Responding to the Global Crisis in Human Resources for Health

Report on Collaborative University-Based Programs Building HRH Capacity in Resource Constrained Nations

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EXECUTIVE SUMMARY

Recognizing the importance of human resources for health (HRH) to address global health priorities, and the role of universities in HRH workforce production and research, the Consortium of Universities for Global Health (CUGH) commissioned this study to examine the role and contributions of university-based health programs in low-and middle-income countries in building capacity to address HRH needs in resource constrained nations. We undertook a systematic scoping review[1],[2] of the literature, structured interviews with key informants, and a focused case study.

Barriers to health professions' education and distribution are numerous and both quantitative and qualitative in nature. Not only is there a shortage in absolute numbers and a misalignment in geographical distribution of health workers, with most health care workers and services located in urban areas, but also problems abound with the quality of education (including pre-service as well as continuing education efforts), the competencies of health professionals, systems of deployment, and retention. Weak infrastructure, lack of equipment and supplies, and poor Internet access make it difficult to meet the needs of students and faculty. In addition, there is a severe shortage of clinical placement sites and clinical supervisors. Locally conducted research is limited by lack of faculty prepared as skilled researchers and those with the administrative ability needed to manage large funded research studies.

University-affiliated HRH efforts around the globe vary widely in scope and goals. Some are narrow in focus and short-term while others are broad-based, long-term efforts involving multiple universities. The overarching goal of all of the partnerships is to increase healthcare and health workforce capacity to meet the health needs of a resource-constrained region. Programs use a

[1] Arksey, H. and O'Malley, L. (2005) Scoping studies: towards a methodological framework, *International Journal of Social Research Methodology, 8, 1, 19-32.*
[2] Levac et al. Scoping studies: advancing the methodology. *Implementation Science* 2010, 5:69

number of strategies to accomplish this: increasing the absolute numbers of health care workers through increasing the capacity of schools to enroll and graduate students and boosting retention of graduates and the current workforce, providing faculty and curricula development to strengthen teaching programs, improving infrastructure, establishing specialty programs, and providing leadership training to address systems issues.

Program evaluation and outcome data is primarily process-oriented and short-term and focuses on tracking the number of students who enter and graduate from degree programs, the number of health care workers who receive training, or faculty who participate in faculty development, and the increase in the number of faculty. Local retention of health care workers and faculty are also examined. Some organizations, such as the Tropical Health and Education Trust (THET) have strict reporting requirements for programs they support that necessitate ongoing assessment and data collection, facilitating program evaluation. Few programs evaluate the quality of education or training or whether knowledge, skills or patient care have improved, though some do look at pre- and post-training test scores. Though the primary final outcome is improved population health, many of the experts we interviewed felt that there are too many confounding variables to accurately determine if or how much of any change in local morbidity and mortality rates can be attributed to actions of the partnerships.

Overall, most programs have had successes in achieving the short-term outcomes identified above and have achieved some part of their goals with resultant improvements in HRH leading to improved health care access in the regions they serve. Positive outcomes include increased medical and nursing students and graduates, increase in test scores post-training, increase in number and complexity of surgeries performed, adaptation of progressive teaching methods by faculty, funded research projects by faculty and faculty publications and conference presentations. This is

encouraging when you consider that these collaborative efforts are relatively new (all but one of the 17 articles included in the systematic review was published within the last five years), barriers are great, and best practices are still being developed.

Partnerships have had their share of challenges. Loss of funding has caused programs to fail or never get off the ground; loss of a program champion or leader when a faculty member leaves an institution can prove fatal to a program as well. Differences in priorities and program conceptualization between a country's Ministry of Health (MoH) and Ministry of Education (MoE) can slow progress considerably and add to budgetary and administrative constraints. When programs used a 'parachute model' (dropping in, providing a service and then leaving within a short time period), changes and outcomes were not sustained after the visiting partner left. The importance of relationship building cannot be overstated and lack of transparency or respect, partners with hidden agendas, and a perception of or actual inequality between partners have been known to derail efforts. Similarly, adapting teaching and communication styles to local cultural norms has proven difficult for some visiting faculty.

Developing best practices for university-based health programs in building capacity to address HRH is hampered by a lack of sharing of resources and information across regions and partnerships and of published research or evaluative reports. Though there are a number of multilateral collaborations, most partnerships work in isolation. This impedes progress because, despite differences in local context, most programs are struggling to overcome the same barriers and constraints. There is a particular lack of published research reports on the implementation and outcomes of partnerships; only one of the articles found in the literature search was a research study. The remaining reviewed articles described the goals, development, implementation, and short-term outcomes of a specific partnership or provided brief descriptions of multiple unrelated partnerships.

There is minimal or no evaluation of the effectiveness of interventions or challenges encountered in most of the articles.

After careful consideration of information from the established literature, in-depth interviews with key experts, and a focused case study, we recommend the following to improve the efficiency and impact of university-led HRH work include:

1) Coordinate efforts and information sharing across programs and regions
2) Commit to long-term support that includes a sustained secure funding stream, dedicated leadership, and ongoing mentorship
3) Develop relationships characterized by trust, respect, transparency, mutual benefits, and well-delineated expectations
4) Engage in partnership that has an agreed upon clear, well-defined purpose with defined goals and outcomes
5) Leverage use of technology, including e-learning, mHealth, and simulation
6) Include governmental agencies responsible for health, education, and economic policies and regulations
7) Undertake a holistic approach that incorporates education, economic, and social factors
8) Begin with comprehensive and detailed pre-assessment of local context that examines available resources, epidemiology, and sociocultural, political and economic factors that impact HRH
9) Conduct systematic evaluation and data collection on outcomes to determine the effectiveness of strategies

10) Carry out rigorous research on factors influencing success of collaborative programs to address HRH, development and implementation of innovative teaching strategies, and recruitment and retention strategies
11) Provide leadership training at all levels of the health system, including management, large program administration, and health systems leadership

There are significant opportunities for CUGH to have a substantive role in supporting and potentiating the effectiveness of LMIC university-based health programs in building HRH capacity. In general, as a central and coordinating body CUGH can act as a curator of information and resources, facilitate communication and coordination across programs and regions, and be a source of evidence-based guidelines for best practices. Specifically it can:

1. Identify best practices of HRH capacity building
2. Develop and disseminate guidelines for successful partnership models
3. Facilitate sharing of resources, information, and outcome data through coordination across partnerships
4. Facilitate a mentorship program for program leaders and faculty of partner universities
5. Develop educational tools and resources that schools in a wide array of settings can use
6. Provide guidance on budgeting and program administration
7. Identify subject experts who are available to assist programs with problem-solving
8. Develop, organize, maintain, and update databases
9. Collect and disseminate information and resources
10. Develop and support a global HRH research trajectory
11. Advocate for increased awareness, funding, and local and global policy development.

