malawi – is in the process of being drawn up in partnership with the United Kingdom Department for International Development (DFID) (as co-funder) and IDRC. The initiative was launched formally in July 2006. There is a possibility that this may lead to further initiatives aimed at strengthening LMIC institutions (interview).

Alongside this, the Wellcome Trust hope to fund a 'Health RCS Learning' project alongside the HRCS Initiative, to enable the partners to learn from the experience, and to compare and contrast the experience of the two countries. This is still in the early stages of development (interview).

Scale:

For the specific HRCS Initiative in Kenya and Malawi, Wellcome Trust and DFID have each agreed to commit UK£ 10 million (approximately US$ 20.3 million) over five years.

For other RCS activities, it is difficult to specify a figure, since they do not 'ring fence' it, and much of the RCS is embedded within the grant schemes. However, in 2006, international spend amounted to approximately UK£ 70 million (approximately US$ 142.5 million) (this includes funding for United Kingdom researchers working in LMICs, but not United Kingdom scientists working on tropical disease research in the United Kingdom). Although the yearly spend varies from year to year (since five year programme spends come out of the one year in which it was committed), they have a mission to increase this by about 50% over the next five years. (interview).

SAREC – The Department for Research Cooperation, Sida

Sida is the Swedish Agency for International Development Cooperation, a government agency under the Ministry for Foreign Affairs. SAREC is Sida's sector department for support to partner country research and research of importance for the development of these countries. The department also supports Swedish research activities relevant to developing countries.

Mission:

SAREC's main objective is "to strengthen the research capacity of partner countries and promote development-oriented research" (SAREC web site).

RCS Objectives: (SAREC web site)

- to support partner countries in creating a better research environment, researcher training as well as developing methods for planning and determining research priorities;
- to promote development-oriented research through both financially and academically strengthening the ability of partner countries in

identifying areas of importance for their development as well as disseminating research results;

- to promote and facilitate cooperation between researchers in Sweden and partner countries.

RCS is a key objective of SAREC, as a means through which countries can counter poverty. Sida/SAREC's learning process with regards to how to strengthen research capacity has taken them through five phases (Sida 2005a):

Phase 1: SAREC initially started by supporting *national research councils,* which were assumed best placed to identify priority areas for research and allocate resources to these.

Phase 2: Following an evaluation in 1985, it became clear that few of the countries involved had sufficient capacity for the research council function. There were simply too few researchers and weak understanding of processes and conditions for research. The *training of individual researchers* came in focus. A project based sandwich model was used, with no scholarships for training abroad. Supervisors came to the country and the PhD candidate went out for shorter courses, laboratory work etc. The training was accompanied by support for libraries, laboratory equipment etc. in order to have some infrastructure for research in place.

Phase 3: Support for *groups and a creative environment*, implying more support for infrastructure – based on more comprehensive projects.

Phase 4: Support for *institutions (universities)* became important. Towards the end of the 1980s, the university crisis had become apparent. During the 1990s, Sida bilateral support for research became negotiated packages of support to key institutions for research development. In poor partner countries, support for research development as part of the build up of a research university was usually identified as strategic. The institutional support package included (and still does) various elements negotiated in line with the university development plan. Research training became linked to staff development plans, as did support for research management, laboratories, library and Internet connectivity, etc.

Phase 5: Two aspects are increasingly prominent, a) the need to support capacity for building *local research training* and b) the need to see *research as a sector*.

The aim of SAREC's bilateral research cooperation is to arrive at a situation in which universities have gained credibility for managing governmental funds for basic research facilities, and are able to attract external funding from the private sector, from foreign donors and from foundations. (SAREC web site).

Programmes:

For SAREC, local research capacity has wide definition, comprising training of PhD students in research projects, building laboratories and modern library facilities, setting up local research funds and mechanisms for allocating priority among research proposals, and dialogue on reform of universities and national research systems. In addition to the bilateral research cooperation, activities to strengthen capacity can also be found in a range of thematic research programmes, which have the primary aim of developing new knowledge in defined areas.

SAREC's bilateral research cooperation is long term (often 20–25 years), and is flexible to respond to the specific needs of the universities in the partner countries. SAREC works with the universities to conduct a needs assessment at the start of the programme, to identify capacity needs. Following that, "the universities are given the funding and they set the agenda; they are in the driving seat" (interview). The universities are linked with researchers in institutions elsewhere, although these are not necessarily in Sweden.

Scale:

SAREC's overall total budget is approximately one billion Swedish Kroner (approximately US$ 144 million). Approximately one third of that is for bilateral research cooperation. Of that, the total amount devoted to health research is about 200 million Swedish Kroner. And of that, approximately one half goes to RCS (equivalent to about US$ 15 million per year) (interview).

IDRC – The International Development Research Centre

The International Development Research Centre (IDRC) is a public corporation created by the Parliament of Canada in 1970. IDRC works collaboratively with many federal government departments, especially Foreign Affairs Canada and the Canadian International Development Agency. Guided by an international **Board of Governors**, IDRC reports to Parliament through the Minister of Foreign Affairs.

Mission:

"Empowerment through knowledge" (IDRC web site)

IDRC was created to help LMICs use science and technology to find practical, long-term solutions to the social, economic, and environmental problems they face. Support is directed toward developing an indigenous research capacity to sustain policies and technologies that developing countries need to build healthier, more equitable, and more prosperous societies.

In carrying out its mission, IDRC provides funds and expert advice to LMIC researchers working to solve critical development problems. It:

- *funds applied research* by researchers from LMICs on the problems they identify as crucial to their communities;
- *provides expert advice* to those researchers;
- *builds local capacity* in LMICs to undertake research and innovate.

Programmes:

- The Centre supports research under the broad themes of:
  - Environment and Natural Resource Management
  - Information and Communication Technologies for Development
  - Innovation, Policy and Science
  - Social and Economic Policy.
- Training and awards programme: helps countries of the south gain a critical mass of trained and experienced researchers to promote sustainable and equitable development in their regions.

- Partnerships. IDRC engages in three types of partnerships:
  - Its staff work hand-in-hand with research partners.
  - They undertake joint funding and activities with other donor and research institutions.
  - They foster and promote collaborative research between Canadian and southern researchers, and among researchers in the south.

Scale:

IDRC is one of the longest running organizations focusing on capacity strengthening. Since RCS is embedded within all their work, and since they do not currently have an explicit programme for health research, it is not possible to calculate, from available figures, how much the organization spends annually on health RCS. However, a 2006 report states that research projects classified primarily as 'capacity building' represent 26% of the total number of IDRC projects approved (146 out of 561), and these account for 31% of total funding. These were found to be equally balanced between three programming areas (Environment and Natural Resource Management, Social and Economic Policy, and Information and Communication Technologies for Development). However, the report noted that when abstracts of all projects are examined, over 75% are found to have capacity building as a central concern (IDRC, 2006). In 2006/2007, IDRC's parliamentary appropriations were Canadian $135.3 million (approximately US$ 127.8 million).

Conclusion

RCS initiatives are wide ranging and far reaching. They tend to be within flexible programmes which, to varying degrees, adopt a broader institutional and/or systems approach to research capacity. This means that while some programmes may initially focus on individuals (for instance, in the Fogarty International Center's approach), they recognize that they must concomitantly be prepared to influence those factors in the institutions (and beyond) that might constrain the capacity of the individuals in question. Other programmes set out specifically to influence the 'systemic' level through, for instance, working with universities or ministries of health.

RCS appears to be largely infused within the organizations' programmes, rather than seen as a separate activity – several interviewees commented on not wanting to waste any opportunity to strengthen capacity. The donor organizations are making long-term commitments to RCS, with programmes lasting from 5 to 25 years. Moreover, several of the organizations have plans for large and continued increases in funds for RCS initiatives.

These issues all complicate the tracking of RCS activities, which is explored further in the next section.

II) The tracking of RCS

Introduction

It is widely recognized that capacity strengthening efforts of donors have largely been subject to little systematic evaluation. Ongoing efforts have sought to rectify this through the development of evaluation frameworks and indicators which might help to more comprehensively describe the performance of RCS initiatives in a language that emphasizes results.

Indicators are important tools in tracking systems. Horton et al (2003) define an indicator, in the context of capacity development, as:

> *A "quantitative or qualitative factor or variable that provides a simple and reliable means to measure achievement, to reflect the changes connected to an intervention, or to help assess the performance of a development actor."* (cited in Ladi & Pop, 2004)

This section looks at how RCS initiatives are currently being monitored and evaluated, particularly through the use of indicators. It looks at indicators that have been developed in the literature, as well as those in use within organizations. It concludes by discussing where some of the gaps are in existing approaches to tracking RCS, and suggests ways in which the gaps might be addressed.

How is RCS being tracked?

Donors are beginning to respond to a widely felt need for improved tracking of RCS activities. Many are developing and using different ways try to judge success (Whyte, 2004). However, there are few models or evaluation tools within the literature that have been specifically designed with health RCS in mind. Two exceptions to this are a framework to evaluate RCS in health care developed by Cooke (2005), and a tool for evaluating health RCS developed by Bates et al (2006).

Cooke's (2005) framework is based on six principles of research capacity building. The principles are that: 1) research capacity is built by developing appropriate skills, and confidence, through training and creating opportunities to apply skills; 2) RCS should support research 'close to practice' in order for it to be useful; 3) linkages, partnerships and collaborations enhance RCS; 4) RCS should ensure appropriate dissemination to maximize impact; 5) RCS should include elements of continuity and sustainability; and 6) appropriate infrastructures enhance RCS. Also important is the idea that research capacity resides (and can be strengthened) at a number of different levels, and that a greater understanding of the interplay between these levels is important when measuring RCS progress. The framework sets out a 'tentative structure' by which to start measuring the impact of RCS interventions. However, Cooke recognizes the need for further information on issues of measuring process and outcome data to understand what helps to develop 'useful' and 'useable' research. While some indicators are suggested around each of the six principles, Cooke hopes that through debate and application of the framework, further indicators might be developed.

Bates et al (2006) describe the development of an evidence-based tool for guiding the design and evaluation of capacity-building programmes in health research. The tool was adapted and used by a teaching hospital in Ghana. It is influenced strongly by organizational theory and quality assurance literature. The tool is structured around four phases, through which organizations are thought to pass when they implement change: awareness, implementation, expansion and consolidation. The tool prompts stakeholders to identify characteristics, activities and indicators of progress for each of these four phases. The authors explain that the tool enabled researchers and hospital managers to work together to improve research capacity, and monitor their progress against predetermined standards. The project reportedly generated and maintained ownership and leadership for RCS within the Ghanaian hospital. Authors identify the participation of all stakeholders in the design of evaluation indicators as a key criterion in the project's success. However, they acknowledge that by focusing on institutional capacity, some important factors – such as those associated with changing the research culture of an institution – were overlooked.

Given the lack of tried and tested models for evaluating RCS, donors have largely been feeling their way through the process of monitoring progress and measuring the impact of their programmes. Indicators on a number of variables have become commonly included within RCS tracking systems (see for instance HRP in-depth review, 2002, Boeren et al., 2006; FIC, 2004). These include quantitative information on:

- research projects (counted as, e.g. project years, research type and amount and source of funding);
- research outputs (usually publications in national, regional or international peer-reviewed journals);
- research training activities (e.g. fellows trained through post-graduate courses, short training courses, workshops, etc.).

Some suggestions for indicators demonstrate an attempt to track the impact of RCS on the supported researchers' career – for instance through tracking career progression, further training, promotions, ability to attract external funds, and so on. Basic quantitative information on individuals supported is sometimes enhanced with qualitative information to provide case studies for presentation in annual reports or evaluation studies (see for example Special Programme for Research and Training in Tropical Diseases (TDR), 2003). However, as representatives from several organizations acknowledged in interviews conducted for this study, it is not always easy to track individuals; and even when it is, it is impossible for the donor or sponsor to attribute an individual's successes in the long-term to their support, given the multiple variables in play.

A number of donor organizations, researchers and academics have attempted to produce further lists of indicators, or evaluation frameworks, which attempt to go beyond the individual level. Some of these have a pronounced focus on *process*, and are qualitative rather than quantitative. For instance, Bautista et al.'s (2001) comparative study, looking at the impacts of donor-initiated programmes on research capacity in the south, suggested the following indicators:

- changes in attitudes to research (on the part of the general population as well as policy-makers);
- the sensitivity and receptivity of researchers to local knowledge;

- the awareness of the importance of self-governance and the exercise of autonomy to decide on a research agenda that meets local interests;
- the popularization of the participatory approach to research and the process of learning from the masses;
- the commitment to the production of research results of quality and of relevance;
- the capacity to negotiate, design, implement and manage research programmes;
- the determination to be accountable both to the local community and to the donor;
- the number and type of linkages/networking/collaborations (north–south, south–south, and academic–non-academic linkages).

Other indicators suggested for measuring institutional research capacity come from a range of different contributors (e.g. McCarthy et al., 2003; Ladi & Pop, 2004; Nurse and Wight, 2007). They include:

- evidence of expansion of the institutions;
- improved amount and quality of research;
- expansion of intraorganizational and interorganizational links;
- diversified funding (a broader source of funding), and core funding for institutional overheads;
- information on how much money was spent, on what, and to what effect;
- data on areas of expertise within the institution, including range of research projects and publications;
- improvement in adequacy, appropriateness and use of infrastructure and equipment (including libraries and communication equipment);
- institutional publications and other research outputs;
- local control of the research agenda and of research funding.

Indicators that attempt to capture changes in research capacity at the national (systems) level are less often included in the tracking conducted by donors. Several evaluation reports acknowledge that it is difficult to measure or document impact at the national level, while at the same time concluding that, generally, the RCS activities they have funded have clearly benefited developing countries (see experiences of HRP and Special Programme for Research and Training in Tropical Diseases (TDR) in Carey-Burngarner, 1999). Donor agencies are generally lacking evidence to support those claims.

In attempting to clarify some more 'measurable' indicators at this systems level, the Health Research Systems Analysis Initiative, developed by WHO and others, has produced a list of 14 core indicators and 42 'descriptive variables', organized around the four key functions (stewardship, financing, creating and sustaining resources, and producing and utilizing research). These were agreed in 2002 and continue to be in the process of development (Sadana et al., 2006b). These indicators and variables broadly reflect 10 key areas (or 'national benchmarks') which the network identified as being important for a supportive environment for research (Sadana et al., 2006a). The 10 key areas are:

- range and breadth of health researcher networks
- transparency of the funding process
- quality of the work space and facilities
- encouragement of collaboration with others
- opportunities to present, discuss and publish results
- relevance of health research activities to health problems
- education and continuous training
- wage of health researchers
- nurturing of careers
- access to information.

There are many examples of indicators which could be used to try to track the areas above. Some are more easily 'measurable', such as R&D expenditure at the national level; others, such as human capital for health research, can feasibly be measured, although with some difficulties; others still are much more difficult to measure, such as the degree to which (and how) the environment nurtures and rewards health researchers.

One helpful ‘checklist’ of indicators has been developed by the Swiss Commission for Research Partnerships with Developing Countries (KFPE) specifically to evaluate the principles of research partnerships in LMICs (KFPE 1998). This checklist provides 28 questions to ask when evaluating research partnerships to assess against 4 criteria:

- mutual trust and shared decision-making;
- national ownership (ensuring that research programmes are owned and managed by nationals, with foreign inputs simply technical and advisory);
- early planning for the translation of research findings into policy and practice;
- development of national research capacity.

The appropriateness of indicators will vary according to different programmes. The following section explores the way in which the 6 organizations in this study approach the tracking of RCS.

Tracking of RCS by six donor organizations

Special Programme for Research and Training in Tropical Diseases (TDR)

In interview, a Special Programme for Research and Training in Tropical Diseases (TDR) representative explained that the organization has always struggled, at yearly programme meetings etc, with trying to prove the impact of their programmes. However, they have been using an indicators tool since 2000, which TDR and the donors are reportedly happy with (interview with Special Programme for Research and Training in Tropical Diseases (TDR) representative). It includes mainly numerical indicators, with short ‘descriptors’. The strategic performance indicators are organized around seven expected results, as shown in Table 3.

In the business plan accompanying the next 10 year strategy, TDR says that it will aim to measure impact in five years time (2012) according to three long-term overall impact dimensions:

1. harmonization of global research efforts
2. disease endemic country leadership in health research
3. enhanced access to superior interventions.

Given the nature of these, the evaluation process needs to be qualitative as well as quantitative. The qualitative component will involve "a detailed and rigorous survey of all of TDR's stakeholders". The business plan proposes examples of some of the questions that might form part of this survey:

- Has TDR helped ensure a more coherent research approach?
- Is there greater engagement and leadership by disease endemic countries due to initiatives undertaken by TDR?
- Has research on neglected priorities, supported by TDR resulted in enhanced access to improved interventions?

The quantitative aspect would be based on a comprehensive review of all research outputs produced by the Special Programme for Research and Training in Tropical Diseases (TDR), in line with a set of 15 quantitative monitoring metrics (which would be tracked annually for interim impact assessment) – see Table 4.

