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Building leadership capacity and future leaders in operational research in low-income countries: why and how?

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SUMMARY

Very limited operational research (OR) emerges from programme settings in low-income countries where the greatest burden of disease lies. The price paid for this void includes a lack of understanding of how health systems are actually functioning, not knowing what works and what does not, and an inability to propose adapted and innovative solutions to programme problems. We use the National Tuberculosis Control Programme as an example to advocate for strong programme-level leadership to steer OR and build viable relationships between programme managers, researchers and policy makers. We highlight the need to create a stimulating environment for conducting OR and identify some of the main practical challenges and enabling factors at programme level. We focus on the important role of an OR focal point within programmes and practical approaches to training that can deliver timely and quantifiable outputs. Finally, we emphasise the need to measure successful OR leadership development at programme level and we propose parameters by which this can be assessed. This paper 1) provides reasons why programmes should take the lead in coordinating and directing OR, 2) identifies the practical challenges and enabling factors for implementing, managing and sustaining OR and 3) proposes parameters for measuring successful leadership capacity development in OR.

KEY WORDS: operational research; leadership; capacity building; low-income countries

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IF LOW-INCOME COUNTRIES are to achieve the health-related Millennium Development Goals by 2015,[1] building capacity to conduct multidisciplinary operational research (OR) within the context of national health systems must become a priority.[2,3] There is ample political recognition of this necessity: OR constitutes one of the key components of the World Health Organization (WHO) Global Stop Tuberculosis (TB) Strategy;[4] the World Health Report in 2012 will, for the first time in its history, focus on the theme of 'No Health without Research';[5] several agencies emphasise the need to improve human capacity and resources for health research;[6,7] and research funding is, in principle, available from the Global Fund to Fight AIDS, TB and Malaria (Global Fund).[8]

Despite this encouraging momentum, the reality on the ground is that very limited OR emerges from programme settings in low-income countries where the greatest burden of disease lies.[9,10] What is generally missing is the 'buy in' from disease control programmes, and the lack of effective management

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structures that link programme managers, researchers and policy makers. In our opinion, this is often what makes OR 'a neglected orphan' at programme level. A number of actions will be needed to change this situation. First, programme managers must recognise the importance of OR and make it an integral component of programme activity. This will require strong leadership to dedicate staff to develop and implement a relevant OR agenda. Second, programmes and their staff must be willing to innovate and apply known science in new ways to address local issues. Third, programme managers must provide a stimulating and sustainable environment for conducting OR for the long haul.

Using National Tuberculosis Control Programmes (NTPs) as an example, we give reasons why programmes should take the lead in directing OR, we identify the practical challenges and enabling factors for implementing, managing and sustaining OR, and finally, we propose parameters for measuring successful leadership capacity development in OR.

WHY PROGRAMMES SHOULD BE LEADERS OF OPERATIONAL RESEARCH

From a programme perspective, OR has been defined as the search for knowledge on strategies, interventions or tools that can enhance the performance of health programmes in which the research is being conducted.[11]

OR leadership should come from the programme level, such as the NTP, for a number of reasons. First, the guiding principles for relevant OR agenda-setting include 1) defining the objectives of the programme, 2) identifying the constraints that prevent those objectives from being met and 3) asking research questions regarding those constraints so as to find solutions that enable programme objectives to be achieved. To do so requires research expertise that is very often not present within programmes. However, as the research question(s) determine(s) the nature and type of research, programmes need to develop the capacity to formulate relevant research questions. This requires that programmes accept responsibility and develop leadership for OR.

Second, embedding OR within the NTP structure provides an opportunity to use routinely collected programme monitoring data to answer important questions. We believe that a strong synergy exists between programme monitoring and OR: the latter often relies on accurate routine data, which should lead to those data becoming more reliable and accurate, which in turn improves the level of monitoring within the programme—a win-win situation. This synergy also provides an incentive for health workers who see that data they collect can contribute to research that improves programme outcomes.

Third, the ultimate measure of effectiveness of OR is whether it contributes to shaping policy and practice and improves programme performance.[12] When research is completely outsourced to external institutions and not rooted within programmes, studies are less likely to be relevant to programme goals. Outside institutions may produce several scientific publications,[11,13] but research findings should contribute to the end goal of improving dysfunctional health systems if they are to be valued by programme managers, health care workers and the community at large. Demonstrating the relevance of research prevents it from being perceived as an unwanted and unnecessary burden on services.[14–17] Enabling this vital process depends on leadership capacity at the programme level.