Introduction

The disparity in health between low-and middle-income countries (LMIC) and high-income countries is dramatic and unacceptable; life expectancy in the African region is 50 years and in Southeast Asia it is 59 years while in the Americas and Europe it is 71 and 72, respectively (WHO, 2013). A major contributing factor is a health workforce crisis in LMICs; in sub-Saharan Africa (SSA) there are 2.3 health care workers per 1000 population and in Southeast Asia there are 4.3, compared to 18.9 and 24.8 per 1000 population in Europe and the Americas (WHO, 2006). The disparities in these numbers is heightened by the fact that Africa suffers 24% of the global burden of disease, yet has only 3% of global health care workers. The crisis is not simply a matter of the number of healthcare workers; workforce distribution, skill mix and competencies, and educational issues within countries are also important contributing factors. Moreover, the problem is not limited only to Africa. The WHO now estimates that **83 countries fall below the threshold of 22.8 skilled health workers per 10,000 population**, and that if present rate of health provider production continues, there will be a **global deficit of 12.9 million skilled health professional (midwives, nurses, and physicians) by 2035**.[3]

Low-and middle-income countries continue to lose a large proportion of healthcare professionals, particularly physicians, to richer countries, – in SSA 23% of physicians work outside of the source country. About 10% of nurses and midwives leave to work in richer countries (Clemens, 2008). There are no data on how many pharmacists and other health workers leave (WHO, 2006). There is disparate geographic distribution within countries as well, with the professional workforce disproportionally located in urban areas (overall 55% of the population with 75% of physicians and 60% of nurses working in urban areas).

[3] WHO/GHWA. A universal truth: No health without a workforce. Nov., 2013.

Skill mix imbalance manifests as both a lack of specialists within medicine, particularly surgical, as well as a lack of public health professionals and professionals prepared for health system management and leadership positions (Swanson, 2010; WHO, 2007). In addition, there is often a mismatch between clinical skills available and local health needs and disease burden.

There is a growing awareness of the urgent need to address this health workforce crisis. Many universities, as well as governmental and nongovernmental organizations (NGOs), have become involved in efforts to ameliorate the shortage through programs directed to increasing the education, distribution, and retention of health care providers where they are most needed. Many of these efforts are taking place through partnerships between universities in LMICs and high-income countries. There are also global and regional consortiums of universities and other entities, such as professional organizations, that have formed with the goal of addressing global HRH. Increased attention is being paid to the importance of HRH and strengthening of health systems, and funding is being directed toward these efforts by philanthropic, multilateral, and governmental agencies.

Documenting current efforts of academic entities in global HRH, along with examples of barriers, facilitators, and best practices, can help shape recommendations for how universities can better contribute to this fundamentally important work. This project was undertaken to examine the current roles and contributions of collaborative university-based programs in building capacity of human resources for health in resource constrained nations and to make recommendations for best practices in moving forward. We performed a systematic scoping review of the literature, conducted interviews with key informants involved in global resources for health, and did an in-depth review of an exemplar university-based HRH program.[4]

[4] We received ethical approval from the New York University Committee on Activities Involving Human Subjects, IRB #13-9567.

Methodology

Systematic Scoping Review

We conducted a systematic scoping review of the literature to determine what the literature collaborative university-based programs involved in building capacity of human resources for health in resource constrained nations. A scoping review is a systematic approach to assessing relevant literature on a topic when there is a broad question of interest that requires a comprehensive review of available knowledge and is not limited by rigid research criteria. Scoping reviews are often used when existing rigorous research is minimal as we found when we did a preliminary scan of the literature on this topic.

We performed a literature search for all articles and grey literature published in English on university collaboration and its effect on human resources for health capacity development in low-resource countries. PubMed, CINAHL, Global Health, Web of Science, and Google Scholar were systematically searched with the assistance of a health sciences librarian. Search terms fit into four categories, 1) university, college, and academic institution, 2) human resources for health (HRH), health personnel, and health workforce, 3) academic institutions, universities, and colleges, and 4) partnership, twinning, and collaboration. These four categories of terms were paired with developing countries and low-resource settings. An additional search was performed on the CUGH website as well as the global health department websites of the consortium members. A hand search of bibliographies was performed after completion of the first search, prior to applying the exclusion criteria. Both grey literature and peer-reviewed studies were included in the search and data analysis. No date delimitations were used.

The search produced 59 articles, published from 1995 to 2013. After application of inclusion criteria: university-based programs implemented to increase HRH capacity in low resource settings

in the fields of medicine, nursing, pharmacy, research, and other healthcare sectors exclusion, 27 articles remained. Exclusion criteria were articles about study-abroad or volunteer programs that did not enhance HRH efforts in LMIC and efforts of NGO or governmental agencies that did not involve universities. Application of exclusion criteria resulted in a final sample of 17 articles and four pieces of grey literature. Two of the authors (K.R. and L.G.) performed independent data extraction using a coding instrument developed by the authors drawing from the Lancet 'Health Professions for a New Century' report and a preliminary close reading of the included literature.

Included articles were published between 1995 and 2013, with only two articles published prior to 2008 (Einterz, et al., 1995; Oman et al., 2007), indicating increased number of partnerships and growing interest in global health HRH initiatives. Sixteen of the 17 articles and one of the pieces of grey literature discussed partnerships with African universities or hospitals; the remaining article (Evans et al., 2013) reviewed a capacity building effort in Southeast Asia. Only one of the articles was a research report (Haglund et al., 2011); all of the others were descriptive reviews of the respective programs (Table 1).

Evaluation of Results of Literature Search

There is a dearth of rigorous research on collaborative university-based programs involved in building capacity of human resources for health in resource constrained nations. As noted above, only one research study was found (Haglund et al., 2011), and there were serious limitations in the report. The authors reported on the results of a twinning program between New Mulago Hospital in Uganda and Duke University Medical Center and the Duke Global Health Institute to increase surgical capacity and efficiency in Uganda. They compared the number of surgeries performed and the complexity of cases before and after initiation of the program using information in the hospital's operative logbooks. They reviewed the overall number of cases, the complexity of cases, the number

of cases per day, and how consistently surgeons used the operating room (OR) on their assigned elective OR day.

Though the authors refer to the data collection as a "study" it appears to be more of a quantitative evaluation of the program. The report is missing too many components of a rigorous study. The authors do not indicate if they received ethical approval. There was no information on who collected the data or if measures were taken to ensure inter-rater reliability. The authors did not discuss limitations at all. One major limitation was lack of information about patient outcomes or the quality and safety of care provided with the increase in volume and complexity.

All of the other articles we found were descriptions of specific partnership programs or an overview of multiple partnerships. The greatest weakness overall was a lack of quantitative analysis of the results of the programs or of their impact on patient or health system outcomes. The few that did include a quantitative analysis only examined numbers of program participants or graduates (Einterz, 2007; Kinnear, 2013; Oni, et al., 2011; Riviello, 2010). Two included information on the geographical distribution – how many remained in country or practiced in a rural setting (Oni et al., 2011; Riviello et al., 2010). Most of the discussions of program evaluation or outcomes focused on factors that the authors felt were important for a successful collaboration ("lessons learned"). However, it is important to note that, as Mullan et al., (2012) point out, the long-term nature of investing in medical education and the multitude of factors that influence health systems make measurement of the outcomes of these programs a challenge and appropriate evaluation methods are still being developed.

Key Informant Interviews

We conducted interviews with key informants involved in global HRH efforts in low, middle-, and high-income countries. A list of 30 key informants was compiled with input from

CUGH. An introductory email requesting an interview was sent followed by one reminder if there was no response. We sent follow-up emails to those who agreed to participate to schedule the interview and included the questionnaire guide. We sent initial interview requests to 30 people; 13 never responded, three declined to participate but suggested an alternate key informant, one declined without suggesting an alternate, and 16 interviews were conducted.