Table 3: Special Programme for Research and Training in Tropical Diseases (TDR) strategic performance indicators

Expected result A: New knowledge	
A1	Number of new and significant scientific advances
A2	Number of patents resulting from TDR funded research and development
A3	Number of outstanding advances in scientific knowledge
Expected result B: New & improved tools	
B1	Number of new and improved tools, such as drugs, vaccines, receiving regulatory approval and/or label extensions or, in the case of diagnostics, being recommended for use in controlling neglected tropical diseases.
B2	Number of new and improved epidemiological and environmental tools being recommended for use in controlling neglected tropical diseases
Expected result C: New & improved intervention methods	
C1	Number of new and improved intervention methods validated for the prevention, diagnosis, treatment, or rehabilitation of populations exposed to or affected by infectious disease

Expected result D: New & improved policies & strategies	
D1	Number of new and improved public health policies and strategies for which the effectiveness has been determined, and evidence on effectiveness made available to decision-makers
D2	Number of new and improved policies and strategies for enhanced access to proven public health interventions developed, validated and recommended for use
Expected result E: Partnerships & capacity building	
E1	Number of R&D partners engaged
E2.1	Number of MSc degrees completed
E2.2	Number of PhD/Doctoral degrees completed
E2.3	Number of persons trained in short courses
E3	Number of research institutions in low-income disease endemic countries strengthened
E4	Proportion of partners who are from disease endemic countries out of the total number of partners engaged
E5	Proportion out of total new and significant scientific advances produced by scientists from disease endemic countries
Expected result F: Technical information, guidelines, instruments & advice	
F1	Number of research instruments and guidelines for infectious diseases developed and published
F2	Number of global research priority-setting reports for neglected infectious diseases published
F3	Mean monthly number of page views to the Special Programme for Research and Training in Tropical Diseases (TDR) web site
F4.1	Number of unsolicited requests (web downloads) for research guidelines and instruments
F4.2	Number of unsolicited requests for hard copies for research guidelines and instruments
Expected result G: Resource management	
G1	Resources for research, product development, and capacity building priorities mobilized

Source: Special Programme for Research and Training in Tropical Diseases (TDR) 2005b

Table 4: Special Programme for Research and Training in Tropical Diseases (TDR) quantitative monitoring metrics

	Supporting interim impact dimensions	Interim monitoring metrics
1. Stewardship		
1	Global consensus on priority research needs	• # of quality consultations/ reports for consensus facilitated by TDR • Surveyed user satisfaction levels with knowledge platform • % of key institutions/networks actively involved in TDR forums
2	Equitable access to health research information	
3	Greater engagement of key institutions/networks	
2. Empowerment		
4	Quality research led by DEC scientists and institutions	• # of publications with DEC researchers as lead authors • # of DEC research institutions/ networks improved towards international standards • # of partnerships with DEC researchers as leads
5	Sustainable regional research and knowledge networks	
6	DEC effectively negotiating research partnerships	
3a. Research – product discovery and development		
7	Promising leads identified and transferred to partnerships	• % of lead development/ transfers at planned milestones • # of innovation networks established/expanded/ strengthened • # of key R&D projects managed by DEC institutions
8	Effective north–south innovation networks established	
9	Product R&D managed by DEC institutions	

3b. Research – development and evaluation of interventions		
10	Evidence on real life safety and effectiveness of tools	• % of real-life safety/ effectiveness evaluations at planned milestones • % of intervention tools and strategies at planned milestones • % elimination/surveillance strategies at planned milestones
11	Effective intervention tools and strategies	
12	Cost-effective elimination and surveillance strategies	
3c. Research – implementation research for access to interventions		
13	Integrated strategies for large scale intervention delivery	• % integrated intervention delivery strategies at planned milestones • % cost-effective scale-up strategies at planned milestones • # of control programmes actively involved in research projects
14	Cost-effective strategies for scale-up of interventions	
15	Research culture within control programmes	

Source: Special Programme for Research and Training in Tropical Diseases (TDR) 2007a

DBL – Institute for Health Research and Development, Denmark

DBL's performance assessment is based on regular internal reviews and external evaluations; bibliometric analyses; institutional, programme, education and training plans; and annual reports. These encompass a combination of quantitative data collection and qualitative case studies. One of the elements of their assessment includes the tracking of their supported students to look at their future – as well as research outputs, they are interested to see whether they are successful in bringing in external funding, whether they get promoted, and whether they widen into other roles which ultimately may help develop national structures. They acknowledge several difficulties with their tracking. These include: a) it is hard to measure attribution and impact, particularly over long time frames; b) it is tricky to capture more than research related outputs in a quantitative way; c) they are yet to develop indicators that assess *how* research knowledge is used; and d) it is difficult to measure cross-disciplinarity, which is a particular emphasis of DBL (interview).

DBL are currently developing a new set of indicators that are as quantitative as possible, within a log frame approach. By using the log frame approach, the monitoring and evaluation processes will be tied closely to specific goals, and annual work and action plans. The indicators are still in development as part of their strategic plan for 2008–2012 (interview). DBL hope that these indicators will allow an assessment of relevance, effectiveness, efficiency, sustainability and impact, and a quick assessment of the overall progress.

Fogarty International Center (FIC), United States National Institutes of Health (NIH)

FIC conduct a continuous performance-based review process, for which they have a framework focusing on outputs, outcomes and impacts.

An FIC review of a programme of the International Training and Research in Population Health (now known as Global Research Training in Population Health) concluded that “there is an urgent need for FIC to work with grantees to devise more feasible, meaningful, and translational ways of measuring and documenting the realized impact of the program” (FIC, 2004). Since then, a framework for programme assessment has been developed (FIC, 2005). That framework states that “While reporting of metrics (number of trainees achieving advanced degrees, number of publications etc.) is necessary, meeting stated metric goals can become a check off exercise with little accomplished. Reviews will go beyond metrics and will depend on the basic principle of external peer review and recommendations” (FIC, 2005).

Review and evaluation use “retrospective measurements of the achievements over a certain time period (eventually a cyclical period) based in part on measured quantitative outputs, outcomes and impacts (metrics), as well as success stories and more qualitative outputs, outcomes and impacts” (FIC, 2005).

A process evaluation, conducted by a Review Panel, occurs at year 4/5 of the programme, and includes an analysis of ongoing project data, as well as interviews. A more comprehensive evaluation, with an attempt to track outcomes, is conducted in year 9/10. It takes a couple of years to conduct, and is contracted to a specialist in evaluation.

Programmes are assessed against their own goals and objectives, and the review is individually tailored to take into account programme and context variations. Self assessment by each programme, between the programme assessments, is based on performance milestones unique to that programme, as well as some common criteria. Data collected by the programme could include:

- reporting major research accomplishments – publications in high profile journals; citations; trainee training; successful new grant applications; presentations at international meetings (and abstracts);

- career accomplishments – tracking the path and impact of graduates who have entered a health field, research, academia or government; percentage of trainees returning to country of origin (brain drain issue); membership on scientific or policy committees; membership on advisory panels; analysis against control groups;
- clinical benefits – improved understanding of new or existing diseases; improved tools to detect, diagnose, treat, and prevent disease; development of treatment or treatment regime for disease;
- institutional changes – creation of networks, collaboration among labs; building infrastructure (labs, departments, research groups); providing critical mass; establishing political support for institution, project; establishing lab as regional centre.
- changing the research/health care agenda – documentation of the changes in approach to solving global health-care issues (e.g. laws impacted or changed, policies created or altered, awareness altered; media attention), better public health programmes;
- information use – documentation of how, when and in what way information was used by the target constituents to implement and/or change the ways they conduct business, use resources, and/or change the quality of life, improve health and treat disease;
- qualitative effects – qualitative description of impact of programme on training, health, and social effects – success stories.

The assessments focus on a number of areas, with suggested indicators of performance:

- **Programme planning**
  - evidence of a planning process and a plan (priority determination, clear articulation);
  - relevance of programme to FIC, NIH IC, (United States) Department of Health and Human Services (HHS) strategic plans;
  - stakeholder involvement (numbers, duration, roles) in planning;
  - integration of input into planning;
  - re-evaluation of programme goals over time;
  - strategic planning process.

- **Programme management**
  - Project selection
    - review process including: composition of panels, review criteria, quality of feedback to PI, amount of time allowed for review, conflict of interest issues and involvement of programme officer;
  - Recruiting talent
    - recruitment of new/young investigators; recruitment of foreign investigators; success rate; minority applications; interdisciplinary teams; turnover of investigators;
  - Institutional setting
    - matching funds; mentorship support; laboratory support; administrative support and good business practices;
  - Programme components
    - network meetings; other meetings/ways at which PIs and/or trainees get together;
  - Human subjects and fiscal accountability
    - presence of operational IRB; good accounting practices; good documentation practices; assurance that all intended funding is reaching the foreign collaborator and the trainees.
- **Partnership and communication**
  - numbers of partnerships; different types of partnerships (NIH, HHS, other federal, international, interdisciplinary, NGOs, industry); involvement of partners in the development of strategic goals; funds from partners; cost of partnership;
  - appropriate community input into the strategic planning; informational meeting/training sessions held with community; involvement of community on advisory board of programme; involvement of community in selection of trainees; involvement of programme in the community; demographics of contacts and efforts; requests for information, presentations; community needs surveys; user community feedback (mechanisms and tracking).

- **Results**
  - number and list of publications (journal articles, book chapters, reports etc.); number and list of presentations; number of trainees; field of training; number and type of degrees/certificates earned; number and list of meetings and attendance at meetings (output);
  - number of laboratories started; number of new grants or new funding procured; scientific methods discovered – number and type; scientific departments started or strengthened; awards received; careers enhanced (outcome);
  - new policies adopted or advanced; new clinical procedures adopted; new career structure in place: alteration of health-care system; alteration of health-care laws (impact).

In addition to the indicators above, the framework lists 'suggested questions' to assist in the evaluation.

FIC have been tracking the careers of their trainees for every programme. Much of this career tracking is qualitative and has revolved around 'success stories', although they are making an attempt to quantify as much of it as they can (this is still in development and not currently available).

Wellcome Trust, United Kingdom

The Wellcome Trust explained in an interview that they use a number of methods in evaluating schemes and projects, including the collection of numerical data based on some of the more traditionally measured outputs (numbers of people trained etc.). However, they also believe that "RCS does not lend itself to rigorous quantitative assessment" (interview). They also attempt to look at outcomes, such as how policy and practice have changed, whether an individual or institution has succeeded in accessing further research funding, etc. In the fellowship programme, they attempt to track individuals, although they acknowledge that this is difficult – particularly in LMICs (indeed, those individuals who move out of research might be harder to keep track of, leading to a picture that is slightly biased towards positive outcomes). They believe that the long-term aspect of RCS makes tracking difficult (since they look at 10–12 year horizons), and they are very much 'learning' when it comes to monitoring and evaluation (interview).

The Wellcome Trust's monitoring and evaluation tools include an end of grant report form (Wellcome Trust, 2008), which is completed by all grant holders within three months of the grant end date. This form aims to capture a brief snapshot of some of the outputs (publications, research resources/intellectual property, communication/public engagement activities, and collaborations) and perceived outcomes (discoveries, achievements and implications of the work). For the fellowship grants, the Trust also uses regular self-assessment progress reports and annual updates. An evaluation team is responsible for more structured evaluations, which occur at periodic intervals, or key points (e.g. prior to the renewal of a grant). These structured evaluations involve the pulling together of the information already gathered from reports, and the supplementation of that information using an online survey software (for collecting more information from grant holders); qualitative interviews (used minimally given the resource implication, but sometimes used to collect further information from other stakeholders); and further tracking of individuals. Site visits, by a team of experts are also conducted.

In order to supplement quantitative assessment, and give a richer picture of the way in which they are making a difference, the Wellcome Trust uses a research narrative approach (called 'research profiles') to the evaluation of research and activity they have supported: "By telling the story behind a particular piece of research or activity, or the development of a researcher, we can explore our contribution, identify the significant actors involved and discover the research and career outcomes emerging" (Wellcome Trust web site). There are two types of profile: 'highlights' give a snapshot of a key achievement or breakthrough; 'histories' provide a more detailed account of significant research or activity supported by the Trust over time. "This enables us to reflect the incremental and unpredictable nature of the research process, document the collaborative nature of much research and activity, and build the evidence base to demonstrate the impact of biomedical research" (Wellcome Trust web site).

In a section on 'monitoring progress' in their 2005–2010 strategic plan (Welcome Trust, 2005), the Wellcome Trust state that "as a key priority over the next five years, we will develop our systems for capturing and assessing outputs and outcomes of the activities we support". As a first step, they explain that they have identified some key indicators of progress "that reflect, at the highest level, what we are striving to achieve". The assessment process being developed aims to help them report against these indicators. The key 'indicators of progress' they expect, through working with their communities, are to:

- achieve significant advances in the generation of new knowledge;
- develop a cadre of high-quality researchers;
- contribute to discoveries with tangible impacts on health;
- contribute to the development of enabling technologies, products and devices;
- make key contributions to the creation, development and maintenance of major research resources;
- enhance capacity development in priority areas;
- have a discernable impact on wider policy development and practice;
- increase awareness and enhance the level of informed debate in biomedical science issues;
- nurture an organizational culture, supported by our staff and processes, that maximizes our ability to deliver our mission;
- deliver an investment strategy that meets our long-term return objective.

The evaluation framework, still under development, remains an internal document at the moment.

SAREC – The Department for Research Cooperation, Sida

The SAREC interviewee feels that at the moment, RCS tracking in SAREC is fairly weak. A weak tracking system is a price they are paying for having relatively open and flexible funding (interview).

Boeren et al (2006), discussing Sida/SAREC's bilateral research cooperation activities, state that "Monitoring of projects and programmes is not systematically attempted, making it hard to obtain a good overview of what is actually going on in the agreements and making it difficult to steer projects on the basis of reliable monitoring and evaluation data. Annual reports are very descriptive and do not contain an analysis of achievements (apart from published papers) or on change. There is a need to define benchmarks and indicators for monitoring progress, particularly in relation to the annual reporting".

They have a number of indicators which are routinely tracked, including number of PhDs, academic achievements, staff recruitment, student recruitment etc. These are presented in annual reports and are tracked by the universities themselves.

Twice a year, there is a 2–3 week visit from a SAREC staff member to the supported institution, during which the elements of support are examined and progress is discussed.

There are then larger evaluations, approximately every five years, conducted by consultants. These do not employ a particular model (such as an evaluation framework).

SAREC are in the process of producing new mechanisms for tighter tracking of results. At the moment, for instance, they don't have a systematic way of tracking individuals that have been supported, and the progress they are making – this information is currently picked up through evaluations, in a rather ad hoc way, looking at cross-sections and coming up with case stories. They are working on ways to track this more systematically across all programmes.

IDRC – The International Development Research Centre

IDRC has contributed substantially to both theoretical discussions around capacity development and monitoring and evaluation, and to the development of methodologies for evaluating qualitative outcomes.

At IDRC, evaluation is decentralized and programme initiatives are responsible for their own evaluation work. The Evaluation Unit provides central coordination and support. The Evaluation Unit also carries out strategic evaluations (i.e. evaluations relevant to a number of different programmes and programming areas in the Centre).

In an ongoing in-depth strategic evaluation of IDRC's capacity building efforts, a number of studies are being carried out. One completed study involved the examination of a sample of 43 projects, using project documents and in-depth interviews with IDRC managers and project staff to gather information on what IDRC had achieved in terms of capacity building. The review found that there is a wide assortment of outcomes associated with the different interventions used by IDRC. Classifying them was problematic. However, the four most frequently reported outputs were: 1) researchers trained; 2) development of training materials; 3) research dissemination (e.g. papers, conferences); and 4) the development of databases. The review found that it was rare that interviewees talked about development results as part of their capacity building conversation. For the most part, people interviewed spoke of 'research capacity building' as changing individual behaviour as well as a wide assortment of individual, group, and organizational and inter-organizational relationships (IDRC, 2006).

Work by Neilson and Lusthaus (2007) for IDRC aims to:

1) provide IDRC staff and managers with a useful set of tools or typologies to help them conceptualize, plan, monitor and evaluate capacity building interventions in their work and;
2) develop a framework that can capture how IDRC's support contributes to capacity development at the individual/group, organizational and network levels in the field.

Their framework detailed five criteria: 1) capacity level targeted; 2) IDRC unit providing support; 3) capacity support activity; 4) outputs; and 5) outcomes. Outcomes were categorized according to three themes: affecting policy/practice; generating new knowledge; and expanding capacities.

An amalgamation of indicators

As shown above, there are many indicators either currently in use, or proposed in the literature. This section presents an amalgamation of these indicators and also brings in new ones drawn from the literature. Note that the indicators have not been separated out into different target levels (since some apply to several levels), or into process or outcome indicators (since often the distinction will depend on the circumstances and goals of the project). However, they are grouped into six conceptual themes which emerged largely from the analysis of the indicators.

The list includes ‘indicators’ insofar as they are variables which can be analysed to inform an assessment of performance. They have not been quantified, though many have been summarized for brevity. Many of them can be further distilled into more specific and measurable indicators (as shown in some of the examples presented in this report). However, this is a process that should be specific to different programmes and contexts.

Developing a strong research culture

- commitment to, and improved understanding of health research;
- existence/function of national health research council;
- budget allocation for health research and continuity over time (% gross national product);
- development of policies and strategies for research;
- improved research support services (e.g. national research council; ethical review boards; improved access to resources);
- research priorities are assessed through transparent process and widely agreed;
- total health research proposals submitted for ethical review;
- local control of the research agenda;
- local control of research funding;
- regional networking and collaboration;
- north–south and south–south research cooperation;
- mechanisms for dissemination of research results and lessons learned;
- media interest in health research;
- presence of strong advocacy organizations for health research.

Taking ownership for health research system and for RCS

- local decision-makers identify needs and purposes of RCS programme;
- local ownership of research and health research system evaluation;
- local strategies for RCS developed and continual re-assessment;
- investment made in developing research leadership;

- research partnerships are assessed for balanced relationships/equity (using for example the checklist produced by KFPE 1998);
- budget allocation for health RCS.

Building research personnel

- critical mass of researchers – multidisciplinarity; proportion with masters and/or PhD qualifications;
- number of trainees and types of training; providers of training;
- success in training;
- longer term follow up of trainees;
- evidence of brain drain or not; staff turnover;
- working conditions and salaries; career development incentives;
- data on the students and graduates of supported academic institutions (regional spread, gender, awards, follow up);
- number of principal investigators within supported institution;
- enhanced reputation and increased appeal of institutions.

Building and sustaining research activities

- number of functional research groups;
- sustainable expansion of research centres and academic institutions;
- range and scale (numbers of staff, funding, months) of research projects; research project completion and number of new research projects;
- research proposals developed, submitted, and successful (in terms of being awarded research funds);
- links between research activities and national priorities;
- international research grants awarded (number, diversity, magnitude);
- information on how much money was spent, on what, and to what effect;
- financial sustainability; dependence on contract research and donor funding; core funding of institutional overheads;
- number and type of linkages/networking/collaborations (north–south, south–south, and academic–non-academic);

- proportion of projects that are inter- or transdisciplinary;
- status of research equipment and facilities (including library, information technology and communication facilities);
- access to journals and existence and quality of national/regional journals.