PRACTICAL CHALLENGES AND ENABLING FACTORS FOR BUILDING AND SUSTAINING OPERATIONAL RESEARCH

Building OR at programme level requires 1) embedding OR within the programme framework (an OR 'focal point' person is key to achieving this), 2) providing a supportive environment for OR, 3) building research capacity through practical training models and 4) retaining trained staff for the long haul. The challenges and enabling factors related to each of these aspects are shown in Table 1,[12,18] and are discussed below.

Embedding OR within the programme framework

Challenges

OR aspires to apply science to the benefit of programme outcomes, and it must therefore be embedded in the programme design. This poses many challenges: first, programme managers prioritise operations based on their education, experience, knowledge of the local culture and context and, importantly, their workload. They may not perceive the relevance of OR because of competition from these factors, or they may believe that research questions are irrelevant or that OR is an inappropriate activity for a programme manager. Complicating the situation is the lack of national research priorities to guide programme managers in setting their goals.

Second, academic institutions and national and international research divisions of development organisations seldom include programme staff, especially at district and local levels, in their research team, thereby providing little incentive for the results to be accepted and applied to improve the effectiveness of the programme. A sense of ownership of the research needs to be developed within the programme setting. Importantly, funding for research activities is often in the hands of academic or research institutions, as they, understandably, have the credibility and skills to make grant applications. With funding goes decision power, and if those institutions do not involve

Table 1 Building OR leadership at programme level: challenges and enabling factors

Issue	Challenges	Enabling factors
Embedding OR into programme planning	Programme managers do not understand the relevance of OR Programme managers perceive 'research' as another department's responsibility Research questions are not relevant to service implementation[11] No mechanism to decide on research priorities at national level Lack of ownership of research studies by decision and policy makers[15] Dependence on external institutions or donors for funding[10]	Invest in a competent research officer with programme skills—a 'focal point'—who works under or alongside the programme director and coordinates OR activities[12,19] Research questions are generated through identified programme constraints A programme-led steering committee guides research agenda setting A partnership model that is inclusive of academic institutions, NGOs and community-based associations is encouraged[11,20] Programme managers and decision makers participate as co-investigators and/or as co-authors[21] OR is integrated into annual programme planning with targets, activities and budgets[13]
Providing a conducive and supportive environment	Programme staff officers are too busy and lack dedicated time for involvement in research Lack of budget, essential research infrastructure and implementation support Programme officers lack motivation	Health workers are given dedicated time (e.g., 2 days a week) to coordinate and conduct relevant research Essential resources are provided: office space, computers, software, virus protection, internet and e-mail, stationery, transport, etc. Performance-linked research allowances and bonuses are useful to enhance motivation[22] Access to scientific literature and small grants (e.g., US$500–1500) are provided Young researchers are encouraged to present their studies at conferences The inclusion of external partners (NGOs, academic institutions, etc.) in research brings additional implementation support[13]
Building capacity for OR	Lack of practical skills in defining relevant research questions and in conducting and publishing research Existing training models are largely theoretical Candidate selection criteria are weak No on-the-job mentorship available Training output is not linked to measurable end products Publication-related challenges: Many scientific journals do not recognise OR Editors and reviewers inappropriately evaluate manuscripts for relevance and suitability for publication	Strict candidate selection and training criteria enhance the likelihood of success Training models are geared towards building practical skills for conducting and publishing research Training models incorporate strong, on-the-job mentorship Performance is judged though submitted papers, published papers, impact of research findings on policy and practice, securing independent funding, etc. Journals should include programme people with OR experience in the review and editorial boards
Retaining trained individuals for the long haul in low-income countries	Trained individuals leave as opportunities at programme level are limited or non-existent Rapid turnover of qualified staff and stakeholders hampers sustainability of research initiatives	Investing in an OR focal point provides an opportunity for trained individuals to take the reins of OR Dedicated budget lines for research activity would improve the working environment Introducing the concept of junior and senior research fellowships serves to retain staff[23] The possibility of pursuing a Masters or Doctoral degree through OR is an incentive to foster retention

OR = operational research; NGO = non-governmental organisation.

programme staff they may implement a research agenda that does not meet programme needs.

Enabling factors

One way forward is to invest in a full-time, competent 'focal point' for OR, an OR officer who works under or alongside the programme manager. Two examples are the use of a dedicated and competent national or expatriate technical assistant, as in Malawi,[12] or the Indian model of WHO national consultant(s) who are involved with OR.[24] The terms of reference of the OR officer, for example for the NTP, might be to 1) sit on TB programme management committees; 2) coordinate and serve as a liaison with programme staff, policy makers, non-governmental organisations (NGOs) and research communities to set research priorities; 3) implement and manage research activities; and 4) ensure dissemination of research findings to stakeholders through workshops, scientific journals or other communication channels. The person should be competent in OR methodology and understand TB control at district and national levels. The individual should also have strong training and mentoring skills so as to build a 'critical mass' of research staff at programme level.[25] The focal point would benefit from support by a qualified data manager or biostatistician who develops data collection tools and conducts and teaches statistical analysis. The characteristics of an ideal OR focal point are given in Table 2. Development of an OR focal point requires time, and programmes need to invest in this long-term plan.