Interviews were conducted via telephone and Skype© using a semi-structured questionnaire for consistent data capture (Appendix). Interviews were audio-recorded to ensure accuracy and the recordings were reviewed as needed to fill in gaps in the real-time notes taken by the interviewer. When scheduling conflicts prevented interviews, informants were offered the option of filling out and returning the questionnaire via email. See Appendix # for the interview questionnaire.

Case Study

We did an in-depth review of the Rwanda HRH project[5] as an exemplar of an LMIC university-based HRH project. The review evaluated structure, impact, and performance assessment of the practices being deployed by the universities involved in this project. We also interviewed one of the project leaders and one of the US nurse educators who recently returned from a year teaching in Rwanda.

In the next section we review key findings integrated from the literature, key informant interviews, and the case study.

FINDINGS

Barriers to HRH

Barriers to health professions' education and distribution are numerous and both quantitative and qualitative in nature. Not only is there a shortage in absolute numbers and a misalignment in

[5] See http://hrhconsortium.moh.gov.rw/. Forthcoming article in NEJM on this initiative by MoH Dr. A. Binagwaho.

geographical distribution, but also problems abound with the quality of education (including preservice as well as continuing education efforts), the competencies of health professionals, systems of deployment, and retention.

Faculty-Related Factors

A common theme (including in high-income countries such as the US) is that there are not enough faculty members to teach the current, much less potential, student body, resulting in very low faculty-student ratios. Faculty shortages are not limited to medicine and nursing; it extends across all disciplines and ancillary services including pharmacology, physical and occupational therapy, public health, data and laboratory specialists and medical engineering.

In some disciplines or subject areas there are no local qualified faculty. In one program, a partnership between the Tropical Health and Education Trust (THET) and the Zambian MoH to establish an anesthesiology residency in Zambia, volunteer faculty from the UK and Canada were needed to do all of the didactic and clinical teaching. The Global Health Alliance of Western Australia (GHAWA) is currently funding masters level education in Australia for two nursing faculty from Tanzania because faculty teaching in the baccalaureate nursing program are themselves only educated at the baccalaureate level. As part of the MUHAS-UCSF partnership, UCSF sent biochemistry faculty to teach at MUHAS for two years to allow junior faculty at MUHAS to travel abroad to obtain their doctorates, increasing the biochemistry faculty from one member in 2004 to seven in 2011. In China, there is good training in medical specialties but the country is currently trying to move to a primary care system but there are no family practice physicians to teach primary care practice.

Two major factors contributing to the lack of faculty are little incentive for health care workers to teach and poor working conditions. Faculty are working under extremely challenging

conditions while earning low salaries, usually significantly less than health care workers in the clinical setting. The shortage means that existing faculty have heavy teaching loads and are responsible for the clinical supervision and training of large numbers of students. This situation is made even more difficult by inadequate teaching resources such as books, library resources, and information technology as well as poor infrastructure – buildings are in poor condition, classrooms are lacking, and equipment is outdated, broken, or nonexistent.

Scaling up faculty is also hampered by the limited opportunities for higher education. In many places, students have to leave the country to pursue doctoral level education. Oftentimes when a student leaves they never return, becoming one of the thousands of health care workers lost to the 'brain drain' every year.

This 'brain drain' is a well-documented cause of faculty shortages in LMICs. Health care professionals emigrate to high-income countries, primarily the US (50%) and Europe (40%) but also Canada and Australia; as well as within SSA where pay scales vary widely (Dumont & Zurn, 2007). However, there is another brain drain happening within countries. Large programs (like PEPFAR) and NGOs draw faculty away from teaching to work on research projects or in clinics, offering salaries that are four to 10 times higher than faculty can earn as professors at universities, and under much better working conditions. There is also some perception that western equals excellence and it is a "point of pride" among African schools when many of their graduates are working in the US.

Clinical placements

Lack of clinical placement sites is a problem noted by most of the key informants and authors of the reviewed articles. Along with lack of sites, there is a lack of suitable clinical supervisors as mentors, as noted above under faculty shortage. The result was clearly described by a program director who noted that when the number of nursing students was scaled up in the region served by

their university, there was no corresponding increase in available clinical spots. Up to 75 students share one clinical spot with little or no supervision, which means that many of them do not show up for clinical assignments. Yet, due to the lack of clinical supervision and the overwhelming workload of faculty, all receive a passing score. The result is that "nurses are being churned out that aren't competent."

Geographical distribution of educational facilities and faculty

There is a large disparity between access to education and care in rural and urban areas. Educational facilities are concentrated in urban areas and most faculty prefer teaching and living there. This contributes to a disproportionately low distribution of health care professionals in rural areas. Even in areas with well-developed medical and post-graduate education, such as Brazil, schools and medical residency programs are concentrated in more developed regions of the country.

Most graduates stay in urban areas after graduation for the better pay and working conditions (including referral resources) and also because that is the setting in which they were trained and are comfortable practicing. Their education did not prepare them for the challenges of providing care in rural areas where severe resource constraints and lack of technology and providers demand a different set of skills. As one key informant noted, students need to be taught to adapt to poor health systems and trained for locally relevant conditions.

One of the obstacles noted by respondents to retaining health care workers in rural areas is poor management of rural hospitals. Rural health system administration and management needs to be given support and attention by university education programs.

One key informant noted that nursing schools and nurses are better distributed than medical schools and physicians in rural areas. He felt this was due to less of a 'western equals excellence'

attitude among nurses so they are more willing than physicians to work in areas where technology and specialized services are absent.

Curriculum-related factors

One of the major problems identified with health education curriculum is its disconnect from the practice context, both in terms of local needs and availability of resources and technology. Alternatively, curricula are rigid and change is so slow that it never catches up with the shifting needs of the population served, as for example with the dual burden many LMICs now face of transition from infectious to increasing non-communicable chronic diseases.

The disconnect between the educational system and real world health needs may in part be because in most LMICs the educational system is regulated by the Ministry of Education (MoE) and health care is overseen by the Ministry of Health (MoH) and often there is little communication or coordination between them. There is also a tendency in some places to teach western medical practices despite their unsuitability to the epidemiological characteristics of the local setting or to available resources and technology. For example, one program leader noted that students are taught when to order an MRI, yet there is no MRI equipment available in the region.

Infrastructure, supplies, and equipment

Weak infrastructure, lack of supplies, and equipment/supply chain problems make it difficult to meet the needs of students and faculty. Key informants report buildings in poor condition, few functioning classrooms, libraries in poor condition even at top universities, lack of access to labs, poor Internet access, and other substantial resource barriers to 21st-century health professional teaching and learning. Some university partners and donors have provided equipment, both for faculty such as electronic scanners for grading and for clinical procedures, particularly surgical; and interest groups have donated textbooks. However, funding for programs is overwhelmingly

dedicated for training, not supplies or technology. New technologies, such as high-fidelity simulation, that have enhanced learning in high-income countries and could help relieve some of the burden of over-populated clinical sites, have not yet become available in most LMICs. However, some locations do have access to low-fidelity trainers such as training simulators used to develop laparoscopic surgical skills, often combined with telesimulation via Skype©.