Generation and dissemination of knowledge

- budget allocation for specific priority health research areas;
- strategic expansion of research activities in scale and scope;
- proportions of basic, applied, adaptive and participatory research;
- demonstrable improvements in research quality;
- research dissemination – type and appropriateness, effectiveness;
- amount and quality of research outputs (patents, publications, tools, products, etc.);
- applicable and user-relevant research results;
- access to information technology;
- engagement with stakeholders.

Getting research into policy and practice

- criteria exist for selection of research proposals;
- policy-relevant/end-user relevant research results – responding to justifiable and development needs;
- incorporation of end-users' concerns into research planning and design;
- incorporation of research results in policy documents and programmes;
- incorporation of researchers into policy-making bodies at national/regional/global level;
- implementation of evidence-based policy at national/regional/global level.

Limitations of current approaches to RCS tracking

From the discussion above, it is clear that most donors would like to improve their tracking of RCS. The challenges they are facing are hardly surprising, given the complexity of both 'capacity' as a concept, and of the notion of developing or strengthening it. There are many issues that complicate the evaluation of RCS initiatives. These include: a) capacity strengthening objectives are frequently, and sometimes deliberately, vague; b) shared understandings among participants are hard to reach let alone sustain; c) the difficulty of evaluating the relative contribution of different actors, and different activities, given the wide range of contextual influences that cloud the analysis (making the identification of programme outcomes/ impact extremely difficult); d) RCS is generally considered to be not just a goal in itself, but also a means to other development goals; e) RCS is a long-term activity, requiring long-term investment – in the early stages, there is often little to show beyond the implementation of process; f) the difficulty of factoring in negative results and 'blue skies' research, and g) there are, as yet, no reports of the practical application of frameworks for assessing RCS programs at the individual, institutional and systemic levels, and there is a paucity of information about how research impact should be assessed (Mackay et al., 2002; Maconick & Morgan, 1999; Moore, 1995; Morgan, 1999; United Kingdom Evaluation Forum, 2006).

Despite these challenges though, it is increasingly recognized that capacity strengthening programmes and initiatives must be able to demonstrate performance. One key reason for this is related to accountability; any organizations that spend money on behalf of others are likely to have to prove that they spent it wisely – particularly if they are competing for further funds. In demonstrating performance, impact is particularly important. As mentioned above, RCS is generally considered to be not just a goal in itself, but also a means to other development goals (this is clear particularly in the mission statements of DBL, FIC and the Wellcome Trust, which identify strengthened research capacity as a route to improved health). Yet, as Simon (2000) states: "After 20 years of activity to strengthen research capacity and millions of dollars of investments, we still know so little about the impact of these efforts." The evaluation of RCS therefore needs to consider the impact of the capacity strengthening itself, changes brought about by that strengthened capacity, and the consequences (or impact) of those changes.

In thinking about outcomes, it is also important to remember the *target* of RCS initiatives. Donors have learnt from experience that a systems approach to capacity strengthening is important, and that learning needs to be translated into evaluation approaches too, so that capacity change is tracked within the wider system (particularly at national level). While change is dependent on a range of volatile factors, the fact that evaluations will be limited in their ability to measure attribution makes them no less important.

Monitoring and evaluation in RCS have other important uses, beyond providing information about results and impacts in order to justify continued support. Since evaluation is important for informing the management of the programme and for organizational learning, it should be seen as an important part of the RCS initiative itself. Capacity strengthening depends for its effectiveness on participant ownership and commitment. It goes to follow, then, that approaches to capacity monitoring must also be participatory and 'client-driven', and must aim to strengthen the ability for self-assessment (Morgan, 1999). Top-down, externally conducted evaluations are failing to capture the full potential of RCS initiatives by seeing evaluation as a separate function, rather than an embedded part of the process.

In addition, in order to capture a comprehensive picture of research capacity, we need to think beyond a traditional input-output approach, based on a number of indicators that measure inputs such as funding and outputs such as number of publications. This linear, 'cause leads to effect' approach ignores the complexity of the context within which change takes place. Ladi and Pop (2004) describe the importance of a 'throughput' approach which focuses on the actual *process* of RCS, as well as the products. What is needed is an approach that includes both *process* and *development outcomes* or *impact* (the two terms can be used synonymously) (Sitthi-amorn & Somrongthong, 2000; Morgan, 1999).

RCS tracking remains a significant challenge. There is, as yet, no consensus on the best methods or tools to use. While there is a greater preoccupation with indicators, there is likewise no consensus on an 'ideal' set of indicators which would be comprehensive enough to capture the complexities of capacity strengthening, and at the same time be feasible and measurable. Representatives of all six organizations spoken to as part of this study confirmed that the development of such a set of indicators would be useful to them. Indeed, they indicated that better collaboration between and among different organizations would be helpful, to share experiences, learn lessons, and develop improved tools.

However, it is important to remember that no report, or set of indicators, will be able to provide an easy solution to evaluating RCS through a definitive list of measurable and comprehensive indicators (a comprehensive general list would be likely to number in the hundreds, which would not be a sensible approach). The next and final chapter of this report, then, will not attempt to provide this 'ideal' list of indicators. Instead, it hopes to present ideas, within a framework, for how to approach RCS tracking more effectively and comprehensively.

Conclusion: a consolidated approach to the tracking of RCS

This report has drawn out a number of important messages for the design of tracking strategies for RCS. In summary, these are:

- A 'one monitoring size fits all situations' strategy will not work for RCS tracking. Different programmes with different purposes and different structures, and at different stages of their evolution, require different approaches to and indicators for RCS monitoring and evaluation (Morgan, 1999).
- In order to monitor or track RCS, it is important that the *meaning* of capacity, within the context of that programme or initiative, is discussed explicitly and agreed. Stakeholders need to pursue a shared understanding or interpretation of capacity specific to that programme/initiative (in terms or *what* 'elements' of capacity, and *whose* capacity). This is essential to define more precisely what the programme/initiative is trying to change.
- RCS monitoring and evaluation (both in terms of choice of indicators and methods of tracking) should be conducted as a participatory, learning exercise, involving multiple stakeholders, and with the emphasis on self-assessment and reflection.
- Given the long-term and complex nature of RCS, *process* indicators and *development outcome* indicators are more useful than traditional input-output-outcome-impact approaches. Tracking systems should avoid overly premature assessments of impact.

- RCS is both a goal in itself, and a means to a wider goal (for development, equity, improved health). The assessment of impact should therefore ideally include an analysis of changes in health systems and policy (and, some would argue, even in health status), even though attribution will be difficult (if not impossible) to prove. The critical question is not whether a particular project itself has created revolutionary change, but whether the institutions and actors responsible for action have been enabled to move more effectively towards their own development goals in a progressive way (Sander, 1998).
- For RCS, indicators need to be often qualitative in nature to reflect what is being measured, and can seldom be transformed into simple quantitative measures. For this reason, they will require a range of (quantitative and qualitative) methods to both track and present them.
- Since an indicator for RCS should provide an indication of *change* (in terms of amount of development achieved), it requires a starting point for comparison purposes (Sida, 2005a). This means that evaluation must begin right at the start of (or even before) the programme itself.
- The tracking of RCS requires considerable time and money over a long time period. It must be budgeted for, and included in the programme design, from the outset and over the long-term. Among the stakeholders, a decision must be made regarding whose responsibility it is to ensure such tracking takes place.

Drawing on these messages, the final task of this report is to present a framework for thinking about the types of indicators that might be important in the tracking of RCS initiatives. At the same time, though, the author has sympathy for Morgan's (1999) view that "Nobody can face yet another new and untested framework to monitor capacity development". The framework below, then, is not a radical departure from those already out there – either in use, or in the theoretical domain. Instead, it hopes to consolidate the strengths of different approaches in a conceptual guide that might be useful in a range of different RCS programmes. Since two fundamental principles behind this framework are that a) RCS tracking should be a participatory, self-reflective process, and b) one monitoring approach cannot fit all situations, it would not be appropriate to detail specific indicators with which to fill this framework. However, examples can be drawn from those currently in use, as summarized above.

III) A framework to guide participatory evaluation

The framework below (Table 5) is intended to guide the assessment of capacity by the (programme/initiative) stakeholders. This assessment would ideally be conducted at the start of (or prior to) a programme's commencement, as well as throughout the programme, and after the programme's end. As already mentioned, an assumption behind the framework is that RCS tracking (and capacity assessment) should be a participatory, self-reflective process.

The first column prompts an analysis of how capacity is defined within the particular programme/initiative. This might be very narrowly defined (for instance, where a programme chooses to focus only on the capacity to generate new knowledge); or it might be much more expansive (for instance, where a programme chooses to strengthen capacity for stewardship and financing of the research system at a national level). In making these decisions, it is important that stakeholders discuss and agree on the elements of research capacity they are *not* targeting, as well as the elements they *are* targeting.

The second column continues the analysis of how capacity is defined by prompting the stakeholders to agree on *whose* capacity (or the capacity of what) is important. This should be discussed and agreed both in terms of 'level' (i.e. individual, organizational, national, etc.), and in terms of target organizations (e.g. government bodies, universities, research institutes, media organizations).

The third column prompts the stakeholders to identify the activities which will be (or have been) carried out to strengthen the defined elements of capacity within the defined target levels/entities.

The fourth column is where process indicators are identified. Process indicators might include both qualitative and quantitative tracking of inputs, processes and outputs. They should be relatively short term.

The fifth column is where desired RCS outcomes (development outcomes) are identified in order to keep the stakeholders focused on a broader goal. These will be similar to longer-term objectives, and might be a further break down of the functions/capacities targeted in column one. The purpose of this column is, rather than encouraging them, to focus only on more narrow, specific, indicators.

The final column attempts to identify some more 'measurable' indicators to help track these longer-term outcomes. However, it is likely that they will include mainly qualitative indicators which will need to be assessed from a variety of different view points, by different stakeholders, and using a range of methods.

Table 5: A framework to guide participatory evaluation

Functions/capacities targeted	Target for RCS	Capacity support activity	Process indicators	Desired RCS outcomes (long term)	Outcome indicators (long term)
Stewardship • Skills to formulate a vision, mission, goal and policy for health research • Skills to prioritize health research, using appropriate methodologies and approaches • Capacity to address ethical considerations in research projects • Capacity to collect, analyse and use information to assess and evaluate the various aspects and steps in the research process • Capacity to design and implement policies, which address in an effective way existing inequities in health research, including the financing of research, setting the research agenda, the gender bias and inequities in knowledge publication and utilization	Both in terms of level (individual, organizational, national, etc.), and more specifically in terms of target organizations (e.g. government, universities, research institutes, media organizations, etc.)				

Financing • Skills to mobilize funds for research from national or international sources • Skills to identify the sources and uses of health R&D funds, to capture the fund flow of major players and to assess if health R&D are aligned with national priorities • Skills to prepare budgets and to handle a system of financial management at the programme and project level and to ensure accountability **Resource generation** • Skills to assess gaps and needs for individuals, institutions and infrastructure within the health research system and to develop a comprehensive plan for RCS and retention • Skills to plan, organize and implement capacity strengthening activities, addressing the needs of various stakeholders • Skills in involving communities, and in particular marginalized groups, in the research process **Production/utilization of research** • Skills in managing the research agenda • Skills in producing and synthesizing evidence • Skills in disseminating and promoting the use of evidence • Skills in utilizing evidence in policy, practice and action					

Table 6: Example of partially completed framework

Functions/capacities targeted	Target for RCS	Capacity support activity	Process indicators	Desired RCS outcomes (long term)	Outcome indicators (long term)
Financing • Skills to mobilize funds for research from national or international sources	Research institution	Training	Details of training delivered Details of people trained Evidence of trainees' satisfaction with training	Organization achieves more sustainable core funding Organization wins increased funding for research, from increased range of funders	Organization has, uses and regularly updates a workable funding strategy Organization has good relationship with government funding body Organization has good working relationship with other research organizations to enable joint bidding for funds Number of funding bids submitted (with details including size, type and source of funds) Number of funding bids won (with details) Financial details of organization (annual budget; budget breakdown; core funding, etc.)
		Institution partnership	Details (and equity) of partnership arrangements Experiences of partners	Organization gains experience in research fund acquisition and management through working collaboratively with stronger institutions	
		Network development	Details of links made with other institutions/ networks nationally, regionally and internationally (e.g. meetings/conferences attended; networks joined; etc.)	Organization achieves a growing reputation with government and other funders	

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[1] The names of the six organizations are not clear from the ODI report.

[2] These strategies are examined in greater detail in the following chapter on the 'brain drain'.

[3] INCLEN – International Clinical Epidemiology Network, initiated by the Rockefeller Foundation. See http://www.inclen.org/

[4] RAWOO - The Netherlands Development Assistance Research Council. See http://www.rawoo.nl/main-2a.html

[5] NCCR North-South – National Centre of Competence in Research, North-South (Swiss National Science Foundation). See http://www.north-south.unibe.ch/

[6] NUFU - The Norwegian Cooperation Programme for Development, Research and Education - is a programme for independent academic cooperation between institutions of higher education and research in the south and their partners in Norway. See http://www.siu.no/en/programoversikt/nufu_programmet

[7] INCO-DC – the European Commission Programme in the field of International Cooperation with Developing Countries

[8] See Dutch Ministry of Foreign Affairs 'Research in Development – Policy Memorandum' http://www.minbuza.nl/en/developmentcooperation/Themes/Development,research/Research-in-development.html

[9] According to currency conversion from Danish Kroner using July 2007 rates.

RCS and the brain drain: where are we now?

RCS and the brain drain: where are we now?

Objectives and approach

One of the critical consequences of a failure to strengthen research capacity in LMICs is the migration of highly skilled health-related scientists and researchers, or the 'brain drain'. While an examination of the literature indicates that financial concerns are a major factor in the brain drain, it also becomes apparent that there are other issues that must be acknowledged, whether they are seen as more concrete (e.g. job advancement or demand for research outputs) or less concrete (e.g. social or family ties outside the home country, or political freedom) The following section examines some of the factors contributing to the brain drain, as well as successes and challenges in instituting policy to stem such migration.

This section is based on a review of available studies on international migration of high-skill researchers from LMICs (as classified by World Bank Income Category). Unfortunately, there are very few experimental and quasi-experimental studies available and as a result, observational studies such as cross-sectional and descriptive studies are included in this review, even though they may be criticized as having weak study designs.

Only studies that included health-related scientists and researchers in developing countries were considered for this review, including: scientists, academic personnel, consultants and researchers whose work involves health and health-related fields. Studies concerning brain drain of health-care providers, or brain drain among developed countries were excluded.

Background

The first effort to put together harmonized international data on migration rates by educational level was the contributions of William Carrington and Enrica Detragiache from the International Monetary Fund (IMF), who used the 1990 United States Census data and Organisation for Economic Co-operation and Development (OECD) statistics on international migration to construct estimates of emigration rates by three educational levels (primary, secondary, and tertiary schooling) in about 60 LMICs (Carrington & Detragiache, 1998).

Most recently, another attempt, made by Docquire and Marfouk in 2004, revealed that the total number of adult immigrants (age >25) living in the OECD countries was 58.5 million in 2000, up from 39.8 million in 1990 (Docquier & Rapoport, 2004). At the global level, 1.66% of the working age population is living in a foreign country.

The worldwide average emigration rates, 0.94%, 1.64%, and 5.47% for low-skill, medium-skill and high-skill workers, respectively, indicate that the trend in international migration has moved towards a skills bias. Increasingly, high-income countries prefer to accept high caliber human capital due to the competitive advantage such immigration may offer in technology and knowledge-based industries, and to offset an ageing population in developed countries.

This international migration of trained personnel was boosted by globalization and trade liberalization, as well as the quality-selective policies in place since the late 1980s in countries such as Australia, Canada and the United States, which have accepted extensive immigration under these policies (Wickramasekara, 2002).

Given that countries need talented workforces for economic innovation, technology adoption, building and strengthening of institutions and sustainable development, depletion in human capital has major negative impacts on LMICs and international migration affects the long-term potential for sustainable economic development in LMICs. In the field of health research, the loss of human capital, one of the most important health resources, severely affects the strengthening of domestic institutions and organizations (Kapur & McHale, 2005). With the loss, through emigration, of the most skilled, there is a deterioration in overall institutional capacity required for identification of policies and programmatic solutions to key national health problems as well as monitoring and evaluation of such policy interventions.

One example of the severity of the problem is in Africa, where, within the past three decades, over one third of human capital has been lost to developed countries, primarily in northern America and Europe. Evidence indicates that there are over 100 000 highly skilled African immigrants in the United States alone (Wickramasekara, 2002).

In view of the significant importance of international migration of highly educated professionals, this study, therefore, sought to examine factors influencing the brain drain of health-related researchers and scientists in LMICs. It also attempts to determine the success or failure of existing government and international strategies to stem the brain drain and to assess the impact of such migration on health-care systems in the home country.

Methodology

Though the intention of this review was to include randomized controlled trials (RCT), controlled before-and-after studies (CBA), time-series analyses, prospective cohort studies, case-control studies, cross-sectional studies, and descriptive studies, there were, unfortunately, very few experimental and quasi-experimental studies regarding international migration of highly skilled researchers. Therefore, observational studies such as cross-sectional and descriptive studies are included in this review, even though they may be criticized as weak study designs.

Within this framework, we considered studies where the participants were health-related scientists and researchers in LMICs. This designation embraces a large number of people, from highly educated individuals with a university degree to well-trained skilled workers including: scientists, academic personnel, consultants and researchers whose work involves health and health-related fields. Studies concerning the brain drain of health-care providers, or brain drain among high-income countries were excluded.

In our analysis, we considered interventions designed to discourage or minimize the migration of health-related scientists and researchers. Within these studies, factors associated with the brain drain were included as primary outcome measures. We have also considered studies without intervention in order to assess associated factors regarding the international brain drain.