Experience from the Malawi NTP has shown that investment in a full-time, competent OR officer working alongside the programme manager led to OR

Table 2 Ideal characteristics of an OR focal point

- Understands tuberculosis control at district and national level
- Is competent in OR methodology
- Can write scientific papers
- Has strong coordination skills to deal with stake holders and foster useful partnerships
- Has strong communication skills to advocate and promote OR
- Is competent to build up a critical mass of staff to conduct OR
- Should develop policy entrepreneurial skills and be able to liaise with MoH decision makers

OR = operational research; MoH = Ministry of Health.

being fully integrated into the programme and being sustained over time.[11,12,19,23] The experience from an implementing NGO (Médecins Sans Frontières, Operational Centre Brussels) is similar, showing that investment in a full-time research focal person with programme skills who was supported by a data manager and a medical editor was key to increasing annual publication output to over 50 peer-reviewed scientific articles by 2010—a 10- to 12-fold increase over a period of 5 years.[13]

Other key aspects of embedding OR into TB programmes include ensuring that research questions address constraints to TB control objectives; having a coordination mechanism at the national level to provide a clear strategy on the setting of research priorities; using existing TB monitoring systems for research and improving them wherever possible; and ensuring that funding for OR is an integral part of the annual budget.

Providing a conducive and stimulating environment for OR

Challenges

OR involves protocol writing, seeking ethics approval, collecting and analysing data, writing manuscripts for publication,[21] dealing with peer reviews, and finally dissemination and translation of research findings into policy and practice. This requires dedicated time which is simply not available for most programme managers. Dedicated budget lines for OR are also often not available, and there is consequently a lack of basic research infrastructure and capacity to translate research findings into practice. The lack of funding for health research has been characterised as the 90/10 gap, in which less than 10% of health research funds are spent on 90% of the world's disease burden.[10] The Commission on Health Research recommends a minimum amount of 2% of the national health expenditure for research.[26] In most low-income countries, where annual per capita expenditure for health is less than US$50, this will translate into negligible research funds. Moreover, in a study of fund flows for health research, only Brazil and Cuba were found to have allocated 2% of health expenditures to health research. As money is power, the priorities for health research and capacity-building may thus be easily distorted by the interests of donors and institutions from industrialised countries.[27] Asserting national sovereignty on setting research priorities will require dedicated research funds at the country level, and these can then be made available for disease-control programmes.

Three other important 'disabling' factors are inequitable access to scientific and technical information, lack of innovative communication channels to influence programme and policy makers and a dearth of active collaboration with research communities.[28] Considering the small number of scientists in any single programme or institution in low-income countries, formation of a critical mass of researchers is difficult, suggesting interaction with research communities beyond these units to strengthen the research environment.[27]

Enabling factors

A key factor for any research programme is to provide staff with dedicated time (e.g., 2 days per week) not only to conduct research but also for co-ordination and collaborative meetings. Without this, there is no chance of research output. To provide additional human resources, possible ways forward include temporary re-allocation of staff, liaising with collaborating partners, including NGOs and implementing agencies, to support the programme with additional staff, or creating (a) new and permanent research post(s). The latter is perhaps the most sustainable option in the longer term. In addition, dedicated budget lines are necessary to provide additional staff, office space, computers, software, virus protection and internet access. Transport, fuel and maintenance (e.g., for motorcycles) are needed to support district level supervision and collect data. If national or donor funding is lacking, innovative schemes for financing national health research can be considered. For example, several Latin American countries have adopted revenue diversion of up to 7% from national lotteries to finance health research,[27] while in the Philippines, allocating 1% of all sources of government revenue to health–related research raised up to US$54 million per year for a health research endowment fund.[27] The Global Fund and other organisations aimed at improving global health need to set up non-bureaucratic and innovative financing mechanisms that will readily allow access to specific funds.