Lack of information and communication technologies (ICT) restricts access to teaching materials, digital textbooks, biomedical journals and numerous other sources of up-to-date information. Without ICT, universities are unable to take advantage of the many opportunities it offers for alleviating some of the burdens of overloaded faculty and enhancing curriculum. It also can contribute to faculty development by exposing faculty to different teaching and learning methods and mentorship from their home institutions. It provides opportunities for cultural exchange and global awareness through shared classes. For example, medical students at the Universidad Peruana Cayetano Heredia in Peru and the University of Washington in the US attend courses together via Skype© and work together on projects. Faculty at both universities teach the classes. No published evaluation is available yet on this project.

EXISTING COLLABORATIONS

Types of Academic HRH Partnerships

Existing partnerships take many forms: one-on-one partnerships between universities, one university partnering with multiple universities, multiple universities on both sides of the partnership, coalitions of universities, and partnerships between professional specialist organizations or NGOs and universities. (Appendix #) Increasingly, university partnerships may be South-South as well as South-North.

There are also a number of organizations whose purpose is to facilitate and support partnerships. They act as a central organizing body, providing administrative and project management services, training, and opportunities for networking. They may act as the funding mechanism for partnerships, pursuing funds and allocating the money through grants. They also develop standards and outcome measures and monitor programs for results.

Global Health Organizations Working in HRH

The Global Health Alliance of Western Australia (GHAWA) is a network of healthcare providers and leaders working to address health concerns in the countries of the Indian Ocean Rim. GHAWA specifically focuses on increasing HRH capacity in the fields of nursing and midwifery while improving maternal and child health. The current country of focus for GHAWA's work is Tanzania, where capacity building efforts include faculty training, recruitment of midwifery and nursing students, and improvement of university infrastructures and training centers to meet the needs of the growing student bodies. All five Western Australian Universities participate in GHAWA, along with Australian providers and Departments of Health.

The Medical Education Partnership Initiative (MEPI) is a 5-year project with aims to enhance medical education in Sub-Saharan Africa through improved quality of education, increased quantity of graduates from SSA medical schools, and retention of graduates in their countries of origin. The MEPI network is comprised of 13 African institutions and their global partners in both North America and Europe. MEPI's work is guided by the Transformative Medical Education model, which emphasizes the interconnectivity between healthcare worker education, the healthcare system at large, and the health of a population. MEPI emphasizes epidemiologically relevant training and research to meet local needs, faculty retention efforts, and strengthening the academic infrastructure to create sustainable efforts.

The Tropical Health and Education Trust (THET) is a United Kingdom based global health organization that uses partnerships to educate, train, and support health workers in low and middle

income countries. A central tenet of THET's work is the inclusion of LMIC community leaders in identifying partnership objectives, ensuring that collaborative efforts address specific local needs. THET's partnerships or "links" form between health institutions such NGO's, hospitals and clinics, universities, LMIC ministries of health, and other governing bodies. While most of THET's work is focused in multiple African nations, partnerships also exist in Southeast Asia and the Middle East. THET's 200+ partnerships maintain sustainable changes in HRH capacity building through long-term commitments based on both respect and mutual benefit of both partners.

Purpose and Goals of Programs

The overarching purpose of all of the university partnerships is to increase health workforce capacity to meet the health needs of a resource-constrained region through enhancing HRH. Partnership programs used a number of strategies to accomplish this: increasing the absolute numbers of health care workers through increasing the capacity of schools to enroll and graduate students and boosting retention of graduates and the current workforce, providing faculty and curricula development to strengthen teaching programs, improving infrastructure, establishing specialty programs, and providing leadership training to address systems issues. (Appendix #)

The primary discipline involved in collaborative programs, both those described by key informants and in published articles, was medicine, including anesthesia, surgery, and family practice with an emphasis on obstetrics and gynecology. This was followed by nursing, and then pharmacy, disciplines. One of the collaborations included occupational health and physical therapy components and one had medical engineering. There are also efforts directed to health systems leadership, and to public health, particularly population and reproductive health (PRH). (Appendix #)

Increasing the number of health care workers

When designing and implementing projects to increase health care workers, partnerships must engage in a balancing act between quantity and quality. Some projects provide intensive training that produces high-caliber health care but not enough of them to meet local needs. Others produce a much higher number of graduates, but at a questionable cost of skill and readiness for practice. An example of this is the current 'flooding' policy in Ethiopia, which has dramatically scaled up medical school enrollment without a concomitant increase in resources needed for quality education. The government opened 13 entirely new medical schools in 2012 and overall medical school enrollment has increased 10-fold since 2005 from 300 to 3100 and, according to Tedros Adhanom, Ethiopia's Minister of Health, is expected to increase to 6,000 to 8,000 in the next two years, stressing the already struggling medical education system (IRIN, 2012). Overloaded faculty (often, piece-paid adjunct faculty) are called upon to teach even larger classes and more clinical courses. To compensate, inexperienced recent graduates are hired as faculty. Along with inexperienced faculty, shortages of books, computers, clinical sites, even patients, compromise the quality of education students receive.

Getting and supporting qualified potential students is the first challenge for educational programs. The costs associated with attending school can be an insurmountable obstacle for many potential students. Some partnerships offer scholarships for pre-service education at the local university or graduate education at the western university. A program in Palestine has tried to enhance recruitment and retention of students through creating a virtual community of alumni and facilitating visits between them and future students.

Increasing capacity of schools to enroll and graduate students depends on increasing faculty and clinical sites. Two primary approaches are used to increase faculty: supplementing local faculty

with visiting faculty and putting in place measures to attract, prepare, and retain local faculty. These approaches are often used together with the goal of eventually building local faculty capacity to meet the needs of the university without reliance on visiting faculty.

A long-term commitment on the part of visiting faculty is the ideal model, providing continuity and time for relationship building. However, there are obstacles to faculty making a long-term in-country commitment: many institutions do not value this type of work and do not compensate faculty for it, nor does it count toward tenure or career advancement (Greysen, Richards, Coupet, Desai, & Padela, 2013). Visiting faculty are often volunteers and long-term placement can create financial hardship. Therefore, most placements are short-term, from one to two weeks for a 'training camp' focused on a specific specialty, or for a number of months as a faculty member.

Distribution and retention of graduates and the current workforce

A common strategy to improve equitable distribution of healthcare workers within countries that has been reported to be successful is moving learning into rural areas. Some countries have created medical schools in rural areas while others provide community-based training through rural clinical placements. When the rural placement comes at the end of a student's education, they may be more likely to stay on in the area of training. Another approach is to recruit students from rural areas who may be more likely to return home to work.

Some areas are addressing the disparity by requiring a period of service practicing in a rural setting after graduation. However, this approach has its disadvantages; such as in Haiti where new medical school graduates are required to work for one year in a rural hospital where they do not have the supervision and mentoring they need to become expert clinicians.

Initiatives to Increase Rural Distribution of HRH

Stellenbosch University Rural Medical Education Partnership
South Africa
To increase rural distribution and retention, selected medical students spend their final year of training in a rural context. The results of the partnership are being studied with data being collected on why they go, what happens when they are there, and what happens four years post-graduation.

PRÓ-SAÚDE
Brazil
Addresses the inequitable distribution of healthcare workers in rural areas through shifting learning scenarios from specialized hospitals to rural community health centers. Receipt of funding from the MoH is contingent upon universities demonstrating that they have done so. The program also calls for a greater emphasis on primary care in the curriculum, better preparing graduates for community practice.

Faculty and Curricula Development

A well-prepared, skilled health care workforce demands high-quality education from expert faculty teaching a curriculum that is current, evidence-based, and relevant to the local context. Also, developing independent, highly-qualified local faculty is essential for sustainability. Therefore, faculty and curricula development is a critical component of partnerships.