Search methods

Publications matching the inclusion criteria were obtained using a search strategy, which has been developed for electronic databases as follows. The search strategy applied the selected MeSH terms or free text terms relating to the literature on “brain drain, international migration, health researcher, human resources, capacity building, and capacity strengthening in developing countries”. Furthermore, searches in all databases were restricted to LMICs listed on the World Bank web site, and covered 20 years, from 1987 to 2007, of English language publications.

In case of electronic databases which did not support the search strategy, alternatively we adapted the search strategy by simplifying the keywords into "brain drain" and "developing countries" or "brain drain" only, in the search algorithm. Then, we screened results manually in order to retrieve only the desirable publications. The results of the search are given in Table 7, below.

Table 7: Search results

Sources	Reference found
1. PUBMED and MEDLINE	88
2. PUBMED CENTRAL	97
3. POPLINE	117
4. ERIC	112
5. CINAHL	24
6. WHOLIS	12
7. ELDIS	24
8. ID21	17
9. ANTWERP	25
10. PAHO	14
11. AJOL	9
12. SEARO	2
13. AFRO	1
14. EBM	79
15. BIOMED CENTRAL	32
16. SCIELO	1
17. DOAJ	19
18. COCHRANE LIBRARY, CENTRAL, MEDCARIB, LILACS, EMRO and OHA	0
19. EMBASE, SCI, CAB DIRECT, IBSS, AND WPRO	Not available: requiring commercial access or under maintenance
Total publications found	**673**

Abbreviations: POPLINE = POPulation information online; ERIC = Education Resources Information Center; CINAHL = Cumulative Index to Nursing and Allied Health Literature; WHOLIS = World Health Organization Library Information System; ELDIS = database of development references developed by the Institute of Development Studies (IDS); ID21 = database on international development research from the United Kingdom; Antwerp = The

Antwerp Institute of Tropical Medicine database; PAHO = Pan American Health Organization Library Catalog; AJOL = African Journals Online; SEARO = World Health Organization Regional Office for South-East Asia Library Catalog; AFRO = World Health Organization Regional Office for Africa Library Catalog; SciELO = Scientific Electronic Library Online; DOAJ = Directory of open access journals; CENTRAL = Cochrane Central Register of Controlled Trials; MEDCARIB = Caribbean Health Sciences Literature; LILACS = Latin American and Caribbean health sciences; EMRO = World Health Organization Regional Office for the Eastern Mediterranean; OHA = Ohio Hospital Association database; EMBASE = Excerpta Medica Database; SCI = Social Sciences Citation Index; CAB-Direct = Global Health; WPRO = World Health Organization Regional Office for the Western Pacific Library Catalog.

Results

Description of studies

Though our searches yielded 673 references, only 76 were considered to merit scrutiny of the full paper. There were 5 other relevant papers identified from references in these publications, therefore there were 81 papers reviewed; of which only 8 studies met all inclusion criteria for review.

Of the 8 studies that met all the inclusion criteria for the review, 4 involved the international migration of general scientists and researchers in China (Zweig, 1997), Zimbabwe (Logan, 1999), Turkey (Gungor & Tansel, 2006), and Lithuania (Kazlauskienė & Rinkevičius, 2006a). Two studies focused on factors associated with the intention to return to the home country or the intention to stay abroad. (Popescu, et al., 2006 for Romania; and Kazlauskienė & Rinkevičius, 2006b for Lithuania). Two other studies assessed the outcomes of interventions to discourage the brain drain of scientists and researchers (Hyder et al., 2003; Kupfer et al., 2004). In particular, the Hyder et al. study assessed the outcomes of a government-supported programme for PhD training abroad in relation to academic outputs and health RCS in Pakistan. The Kupfer study evaluated the strategies used to encourage scientists trained abroad to return to their home countries.

A detailed breakdown of study characteristics is provided in Table 8, which organizes the studies according to health-related scientists (4 publications) and general scientists (3 publications). NB: only 7 studies were covered as the Lithuania study was written in 2 separate papers (Kazlauskienė & Rinkevičius 2006a) and (Kazlauskienė & Rinkevičius 2006b).

Table 8: Characteristics of studies included in the review

ID	First author/ year	Country	Study site	Methods			Main outcomes
				Design	Sample size	Study group	
I. Health-related scientists							
1.	Kupfer et al. 2004	United States	Research training institute in the United States	Measurement after intervention only	186	Biomedical researchers from LMICs	Principle investigators used combined strategies to encourage scientists to return home after research training programmes including: scientific strategies, political strategies and economic strategies. **Results:** Average rate of return home of researchers was 80%.
2.	Hyder et al. 2003	Pakistan	Researchers in health sectors in four provinces	Descriptive	54	Health PhD researcher trained abroad	PhD training abroad, funded by the government: 1. 87% indicated training relevant to their work. 2. Outputs and included: 15 published papers per person on average, 9.3% received some form of international recognition, 5-6 research grants per person on average, equivalent of USD 3530 per person, 26% of grants received were from international sources, and 69% of researchers supervised postgraduate students. 3. Lack of academic liberty, incentive and resource support to sustain their research efforts are major barriers for their scientific contributions.

ID	First author/ year	Country	Study site	Methods			Main outcomes
				Design	Sample size	Study group	
3.	Popescu et al. 2006	Romania	Romanian researchers in other countries	Cross sectional	101	Scientists/ researchers (PhD students, post-docs, professors etc.)	1. Factors influencing emigration of researchers – Limited research funding (71%) – Professional and career development (64%) – International experience (58%) – Type of work (57%) – Salary and compensation (53%) 2. Promoting the research system in Romania is a way to attract Romania scientists towards their home country ($p=0.01$). 3. Scientists who intend to return to Romania maintain stronger relationships with colleagues in Romania ($p=0.05$). 4. The more time spent abroad, the higher chance of remaining in the host countries ($p<0.05$).
4.	Kazlauskiene et al. 2006	Lithuania	Highly-skilled Lithuanian workers in other countries	Snowball technique of identifying samples	416	Scientists/ professionals/ businesspeople/ others	1. Factors significantly associated with emigration – Professional opportunities in foreign countries. – Socio-economic conditions are major push factors. – State academic system and collaboration with outside countries were both push and pull determinants. – State macro-economic conditions and government policy are major push factors. 2. Social ties having significant association with migration were – Academic institutes – Spouses or intimate friends – Family member abroad - Recruitment agencies – Foreign Lithuanian communities

ID	First author/ year	Country	Study site	Methods			Main outcomes
				Design	Sample size	Study group	
II. General scientists							
5.	Tansel et al. 2006	Turkey	Turkish university students in Northern America and the United Kingdom	An Internet search and snowball to identify samples, then e-mail questionnaire surveys to samples	1103	Turkish university students in north America and United Kingdom	1. Of total samples, 53% intended to return home, 9% did not intend to return. 2. Reasons for intention to return home: achieve academic/work goals, missing family, child education. Analysis indicates the importance of prior return intentions and the role of the family in the decision to return or stay overseas. The compulsory service requirement attached to government scholarships increases the probability of student return. Turkish Student Association membership increases return intentions. 3. Push and pull factors encourage migration: – Push factors: economic instability, bureaucratic obstacles, lower salary, and little opportunity for career advancement. – Pull factors: better prospects for career advancement and further education, more organized environment in general, job availability, higher salaries offered by the host country and lifestyle preferences.

ID	First author/ year	Country	Study site	Methods			Main outcomes
				Design	Sample size	Study group	
6.	Logan 1999	Zimbabwe	University of Zimbabwe	A questionnaire survey on Zimbabwean academic staff	173	Academic staff	Of the total sample, 44% intended to emigrate from Zimbabwe, while 56% intended to remain in the home country. Decision to migrate is based on complex combination of economic, cultural, social and geographic considerations. Those who intended to emigrate were young, untenured, had a shorter length of service, no child dependants and were mostly from the hard sciences.
7.	Zweig 1997	China	United States	Face-to-face interviews	273	Students, scholars, and former residents of China in the United States	1. Fewer than 9% of interviewees had concrete plans to return to the home country, over 32% were positively disposed to returning in the future. 2. Key background variables affecting the decision to return were participants' age, sex, social background in China, and their views about returning when they first left China. 3. Concern about children's future was not significant, but having a spouse abroad greatly increased the desire to stay abroad. 4. Why people chose not to return varied significantly between those who had children and those did not. Even four years after the Tiananmen crackdown, concerns about political instability, lack of political freedom, and a lack of trust that the government would allow those who returned to leave again were significant reasons for not returning. 5. Economic factors – better United States housing and incomes – as well as professional concerns about lack of job or career mobility in China and a poor work environment in the home country were equally important. Given the weight attributed to economic factors and political stability, if the Chinese economy continues to grow, significant numbers of Chinese may return.

Methodological challenges

Given that the objects of brain drain studies are health systems and policy research, the methodology is not particularly robust compared to biomedical or clinical studies where randomized controlled trials, controlled before-and-after studies (CBA), time-series study, cohort studies or case-control studies are applied. Indeed, none of the eight studies reviewed had applied these robust methods. However, there is a rare chance to apply a pre-post intervention experimental design for health systems and policy research, in particular in the field of health systems research.

With regard to the studies reviewed here, the results of the four included have several limitations. Firstly, the sample selection in two studies was not based on a probability and representative approach; this might have led to a selection bias of the sample and/or the sample size not being likely to represent the target population. Secondly, the data collection tools were self-reporting, whereby the results were likely to be subjective. Connected to this, the wide variety of the results has reduced the opportunity to make generalizations concerning the results reviewed.

It is not unexpected, but very unfortunate, to find so few studies on the brain drain that have strong methodological design, despite the fact that international migration of highly skilled professionals, especially researchers, is on rise. In particular, there is only one study on the impact of strategies to discourage brain drain (Kupfer et al., 2004). The measurement of this study, which was the percentage who return to home country upon graduation is a short-term outcome, and further investigation is needed to assess long-term residence and performance of these scientists within their home institutions.

Report on outcomes

As mentioned earlier, the objective of this study was to examine factors influencing brain drain, the effectiveness of strategies to discourage brain drain, and the impact of the brain drain on the health systems of the home countries. However, none of the studies under review evaluated the third objective, so the following presents an assessment of the first two objectives. Further examinations of how the brain drain impacts health systems of home countries would certainly add important information to discussions of RCS.

Factors influencing brain drain

Of the 7 papers reviewed, 5 addressed factors influencing the brain drain of highly skilled professionals. These are the studies by Popescu (ID3), Kazlauskiene (ID4), Logan (ID6), Tansel (ID5) and Zweig (ID7). The studies refer, either directly or indirectly, to 'push and pull' factors for migration, that is, 'push' factors which encourage migration away from the home country, and 'pull' factors, which attract migrants to the host country.

The Popescu study found that factors influencing the emigration of Romanian researchers included: insufficient resource allocation to research; better opportunities for professional development and advancement overseas; the desire for international experiences; not having the opportunity to perform "similar or an equally interesting work" in the home country, far lower salary and compensation in home country institutions.

As inadequate access to funding resources is almost universally cited as a major cause of brain drain emigration, it is not surprising that a subset of samples from this study indicates that scientists in the areas of biology, biochemistry and genetics, which require large investments in laboratory capacity, viewed this as the most important determinant for emigration, compared to other disciplines such as engineering and mathematics. The study also found that the more time scientists and researchers spent abroad, the higher the percentage of them who preferred to remain working in the host countries.

One interesting finding indicates that two thirds of participants kept in touch with their former university or research institute and their former colleagues in the home country. And stronger relationships with colleagues in Romania had a substantial influence on the intention to return to Romania. These institutional-level relationships are an important determinant for 'reverse brain drain'.

The Kazlauskiene study applied the neo-classic macro and micro economic model of migration. Of the 14 push and pull parameters, 7 gained high scores of significant importance (more than 3 out of 5, especially for pull factors). These are wage differences between foreign and home countries; differences in labour conditions and equipment, with a very large gap between pull and push; differences in living conditions; differences in the opportunities for professional achievement or improvement; differences in academic systems and their respective flexibility; differences in demand for related professionals; and finally, differences in political–juridical systems. There was no gap identified between push and pull for taxation systems, government business policy and academic policy.

The study further applied factor analysis to re-categorize 14 push and pull parameters into 6 factors. Of the 6, 2 factors got substantial acceptance of more than 50%: professional attraction and socio-economic status push. The study highlights the fact that significant improvements in the socio-economic and professional realization conditions in the home country will not halt brain drain from Lithuania as long as the quality of life and work is relatively higher for scientists and researchers in foreign countries.

The study also demonstrated significant association between emigration and social ties such as affiliations with academic institutes in foreign countries, a spouse or intimate friends in foreign countries, family members who are living abroad and the presence of Lithuanian communities outside of Lithuania. These social ties played important roles in the dissemination of information related to living and working conditions abroad, the cultural life in host societies, access to financial aid, and support in finding employment and accommodation. While such ties may exist in home countries, they may need institutional and network strengthening, and be assisted by changes in mindsets about collegiality and the value of research work.

The Logan study suggested that highly skilled Zimbabwean personnel at the professorial level (for example, paediatrics, pharmacy and psychology) who expressed an intention to emigrate in near future (1–3 years) were influenced by several factors. Among the factors that contributed strongly to this intention were age, family, and the strength of the link to the home institution, with more emigration seen among professors who are young (31–40 years), who are married or single without children, and who have fewer than 10 years of service in home institutions, respectively.

Several push factors were also identified by the Logan study in Zimbabwe, including low salaries, poor conductive research environments, insufficient career opportunities and work pressure.

The Tansel study looked at push and pull factors affecting the migration of highly skilled Turkish personnel. This survey indicated several pull factors that encouraged researchers to stay in the host countries when they graduated. The top three most important pull factors identified are: better prospects for career advancement; greater opportunity for further educational development in the specialized area of study; and the existence of a more organized and ordered environment in general.

Among the push factors identified by Tansel were: economic instability and uncertainty in Turkey (the level of unemployment was 30% among high school and university graduates); bureaucratic obstacles; lower expected income; little possibility for career advancement; and other factors such as corruption, partisanship and nepotism. The unproductive environment in home institutions, as well as not being valued and respected, are two other important push factors. In a more tangential way, among Turkish men, compulsory military duty is noted as an important push factor towards migration.

The Zweig survey looked at the situation for Chinese scientists and researchers, and indicates that the main reasons discouraging return to the home country included: lack of political stability and political freedom; lack of opportunities for career advancement in the homeland; poor work environments; and a much lower living standard in China. It is interesting to note that although political uncertainty was regarded as the major concern among Chinese expatriates, only 7.5% of interviewees stated concretely that they did not plan to return to China. From the other end, the decision to emigrate was supported by positive views on the United States relating to political freedom, ample choices and opportunities for jobs, good working conditions, higher living standards and the potential for job mobility.

Effectiveness of strategies to discourage brain drain

Only one study examined policy interventions which encourage scientists and researchers to return home. The Kupfer study evaluated the effect of the combined strategies applied in the past 15 years to encourage scientists who were trained in universities in the United States at the master's or doctoral levels, in the areas of HIV and TB, to return to home institutions in order to build up long-term capacity in LMICs. Three groups of comprehensive and holistic strategies can be categorized as follow: scientific, political and economic.

Scientific strategies cover a wide range of synergistic interventions including:

(1) research that is responsive to priority health problems in the home country;

(2) sandwich training to allow for first year (to start up PhD proposal) and final year (to write up thesis) at a university in the host country, while the middle years are used for field work in the home country;

(3) home country institution involved in trainee selection (for sandwich training);

(4) mentoring in the United States and in the home country to foster stronger institutional and scientific collaboration, especially after the training;

(5) equipment support;

(6) journal and Internet access even beyond the training period;

(7) professional networking support through long-term mentor; previous trainees will foster support to new groups of trainees, especially beyond graduation;

(8) re-entry funding opportunities in order to support continued work in the trained areas;

(9) support with writing successful grant applications in order to ensure career establishment and long-term engagement in the priority research areas.

Political strategies cover:

(1) temporary visas that do not allow for visa extension in order to prevent prolongation of training in the United States;

(2) return agreements to ensure repatriation upon completion of training;

(3) training for decision-makers in developing countries in order to highlight the importance of support for scientists.

Economic strategies cover:

(1) repayment agreements, for the training costs in United States institutes, if scientists refuse to return home;

(2) letters of future job support to secure post upon returning home.

Although there was no comparison group, the evaluation illuminated the significant benefits of strategies aimed at halting the brain drain. The average rate of return home of researchers included in the study was 80%, among 186 trainees who came from 38 LMICs. This compared to other schemes without such interventions, for example 54% of international science and engineering PhD students in the United States accepted firm offers to remain there, which is a return rate of 46%. Another comparison is the return rate of 44% for African students who were studying for a PhD in health sciences in Canada and the United States.

However, Martineau (2004) raises the concern that the return rate is primarily a good short-term success indicator, while longer-term factors, such as the productivity and sustainable contributions of these researchers are equally important. Long-term career advancement beyond the immediate few years following re-entry grants for newly graduated PhDs is equally important. In addition, HIV attracts huge international funding sources to sustain these scientists in their careers, compared to others less popular areas which have a harder time attracting funding support. In this manner, the Kupfer study tends to have a systematic positive bias towards successes.

The Popescu study did not involve interventions discouraging the brain drain. However, it recommended promoting clear criteria and objective assessment of the Romania research system in the hope that it would attract scientists back to their home country. In addition, it found that their intention to return is influenced by sustained scientific relationships with scientists in Romania.

The Logan study suggested two strategic options to discourage brain drain:

(1) introducing institutional reforms in the research organizations by providing favorable working conditions and increasing financial incentives;

(2) increasing investments in training of required human resources in health research to achieve the national development goals.

Discussions

Factors influencing the brain drain: are they controllable?

Reviews indicate that factors influencing the brain drain across country settings tend to provide similar results when categorized into push and pull factors. Factors influencing the brain drain of health-related researchers are not dissimilar to those that affect physicians (Bundred PE et al., 2000), which is unsurprising in that they are within the same category of intellectual capital.