Programme staff need to be encouraged and motivated. This can be done through on-the-job training and supervision to encourage district level workers to develop their own studies, supporting young researchers to attend/present at conferences, investing in overcoming the 'digital divide' to provide access to scientific literature,[28,29] conducting research dissemination workshops and providing regular feedback. Small research grants (e.g., US$500–$1500) and research bonuses for successfully completed research have been shown to be particularly useful in encouraging programme staff to become involved in research.[22,23,30,31]

Involving NGOs and local or international academic institutions in OR can add useful infrastructure, implementation support and supportive advocacy to a programme.[13]

Building capacity for OR

Challenges

Building capacity[27] for OR can be defined as an ongoing process of empowering individuals and programmes to 1) identify and prioritise problems in a systematic manner, 2) develop and scientifically evaluate appropriate solutions and 3) share and apply the knowledge generated in a manner that influences policy and practice.

At the programme level, the first basic challenge is the lack of practical knowledge on how to define the right research questions, knowing the steps needed to run a study and manage data and having the writing skills to publish in a peer-reviewed journal. Defining relevant research questions and publishing requires research expertise that are often lacking at programme level. This is a real weakness, and explains why much research that is conducted never gets published.[21,32,33]

The second challenge lies with current models of capacity building. There are several reasons why many training models are unsuitable for OR training,[23,27] and these include: candidate selection criteria are weak (training is often offered as an incentive); the selected candidate(s) might not be interested in or suited to OR: the curriculum is largely theoretical; there is no on-job mentorship once classroom training is completed; training is not linked to output from candidates; and there is no assessment of the extent of field application of the acquired knowledge.

The third challenge is the lack of collaboration with disciplines such as social sciences and health economics, which provide unique types of information particularly useful to operational programmes. These include qualitative and health economic research.[34]

The fourth challenge is the issue of North-South partnerships and the establishment of centres of excellence.[20,35] Many partnerships have been successful in producing high-quality research, and a considerable proportion of the scientific output from low-income countries can be linked to these.[20] Some laudable examples include the European and Developing Country Partnerships (EDCTP) in various African countries,[36] the Wellcome Trust Initiative to develop capacity with academic institutions in Africa,[37] the WHO Special Research and Training Programme (WHO/TDR) for supporting malaria research in Africa,[38] and long-term research collaboration and training at sites in India, Mali, Uganda[39]and Zambia.[36] Although the contributions of these initiatives are significant and such partnerships have independent merit, they were not primarily designed to fill capacity gaps in programme-driven OR. As a result, problems arise that include: loss of programme autonomy, increased organisational costs related to building of mutual trust, stresses regarding ownership and sharing of decision-making processes, and difficulties sustaining indigenous research capacity.[20,35] Centres of excellence also run the risk of headhunting from the public sector and can become 'ivory towers' for externally driven research agendas for scientists from industrialised countries.[27,40]

Finally, there are no databases or formal evaluations that track the outcomes of training. A published study from the Research Institute of Tuberculosis (RIT) in Japan illustrates this point well. Of all participants attending an international training course between 2001 and 2007 at the RIT, which included a component on OR, only 40% started OR projects and none wrote a scientific paper.[41] The main reasons cited for failure to implement and complete studies were lack of time, lack of funds, lack of approval from supervisors and lack of writing skills—important barriers to be tackled at the field level.

Enabling factors

We need to rethink the process of learning through innovative and product-oriented training models that can deliver results in relatively short time frames (e.g., 12–15 months) and have quantifiable output. To be useful to programmes, OR studies should be conducted in a timely manner and have practical results. Spending years on randomised trials is not the focus of OR. What is needed is a practical approach that includes both 'learning by doing' and 'co-learning—learning from one other'.[27] Learning by doing is feasible when accompanied by strong individual mentorship from seasoned researchers. For example, the International Health Policy Programme in Thailand relies heavily on mentorship by senior researchers and policy analysts as a method of problem-oriented capacity-building.[42] In India, co-learning has been found to be very effective in strengthening the skills of stake-holders, including policy makers, programme managers, health practitioners and members of civil society.[27,43,44]

Other promising examples include the Centers for Disease Control and Prevention (CDC)/United States Agency for International Development (USAID)[45–47] and International Union Against Tuberculosis and Lung Disease (The Union)/Médecins Sans Frontières (MSF) models of sustainable capacity building.[23] The Union/MSF model, which started in 2009, is run as three 1-week modules over 9 months and focuses on strict candidate selection, to ensure that the right candidates are chosen; practical training involving on-the-job mentorship by a pool of experienced OR resource persons; and performance-linked support and continuing evaluation based on achieved milestones and end products.[23] The strict selection criteria increase the likelihood of success (Table 3). The course curriculum and expected outputs to be accomplished