Faculty development is clearly a goal across partnerships but there is not much information in the literature about how it is being accomplished; though most of the reviewed articles mentioned that faculty development was part of their program, few provided details. Strategies described by partnerships included 1) funding faculty to spend time at the western university as visiting scholars where they can participate in classes to observe teaching modalities, audit courses, acquire teaching materials, receive guidance in revising their curricula, and receive mentoring, 2) workshops on

teaching provided by visiting faculty at the LMIC schools, 3) offering incentives to faculty for continuing education, 4) updating policies to include merit-based promotion, 5) funding faculty to attend international conferences, and 6) providing opportunities and mentoring for scholarship activities, such as research and publication.

Partnerships also work with faculty to develop research skills. Studies look at traditional health-related or disease-focused questions and also examine the effectiveness and impact of HRH capacity building efforts. Mentoring is provided in obtaining funding, conducting a study, and publication of results. There is still a propensity for grant funding to come through the western university: local universities often lack the resources and grants administration skills needed to manage large funded research projects. Also, NIH grants restrict foreign universities to a 7% institutional indirect rate, unlike the US indirect rates of 50 to 70+%. Therefore, building research capacity needs to include administration and management of grants and research teams. To enhance collaboration when partnerships work together on research, there needs to be a data user agreement to clarify who owns the data and how it can be used and clearly defined expectations about research deliverables, such as how the results will be disseminated. Committing *a priori* to article authorship that highlights the LMIC partner roles and faculty is another approach.

Curriculum development is often integrated with faculty development. The primary goals are to match curriculum to the local context, make sure it is evidence-based, and to incorporate various learning modalities, such as simulated patients and problem-focused learning. In some regions, the curriculum is controlled by governmental agencies such as the MoE or MoH and change is slow and difficult.

Interprofessional education is now recognized as essential to developing the communication and teamwork skills necessary in the complex healthcare system (Frenk et al., 2010) and many

partnerships are incorporating this model into curriculum development. Ironically, some regions used this model initially but changed to educating individual professions separately to follow what western universities were doing.

Faculty Development Initiative

Health Professions Work Group (HPEG)
MUHAS : UCSF
Interprofessional group of junior faculty members with potential to act as change agents and mentor other faculty members. They received intensive faculty development training to integrate teaching and mentorship into their careers, including workshops and a post-graduate education course.

Improving infrastructure

Physical infrastructure tends to be a neglected need in partnerships. Funds are allocated to training, not buildings, equipment, or supplies. There are some exceptions, such as a multi-lateral partnership that Johns Hopkins School of Public Health is part of; a certain portion of grant money is designated for improving infrastructure and providing resources.

Digital connectivity is recognized as an important tool in improving HRH capacity and though there are still problems with reliability and bandwidth capacity, the Internet increasingly is accessible everywhere but in the most remote locations, however cost, maintenance, and electricity issues remain. Information and communication technology has great potential to address problems associated with the faculty shortage through innovative distance-learning modalities, allowing overburdened faculty in LMICs to share course workload with partner faculty using virtual classrooms, internet modules, and cell phone curriculum, examples of which are being developed by universities such as JHU as well as NGOs.

Funding

There is minimal information about funding models or distribution and management of funds in the reviewed literature other than a few authors stating how much funding was obtained and where it came from. Most of the information discussed in this section came from the key informant interviews.

There are many different funding models and there is no consensus about which model works best but those involved in partnerships agree on certain factors that are essential when it comes to funding:

1) Good partner relationships characterized by honesty and transparency
2) Funding source is secure and long-term
3) Communication about expectations, needs, and available funds
4) Expectations for funding are clearly delineated and understood by all partners
5) Accountability that is demonstrated by time-limited reporting of progress and attainment of goals

Funds are usually secured from grants awarded to North/high-income universities and are administered by them as well as who manages the money usually depends on who obtains the funds. This can create inequities in power and benefits. To avoid this, ideally all universities involved in a partnership should apply for grants and receive funding together. This is more likely to occur in South-South partnerships where there is a more horizontal structure. There are some partnerships where the money is awarded directly to the LMIC (usually to NGOs or MoH) to manage and disburse as in the Rwanda HRH program and in PEPFAR-sponsored programs. At the International Development Resource Center at McGill University, McGill assisted with grant writing and obtaining the funds, but funding went through the low-resource country.

Programs such as the PEPFAR-funded medical and nursing HRH initiatives (MEPI and NEPI) and organizations such as THET manage funding for the projects they are supporting. Some funding is administered through NGOs: for example, USAID funds companies such as Intrahealth and Family Health International. The problem with this model however is that often only a small portion of each dollar actually gets to the LMIC universities.

Assessments and Outcomes

A key question asked in higher education generally today is how to measure success? Counting the increased number of students, health care workers, and faculty, measures only one dimension of success. It does not answer the question of whether programs are producing better doctors, nurses, or pharmacists. Or if they are producing individual health cadres who are better at working effectively in interprofessional teams, as has been noted as a goal by the Lancet '21st Century' HRH document (Frenk et al., 2011). Answering these questions requires a qualitative as well as quantitative approach and greater focus on measurement of context-specific competencies and outcomes.

There is some disagreement on what types of outcomes should be measured. Some experts feel that program outcomes should stay focused on the goal of capacity building, not health or disease indicators in the beginning. Others feel that although in the short-term indicators like whether graduate number targets have been met makes sense, the ultimate impact is improved clinical practice/healthcare provision and thus, health. They would argue that programs need to be looking at population health outcomes, such as morbidity and mortality rates or progress on health-related Millennium Development Goals. They acknowledge that this may be more difficult and will

require cooperation among universities as well as with MoHs/MoEs for funding, research, and data resources.

Measuring the impact of partnerships on health worker retention is also challenging. Whether graduates stay in the area is influenced by multiple factors: regulatory bodies, salary scale, job security, infrastructure, local threats such as violence, positive practice environments, career ladder, and personal factors including family opportunities.

Certain indicators can be used to assess the success of the partnership itself, such as the duration, the number of joint programs and projects the partners are engaged in or completed, the number of visits between institutions, growth in number and kind of collaborator, and how much funding is raised. Regular monitoring of a program is important to ensure that it stays focused on its goals and to identify and resolve any problems early.

Major Challenges/Lessons Learned

Transparency and clearly stated group values, goals, and expectations from the planning stage that are then reevaluated periodically as programs move forward are key to effective partnerships. This theme came up repeatedly – true collaboration is characterized by equality and mutual planning of goals, budgets, and outcome measures. Communication needs to be honest and frequent. Hidden interests will result in failure of partnerships.

It is important to include governmental agencies, particularly the MoH and MoE but also agencies involved in economic policies and regulation. Many of the factors that impact recruitment and retention are related to the work of these agencies and they bear a share of responsibility for improved HRH in a country, along with individual professions and universities. Their input and support is needed to address system production, deployment, and retention issues such as pay,

working conditions, and investment in infrastructure. Western universities and programs need to ensure that the purpose of a partnership is locally driven and that benefits for them and their students do not override those of the LMICs. The recent heightened interest in global health seems to have created a "trend" for many universities to rush to participate with the primary goal of offering their students a 'global experience'. This results in the proliferation of 'parachuting' type programs characterized by short-term trips with low or no funding to the host partner and little or no continuity. In addition, volunteers need to be selected based on expertise and because they are able to meet a need, not because they are looking for an 'experience' or the chance to travel.