The Popescu, Kazlauskiene and Logan studies confirm the neo-classical macro-level migration theory that international labour migration occurs because of wage differences in different countries. However, highly skilled workforces not only respond to the wage differences, but career advancement and other factors also play equally important roles in migration patterns. Looking at less concrete reasons for emigration, not having an opportunity to perform “similar or equally interesting work” in home countries was not viewed as less important.

The question remains, however, of what should be done to stop the brain drain. Should we infringe on the desire of individuals to seek a more satisfying quality of life for themselves and their families? If yes, can we enforce such a regulation? While the answers to both of these question seems to be ‘no’, there are steps that can be taken to address the disparity that is being created by this emigration. These steps can be loosely categorized into three areas of action: (1) increase the supply of highly-skilled personnel in high-income from internal sources in order to meet their own needs; (2) compensate institutions in LMICs for the loss of their intellectual capital to host countries; and finally, (3) institute ethical codes of conduct governing the international recruitment of intellectuals from LMICs. Such actions, it should be noted, are a more passive response to the problem.

From a more active perspective, the very limited evidence shows that interventions to halt brain drain require a comprehensive mix of actions enforced by institutions in host and home countries. Positive and negative approaches can be, and have been used, in various country experiences. For example, compulsory public service for physicians is common, but less common for health-related researchers or scientists. As a negative incentive, mandatory public service, for a period of double the study leave time for a master's or doctoral degree, is the most common practice in most LMICs, with a fine for non-compliance. Positive approaches include ensuring post and placement when graduates return home, improvement of financial and non-financial incentives, and career advancement.

Using policy to mitigate the brain drain

Several policy options have been proposed to alter the migration of intellectual capital from developing countries to developed countries (e.g. Lowell, 2001; Wickramasekara, 2002; Thorn & Holm-Nielsen, 2006). Some address the issue that the shorter the stay in a host country, the more likely that the migration will be temporary (Todisco et al. 2003). Also noted is the tendency of highly skilled scientists and researchers to emigrate to attractive research environments (Thorn & Holm-Nielsen, 2006).

For an assessment of these policies, it is useful to categorize them here into three groups of interventions, as follows.

Individual interventions

Restriction of international mobility

While high-income countries have applied quality-selective policy to screen top-level intellectual immigrants, many LMICs have introduced restrictive emigration policy to prevent the loss of human capital (Lowell & Findlay, 2001). In 1990, the Chinese government introduced mandatory five years of post-doctoral work for the government, with heavy fines for non-compliance. However, this policy seems not to have been effective in halting continuous non-compliance (Cao, 1996).

Return of expatriates

Return of overseas researchers and scientists benefits home institutions, as they gain the international experience in research, new methodologies and other know-how of the returnee. Repatriation raises concern among returnees if they lose their residency status in their host country. The possibility for them to return to the host country anytime helps relieve uncertainty among returnees if they cannot adapt to the poorer work environment and economy.

The backup possibility of going back to overseas institutions may be required for some individual researchers (Lowell, 2001).

In the context of globalization and the large income gap between rich and poor countries, restrictive policies introduced by LMIC governments prove to be ineffective as a method of retaining highly skilled scientists and researchers. Success requires more comprehensive interventions, such as positive incentives, career opportunities, less bureaucratic rigidity, better access to funding for research and other positive enabling environments in order to attract these individuals back to home institutions when they graduate.

State interventions

Since the intention of highly skilled researchers working overseas to repatriate is influenced mostly by their specialized fields and by the research environment in home institutions (Todisco et al., 2003), home countries need to create favorable conditions and opportunities, not only to retain existing intellectual capital, but also to attract and repatriate those individuals who have emigrated.

Developing countries also need to invest more in the educational sector. In the case of India, the government has set up information technology (IT)-focused universities and implemented IT courses nationwide to meet the forecasted demand for IT personnel. Expanding the education sector not only increases the number of domestic researchers, but it can also help to attract researchers and scientists working overseas back to the home country, where they can take advantage of greater institutional stimulation and opportunity.

Since human capital is the most valuable resource, there is a need to strengthen educational institutions at all levels, especially in tertiary education, in order to offset brain drain (Lowell, 2001).

Network-based interventions

The relationship between scientists working overseas and scientists in home institutions is a conducive factor for repatriation (Popescu et al., 2006). Research collaborative networks between overseas and home institutions facilitate information flows and time-sharing of expertise, and may prevent full-blown brain drain of intellectual capital.

In 1992, the Chinese government decided to reform the restrictive outflow of intellectual capital. A programme was launched to encourage highly-skilled researchers to return to home institutions for temporary academic visits in order to enhance collaboration with local scientists. This programme attracted more than 1,200 individuals from the United States, the United Kingdom, Germany and Japan between 1992 and 1995. Furthermore in 1997–1998 the programme was expanded and brought over 7,000 individuals and 50 groups of expatriates to serve the research needs of China. In some cases, these numbers represent a partial or almost full reversal of the brain drain. This policy also works well in Taiwan, which introduced a programme for temporary visiting professors and business consultants. It resulted in over 3,700 senior scientists and 2,500 scholars returning to work domestically as visiting professors and visiting research professors (Zweig & Fung, 2004).

Thailand launched a project to reverse brain drain that aims to promote collaboration through technical linkages between domestic institutes and Thai overseas experts, with the Reverse Brain Drain Project web site (http://rbd.nstda.or.th) acting as a coordinating information center.

Therefore, opportunities exist through these networks to modify a full brain drain situation, and convert them to ‘brain circulation’ and ‘brain sharing’ between institutions in rich and poor countries. This can be one of several win-win solutions in an interdependent world.

Likewise, in the longer-term, domestic research capacity needs to be strengthened in concordance with strong international stakeholder integration and policies which address both effective and sustainable financial management.

Conclusions

Even as new evidence emerges regarding the need for RCS programmes that approach the issue multilaterally, the training and retention of highly skilled researchers and scientists remains a critical problem to successful health development. Given the factors raised in this review, it will not be easy to halt or alter the strong tide of emigration of these individuals, as long as (1) there is a large gap in wages and other living conditions between richer and poorer countries; (2) there are no ethical codes governing international recruitment of intellectual capital from LMICs; (3) bureaucratic and inflexible management of scientific institutions remains a significant barrier to maintaining intellectual capital; and (4) the fiscal capacity of LMICs is insufficient to meet the demands of these researchers and scientists. While innovation is needed to move RCS forward, there must be a concomitant reinvestment in those strategies that have historically set health development on the right path.

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Beyond research: RCS and the media

Beyond research: RCS and the media

Objectives and approach

For most health researchers, the media is seen as a mystery or a monolith. It is not a partner one collaborates with or complements. Researchers distrust it; are intimidated by it; yet understand all too well its vital role in the research process. Such a simplistic conceptualization, however, forestalls a deeper understanding that might, in the end, inform and energize the research-media link. There is very little thinking about how the media might be involved at other points in the research cycle, and none at all when it comes to the subject of the media contributing to the capacity of health researchers or the health system itself. While it would be relatively straightforward to argue that research and researchers can most certainly build the capacity of the media – through, for instance, sensitization workshops or writing simplified policy briefs – how might this work in the other direction? How might the media begin to build the capacity of health researchers? How might we reconceptualize this relationship into something much more than the usual uni-directional (research-to-media) flow? How might the media become a more robust part of a national health research system?

This case study presents a review of the interplay of research and the media in Kenya, particularly in terms of how the print media[1] reacted and responded to the results of the two clinical trials, in Kenya and Uganda, which found that male circumcision (MC) was an effective HIV prevention intervention – so effective that the research was stopped on ethical grounds.

The study used a sample of 24 articles in The Daily Nation (daily circulation 170,000), The East African Standard (daily circulation 70,000), and The East African (weekly circulation 40,000), the pre-eminent newspapers in Kenya. Relevant articles published between 15 December 2006 to 10 September 2007 were examined.

In these articles, we sought to determine if the journalists had: fairly reported the research; synthesized the findings; provided the non-scientific context; and pushed for policy change or future avenues of research. To this end, we designed a closed-question survey (yes or no) to determine if the articles: paraphrased the research; directly quoted the research; interviewed the researchers, cited the research institution or mentioned the publishing journal; cited the previous MC study in South Africa; used the phrase “partial protective effect”; used the phrase “randomized controlled trial”;

reported the risks of male circumcision as an HIV-prevention intervention; reported the benefits of the intervention; reported the financial costs of the intervention (either financial or expressed as an impact on the health system); provided the cultural context of the intervention; called for action or a policy shift or change; and/or called for further research.

Results

Our analysis found that the media added several vital elements to the MC issue – contributing the essential non-scientific elements, serving to publicize the findings, to synthesize the findings, while also questioning the science itself. It was ombudsman, translator, and publicist. It has emphasized time and again that MC happens within a swirl of other complex events and thus is an intervention that must be weighed on factors beyond science alone. It managed in many cases to balance biomedical findings with social science, situating the surgical act among the cultural and noting the many issues therein. Its synthesis work – particularly in observing similar MC research in South Africa – served to consolidate the evidence base by presenting it as a study building on and confirming a previous study which, when taken together, provided overwhelming evidence of the intervention's efficacy. All of this, most importantly, raised the need for public discussion around the possibility of a new or modified HIV prevention policy.

More broadly, our study concludes that the media can become an active and essential contributor towards the capacity of a national health research system (NHRC). It is an actor whose work can contribute to the accountability of the system, towards its stewardship and governance, and towards its abilities to translate knowledge, all of which may ultimately result in an increase in the demand for research, in investments in research, and in the policy appreciation or application of research.

RCS, NHRS and the media

As Sitthi-amorn and Somrongthong (2000) note, the need for sustainable institutions and organizations within the RCS problematic. They divide research capacity into four domains: "skills and competencies; scientific activities; outcomes; and impacts on policies and programmes."

While this type of sub-division within RCS is useful, more pertinent to our discussion is describing it according to the *level* at which RCS takes place. As Nuyens (2005) observes, the "classical distinction" in RCS is typically among the three different levels of capacity strengthening – individual, institutional and systemic. While the first two levels are conceptually straightforward, this latter systemic level is far more complex, particularly as it is where the concepts of RCS and the national NHRS intersect. Usefully defined by Matlin and IJsselmuiden (2006) as a framework that guides research and research efforts, an NHRS is best seen through its five major functions: stewardship or governance; financing; capacity building; knowledge generation and translation; and knowledge utilization (see Murray & Frenk, 2000; WHO, 2001; Nuyens, 2005; Matlin & IJsselmuiden, 2006). As Matlin and IJsselmuiden (2006) further observe, such conceptions of the system *around* health research help push us past a researcher-centric world, introducing onto the scene other actors essential to the generation, management, translation and utilization of research, from communities to practitioners to policy-makers to the media.

How, in concrete terms, do we build the capacity of a *system*? If our focus is health research, why would we contribute our scarce time and resources to building the capacity of actors whose main remit is *not* health research? This question has received much scrutiny in the literature, with many commentators asserting that the traditional form of capacity building, which focused on researchers and methodological tools and training (or in Nchinda's (2002) memorable phrase "the understanding of pathogens"), has to date enjoyed only a modest success (Albert & Mickan, 2003; Alliance, 2004). As has been noted earlier, there is a need for capacity building in all aspects of the research process. To take one instance, the need to develop core skills and capacities for the dissemination and uptake of research results is widely acknowledged and often cited as a principal challenge for capacity building (Nuyens, 2005; Wolffers, et al., 1998; Nolen & Volmink, 2006; Schulz-Baldes et al., 2007). But what are the avenues that provide for the greatest access in such a process?

Useful here is the further distinction in RCS between the supply and demand sides of health research. If focusing on the supply side of research represents the more traditional (and modestly successful) approach to RCS, then examining how to strengthen the 'demand' side of research – among, for instance, national policy-makers and the media – is one logical next step (Global Forum for Health Research, 2002; Lansang & Dennis, 2004; Alliance, 2004). Underscoring all of this is the necessary development of national-level linkages and alliances between supply and demand, as a system marked by good supply without a healthy demand will invariably falter (Velho, 2004; Bates et al., 2006). Trained researchers and strong research institutions mean very little if the supply side cannot link with (and understand) the demand side. While there are certainly strong, project-based examples of this kind of demand–supply linkage, perhaps more important is a further examination of the *methodology* of creating and sustaining these kinds of linkages. Several commentators point to the role of needs assessment and priority-setting exercises as critical to the development and fostering of these linkages, which in the end may well create strong research collaborations and vibrant networks (Nuyens, 2007; Schulz-Baldes et al., 2007). Involving a range of demand-supply stakeholders, achieving an intricate and cross-fertilized ownership of the research process, and developing research methodologies that exploit the full potential of these partnerships – this is critical to the eventual uptake and utilization of research results, and thus to the health of the system as a whole.

And yet, when we return to the issue of research and the media, we see none of these vibrant exchanges or partnerships – just wary researchers crossing their fingers and hoping that a headline hungry organization will publish, accurately and faithfully, their research results. While a growing number of authors emphasize the need to develop 'relationships' and 'active engagements' with the media (see Lloyd Laney, 2005; Hovland, 2005; European Commission, 2004; Nolen & Volmink, 2006), these relationships are, typically, of the one-way variety – relationships designed to build an eventual conduit for the publication of research results. Given the extremely important role the media plays in setting the policy agenda, in influencing societal discourse and behaviour, and in encouraging the utilization of health services and certain health-care interventions (Glynn et al., 1999; Kingdon, 2003; Grilli et al., 2002) promoting this type of one-way relationship is highly unsatisfactory. If, as Schwitzer et al (2005) maintain, the mass media is the single most important source of health information for the general public, then surely researchers can improve on *the strategy of hope* for getting their message to the media. The media's role in public health must be revisited and reimagined (Entwistle & Watt, 1999) and its importance, on par with formal political institutions (Cook, 1998), recalled, reinterpreted and stressed all over again. It is time to aggressively develop and promote genuine partnerships and collaborations that draw the media into national health research systems.

The emerging field of Knowledge Translation (KT) – variously termed Knowledge Transfer and Exchange; Research to Policy; Research to Action – has the development of such linkages at its core. Most usefully defined by the Canadian Institute of Health Research (CIHR, 2004) as the "exchange, synthesis and ethically-sound application of research findings within a complex set of interactions among researchers and knowledge users," the concept of KT extends beyond the simple act of dissemination. It is a series of ever-evolving, iterative strategies that build upon conscious and active participation of researchers and research users.[2] In practical terms though: how can we cultivate these real relationships? And, perhaps most of all, how can we convince the media that it ought to be a stakeholder in the research system?

When it comes to the direct relationship between health research and the media, the focus has all too often been on improving the *accuracy and quality* of news coverage, an attitude with unfortunate overtones of condescension, as if it is the journalists alone who are the problem (Waddell et al., 2005; Weigold, 2001; Nolen & Volmink, 2006). In the literature, journalists are variously held to be sensational and speculative, drawn to controversy, potential and scandal, lacking any critical appraisal skills, and given to overemphasize reports on risk, discovery, and avoiding/detecting/treating threats to one's health (Waddell et al., 2005; Weigold, 2001; Larsson et al., 2003; Bubela & Caulfield, 2004). Journalists, on the other hand, often find scientists incapable of describing their work in human terms, self-aggrandizing and obsessed with accuracy and public education – down to the minutiae of scientific findings (Waddell et al., 2005; Wiegold, 2001). Researchers all too often bemoan the lack of scientific training among journalists – but how many researchers have ever undertaken media training? The literature focuses almost exclusively on getting science into the media: perhaps it is time to focus on getting media into science.

Returning to the vital intersections of the media, RCS and the NHRS, it is clear that a variety of opportunities exist for the media to influence the NHRS and to contribute towards its capacity. In the ideal case, when properly informed and involved in research, the media could bring to bear its ombudsman's eye and attitude, thereby adding an accountability and objectivity towards the leadership and direction of the research system; it could provide high-level synthesis of research work; it could provide the necessary task of contextualizing the science (particularly around policy issues); and of course it could push research findings to significant national – or global – audiences. Taken together, the media needs to be seen as an essential component of an NHRS, an actor whose work can contribute to an increase in the demand for research, in investments in research, and, ultimately, in the policy appreciation or application of research.

Male circumcision in Kenya: setting the context

As Aggleton (2007) observes in his historical survey of the act, male circumcision is an act of power and politics, a rite of passage that embodies a range of potent symbols, beliefs and ideologies. Particularly in the African context, male circumcision "is often thought to purify and protect the next generation from dangerous outside influences, to bind all youth to their peers or age set," while also fixing "generational respect and authority patterns" (*Africa Update*, cited in Aggleton, 2007).

When the news hit the headlines on 15 December, 2006, that MC was such a potent HIV intervention that two studies on the topic had been stopped on ethical grounds, the issue of MC was already a well known and discussed topic in Kenya. Many ethnic groups in Kenya participate in the rite, which even has special linguistic associations in languages such Kimeru and Kikuyu. At the same time, male circumcision often flares lingering national insecurities, a cultural rite the modern class often perceives as 'backward' or quaintly traditional, and views with the same amount of gentle contempt as they do the Maasai. Kenya is a rapidly modernizing nation, and as other modernizing countries have so often done, is struggling with the weight of those who do not embrace a future of skyscrapers, linoleum and virtual dating. MC as a cultural 'bush' rite is the perfect symbol of a receding past, an anachronism that no longer fits their modernizing world.

For all of these reasons, circumcision is a story the media loves to tell, where journalists can flex their novelistic muscles by describing the various steps 'up-country' boys must undergo during their circumcision ceremony – often told with subtle tones of the ethnic chauvinism that lurks beneath most Kenyan discourse. In one *Daily Nation* story, we have a circumciser "flashing a traditional knife," and executing "the operation in one swift move before stepping back to allow elders to examine his work. When they pronounced it well done, ululations rent the air as a new round of celebrations began. Makokha raised his right fist to acknowledge the cheers from onlookers, friends and the relatives he had done proud" (Kusimba, 2004). In another, we have the picture of "the chief circumciser" with his "head covered in a colobus monkey skin" and an aunt who eventually buries the foreskin so that the man's enemies could never find it "because they could use it to bewitch him" (Mwangi, 2005). Despite the gentle ridicule of these ancient practices, there is nothing but scorn for those few tribes who do *not* practice the rite – the Luo, the Turkana, the Teso.