Table 3 Selection criteria for applicants to the Union/MSF OR course

- Detailed curriculum vitae
- Two references
- Written statement confirming the applicant's commitment to participating in all three course modules, returning to his/her current disease control programme/project or health institution following the course, and applying the knowledge gained
- Written commitment to mobilising the funds required to carry out OR at programme level during the course
- Written statement from the applicant's direct supervisor attesting to the investment of resources, and granting permission to have the time and opportunity to carry out OR within the programme
- Selection of a local mentor and written statement from the applicant's mentor describing how the person knows the applicant and how the person proposes to support him/her to complete the course successfully
- A written half-page of text that describes a problem that the applicant has identified within his/her programme and formulates a possible research question to be developed into an OR project during the course; research questions using routine programme data are preferred, as prospective studies are unlikely to fit into the time-line and expected outputs of the course

The Union = International Union Against Tuberculosis and Lung Disease; MSF = Médecins Sans Frontières; OR = operational research.

Table 4 Course curriculum and expected milestones of the Union/MSF OR course

Module 1 (5 days): Research questions and protocol development
The purpose of this module is to develop a thorough understanding about what OR is all about and to ensure that a draft research protocol is produced with the support of the facilitators before they return to their own countries. The module covers the following:
—Introduction to OR
—Asking the right research question(s)
—Research terminology
—Developing research protocols
—Patients and data
—Simple analysis
—Ethics
Expected output: Draft study protocol written by each participant

Module 2 (5 days): Data management and analysis
The purpose of this module is to ensure that participants understand the importance of good data quality and have the skills to produce an efficient electronic data entry form, based on principles and adaptable to their specific needs. The module covers the following:
—Importance of good data
—Designing an efficient data entry instrument (EpiData, EpiData Association, Odense, Denmark)
—Making an efficient computer data entry questionnaire
—Entering and validating data entry
—Introduction to data analysis
—Exercises
Expected output: Draft instrument for electronic data entry for each participant

Module 3 (5 days): Paper writing—focus on manuscript writing for publishing
The purpose of this module is to help participants use the results of their completed studies and turn these into a draft article for submission for publication. The module covers the following:
—Principles of writing a scientific paper in a step-by-step manner
—The writing of a draft paper during the course of the module with support of the mentors
—Learning how to electronically upload articles
—Understanding how to manage peer review
Expected output: Draft manuscript

The Union = International Union Against Tuberculosis and Lung Disease; MSF = Médecins Sans Frontières; OR = operational research.

are shown in Table 4. The first of these courses ran between August 2009 and April 2010 in Paris, with participants from Asia and Africa. The results were encouraging, with 11 candidates submitting a total of 14 papers for publication, of which 12 are already published or in press. A decentralised version of this course, offered in collaboration with the Public Health Foundation of India, Hyderabad, and completed in March 2011, resulted in eight of 10 candidates submitting papers to peer-reviewed journals for publication. Of the two candidates who did not submit papers, one had to leave for further studies abroad, while the other had problems receiving permission to collect data.

Similarly, the CDC/USAID course, which started in 1997, runs for 6 days and teaches protocol writing for studies that are to be implemented on the candidates' return to their respective countries, provides mentorship on technical issues and subsequently, reconvenes participants for feedback and manuscript writing.[45] The CDC training model has served as a pathway to sustainable public health capacity development in Central America.[48] These mentored and output-oriented approaches seem to be quite effective in achieving the goals of increasing capacity for research publication.

Both of these models pursue the goal of submitting papers to peer-reviewed journals. This is because publication is a milestone in the successful completion of a research study as well as an important step in the process of disseminating research findings. A published study is seen as legitimate evidence and has a better chance of influencing programme planning policy. Other important output to evaluate success includes effective dissemination to appropriate audiences, influence on actual policy and practice and specific impact on programme performance (Table 5).

When it comes to programmes engaging in partnerships with institutions, universities and NGOs, the comparative advantages of the different groups should be considered.[15] For example, an academic institution would be the most suited to support a clinical trial, while an implementing NGO would be the best partner to run feasibility studies. What is vital is that the programme management team has the decisional sovereignty over research agendas and priorities.[10,11] The role of external expertise should be to facilitate the development of local skills through learning by experience rather than controlling funds and expertise over a poorer 'beneficiary' partner.[49] If correctly managed, the potential advantages of working partnerships could include access to new ideas and best practices, technical expertise and resources,

Table 5 Parameters for measuring the success of OR leadership development in low-income countries