Visiting faculty should receive training that prepares them to work in the local environment, including cultural and social norms, educational models and styles used in the region they are visiting, as well as the epidemiology and medical practices they may encounter.

Challenges occur on micro and macro levels. Funding constraints, lack of governmental support or disabling interference on the part of government agencies, problems with adjusting to the local environment or culture, differences in communication styles that hamper understanding or knowledge transfer, are some of the challenges partnership programs have experienced. Some factors are out of the sphere of influence of the universities, such as governmental regulations and local working conditions for faculty and clinicians, though programs need to be cognizant of and factor in these issues during planning and implementation.

Conclusion

Currently there are multiple university collaborations with varying goals and configurations. Goals range from a narrow focus on increasing HRH to address a specific disease (i.e. HIV) or procedure (i.e. neurosurgery) to a comprehensive, interprofessional approach that may include education, retention and distribution of clinicians and faculty and development of researchers.

Program configurations include intermittent in-country support over a period of time, often long-term (i.e. training camps); rotation of visiting faculty to sustain ongoing in-country support through the life of the program, long-term presence of specific faculty in-country, and distance support through the use of information and communication technologies.

This review highlights two priority areas that need to be addressed to build capacity and enhance the effectiveness of global HRH efforts, 1) lack of coordination of efforts with sharing of experiences, knowledge, and resources, and 2) lack of outcome data, both rigorous research on the implementation and outcomes of partnerships and individual program evaluations.

As noted previously, all of the programs face similar challenges, and though there are a few multilateral collaborations, overall most programs work in isolation. With limited funding and resources available in LMICs, such as expert faculty, clinical sites and preceptors, and equipment, it is imperative that universities coordinate program development and implementation to reduce redundancies, leverage what resources are available, and avoid program pitfalls encountered by 0o0thers, with their associated waste of resources and risks of failure.

Development of appropriate evaluation metrics across programs is a priority. Many key informants talked about the lack of outcome data and the persistent question of what that outcome data should be. Few of the articles included information on evaluation and outcomes. We cannot truly identify best practices without accurate and ongoing assessment of the effectiveness of different approaches, program designs, and implementation methods that various partnership models use. There needs to be expert consensus on what outcome data should be collected, along with how and when it should be collected and by whom.

Finally, this review highlights the strong commitment of universities and individuals to reduce global health disparities through collaborative work that crosses cultural, social, and

economic divides. The fundamental and unique role that universities can play in building human resources health capacities around the globe is clear, and as noted below, can be further strengthened by enacting best practices.

RECOMMENDATIONS FOR BEST PRACTICE

Based on our review of the literature and the key informant data, we summarize recommendations to improve university engagement in global HRH here. Universities engaged in global HRH capacity building should:

1. Coordinate efforts and information sharing across programs and regions
2. Commit to long-term support that includes a sustained secure funding stream, dedicated leadership, and ongoing mentorship
3. Build relationships characterized by trust, respect, transparency, mutual benefits, and well-delineated expectations
4. Ensure partnership has an agreed upon clear, well-defined purpose with defined goals and outcomes
5. Leverage use of technology, including e-learning, mHealth, and simulation
6. Include governmental agencies responsible for health, education, and economic policies and regulations
7. Take a holistic approach that incorporates education, economic, and social factors
8. Conduct systematic evaluation and data collection on outcomes to determine the effectiveness of strategies

9. Perform rigorous research on factors influencing success of collaborative programs to address HRH, development and implementation of innovative teaching strategies, and recruitment and retention strategies
10. Conduct a comprehensive and detailed pre-assessment of local context that examines available resources, epidemiology, and sociocultural, political and economic factors that impact HRH
11. Provide leadership training at all levels of the health system, including management, large program administration, and health systems leadership

Opportunities for CUGH

There are clear and significant opportunities for CUGH to have a substantive role in supporting and potentiating the effectiveness of LMIC university-based health programs in building HRH capacity. As a central and coordinating body CUGH can act as a curator of information and resources, facilitate communication and coordination across programs and regions, and be a source of evidence-based guidelines for best practices. Its history of work in this area (via the Global Health Education Consortium [GHEC] that merged with CUGH in 2010), including existing curriculum resources, currently being updated, is a strength. CUGH can now go even further. We Specifically recommend that CUGH:

1) Identify best practices of HRH capacity building
2) Develop and disseminate guidelines for successful partnership models
3) Facilitate sharing of resources, information, and outcome data through coordination across partnerships
4) Facilitate a mentorship program for program leaders and faculty of partner universities

5) Develop educational tools and resources that schools in a wide array of settings can use
6) Provide guidance on budgeting and program administration
7) Identify subject experts who are available to assist programs with problem-solving
8) Develop, organize, maintain, and update databases
9) Collect and disseminate information and resources
10) Develop and support a global HRH research trajectory
11) Advocate for increased awareness, funding, and local and global policy development.

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Table 1 Literature

Primary Author, Year	Setting	Partners	Methods	HRH Developed	Program Outcomes
Einterz, 2007	Kenya	Indiana University and Moi University Faculty of Health Sciences (now named Moi University School of Medicine)	Administrative development, faculty and academic program development	HIV/AIDS program development	40,000 AIDS patients treated by 2007
Evans, 2013	India	The School of Nursing, Midwifery and Physiotherapy (SNMP) at University of Nottingham (UK) and Government College of Nursing in Hyderabad (GCNH)	Conference, workshops and modules, faculty visits to Andhra Paresh, evaluation over 2-year period	Nursing	Positive evaluations by participants but few implemented what was learned due to deeper structural problems including national and state level policies, working conditions, and staff shortages
Farquhar, 2011	Multiple, Africa	1. Makerere University, Kampala, Uganda, and Johns Hopkins University 2. Muhimbili University of Health and Allied Sciences, Dar es Salaam, Tanzania, UCSF 3. University of Botswana, Gaborone, University of Pennsylvania 4. University of Nairobi, Kenya, University of Washington	Courses in leadership and management, hands-on assignments for application, post-training support and mentoring phase	Multi-disciplinary (Medical, nursing, research, public health)	No information on outcomes
Haglund, 2011	Uganda	Duke University Medical Center and New Mulago Hospital, Uganda	Neurosurgical and Anesthesia training "camps," including donation of surgical equipment and supplies	Surgeon-Neurosurgery, intraoperative teams (anesthesia, nursing)	Increase in number of cases performed, including increase in number of complex cases, and increased efficiency as measured by number of elective cases over time. No information on patient outcomes
Kaaya, 2012	Tanzania	University of California San Francisco and Muhimbili University of Health and Allied Sciences (MUHAS)	Curriculum and faculty development	Multi-disciplinary	No information on outcomes