Surrounding this depiction of circumcision within Kenyan culture, MC has also spilled over into politics and education. Raila Odinga (a Luo), the main opposition candidate for president in the 2007 elections, is continually reminded of the fact that he is not circumcised, with other presidential aspirants coming just shy of stating that "only circumcised men can lead" (*The East African Standard*, 2007). Odinga, for his part, has retaliated by invoking the names of (the reportedly uncircumcised) Tony Blair and George Bush as "examples to demonstrate the irrelevance of circumcision" in leading a nation (Odhiambo, 2007). Add into the mix the routine reporting of trouble at Kenyan schools, where circumcised boys refuse to sit in the same classroom as the uncircumcised ("There was a lot of screaming and disturbances when your son was discovered to be the way he is" (Muthuri & Wachira, 2007)) and we can see that MC is an enduring issue routinely in the headlines of Kenyan dailies.

The context around MC is significant in grounding our discussion on how the media has interacted with the MC research results, and indeed the overarching research process around MC and the health research system. Clearly, MC was an issue of great familiarity to the print media, and thus there was no significant barrier for journalists in understanding the basic tenets of the science. Nor, given the perennially 'hot' subject of HIV and the near-vaccine-like promise of MC, was there any need to convince journalists of the science's value: even at a cursory glance, it deserved to be published. Nonetheless, our study found some extremely interesting results upon analysing all articles published in Kenya (in *The Daily Nation*, *The East African* and *The East African Standard*) that linked male circumcision with reduced HIV transmission or acquisition, from 15 December, 2006 (when the news of the study broke in Kenya) to 10 September, 2007 (the last published report). We gathered 24 articles over this period, from The *Daily Nation* archives, and from the respective web sites of the *Daily Nation*, the *Standard* and the *East African*. We also searched for articles in these publications on *AllAfrica.com* using the keywords "circumcision," "cut," "AIDS" and by the names of known health journalists for each of those publications.

We wanted to get a clear sense of the role the media has played within Kenya's national health research system, particularly in terms of the MC issue. While any study designed to capture the 'degrees' of the media's abilities would be necessarily soft, we can nonetheless tease out several important elements of their coverage, with implications for how it did or did not contribute towards the capacity of the five core NHRS functions:

- Veracity: Did journalists quote the research directly? Paraphrase it? Interview a researcher? Cite the name of the researcher, research institution or the journal in which the research appeared?
- Synthesis: Did journalists use the term "partial protective effect"? "Randomized controlled trial"? Did they mention the previous RCT on MC in South Africa?
- Context: Did journalists cite the risks of the MC intervention? The benefits? The costs – either financial or expressed as an impact on the health system? Did journalists situate MC within the broader cultural context?
- Impact on policy and future research: Did journalists call for a policy shift or change? Did journalists question the research or suggest future avenues for more research?

We analysed the articles through a straightforward closed-question (yes-no) survey.

Table 9: Article analysis survey responses

	Direct quotation from the research[3]	Paraphrase the research	Interview researcher/ cite institution/ journal	Use the term "partial protective effect"	Use the term "randomized controlled trial"	Cite the previous RCT in South Africa
Yes	8% (2)	96% (23)	33% (8)	8% (2)	4% (1)	58% (14)
No	92% (22)	4% (1)	67% (16)	92% (22)	96% (23)	42% (10)

	Describe the risks	Describe the benefits	Describe the costs	Cultural context	Policy choices	Future research
Yes	83% (20)	100% (24)	8% (2)	50% (12)	67% (16)	21% (5)
No	17% (4)	0% (0)	92% (22)	50% (12)	33% (8)	79% (19)

The results here point to some interesting trends. In terms of the 'veracity' element, there is little that is surprising. Most articles began with a relatively balanced overview of the research (a virtual requirement for any article that would discuss the MC–HIV link), though very few felt compelled to quote directly from the research or the NIH's press statement on the issue (see NIH, 2006). Only a third mentioned a researcher, a research institution, or the publishing journal (*The Lancet*). Given that part of the team was from the University of Nairobi and was on hand to answer or direct queries – and given that it was published in a very high profile journal – this is perhaps a startlingly low number. Or perhaps the *who did it* part of the equation here is far less important than the *what was it all about* element. After all, if the hallmark of biomedicine is its reproducibility, why dwell on its first creator?

The 'synthesis' element provides three very pointed insights. First, the methodology (RCT) is so unimportant to journalists as to barely factor in their reportage (4%). Second, going into scientific nuance around MC and HIV is not necessarily newsworthy – the issue here is that MC can reduce HIV transmission – period – not that it only provides a "partial protective effect" (8%). And lastly – and easily one of the most intriguing results of this analysis – was the relatively high number (58%) of articles that cited the only previous RCT on the subject, the Orange Farm study in South Africa. This shows very graphically the need to couch research findings within the wider picture, to surround one study with like findings from another. This study was not the first of its kind: rather, it *confirmed* previous evidence and was thus, if not incontrovertible, so strong as to be instantly worthy of high-level discussion and deliberation. The fact that this study was done in South Africa, which may well carry the perception of being on-par or slightly wealthier than Kenya, and certainly capable of quality research, would also resonate well with Kenyans. Lastly, we should stress again the systemic importance of bringing in the example of another country to, in the words of Matlin and IJsselmuiden's NHRS depiction (2006) "understand the importance of research done elsewhere and to use it towards [a country's] own health benefit".

The "context" element of this analysis yielded few surprises, with the exception that the risks to the intervention were not, unlike the benefits, mentioned in every article. The fact that the costs were mentioned in only two articles (8%) is likely due to the fact that there is as yet no full policy around MC (or integration of MC into existing HIV-prevention policies) and thus no compelling public reason to discuss such costs at the present time.

The final category on "impact on policy and future research" presented few surprises in the actual percentages, though perhaps 21% of articles mentioning possible future research should be taken as a positive. However, only one journalist (in two separate articles) questioned the nature of the research itself, despite the fact that Ugandan President Yoweri Museveni made headlines all around the continent for his personal rejection of the MC research (see Reuters, 2006). Keeping the media where it ought to be – in nobody's corner; as an unattached ombudsman – *The Daily Nation's* Charles Onyango-Obbo wrote in July 2007, "I don't know enough about the science of this study to be able to either fault or laud it. But its politics is troubling." He wonders whether MC will be made compulsory "and, presumably, those who refuse to submit to the knife will be sent to prison". In a follow-up published in September 2007, he wrote "Turns out, there are many studies showing that either circumcision does not make a difference to the spread of AIDS, or might actually increase it," then citing a Dutch study (and providing the URL) that throws serious "doubts on the wisdom of promoting male circumcision to prevent HIV infection, not only because of the risk of increasing HIV in women, but also because circumcision removes a natural HIV-1 barrier from men". He mentions a "preliminary study" in Malawi showing that "the incidence of HIV is highest where male circumcision is highest" and then dips into an argument made in several sources (see Aggleton, 2007; Darby, 2005) that describes the United States as the most circumcised country in the developed world that also, seemingly paradoxically, has the highest rates of heterosexually-transmitted HIV in the developed world.

The MC story is still unfolding in Kenya. It will most certainly undergo further scrutiny in the media as the Ministry of Health develops policies to address its role as an intervention, and groups like the Regional East African Community Health Policy Initiative (REACH-Policy) convene inclusive groups of stakeholders to discuss the impact of the research, possible responses for researchers, policy-makers and the media, and a way forward for governments, donors, civil society and researchers.

Conclusions

The lessons here are strong and instructive. Beyond a doubt, the print media has added a vital element to the issue of male circumcision – adding essential non-scientific components, publicizing the findings, while also questioning the science itself. It has emphasized time and again that MC happens within a swirl of other complex events and thus is an intervention that must be weighed on factors beyond science alone. It managed in many cases to balance biomedical findings with social science, situating the surgical act among the cultural and noting the many unresolved issues therein.

In terms of Kenya's NHRS and the role of the media in building the capacity of the NHRS (particularly in achieving its five functions), several strong conclusions from this case study can help to inform the development of NHRS's across the developing world.

1. An NHRS cannot rest upon science alone, as there are a host of non-scientific factors required when bridging the research-to-policy gap. An evidence base is often not sufficient to influence policy: researchers must become more aware of the cultural, social and political issues that touch upon and impact their findings in order to help journalists inform themselves comprehensively of the issues at hand and to influence policy shifts.

2. In its role as ombudsman – a necessary role it plays in many political systems across the globe – the media can provide useful challenges to the research findings and the research community at large. How will the research community respond to the questions raised by the dissenting

Charles Onyango-Obbo? In the stewardship and governance component of an NHRS, the media can usefully and powerfully add the essential component of *accountability* to the system. Strong evidence does not, after all, fit the needs of every system.

3. In terms of knowledge translation, the media can play a pre-eminent role in synthesizing findings. Journalists are, after all, de facto knowledge translators: they already have the skills required to reduce a complex story into its compelling component parts. In the MC case, they couched existing findings within other work and thus bolstered the strength and applicability of those locally generated findings. The media as much as any other actor worked to *confirm* the evidence base. The fact that 58% of the articles mentioned the South African RCT has strong implications on the need for science to find its like and thus achieve a critical mass that can ultimately influence policy. Synthesis can also mean weaving the scientific facts in with the non-scientific, another strong and successful element from the MC case study.

4. The most obvious aspect of the media – its ability to disseminate, sensitize, publicize and reach large audiences – is central to the functioning of an NHRS but also typically the most difficult aspect for researchers to grapple with. Though the MC case offers little direct insight on this particular issue, it is clear from the literature that the more informed and involved the media is, the greater its ability to spread accurate information to its constituencies. It is time to investigate means of involving the media in project design, in needs assessment exercises, in policy-setting workshops, and, especially for social science research, within the composition of research teams. In the MC case, the media was not part of the research design, and was, as usual, brought into the issue at the end of the research process. But what if researchers had consulted the media at the outset of the project?

Taken together, the media can most certainly become an active and essential contributor towards a stronger NHRS, an actor whose work can contribute towards the governance and accountability of the system, towards translation of key results, ultimately resulting in an increase in the demand for research, in investments in research, and in the policy appreciation or application of research.

All the same, some significant challenges remain. First, researchers must work to convince the media that they are a vital stakeholder in the NHRS. Researchers and policy-makers must invite the media to priority-setting workshops and needs assessments, in the hopes of developing linkages and partnerships that can fully exploit the media's potential as a research partner and even as a *knowledge generator*. Such exchanges would also help to educate media partners on issues related to health research, such as research protocols, and lead to greater understanding among the public of scientific processes and their relation to the evidence.

Second, researchers must undergo some media sensitization courses to better understand the functioning and needs of the media. It cannot always be about getting science into the media: there must be some responsibility taken for getting the media into the science. Though this study has only touched upon print journalism, this is an age of burgeoning media in every sense, with the Internet in particular becoming a significant new actor.

Lastly, both researchers and the media need to recognize their similarities – that, in essence, they are both investigators of problems and issues, and that each can improve their work with the assistance and expertise of the other. This depends obviously on direct relationships with the media, where each can get over their fear and loathing of the other.

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[1] Due to technological limitations we must restrict our analysis to print media. This is highly unfortunate given the often inflammatory role of televised media in portraying the male circumcision story in Kenya.

[2] A number of toolkits dedicated to KT offer grounded tips for engaging with the media (see Hovland, 2005; Laney, 2005; European Commission, 2004; Start & Hovland, 2004; Campbell et al. 2008; Panos Institute, 2005a). However, very few go beyond discussions of the various 'tools' researchers can develop to get their message to the media: from briefing notes to press releases to a mid-afternoon cold call, the methodology is the same: shine your results like so many lights onto the intended target. Even in a field as dynamic as KT, there must be a greater emphasis – and know-how – placed on the strategies for two-way interactions with journalists. The Panos Institute appears to be one of the few exceptions to the rule, examining engagement and communication with the media as a double-edged process. They emphasize researcher engagement before, during and after the research process (Panos Institute, 2005b), invoking ideas that sound very familiar to the research-policy problem.

[3] As the research itself did not appear until 24 February, 2007, we have included direct citation of the NIH's statement (which occurred on 13 December, 2006) about halting the research as a 'direct quotation'.

RCS: views from the south

RCS: views from the south

Objectives

This chapter attempts to examine the specific needs of RCS in the south as well as the innovations being put forward by those very recipients. These accounts, which range from observations concerning specific programmes to more general critiques of regional situations, offer insight into challenges that remain with regard to RCS from a southern perspective. Some of these challenges reiterate points made earlier in this report, while others offer interventions that arise specifically from the experiences of particular southern regions. Each contributor offers recommendations based on the specific points raised in the foregoing sections. (see end of chapter for contributors' names)

Strengthening ethics research capacity: a view from Argentina

The different strategies to build capacity largely depend on the role and possibilities of the agency, institution or organization that fosters them. My own experience is at an academic institution: Facultad Latinoamericana de Ciencias Sociales (FLACSO) in Buenos Aires, Argentina. We offer several different kinds of capacity building experiences.

The most successful has been the Training Program in Research Ethics in the Americas that I (FLACSO-Argentina) co-direct with Dr Ruth Macklin (Albert Einstein College of Medicine (AECOM)). The Fogarty International Center (FIC) of the National Institutes of Health (NIH) in the United States of America funds the programme, which is conceived as a fully collaborative effort between the north and the south. We select four Latin American researchers per year and train them in research ethics. During the first year they spent six months in New York at AECOM working with Dr Macklin and six months in Buenos Aires at FLACSO with me. Owing to some operative problems during the first implementation, we decided to conduct the second version of the programme entirely in Argentina, thus making it an eight-month residency at FLACSO. Throughout that time, among other activities, trainees took bioethics courses and two-week intensive research ethics seminars designed specifically for the programme. They attended the meetings of research ethics committees in private and public hospitals in Buenos Aires and developed a plan to implement on returning to their home institution. This programme worked extremely well but we decided to build on the previous experiences and add a distance-learning seminar to strengthen the work of the trainees at their home institutions during the third programme. So, the current trainees now spend four months in Buenos Aires and then continue working in their countries. During the six months at their home institutions they take a specially designed distance-learning course and put their plan into practice.

The programme's impact was mostly felt in Argentina in the first few years. The reasons for this include the fact that our intensive seminars were open to members of the faculty's research ethics committee and to other researchers in the area. It was also due to the fact that Argentinean graduates of the programme could follow up their contact with FLACSO once their formal training had ended. This helped to broaden the impact of the course as the graduates developed their own courses and activities in collaboration with FLACSO. We now have six cohorts and the impact can now also be seen in other countries. Former trainees can work together and provide support for the less experienced participants. However, we also felt that they needed broader academic support.

A key change introduced in the third version of the programme concerned e-learning. Since 2005, the bioethics department at FLACSO has begun to offer distance-learning courses. This rewarding experience convinced us of the comprehensive power of this mode of teaching. We were surprised by the interest raised across Latin America. The success and impact was outstanding and we decided to incorporate it and strengthen the existing training programme funded by FIC. Hence, both programmes complement each other. The FIC-funded programme benefits from the previous experience of FLACSO courses (although we altered the structure to try out a different design) and FLACSO benefits from FIC-funding as it allows for the design of a new seminar to help promote a degree in bioethics.

An additional advantage of the distance-learning seminar strategy for the FIC programme is that it allows us to offer continuous support before and after the trainees period of study in Buenos Aires. This is especially beneficial to trainees outside Argentina who were previously 'on their own' after having left Buenos Aires. They can now continue their training in ethics over a number of years from their own countries through the other e-courses in bioethics that FLACSO offers (as 4 or even 8 months of course work is not sufficient to master the field). E-learning can also help them to build a network in bioethics and research ethics where they live. In the past, former trainees found it difficult to locate other faculty if they wanted to organize a seminar or workshop in their area, as many were working in relative isolation. Now, they can even offer scholarships to other colleagues or members of research ethics committees as part of their implementation plan – using FLACSO's e-learning platform. They now have access to "high level capacity building tools" to use in forming and developing their own groups.

An equally important effort in capacity building are the activities of research ethics committee networks. My experience is linked with FLACEIS (Latin American Forum of Ethics Committees in Health Research), originally created by the Special Programme for Research and Training in Tropical Diseases (TDR). I will focus particularly on the work of FLACEIS Argentina, which, I believe to be one of the most active country networks in the region. Since 2002, FLACEIS Argentina has been organizing approximately four meetings per year at FLACSO. The distinctive feature of this endeavor is its horizontal dynamics. For example, the Research Ethics Committee members themselves set the agenda democratically according to their expressed needs. These informal meetings have proved to be very productive: for example, legislation has been designed and submitted to the Parliament regarding the accreditation of Research Ethics Committees and clinical research regulation, and the guidelines regarding assent by children to participate in health research are under discussion.

Recommendations

In making some recommendations based on my own experience, I would first reaffirm the overall value of *education*. In particular, distance learning – when designed carefully and with a suitable technical infrastructure – is a tool with excellent possibilities: it demonstrates a well-proven influence and multiplying effect. Another crucial aspect to consider is *flexibility* in providing an ongoing evaluation of what is being done to change and adapt plans to the dynamics of LMICs. A third recommendation is to *reinforce what already exists and works*. Finally, with respect to *collaboration and networking*, researchers and members of local Research Ethics Committees constitute a great potential for enhancing the impact of training programmes. They are the ones that face the daily problems and challenges. Raising awareness of ethical problems through education and helping them to generate their own space for discussion has proved to be highly productive and rewarding.

Strengthening research capacity: a view from the Cameroon

Research has, in recent times, become recognized as one of the keys to sustainable development. However, researchers from the south are latecomers to the scene and have lagged behind their northern counterparts in terms of the quality and, in particular, the volume of their scientific outputs, notwithstanding the many initiatives in RCS over the last three decades. Partly, this is a legacy of colonialism and the post-colonial period during which 'nationals' were rarely trained to do research. This imbalance also seems to be partly due to the absence of a research tradition and because there is often no coherent health research agenda, neither nationally nor in research institutions, in most LMICs – particularly in Africa. Instead, the agendas for research in health are likely to have been set in the north.