Embedding OR into programme planning and management	
Research questions are generated from programme constraints	Yes/no
There is a national mechanism to decide on research priorities	Yes/no
Research activity is part of programme planning	Yes/no
There is a dedicated ORFP to coordinate and manage research activity at programme level	Yes/no
The ORFP is part of a programme management group	Yes/no
The ORFP is supported by a data manager and support staff	Yes/no
Budgets for research infrastructure and implementation support are planned and available at programme level	Yes/no
New collaborative partnerships and forums for interaction are established and include stake holders such as academia and implementing NGOs	Yes/no/number
Programme level research activity	
Planned studies are implemented and completed on schedule	Number/type
Presentations made at national and international conferences	Number/type
Published studies in peer review journals authored or co-authored by programme staff	Number/type
Impact of study findings on policy and practice	
—Rapid advice or circulars issued by the Ministry of Health	Yes/no
—Changes in national or international guidelines	Yes/no
—National training materials integrate new evidence	Yes/no
—Monitoring tools are updated with new evidence	Yes/no
Impact of study findings on programme performance	
—Improvement in health systems and/or programme performance	Yes/no
—Positive impact on morbidity and mortality	Yes/no
Capacity building and retention	
Trained individuals become trainers and mentors of other programme staff over time	Number/trend
A critical mass of research staff is available at central and district levels for supervision, data analysis and manuscript writing	Number
Trained individuals are retained in the programme for at least 4 years	Number retained
Specific research cadres, e.g., OR fellows, are introduced into the programme management framework	Number of fellows
Programme staff engage in long-term career development by obtaining MPH and PhDs while remaining attached to the programme	Number with degrees
OR is recognised as being important to management and research staff are promoted to higher decision-making levels	Yes/no
New research initiatives are led by programme researchers	Number
National researchers become leaders of research institutions and initiatives	Yes/no/number
Collaborative grants/funding secured by trained national researchers	Yes/no/amount

OR = operational research; ORFP = OR focal point; NGO = non-governmental organisation; MPH = Masters in Public Health.

wider dissemination and impact of research findings, improved recognition and credibility of the programme in which the research is conducted and increased probability of sustainability.[27] Laudable examples of sustainable health research capacity development include partnerships led by the Liverpool School of Tropical Medicine in Ghana, Kenya, Malawi and the Democratic Republic of Congo.[29] Projects became sustainable after a median of 66 months, and the three key strategies that contributed to sustainable capacity building included 1) a phased approach engaging all relevant stakeholders from the start, 2) harmonisation with existing health systems and avoiding the creation of parallel systems and 3) ensuring local ownership and sustainability from the onset.[29]

Retaining trained personnel for the long haul in low-income countries

Challenges

Promising research individuals from programmes are often sent abroad for further training and return with Masters degrees or Doctorates. However, they are then very frequently promoted to senior-level management positions and have no time for research.[27] If they stay in the research field, they often lack dedicated budgets and opportunities to implement research and eventually end up emigrating to greener research pastures—the 'brain drain'.[50] For example, only 2% of individuals with doctoral training in Pakistan received more than two grants following completion of training, although training had been completed as much as 15 years earlier.[51] The United Nations Educational, Scientific and Cultural Organization (UNESCO) has estimated that for research and development, there were an average of three researchers per 1000 population in industrialised countries compared with three per 10 000 in low-income countries.[52] These estimates highlight the existing inequities and the importance of retaining trained researchers.[27] Staff turnover is also a major hurdle for sustaining OR, even in relatively well-resourced implementing NGOs such as MSF.[13] For example, over

the last 3 years, six individuals working in the field and linked to the MSF Brussels OR unit have left for the academic sector or other institutions. The main reason cited for leaving was the lack of long-term career opportunities. This attrition not only hinders institutional capacity building and the sustainability of research, but also reduces the impact of OR at the programme level.

Enabling factors

There are a number of ways forward to encourage retention in research. First, investing in the position of an OR focal point, as discussed above, provides an opportunity for trained individuals to take over the reins of OR at the programme level. Second, there is a need to create programme level OR fellowships with a defined career pathway so that promising junior research fellows can evolve to become senior fellows. In this manner, a cadre of skilled OR fellows can be built up and can eventually become leaders. The fellows are attached to programmes while under local and international mentorship, and can assume responsibility for driving the OR agenda in these programmes.