Kinnear, 2013	Zambia	United Kingdom Department for International Development, University of Zambia School of Medicine, THET	Development of Masters in Medicine, anesthesia concentration program	Medicine, anesthesia	Entire first cohort (N=8) progressed to second year of study Conflicts between local participants and non-participants.
Lipnick, 2010	Uganda	University of California San Francisco (UCSF) and Makerere University, Uganda Partnerships guided by Global Partners in Anesthesia and Surgery (GPAS)	Trainee program, postgraduate retention program, biomedical support program, education initiatives Research agenda	Perioperative medical team (surgeon, anesthesia)	Authors state they analyzed process measures of surgical capacity but do not give information about what these were or if they were considered successful. Authors acknowledged that they did not measure clinical outcomes Research program resulted in 15 collaborative publications and one Ugandan faculty member being funded as the PI
Mloka, 2012	Tanzania	Muhimbili University of Health and Allied Sciences (MUHAS), Tanzania and University of California San Francisco	Faculty-training program, workshops focused on both clinical and classroom training development, scholarship and academic development	Faculty of health sciences	Faculty training was successful in introducing new teaching methods, encouraging innovation, and developing mentoring relationships. Impact on local health needs will be a long-term outcome
Mullan, 2012	Multiple, Africa	-President's Emergency Plan for AIDS Relief (PEPFAR), 13 African Medical Schools and 1 US University (George Washington University School of Public Health and Health Services) Medical Education Partnership Initiative (MEPI) is funded by PEPFAR and includes other US institutions	Faculty, curriculum, department development	Multidisciplinary (dependent on country)	Outcome data not available at time of publication but authors note that investments in medical education will be reflected in long-term outcomes
Oman, 2007	Kenya	1,University of Maastricht Faculty of Health Sciences, Netherlands	Faculty development, physician training, research, work-	Multi-disciplinary	Varied by university program. Authors state that it resulted in enhanced curriculum,

		2. Linkoping University Faculty of Health Sciences, Sweden 3. Ben-Gurion University of the Negev Faculty of Health Sciences, Israel 4. Indiana University, US 5. Moi University Faculty of Science, Kenya	study scholarship, curriculum development		improved physical infrastructure, work-study programs, scholarships, and new programs of study. No information on evaluation, metrics or specifics about above improvements.
Oni, 2011	Multiple, Africa	1. Johns Hopkins School of Public Health 2. Addis Ababa University, Ethiopia 3. Kwame Nkrumah University of Science and Technology, Ghana 4. University of Ghana, Ghana 5. University of Malawi, Malawi 6. Obafemi Awolowo University, Nigeria 7. University of Ibadan, Nigeria	Reproductive health curriculum development, clinical training, research implementation, use of evidence-based methodology	University faculty, researchers, university department focused on reproductive health	48 faculty members attended PRH programs at Johns Hopkins University 93 PRH courses offered 625 graduate students chose PRH concentrations and 158 graduated 90% of PRH program graduates stayed in the country
Pallangyo, 2012	Tanzania	Muhimbili University of Health and Allied Sciences and University of California San Francisco	Curriculum and simulation development, competency development and implementation	Faculty and institutional development	No information on evaluation methods or metrics Change to interdisciplinary education
Riviello, 2010	Multiple, Africa	1. UCSF and the Bellagio Essential Surgery Group 2. USCF and Makerere University, Uganda 3. Vanderbilt and Baptist Medical Center, Ogbomoso, Nigeria 4. Vanderbilt with Kijabe Hospital, Kenya 5. University of Toronto, Hospital for Sick Children withMoH, Botswana 6. Harvard (Brigham and Women's Hospital and Children's Hospital Boston) with Partners in Health in Haiti and Rwanda	Clinical rotations, faculty development, trauma training program, nurse anesthetist training, surgical training workshops (laparoscopic, pediatric, minimal access, etc)	Perioperative (surgeon, RN, anesthesia)	4. 55 interns, 12 registrars, and two fellows in pediatric surgery have been trained. Nurse Anesthetist training center established and 100% of nurse anesthetist graduates continue to work in rural hospitals in Kenya

Shrestha, 2006	Nepal	Tribhuvan University Teaching Hospital (TUTH), Kathmandu, Nepal and University of Calgary, Canada	Establish anesthesia program. Continuous academic and administrative support provided for 3 years Senior Canadian Anesthesiologists lived in Kathmandu from 3 to 12 months. Established	Anesthesiologists Two tracks: Diploma (DA), established 1985 Medical Doctor (MD) established 1996	By 2000 DA: 43 graduates 13 emigrated MD: 21 graduates 2 emigrated
Tache, 2008	Tanzania	Muhimbili University of Health and Allied Sciences (MUHAS), Tanzania and University of California San Francisco	Introduction of novel teaching methods, faculty/lecturer training, skills-based training program	Faculty and provider	No information on evaluation or metrics. No quantitative outcomes discussed Authors did discuss 4 preliminary process indicators of success of the partnership itself: 1. Maintain intensity of ongoing collaboration 2. Expansion of collaborators at both MUHAS and UCSF over time 3. Long-term commitment of resources from UCSF 4. Continuing engagement
Twagirumugabe, 2010	Rwanda	Canadian Anesthesiologists' Society International Education Foundation (CASIEF) and National University of Rwanda	Core training competencies divided into modules for new residents, clinical and didactic training, encourage specialization (ie. Obstetric, pediatric anesthesia)	Anesthesia	No information on metrics or outcomes.
Youmans, 2012	Tanzania	University of California San Francisco School of Pharmacy and Muhimbili University of Health and Allied Sciences (MUHAS) School of Pharmacy	Transition from traditional to clinical pharmacology, greater emphasis on patient teaching, inter-professional learning	Pharmacy	No information on metrics No outcomes

Table 2 Types of Collaborative Programs

	One-on-one partnerships between universities	One university partnering with multiple universities	Multiple universities on both sides of the partnership	Coalitions of universities	Partnerships between organizations and universities
Einterz, 2007	x	x			
Evans, 2013		x			
Farquhar, 2011				x	
Haglund, 2011	x				
Kaaya, 2012	x				
Kinnear, 2013					x
Lipnick, 2010			x		
Mloka, 2012	x				
Mullan, 2012					x
Oman, 2007		x			
Oni, 2011		x			

Pallangyo, 2012	x				
Riviello, 2010	x				x
Tache, 2008	x				
Twagirumugabe, 2010					x
Youmans, 2012	x				

Table 3 Countries or Regions Represented in Interviews and Literature

Botswana	Peru
China	Rwanda
Ethiopia	South Africa
Ghana	Tanzania
Haiti	Uganda
India	Zambia
Kenya	Zimbabwe
Malawi	
Mozambique	*Regions represented without*
Nigeria	*country-specific designation:*
Palestine	Sub-Saharan Africa
	Latin America

Appendix A

Key Informant Interview Guide

Review purpose of the interview, terms of taping and data presentation and consent.

Review demographics for accuracy: Profession/role and title/credentials

Collaborative approaches to building and sustaining HRH in LMICs

What are the significant barriers to health professions education in the region served by the university/organization?

Including: most critical resource constraints (e.g. faculty shortages, information technology, medical equipment, textbooks)?

What do you think are key factors in creating an effective partnership?

Including: ideal model, curricula sharing (why or why not?), expertise development,, challenges and their resolution

What are the expectations for each partner?

What linkages are there with local and national health care delivery systems?

Funding

How is the partnership funded?

Who controls and manages the budget for the partnership?

Including: Shared? What does split look like? How are decisions made?

Outcomes

What assessments of HRH effort outcomes are being done?

Including: What outcomes? Metrics being used?

What are the primary successes you have seen in the program so far?

How is sustainability being addressed?

What are the priority goals for LMIC universities in the provision of health profession education moving forward?

What examples have you seen of very successful HRH efforts/partnerships? Why?

What examples have you seen of HRH efforts that have not been successful? Why not?