Many training programmes in research institutions in the south have a research agenda that was drawn up during the colonial period with more emphasis on research problems defined by the north than based on national or regional priorities. In order to survive (financially) some researchers from the south find themselves in the unacceptable position of being used for collecting field data for their counterparts from the north as they tread the 'publish-or-perish' route common in northern universities. Most researchers in the south are not engaged in research that is relevant to national needs, and that can provide the evidence-base needed for decision-making by ministries of health. Thus a culture of 'development without research' persists. Research capacity development has to be moved to centre stage on the agenda of developing countries. Research capacity development is a must for all developing countries if they are to have suitably trained scientists and professionals who can meet their research needs.

Major deficiencies in research capacity in Africa

While training of researchers in tropical and infectious diseases has increased considerably in the last decade, research in the behavioural sciences, health policies and systems and health economics has largely been absent or grossly insufficient and need more focus in the future. Some of the major deficiencies in the training of researchers in Africa and in the capacity of the research system to support research needs include:

- Research topics are often inappropriately selected and have little of no relationship with national health problems thus compromising the use of the results once the research is done.
- There is inadequate or insufficient research capacity (trained persons with adequate resources and infrastructure for good research) in the countries.
- There is an absence of defined national research priorities that could guide researchers and trainees in the national institutions to make choices of research topics.
- Research institutions themselves often have no research priorities, let alone ones in line with national priorities.
- There is insufficient or often even no research funding available for ‘unpopular’ research for which there is no external funding.
- Most research issues for which northern donors do provide funds, address health problems that are of relevance to donor agendas – which are not necessarily of national importance.
- Universities are the main – and in many instances the sole – institutions in LMICs where research is being done; this environment usually prescribes a ‘publish or perish’ approach, resulting in national academics preferentially addressing issues that are publishable rather than addressing problems of national importance.
- There is an absence of a research tradition in many countries and evidence-based decision-making is still a new concept that has not yet been integrated in the national administrations of African governments.
- Many universities – particularly medical schools – place most emphasis on clinical and patient care roles, and research is generally done only if funds are available – which means that it is ‘rarely done’.
- There has been little emphasis on presenting results of research in a format aimed at action that would be read by policy-makers.
- The brain drain remains a problem in spite of growing efforts to increase the number of researchers in LMICs and to improve their service conditions.

Health equity, gender and research capacity

Health equity, specifically as it relates to gender, has been and continues to be an issue for discussion. Governments in LMICs are still being confronted with the glaring gaps in the provision of health services between sectors of the population – specifically between urban and rural populations and between men and women. Health research can make a major contribution to reducing such inequities and should thus be considered as furthering inclusiveness. Health research is, in this sense, a key instrument to promote social justice, and national research systems should explicitly focus on 'fairness in distribution of health activities' and on the identification of 'who is worst off'. Only then can governments plan health resources redistribution in line with promoting health equity.

All countries should be able to measure availability, accessibility, affordability, utilization of and coverage by health services in relation to key determinants of health inequity. These are areas where African countries themselves have to take the initiative to draw up and focus their own national research agenda, and insist on individual and system research capacity development that will make equity measurement possible and will allow evaluation of interventions. This means that countries have to possess the capability to carry out, interpret and use a wide range of research studies spanning the many different components of health care delivery, including:

- Population-based studies of health-care coverage, in general and for specific conditions, such as vaccinations and immunizations, availability or otherwise of key services such as those for mother and child and large-scale control of endemic diseases with known therapy and control strategies such as leprosy, sleeping sickness, bancroftian filariasis, onchocerciasis, schistosomiasis, leishmaniasis, etc.
- Disease burden studies for different groups in the population to determine the level of resources to be provided for different priority health problems; and to identify groups of specific health-care problems that are under-funded or for which special funding should be made available.
- Availability of medications and strategies of their use to cater for special diseases and conditions such as HIV, malaria, TB and some of the emerging diseases;

- Creation of a health information system that will permit monitoring of variations in the provision or uptake of health care to provide an early warning system in respect of under-served groups.
- Equity in health, particularly related to gender, can not be separated from cultural and social contexts. Research into these issues requires familiarity with the social context and disease patterns of the countries. To effectively address equity, it is necessary for countries to have their own indigenous research capacity.

What are some major constraints and challenges?

- LMICs are not a homogeneous group. Some more advanced LMICs have used training opportunities offered through competitive training grant awards to build up their indigenous research capacity much faster than their others. A key challenge is to develop strategies to close this gap and not only allow those that are performing well to improve further.
- There is a disharmony between researchers in universities and research institutes on the one hand and administrators and policy-makers on the other hand. The challenge is to find ways to bring these two groups together.
- Many developing countries do not have a comprehensive priority health research plan and have not prepared any coherent programme for research capacity development. The challenge is to enable policy-makers to establish and implement health research priorities and develop research system capacity development plans. Past efforts at promoting this actively have produced very slow responses at best.
- Governments in LMICs are still not fully engaged in knowledge-based and science-based decision-making nor are they demanding evidence from their advisers to back up recommendations for action. The benefits of research are not fully appreciated and research remains low down on the national priority list. Changing this remains a key challenge.
- Past recommendations about the proportion of the national health budget or technical assistance programme funds needed to develop national health research capacity have largely been ignored. The challenge is therefore to get policy-makers to increase their demands for evidence from their researchers and to shift research higher up

on the national financial and political agenda, on the one hand, and to obtain the agreement of external health programme sponsors to contribute their share towards national research system building.

- Research institutions, particularly those in universities, still shy away from creating strong networks with institutions in neighbouring countries to improve post-graduate research training. Post-graduate students should be able to do some of the modules and units of their courses and practical aspects of their research in a sister university that is strong in a specific area and discipline. The process of establishing equivalence of degrees between universities across the continent will have a capacity building effect on these institutions – aspiring to commonly defined, high standards; on individual students – who have the opportunity to learn from the best; and on disciplines – as it will mitigate the effect of low critical mass.

Recommendations

To advance along the path of building appropriate research capacity in developing countries, a certain number of conditions need to be met, including:

- Capacity development should always build on what exists and should be anchored on the priorities of the countries and the needs of the people it is meant to serve.
- Research capacity development should strengthen existing capacities rather than 'start from scratch': past efforts, initiatives, mechanisms or structures should never be negated but should serve as springboards for the future.
- Partnerships should be developed with stronger institutions in the north or south to further enhance capacity.
- Research capacity development should be based on clear goals and clear responses to three fundamental questions: *Why* is research capacity being developed?; *What* is the capacity being built for? – in terms of activities it is meant to perform; and *Whom* is this capacity meant for? Clearly, all countries need capacity in different disciplines to meet the large number of challenges they face both currently and in the future.
- The issue of brain drain *must* be explicitly discussed and addressed in all RCS initiatives – from the beginning of the initiatives.

Strengthening research capacity: a view from many places

My major observation of how health research is conducted in developing countries is that times have changed and that times have not changed. Where northern researchers once set up research laboratories in southern countries and created the rules of engagement, principles of international partnerships have now been formulated and are expected to be observed by all partners. Where research proposals once only needed ethical approval by the northern partner, joint proposals now need approval at both institutions. Where once donors dealt only with the northern partner in the development of a grant proposal, they now look for the contributions of southern institutions and involve them in their review processes. But, of the relatively few funds that are channeled for research into the health problems borne by populations living in LMICs, only a small proportion goes to researchers and institutions in those countries. The authorship of resulting research papers is still dominated by investigators from developed countries and, while northern institutions specializing in international health and global health are flourishing with large new funding streams, many academic and research institutions in LMICs are struggling to stand still.

Why after all the productive years of tropical medicine research and the training that has resulted in so many eminent scientists from LMICs are we still talking about research capacity building? Clearly, the underlying explanation for the vulnerability of research in LMICs is associated with the human resource crisis worldwide. The brain drain of scientists and potential scientists undermines research institutions like any other health institution and, in turn, undermines the enabling research environment making it less and less attractive to recruit young scientists to conduct research. Even given this situation, and all the other possible explanations, there are two factors that I think need highlighting. The first is structural and the second is attitudinal.

Challenges

The *structural differences* in the systems and circumstances in which we each conduct research lead inevitably to an imbalance in how priorities are set and the way in which research is conducted. Many academics working in northern institutions are dependent for their salaries on obtaining extramural grants. The University of California, San Francisco, for example, obtains over 50% of its income from grants or private gifts. National grant-making bodies such as the National Institutes of Health make awards to United States institutions with indirect costs as high as 50% and sometimes more. It is in the interests of these institutions to provide technical support to faculty in obtaining and administering these grants and to build the capacity of young faculty to ensure that the quality of the work done is high. The system is the same whether or not a grant is awarded for work in an LMIC.

There is no such research support system in many academic institutions in LMICs. Since there are few local grant-making bodies, academic institutions are dependent on meagre governmental funding. Academics receive low salaries for heavy teaching workloads and are given little institutional support to obtain additional funding to develop their research programmes. The major source of extramural funding, therefore, is through northern funding bodies that set the priorities, and awards made to northern principal investigators who are dependent for their salaries and promotions on obtaining, and steering the grants obtained. The indirect costs awarded to LMIC partner institutions are usually negligible and so they are unable to build their own institutional capacities to obtain and manage grants, and there is really little incentive for them to do so.

The other undermining factor is an *attitudinal problem* and concerns the actual use of the term ‘capacity building’. It is absolutely correct that significant investment is needed to create a self-standing researcher, hence the opportunities provided to post-doctoral and junior researchers by most northern academic institutions. It is also a basic premise that any research project, wherever it is conducted, should increase the capacity of the individual scientists and their institutions to conduct quality research. For some reason, this is called ‘capacity building’ in LMICs but not otherwise. The term is usually well-intended, meaning that ‘we should leave something behind’ but its one-sided use undermines the equality of the relationship for which we are still striving. There is no doubt that researchers in developing countries, as in other parts of the world, enjoy collaborating internationally with institutions that have specialist expertise that is complementary to their own, and from which they learn. Likewise, northern researchers who go to work in LMICs are on a steep learning curve and gain capacity from the skills and experience of their collaborators.

Recommendations

The term 'capacity building' might become superfluous if the structural issues described above were addressed, partly because some capacity would have been built but also because the LMIC institutions would be sharing the driving seat. My top two recommendations for getting there are:

1) for partners to build, and donors to support, international collaborations at the institutional rather than at the project or individual levels. Proposals could be formulated that openly build capacities at both institutions and address common priorities; and there could be cross-fertilization of ideas for institutionalizing research; and
2) that donors address the inequalities in indirect costs, providing sufficient indirect costs to LMIC institutions to enable them to generate and support research activities, for example, by creating offices to manage contracts and grants, and schemes for faculty development. In this way, there would be greater equity in the distribution of research funding and in the building of institutional infrastructures.

Strengthening research capacity: a view from the Philippines and Columbia

What are the goals and objectives of health research and RCS in the country or institution?

Ideally, the country or the home institution should draw up a roadmap for research and the associated research capacity needs for the next 5–10 years. At the very least, this could start out as a rough sketch, but it is important that the southern partner defines what the research development task is all about. Very often, southern institutions and individuals look for training opportunities on *how* to do research, and yet have not asked the big-picture question: *what* are we trying to answer through research? What priority health problems are we seeking? For training institutions, this means that there should be initial discussions about the overall research plan of the home institution and/or the country, and whether there is a 'good fit' between the training opportunities and the overall research plans of the home institution and/or country.

For example, during the initial years of INCLEN, the fellowship programme emphasized the training of physicians in clinical epidemiology and biostatistics. However, it soon became apparent that to comprehensively address important issues impacting on the public's health, further multidisciplinary research capacity in economics and social sciences needed to be developed. More importantly, the INCLEN experience over the past 25 years has shown that although research methodology is at a premium and much sought after, the most successful fellows are those whose institutions have a clear sense of purpose for the production and use of evidence in addressing important and relevant health problems in the country.

Conclusions

At the end of the day, the national health research system and a supportive research environment in the workplace are critical aspects for capacity retention and productivity. Efforts directed towards strengthening the research system nationally and the institutions' absorptive capacities are as important as individual research training; unfortunately RCS strategies for such complex processes are not well developed. For example, it is important for home institutions and countries to develop a master plan for RCS, steadily building a critical mass of researchers in the most essential fields and areas, fostering a conducive research environment and infrastructure, developing an attractive career structure for researchers to affirm concretely that they play a central role in health and development, providing adequate research grants to address the national research agenda, and promoting continuing education opportunities – all of these promote the integration and reintegration of researchers within the R&D community of the country/institution.

While the prime responsibility for this task rests on the national health research systems (including institutions) in LMICs, they should also look for opportunities to forge healthy (i.e. equitable) partnerships with international and regional initiatives and funding agencies that aim to strengthen national health research systems.

Recommendations

In our view, some features that institutions in LMICs should look for (and which northern initiatives should engender) are:

- training that promotes lifelong learning skills on identifying priority research problems/questions and research methods;

- education and training strategies that promote innovative thinking and the ability to respond to new situations and new health problems;
- mentoring and on-the-job training, which foster problem-based learning while also building lasting mentor–mentee relations beyond the formal training period;
- emphasis on quality and scholarship;
- mechanisms to promote collegiality and networking after training to neutralize the 'research culture shock', especially for first-batch trainees in new or fragile research environments in their home institutions;
- re-entry grants to facilitate the transition of trainees within the home institution, or, a 'sandwich' programme that allows periods of study in both the training institution and in the home institution or country.

Challenges

On the other hand, there are questionable RCS practices that should be avoided, for example:

- Research fellowships where the trainees become a cheap source of labour. The most egregious examples have used these fellows to carry out the lab or field research of senior scientists in a northern institution, extending and encouraging the stay of the most productive fellows without regard for the commitment and obligation of the research fellow to the home institution.
- Research fellowships focused on a limited set of skills (usually new laboratory technologies or procedures) without regard for transferability or resource requirements in the home institution. This eventually leads to 'white elephant' labs and/or brain drain. In the same vein, didactic education in northern institutions that focuses on health problems and research tools mostly applicable to high-income countries delays or deters application in the home country or institution. Worse, without a broader research system perspective taking root, inappropriate and inefficient solutions could be engendered by ill-advised 'research transplants' in the south.
- In the area of networking, south-based networks (such as INCLEN) depend a lot on on-the-job research opportunities at the national, regional and interregional levels. For these networking activities to succeed, the main research nodes would need to learn the skills to

design, coordinate, manage, finance and monitor large multicentre studies. However, some powerful institutions and research enterprises, long in the business of international 'partnerships' and multicountry studies, have been reticent in sharing the know-how and expertise in running such large trials and studies, mostly limiting knowledge-sharing to good data collection practices in the participating sites.

Strengthening research capacity: a view from Senegal

The time is long gone when research was regarded as a luxury reserved for high-income countries while LMICs were supposed to concentrate solely on managing the population's health and health care. All governments and especially those of the LMICs came to realize that health research is an essential element in the search for solutions to improve public health care, ranging from the development of tools for preventive diagnostics and new treatments to the evaluation of new strategies and assessments of systems already in place.

The world summit on health research, which was held in Mexico in 2004, acted on this new awareness by issuing a statement on behalf of all the health ministers present, advocating health research as a major tool in realizing the health-related Millennium Development Goals. The subsequent summits of African health ministers followed up on this approach in no uncertain manner by adopting a statement advocating that countries should devote 2% of their research budget to health.

However, it seems that a considerable distance remains to be travelled before statements of intent are translated into effective implementation.

In addition to the political will of governments and the national financing required, the development of health research at a national level in LMICs also means creating a propitious environment that includes material aspects, a strengthening of capacities and also the creation or strengthening of the legal and administrative frameworks within which the research must be carried out. This has special relevance to development partners: investing in the development of research capacity must involve an assessment of the effectiveness of the initiatives taken to strengthen these legal and administrative frameworks and perhaps a review of financing priorities with a view to creating efficient and lasting national research programmes.

Most development programmes for research place the emphasis on training. Although this aspect essential, it is not in fact the determining factor in creating a national research structure. LMICs already allocate much of their budget to training managers in all fields. However, while these efforts must continue in order to increase the critical mass of persons engaged in such activities, research will find it difficult to progress as long as the environment is not conducive to welcoming and retaining these trained individuals.

Recommendations

1. Researcher status – posts and career structures

Countries need an administrative and legal framework enabling researchers to see career opportunities in research alongside other more conventional pathways. Otherwise, what is the point of investing in an activity that not only brings no rewards but, worse still, acts as an obstacle to other activities more likely to generate promotion?

Universities certainly constitute a structure in which research is an important factor for promotion and careers of academic staff, but if research is to develop in earnest, research careers must not be limited to this specific environment. Research should also be an inherent part of the activities of clinicians, laboratory specialists, and persons responsible for managing health systems, for example. For that to happen, there has to be a research culture shift: all parts of the health-care sector should become regarded as potential research environments.

An example is provided by the member countries of the West African Health Organization (WAHO): discussions are currently in progress to create a standard category of researcher in the Communauté Economique Des Etats de l’Afrique de l’Ouest/Economic Community of West African States (CEDEAO). Once this has been created in countries where there is currently no post for researchers, this system will then allow the harmonization of positions within the CEDEAO area, including harmonization of the criteria for accreditation as researcher and subsequent professional development. The aim of this effort is a less compartmentalized structure, easier exchanges between countries and the sharing of competences.

2. Material conditions

Development partners should consider – or rather reconsider, as it was the case at one point – the need to integrate the financing of improvements to material working conditions, such as equipment and facilities, into the research grants to a much larger extent. When one looks at the structuring of most calls for offers in this field, the conclusion is that an equipment and operating budget is far from being a major priority. However, for certain kinds of research, having access to well-equipped laboratories, for example, is a vital precondition for high quality research.

3. Access to international financing

However big the desire of LMICs may be to allocate more of their budget to research, even if only to lay the foundation on which research must still be built, there is not enough for genuine development. Even in high-income countries themselves it is clear that the public sector funding of research alone falls far short of what is needed to achieve progress in research. Part of the funding in these cases then comes from private funds either originating in pharmaceutical companies or other private-sector businesses, or alternatively from international donors/research sponsors.