The Union and MSF have recently introduced a system of OR fellowships. In terms of selection, candidates can be doctors, paramedical officers, nurses or data analysts; they need to have successfully completed the Union/MSF training course on OR;[23] they must be strongly supported by their directors or health institutions; and they need a suitable curriculum vitae supported by two strong references. The support provided to fellows includes 1) 1-year renewable contracts that are performance-based, including the submission of two papers to peer-reviewed journals in 12 months in which the fellow is the first author (failure to do so means no renewal of contract);[23] 2) the opportunity to move from junior to senior fellowships after 2–3 years, dependent on satisfactory overall performance, which goes beyond submitted papers; 3) support to attend national and international conferences to present their research; 4) the opportunity to work as facilitators in OR courses to train others; and 5) support for work that can lead to an eventual Masters or Doctoral degree. This needs to be done in collaboration with academic institutions. Since the first Union/MSF course, run in 2009,[23] three OR fellows have become facilitators on subsequent courses. Importantly, the designation of a person as an 'OR fellow' is also likely to provide some protection from being transferred to a management position.

We believe that the prospect of undertaking a higher degree in OR by fellows while working in programmes or at NGO level may be a strong motivating factor for retention.[27] For the programme or NGO, this implies a minimum retention period of a trained individual for up to 4 years or more—the period required to complete a Masters or Doctoral degree—while for the candidate this arrangement brings a prospect for long-term career development, a win-win situation. From a total of six OR fellows who started work in 2009 and 2010 at the Union, Paris, four were supported through memoranda of understanding with NGOs. By 31 March 2011, a total of 43 research projects had been undertaken, of which 20 were completed and submitted for publication. Although this is a preliminary *quantity* indicator, with time there will be a need for assessment of *quality* of output, including the impact on policy and practice (Table 5). Table 6 lists published papers by OR fellows, while the following is a perspective from an OR fellow:

> As a person who works with the National Tuberculosis Programme in India, I found the Union/MSF course to be of particular added value in providing me with practical skills for defining relevant and focused OR questions, becoming conversant with ethical issues around research; being able to conduct and actually publish OR using

Table 6 Papers published by Union-supported OR fellows in 2010 and 2011

Edginton M E, Miller D L, Burney P, et al. Surveillance for MDR-TB: is there an obligation to ensure treatment for individuals identified with MDR-TB? Int J Tuberc Lung Dis 2010; 14: 1094–1096.

Edginton M E, O'Brien R, El Sony A, Roldan A, Srinath S. Informed consent [Editorial]. Int J Tuberc Lung Dis 2010; 14: 938.

Hoa N B, Wei C, Sokun C, Jens L M, Rieder H L. Characteristics of tuberculosis patients at intake in Cambodia, two provinces in China and Viet Nam. BMC Public Health 2011; 11: 367.

Hoa N B, Wei C, Sokun C, Lauritsen J M, Rieder H L. Completeness and consistency in recording information in the tuberculosis case register, Cambodia, China and Vietnam. Int J Tuberc Lung Dis 2010; 14: 1303–1309.

Jha U M, S Srinath, Dewan P K, et al. Risk factors for treatment default among re-treatment tuberculosis patients in India, 2006. PLoS One 2010; 5: e8873.

Kamineni V V, Turk T, Wilson N, Sathyanarayana S, Chauhan L S. A rapid assessment and response approach to review and enhance advocacy, communication and social mobilisation for tuberculosis control in Odisha State, India. BMC Public Health 2011; 11: 463.

Nglazi M, Kaplan R, Wood R, Bekker L G, Lawn S D. Identification of losses to follow-up in a community-based antiretroviral therapy clinic in South Africa using a computerised pharmacy tracking system. BMC Infect Dis 2010; 10: 329.

Nglazi M D, Lawn S D, Kaplan R, et al. Changes in programmatic outcomes during 7 years of scale-up at a community-based antiretroviral treatment centre in South Africa. J Acquired Immune Def Syndr 2011; 56: e1–8.

Srinath S, Sharath B, Santosha K, et al. Tuberculosis 're-treatment others': profile and treatment outcomes in the state of Andhra Pradesh, India. Int J Tuberc Lung Dis 2011; 15: 105–109.

Srinath S, Shivashankar R, Vashist R P, et al. Characteristics and programme-defined treatment outcomes among childhood tuberculosis (TB) patients under the national TB programme in Delhi. PLoS One 2010; 5: e13338.

Tweya H, Gareta D, Chagwera F, et al. Early active follow-up of patients on antiretroviral therapy (ART) who are lost to follow-up: the 'Back-to-Care' project in Lilongwe, Malawi. Trop Med Int Health 2010; 15 (Suppl 1): 82–89.

The Union = International Union Against Tuberculosis and Lung Disease; OR = operational research.

routine programme data and linking up with other researchers, policy makers, NGOs and communities to practically apply research findings.

Becoming an OR fellow has particularly provided me with a stimulating environment to progress further in the field of OR, the much needed exposure to various scientific communities and, importantly, the opportunity to teach and mentor other interested colleagues from low- and high-income countries.