What would your institution/partners perhaps do differently if the project were to start over?

Best Practices for LMICs to grow and retain HRH

How aligned are health professions school curricula with local healthcare needs?

How are visiting teachers/mentors evaluated?

What faculty development strategies are being used?

How have specific competencies been developed? How are they assessed?

How is professionalism (e.g. standards of practice, ethics, values) being incorporated into health professions education?

Have core competencies for students been identified?

What are the clinical placement options for students?

Including: Supervision? Clinical competency evaluation?

What opportunities are there for interprofessional education?

Including: Disciplines involved? Challenges and opportunities?

How prepared are faculty to teach critical appraisal and evidence-based practice (EBP) skills?

What efforts are being made to increase research capacity?

What measures are being taken to recruit and retain local faculty?

How can an entity like the CUGH best assist all universities with HRH efforts?

Appendix B

Case Study: Rwanda Human Resources for Health Program

Introduction

The Rwanda Human Resources for Health (HRH) program is a long-term collaborative effort between the Rwandan Ministry of Health (MoH) and 19 US-based institutions of nursing and midwifery, medicine, dentistry, and public health (Table 1). The goal is to build a high-quality healthcare system through enhancing the knowledge and skills of the current workforce and developing the health education sector. At the end of seven years of support it is expected that the Rwandan government will be able to sustain the improved health system without international assistance. It is designed to be a comprehensive approach to *health system* improvement, replacing the typical approach of multiple fragmented projects in various settings and sectors by multiple parties. This will lead to the type of transformative change needed to **build and sustain** a high-quality health care system.

Background

The HRH program was initiated by the Rwandan government to address the shortage of skilled health care workers and poor quality of health education in the country. The 1994 genocide decimated the health care system in Rwanda, destroying infrastructure and leaving the country with few health care workers. Though there has been significant progress, the country continues to suffer severe health worker shortages (.06 physicians and .66 nurses per 1000 population compared to .19 and 1.02 respectively in sub-Saharan Africa overall and only 10 dentists for the entire population [>10 million]) as well as low standards of health education.

Structure

The Rwandan HRH program is unique in that the Rwandan government manages the project and funds go directly to them rather than through a managing body such as a non-governmental organization. The Rwandan government has experience successfully managing large grants and complex projects. The Rwandan MoH allocates funds for visiting faculty per contracts between Rwanda and participating universities.

Each participating university recruits, hires, and manages faculty for different health worker sectors (i.e. nursing, medicine, dentistry) as determined by the planning committee (approximately 100 faculty made up the first cohort from July 2012 to July 2013). Faculty commit to teach for one year, spending at least 11 months in Rwanda, except for some of the medical specialists who may have shorter terms of service. In year two, a health management component will be added to the program.

Faculty for the nursing program is divided into educators and clinical mentors, though there is overlapping between the roles on the ground. Educators and clinical mentors are partnered with a Rwandan counterpart (twin) with the expectation that they will share knowledge and support. Clinical mentors are based primarily in the clinical placement sites associated with nursing education programs throughout the country and are expected to act as preceptors for students, provide continuing education for staff, and assist with professional development activities. Educators are primarily based in schools of nursing and are expected to mentor faculty as well as provide guidance in budgeting, faculty and curricula development, and raising the standards of education.

Physicians provide mentorship to faculty and clinical training to students and current physicians. Initial focus is in the areas of internal medicine, anesthesiology, family and community medicine, obstetrics and gynecology, pediatrics, and surgery. Other specialties will be added in subsequent years, including psychiatry and oncology. Oral health professionals focus on curriculum development, faculty development, and teaching students. All faculty are expected to work together as an interprofessional team.

Monitoring and Evaluation

Monitoring and evaluation was included in the planning and focuses on increases in health worker numbers and skill levels. Faculty on the ground are monitored closely along with receiving support from their home institutions. They are required to complete periodic evaluations and participate in monthly meetings that include representatives from their home universities via phone or Skype©. According to the proposal and participants, outcomes are being assessed through the collection of quantitative data on the increase in number of health workers, including physicians, nurses and midwives, dentists, and health managers (new specialty). In addition, formative outcomes are being assessed using indicators such as number physician specialists per year, number of nurses and midwives at higher levels of nursing degrees (A1 vs. A0), number of graduates from dental and health management programs, how many targeted clinical upgrades are completed, curricula reviews, student/teacher ratios, and active research partnerships.

Challenges

As with all university-based partnership programs, accurate and appropriate assessment of outcomes is a challenge. Monitoring and evaluation has been fragmented and sporadic. Faculty and mentors are scattered across the country and their goals and objectives and activities

vary widely, depending on the local needs and resources. Therefore, assessing overall program outcomes is prohibitive and may not be an appropriate approach.

Another challenge faced by faculty on the ground is the language barrier. Though health workers are expected to speak English, many are not fluent and rely on Kinyarwanda and French, particularly in the rural areas where very few people speak English.

A third challenge has been the poor infrastructure and lack of equipment and supplies. Though there was supposed to be substantial upgrades to facilities prior to the arrival of the first faculty cohort, there remains serious deficiencies, particularly in the rural areas. Infrastructure in the larger facilities in Kigali is better. Many faculty have found it took time to develop tactical approaches to procedures using existing resources and have had to reevaluate their goals based on that.

Early Successes

Currently there is no hard data available on the indicators outlined above. However, despite the challenges there have been notable successes on the ground. Clinical mentors and faculty worked with their Rwandan partners to establish a new adult critical care unit and neonatal intensive care unit at the Rwanda Military Hospital. Monthly skills labs have been established in hospitals, interprofessional communication workshops were held, documentation of procedures has increased, and continuing education programs have been implemented and well received.

Key Factors

Early and extensive planning that included all stakeholders

Intensive planning was done prior to starting the program that included the Rwanda MoH, representatives from the Rwandan health sector and teaching institutions, and

representatives from the U.S. Academic Consortium. The Clinton Health Access Initiative (CHAI) was also involved in development of the program and continues to be involved facilitating ongoing monitoring and evaluation and supporting the faculty on the ground.

Project managed directly by the Rwandan government

This approach allows Rwanda to own the project and is expected to "minimize the inefficiencies" and "streamline the coordination of efforts" (Funding proposal, p. 5) and keep administrative fees low (no more than 7% of total direct costs). Transparency is upheld through making project information, including funding and contracts, public and available on the Internet.

Secure and Adequate Funding

The project is funded by a number of US government programs, including PEPFAR and USAID, as well as the Global Fund to Fight AIDS, Tuberculosis, and Malaria. Importantly, funding has been secured for the life of the program at a level that will allow for effective implementation. The total budget is 151.8 million over the life of the program with the highest costs expected in years one through three. Much of the higher costs early in the program are due to the cost of investments in infrastructure and equipment and expenses associated with U.S. faculty. As U.S. faculty are phased out in the latter part of the program costs are expected to decrease to $8 million by the last year.

Table 1 Participating Institutions, Rwanda HRH Project

Medical	**Nursing**	**Public Health**	**Dentistry**
Brown University	Duke University	Yale University	University of Maryland
Duke University	Howard University		Harvard University
Dartmouth College	New York University		
Harvard University	University of Illinois at Chicago		
University of Colorado	University of Maryland		
University of Maryland	University of Texas		
University of Texas	University of Virginia		
University of Virginia			
Yale University			