It is here that researchers in LMICs face additional problems:

- ***Access to information***: Many researchers do not have information on the opportunities available for funding their research and either do not automatically think of seeking it out or do not know how to do so. Development partners therefore need to give thought to how to ensure this information gets through to the largest number of potential users.
- The ***ability to write competitive research proposals***: No university or other training provides this information that is nevertheless so vital to anyone seeking to embark upon research. Training in the methodology of drawing up project proposals should be available more systematically and included in university courses.
- The ***language barrier***: Non-English speaking researchers face an additional difficulty as the response to most international calls for tenders must be in English. Completed proposal forms constitute one of the first criteria on which evaluations are based and a project that is presented correctly is much more likely to be financed irrespective of the quality of the scientific project itself. English-speaking evaluators

> find it very difficult not to equate poverty of presentational style with poverty of scientific content, forgetting that non-English speakers are going to find it much more difficult to express their ideas in an elegant manner than a colleague whose mother tongue is English.

4. Promotion of leadership by national researchers

Another very important aspect for the development of a country's research capacities is the promotion of a greater role and responsibility for LMIC researchers in managing research projects and structures. Very often research projects are designed totally in southern countries, but have a researcher from the north as principal investigator. In fact, some European countries only finance projects if the principal investigator comes from that country, thereby ruling out any possibility of having principal investigators from the south. This type of 'partnership' acts as a real brake on the emergence of a competitive and motivated body of scientific professionals in LMICs who are prepared for and capable of assuming project leadership responsibility.

To counter this imbalance, it is not enough to strengthen the ability of southern researchers to take on project leadership. International donors must also be prepared to trust them or at least put into place a system of shared project responsibility. To promote national research there must be senior researchers able to ensure the continuation of research programmes over time, a link with national policies to ensure that research results are acted upon and the permanent rooting of research activities in a country's health actions. This will not only ensure that projects are protected from termination that occurs when northern principal researchers repatriate, but will also promote the communication of research findings within the home country.

Lack of access to project management or to positions of responsibility within research structures can also be very demotivating for researchers in LMICs, and this will encourage emigration and brain drain.

Cooperation and partnership are the keys to giving new impetus to national and international research, but will only have a lasting impact if they are rooted in a balanced partnership and mutual respect. For that reason, the various actors in the north and south must agree to make an objective analysis of the partnerships in place and of the ways and means to achieve a more equal sharing of the benefits of research, as well as of the burdens and responsibilities that the research programmes bring with them.

Strengthening research capacity: a concluding view

This section is not a summary but an attempt to highlight a few important issues – some of which are from the contributors and some of which are my own.

Two of the contributions focus especially, but not exclusively, on education and while the other three focus primarily on 'research system' issues that need addressing. Both papers focusing on improving the educational approach describe a variety of ways to enhance the impact, relevance and multiplier effect of the programmes for researcher and research ethicists. Clearly, this is good, as it means that many and substantive attempts have been made and continue to be made to evaluate and improve the delivery of educational programmes.

All four contributions, however, refer directly or indirectly to RCS as needing a much wider interpretation than 'education'. From the 'availability of Internet access' to 'having conditions of service for researcher improved', all of these are measures of RCS that operate at another level than the education of individuals. Such measures are at least as important as the individual training programmes if RCS is to result in improving health and health equity in low-income populations and countries. Yet, it is in these other spheres of RCS that good understanding of the framework of possible actions is lacking, and that there is much less systematic evaluation or experimentation being done.

Conceptually, it is good to think about at least four levels at which RCS actions should be considered in countries: i) the individuals, ii) the institutions in which they work, iii) the research system in which all this operates, and iv) the national socio-political and economic environment that may or may not be conducive to the operations of the first three levels. Beyond the individual levels, there is a dearth of understanding of what 'research capacity strengthening' means, and how it operates. Also, leaving the 'comfort zone' of the individual training programmes means that one has to deal with institutional and even national politics, with diffuse 'systems', with ad hoc results, with 'unproven' interventions. In short, a major reason why insufficient evidence is available about appropriate measures and their potential impact at institutional, system, or national levels is the lack of familiarity and confidence that research donors and sponsors have with this, and the potential for interfering with national politics.

Yet it is in these spheres that some of the core aspects of RCS need to be addressed. Having a long-term human resources for health research plan is a key issue for LMICs and their institutions, so that capacity strengthening can be done in line with a long-term objective. Having national priorities for health research is a key 'capacity' aspect, as it allows alignment of individual, institutional and sponsor capacities. Having proper career structures, including 'merit-based' rather than 'age-based' promotion mechanisms in the research environment may keep the young in, rather than join the exodus, and thus constitutes a key 'system capacity. Finally, having national funding for research that is competitively available will at least create a national demand for excellence in research, and will encourage research in fields that external research sponsors are not interested in. This will also encourage national funding for research as an essential 'capacity' issue. Similarly, linking health and general science, technology and innovation funding will increase the availability of funding for health research. The latter two issues constitute 'national capacities', as do 'having a national health research policy framework' or a 'national research management office'.

This far-from-comprehensive list of measures to foster capacity strengthening, beyond the individual level, is provided to illustrate the urgent need to systematically outline key measures that can be taken at each level, and for countries and donors to engage in experimenting with such measures.

The second reason to provide this list is to argue that perhaps 'research capacity strengthening' is not the right term to apply to action at all these levels. RCS is often only considered at the level of individuals. Therefore, it may be better to speak about 'research system development' – which includes the training of individuals.

A second major issue is the assumption that when we speak about 'research capacity strengthening', it is automatically assumed that it concerns 'researchers', i.e. people doing the research. Such a reflex response is very similar to the majority of people assuming that a 'doctor' or a 'professor' is male and a 'nurse' or a 'social worker' is female. It is clear that this preconception is problematic. If the relevance of research is judged not simply by publications but by actual change in health or health equity in a population, then it is patently obvious that RCS needs to do much more than improving the generation of knowledge. It should deal with communicating results to communities, politicians, industry, and institutions; it should deal with human resource management, with institutional management, with long range planning and fore sighting, with developing stable and predictable financing strategies, with research contracting, with infrastructure provision and management, and with many more activities and competencies required to 'make health research work'. Probably, this is yet another reason to replace the use of 'research capacity strengthening' by 'research system development'. It is perhaps not surprising that the contributors do not specifically refer to this – it is so automatic to equate 'research' with those 'doing the research' and so, capacity building reflects them. However, if health action is to result from good research, we need to build capacity in many spheres of the research domain.

The human resources involved in ensuring translation of research into action concerns a very wide spectrum. Concentrating on researcher alone is done at the risk of non-action.

A third issue referred to by several of the contributions concerns the link between north and south in this joint process. On the bad side: the fact that 'research capacity strengthening' is only applied when speaking about the southern partner in research is – correctly – perceived to be paternalistic – especially as so few northern researchers take the predictability of the systems in which they operate for granted. They do not have to chase the electricity supplier, the unreliable Internet provider, the cold-chain maintenance persons, or project accountants – because in their institutions this is being provided : paid for by generous overheads on research grants. If a productive research partnership is the aim of collaboration, then 'research capacity strengthening' should apply equally to increasing the understanding of the northern partners of the potentials and limitations of the other partner and their ability to engage productively with these. In this context, the term 'research partnership development' may be more appropriate to indicate a two-way process. The other 'bad practice' is that 'research capacity strengthening' is often only defined in the context of the need to meet the research grant objectives of the northern institutions. It is not done in the framework of a national human resources strategy, nor with an eye on long-term sustainable national research system development (we use the term 'Responsible Vertical Programming' or RVP for the rare research programmes that do take this long-term research development need into consideration). Hence, there is fragmentation, lack of link to nationally supported research endeavours, and absence of sustainability following the end of projects – probably fuelling the brain drain of researchers. We must question why are there still research 'partnerships' where the leaders have to come from the donor countries.

On the good side, there is much more interest now in moving beyond 'research capacity strengthening' at the individual level. Efforts and funding to understand what constitutes 'best practice' in capacity building at institutional level is being provided by institutions that were – not so long ago – only interested in individual excellence. With this chapter, we hope to have made a little contribution towards stimulating this shift, and encouraging even more bold behaviour – trying to 'build capacity at the institutional, system and national levels'.

Whether we engage in 'research capacity strengthening' or in 'research system development' it should be clear that action is needed comprehensively – at all levels – to increase the chances that health research will result in meaningful health improvements in LMICs. Not every research initiative can do these all – but as a portfolio of research programmes and projects, southern and northern countries need to ensure that all levels receive commensurate capacity strengthening.

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12 priorities for action

12 priorities for action

This concluding chapter does not attempt to recapitulate the many analyses and recommendations of the contributions to this report, rather it offers reflections on lessons that may be learned and possible directions for future movement, from a more comprehensive perspective.

The report shows that overall RCS progress since the Commission on Health Research for Development first highlighted its importance has been substantial. We have come a long way since 1990, but how much have we learned?

As the report highlights, even definitions of 'health research capacity' are beginning to appear outdated alongside current lessons and realities. Many stakeholders – and the predominant literature – continue to see research 'capacity' mainly as a human resource issue, concerned with skill development and training at the individual level.

An implicit paradigm embodies many persistent notions of research capacity development: that capacity is something that is brought, to and for some, by others who presumably have greater capacity. There is a significant risk that development and processes of learning of individual researchers, their institutions, national research systems and, crucially, the users of research, are still largely absent from the picture in current RCS-related discourses and literature.

As most contributors attest in this report, a significant paradigm shift is urgently needed in order to align RCS with other health-related changes, and to move health research itself closer towards centre stage at the national level in LMICs.

12 priorities for action emerge from this report.

12 priorities for action

1. Expand to a demand-driven model of national RCS
2. Introduce a rights-based framework for RCS
3. Strengthen general health systems
4. Address the broader determinants of health
5. Engage different stakeholder groups
6. Apply Essential National Health Research strategy
7. Combine shared ownership of research coordination with accountability
8. Galvanize different parties through national leadership
9. Enhance RCS investments
10. Devote 2% of national health budgets to research
11. Establish international research networks
12. Monitor and evaluate institutional RCS

1. Expand to a demand-driven model of national RCS

There is an urgent need to expand beyond the focus on individual researchers, through the evident institutional capacity challenges, to a more comprehensive, holistic and demand-driven model of national research systems. Such a model genuinely engages policy-makers, government officials, the media, health-care professionals, private companies and insurers, patient advocacy groups, community-based organizations, and the general public, as well as the full spectrum of other social, cultural, civil society and faith-based institutions.

As with all paradigm shifts, some reluctance and/or poor idea uptake by important actors and stakeholders is anticipated. This resistance should be seen as the impetus for change and momentum-building, rather than a cause for hesitation.

2. Introduce a rights-based framework for RCS

The provision of basic health care has become increasingly unattainable for many LMIC populations, resulting in increased global awareness of deep-rooted health equity-related challenges. Realizing the right to health has arguably become the dominant condition in the entire health sector, and introducing a rights-based framework for health research and related capacity strengthening is therefore of paramount importance.

3. Strengthen general health systems

A widening range of health problems are now given focused attention by ever-increasing constituencies. This includes the emergence of chronic (non-infectious) conditions as key considerations in the developing world. The response to this general broadening of the health agenda, among donors and policy-makers alike, has been to raise the challenges of strengthening general health systems – and service delivery – to an unprecedented level of importance.

4. Address the broader determinants of health

Finally, there is a far greater understanding of the importance of the social determinants of health. Health is no longer seen as the purview of health authorities alone, and addressing the environmental, social, economic and legislative determinants of poor health is now a distinct element of the global health agenda for the coming decades.

Each of these contextual factors raise specific challenges and opportunities for setting health research agendas, and for strengthening demand for health research, and must be considered more comprehensively in RCS discourses.

5. Engage different stakeholder groups

Re-defining national research systems using a comprehensive, holistic and demand-driven model will be undermined by any prevalent lack of appreciation of the value of research and its potential to contribute to policy development. This reality, in turn, underlies the essential requirement for involving different groups of key stakeholders in national research priority-setting, governance and accountability of national health research systems.

Working backwards from individual health service users to researchers can help identify the linkages between research and its diverse users. These are essential stakeholders in the pathway to creating research demand: Community-based organizations, organized civil society, private companies and insurers, health-care professionals, the media and, finally, national policy-makers. This pathway of engagement becomes all the more important in settings where individuals are asked to take a more active and accountable role in their own health care, as is the case in many rapidly changing and modernizing nations.

In returning to the RCS conceptual framework provided in the Introduction, it is clear that while many lessons have been learned on the supply side of health research – in particular through the development of individual research capacity, as well as addressing the challenges of strengthening institutional capacities – demand for research will only be created through the direct engagement and coordination of numerous stakeholders in national health research systems.

Authentic multistakeholder engagement around national health research requires the expansion of at least three essential avenues of action:

- Helping to define a new type of collective identity with, and stakeholder responsibility in, national health research sectors and priorities;
- Making sure people get access to relevant research-related information, especially the type of information that will help them hold other stakeholders accountable;
- Supporting a re-defining of roles and methods of participation in the health research sector.

Facilitating widespread engagement also helps tackle a number of national health research-related critical challenges, which remain significant in many settings:

- Meeting the urgent need for clear and capable leadership in the health research sector;
- Closing accountability gaps, in particular by responding to the people and constituencies dependently affected by advances in health research and by policy/implementation priorities that are/are not adopted;

- Development of effective partnerships among various actors who must work together in order to affect significant change and share resources;
- The mismatch between the recognized importance of rigorous and comprehensive evidence and its integration into policy and programme guidance.

Strengthened engagement in the health research field can be facilitated through the creation of more opportunities for genuine and meaningful involvement in research priority-setting, design, implementation and translation into policy and practice. In turn, this promotes literacy, trust and affinity among an ever-increasing number of key stakeholders and constituencies, promoting more sustainable interest and advocacy around national research priorities.

6. Apply Essential National Health Research strategy

Multistakeholder engagement in research has been enhanced in many countries through the Essential National Health Research (ENHR) strategy as advocated by COHRED. The practical lessons learned through the application of ENHR models should be urgently and fully harnessed as the basis for standard-setting in all countries.

National research coordination processes and structures must be carefully assembled to create a win-win dynamic and then must be actively managed to anticipate and deal with potential problems before they arise. The elusive combination appears to be a structure that is both accountable and transparent, combined with an efficient organization in which stakeholders share some common goals and have mutual respect for one another – with authentic dialogue as a guiding aim and principle.

7. Combine shared ownership of research coordination with accountability

As articulated so well by the chapter on health research and the media, the key words for effective research coordination processes are ‘transparency’, ‘accountability’ and ‘participation’. There needs to be shared ownership of research coordination combined with accountability and these should depend on clear rules, measurable goals, and transparency through good communications for all.

One of the most difficult challenges is managing the relationships and expectations of the various coordination participants. Various stakeholders will enter into research coordination activities with different expectations of the process – and their own roles and responsibilities – and the resulting patchwork of expectations does not necessarily add up to a workable platform for common action.

One challenge is to create a coordination process that includes the right national authorities, organizations and individuals, and maintains a reasonable balance between them so that coordination is not dominated by any one specific group or set of interests. Participants should agree on the coordination goals at the outset, even if their own agency has somewhat different goals to what is agreed in common. In this respect research coordination is a separate venture from those of each stakeholder or organization.

The time and commitment needed to build trust and mutual respect between national health research stakeholders represent some of the highest transaction costs. Coordination usually involves people who do not know one another at either personal or organizational levels, some of whom may even be initially mistrustful of one another. Taking the time needed to build trust and develop interpersonal relationships is essential. At the same time, stakeholders will have negative experiences if too much time is spent talking and planning before they actually undertake any joint action.

8. Galvanize different parties through national leadership

There is a need for national leadership to galvanize the different parties to work together and to create a 'safe' space to focus on health research needs. Without that leadership, coordination rarely develops into platforms for ongoing discussion and action around a common research strategy.

9. Enhance RCS investments

One of the most important points made in the report, that of insufficient funding for RCS, has been an ongoing focus of related discussions, and one that illustrates how resources and capacity can transfer from international donors to individual researchers, to influence institutional security, to develop and support national and regional networks. Clearly, there is a continued need for RCS investment, although as many have reiterated, it is also time to rethink how investment is sought, what form it takes and who decides where and how it will be spent. In order to make funds work efficiently and comprehensively, donors and researchers need to consult with representatives from multiple levels, including national institutions and policy-makers, from the earliest stages of project planning to identify where productive collaboration and coordination can be sought.

10. Devote 2% of national health budgets to research

In addition to the general resource considerations above, domestic research funding is clearly limited by the size of national health budgets. Limited demand for health research also exacerbates domestic research funding constraints. If the potential value of research, and research findings, is not recognized, national decision-makers will not regard the funding of research as a high priority. But national funding for health research is vital to ensure the independence and relevance of the national research agenda. In this context the proposed target that at least 2% of national health budgets be devoted to research should continue to be a cornerstone of national research-related advocacy.

11. Establish international research networks

As also highlighted, research networks are one of the most important elements of effective RCS initiatives, but currently receive insufficient attention. In particular, and as a potential counterbalance to the impacts of brain drain, international research networks have been identified as one of the key RCS success factors. The features of successful international research networks (be they north–south or south–south in nature) are now sufficiently well understood to allow them to be established more actively and extensively.

12. Monitor and evaluate institutional RCS

Finally, it is plausible that international donors have tended to give their support to areas of RCS that are the most tangible and easily measured. This may explain, at least in part, why individual-focused efforts have tended to dominate RCS activities. If this is indeed the case, the phenomenon may be likely to continue until such a time as the impacts of the relatively complex institutional research capacity strengthening and the national research-enabling environment are more readily monitored and evaluated.

As the perception and scope of national research systems are expanded towards a more comprehensive, holistic and demand-driven model, the importance of developing a consolidated set of indicators that link to the overall research capacity framework and assess the impact of multistakeholder engagement in the RCS process will become increasingly important.

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