—S Satyanarayana[53]

MEASURING LEADERSHIP DEVELOPMENT AT PROGRAMME LEVEL

OR leadership development at programme level needs to be measured. We propose that programmes measure this in collaboration with research partners or external evaluators and involve a number of broad parameters. These measures could include 1) assessing whether OR has been successfully embedded into programme planning and management, 2) determining if there are successful programme-level research outputs and 3) documenting specific outputs of capacity building and retention strategies (Table 5). These parameters could serve as a basis for developing generic- and context-specific indicators to evaluate leadership development.[29,49] Local 'buy in' of these parameters will be essential to ensure that progress is evaluated from a country perspective rather than from the perspective of external agencies.[49]

CONCLUSION

It has been said that 'research capacity in underdeveloped countries remains one of the world's great unmet challenges'.[9] Undoubtedly, the price paid for this void will include a lack of adequate understanding of how health systems are actually functioning, not knowing what works and what does not, and the inability to propose adapted and innovative solutions to existing problems.

We suggest that leadership for managing OR should move into the hands of individual programmes that are under the umbrella of and responsible to Ministries of Health. Leadership in OR will require national sovereignty over research agendas and independent funding at the national level both to nurture the capacity of indigenous scientists and to conduct OR.

If we are to live up to the theme of the World Health Report in 2012 of 'No Health without Research'[5] through deeds and not just words, we will need to make a quantum shift in the amount of programme-related OR that is currently performed. We have described some promising ways of building research capacity and hope that they may contribute towards this goal.

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RÉSUMÉ

Les recherches opérationnelles (OR) sont très limitées dans les contextes des programmes des régions à faible revenu où le fardeau de la maladie est le plus important. Le prix payé pour ce vide inclut une insuffisance de compréhension du fonctionnement actuel des systèmes de soins ; le fait d'ignorer ce qui fonctionne et ce qui ne fonctionne pas ; et une incapacité à proposer des solutions adaptées et innovantes aux problèmes des programmes. Nous avons utilisé le Programme National de Lutte contre la Tuberculose comme exemple pour plaider en faveur d'une puissante prise en main au niveau du programme concernant l'orientation de la OR et la création de relations viables entre les directeurs de programme, les chercheurs et les concepteurs de politique. Nous soulignons la nécessité de créer un environnement stimulant pour la conduite des OR et celle d'identifier au niveau du programme certains des principaux défis pratiques et principaux facteurs facilitateurs. Nous insistons sur le rôle important d'un point focal d'OR au sein des programmes et sur celui des approches pratiques de formation pouvant fournir des résultats quantifiables en temps utile. Finalement, nous insistons sur la nécessité de mesurer le développement d'une capacité effective de mener la OR au niveau du programme et nous proposons des paramètres permettant d'évaluer cette dernière. Cet article 1) expose les raisons pour lesquelles les programmes devraient prendre la direction de la coordination et de l'orientation de la OR, 2) identifie les défis pratiques et les facteurs facilitateurs d'une mise en œuvre, d'une prise en charge et du maintien d'une OR et 3) propose des paramètres pour mesurer le développement d'une capacité de direction en matière de recherche opérationnelle efficiente.

RESUMEN

Las investigaciones operativas (OR) que surgen de los programas son muy escasas en los países de bajos ingresos, donde se observa la mayor carga de morbilidad. El precio de esta carencia es una falta de comprensión del funcionamiento actual de los sistemas de salud, el desconocimiento de las intervenciones eficaces y las ineficaces y una incapacidad de proponer soluciones adaptadas e innovadoras a los problemas de los programas. Se utilizó el programa nacional contra la tuberculosis como ejemplo, a fin de fomentar un liderazgo firme a escala programática, encaminado a dirigir la OR y establecer relaciones viables entre los administradores del programa, los científicos y los encargados de formular las políticas. Se destaca la necesidad de crear un ambiente propicio a la realización de la OR y de definir los principales factores que obstaculizan y que favorecen OR a escala del programa. El análisis se centra en la importancia de la función de un centro de enlace de la OR al interior de los programas y en las estrategias prácticas de capacitación que puedan aportar resultados oportunos y cuantificables. Por último, se hace hincapié en la necesidad de medir la creación de liderazgo en materia de OR a escala programática y se proponen los criterios de evaluación. En el presente artículo: 1) se suministran las razones por las cuales los programas deberían tomar la iniciativa de coordinar y dirigir la OR, 2) se definen los principales factores que constituyen obstáculos o que facilitan su ejecución, su dirección y su sostenibilidad y 3) se proponen criterios que permitan evaluar el desarrollo eficaz de la capacidad de liderazgo en OR.