Action now on the Tanzanian health workforce crisis

Expanding health worker training – The Twiga Initiative

JUNE 2009

TouchFoundation
Contents

Prologue ........................................................................................................................................................................... 3
    The challenge of a molecular system .......................................................................................................................... 4
    Acknowledgements ...................................................................................................................................................... 6
    Glossary ....................................................................................................................................................................... 6

Executive Summary ......................................................................................................................................................... 7
    Increasing training capacity ......................................................................................................................................... 7
    Translating policy into action ...................................................................................................................................... 8
    Harnessing existing opportunities ............................................................................................................................. 9
    Enabling system-wide support .................................................................................................................................. 10
    Furthering transformational changes ......................................................................................................................... 10
    Capabilities, leadership, and funding are required .................................................................................................... 11
    Implementation starting now ......................................................................................................................................... 11
    Meeting the challenge outside Tanzania .................................................................................................................. 12

Context ........................................................................................................................................................................... 13
    A global crisis ............................................................................................................................................................... 13
    The state of health and the health workforce in Tanzania .......................................................................................... 16
    Policy frameworks ......................................................................................................................................................... 19
    The Twiga Initiative ..................................................................................................................................................... 20


**Prologue**

The following report was written by the Touch Foundation. It is based upon work undertaken by the Touch Foundation at the request of the Tanzanian Minister for Health and Social Welfare, Professor David Mwakyusa, with direct support from a *pro bono* strategy and technical assistance team from McKinsey & Company.

This report draws heavily on the Touch Foundation’s work to expand and strengthen training of health workers at the Weill Bugando university and teaching hospital (Bugando) in Mwanza, northwestern Tanzania, and builds upon previous work by consultants with McKinsey’s Global Public Health Practice, particularly two previous reports: *Acting Now to Overcome Tanzania’s Greatest Health Challenge: Addressing the Gap in Human Resources for Health* (2004); and *Investing in Tanzanian Human Resources for Health: An HRH report for the Touch Foundation* (2006).

The previous work documented the severe shortage of skilled health workers that is hindering progress in meeting the Millennium Development Goals and improving public health in Tanzania. Seeking to dramatically improve this situation, Tanzanian President Jakaya M. Kikwete has declared that the country will construct over five thousand new primary health care facilities to at least double access to primary care across the country. The research and analysis underpinning this report was commissioned by the health ministry to help determine how to produce sufficient numbers of health workers to staff such an expanded health system.

This report should be read in conjunction with *Catalyzing Change: Molecular strengthening of the health system in the Tanzanian Lake Zone* (2009), also produced by the Touch Foundation and based on work undertaken also with the support of McKinsey. That report recommends a number of priority initiatives that would strengthen the underlying health system and enable an expanded workforce to reach its full potential to improve public health.

While this report targets health worker training in Tanzania, the precipitating health workforce shortage is a global crisis. Our analytical process is replicable across sub-Saharan Africa, and we expect that many of the recommendations put forward to the Tanzanian health ministry will apply equally in other countries.

**Field research**

The baseline data collection and analysis for this report was conducted by a Touch Foundation/McKinsey team over a four-month period from October 2007 through January 2008, with follow-up research conducted through 2008-09. During visits to 39 health worker training schools in fourteen of Tanzania’s 21 regions, the team interviewed leadership and staff at training schools and affiliated clinics and hospitals, toured facilities, and spoke with students, gathering data on school capacity and the primary constraints limiting expansion.

The visited schools represent a broad cross-section of the training networks in Tanzania, including public, private, and faith-based institutions, located in both rural and urban areas. They reflect the diversity of Tanzania’s health workers, comprising both clinical workers and diagnostic support staff, ranging from

---

1 In the Tanzanian health system, the Lake Zone denotes the catchment area of the referral hospital at Bugando in Mwanza. It comprises six regions – Kagera, Kigoma, Mara, Mwanza, Shinyanga, and Tabora – with a population of around 15 million. Our Lake Zone Initiative focused on priority initiatives to strengthen the health systems of this catchment area.
nurses to medical specialists. In addition to pre-service programs, the team reviewed continuing education courses that enable lower-skilled health workers to upgrade to more advanced positions.

**Government support and consultation**

In tandem with field research, the team worked closely with officials in the Tanzanian Ministry of Health and Social Welfare. Interviews focused on clarifying policy priorities and constraints; documenting government initiatives in consideration, planning, or implementation phases; and probing the political feasibility of new initiatives. The Twiga Initiative was overseen by the Chief Medical Officer, Dr. Deo Mtasiwa, and the team worked in partnership with the Director of Human Resources Development, Dr. Gilbert Mliga, and his department.

Other key officials consulted include the directors of Administration and Personnel, Policy and Planning, and Hospital Services, and numerous ministry support staff. In addition to health ministry officials, the team consulted staff of the Ministry of Education (which governs universities) and members of the Higher Education Loans Board, regarding student education financing.

**Other inputs**

We undertook a comprehensive review of existing efforts to resolve the global health worker shortage. This included reviewing published reports and official Tanzanian data, and interviewing public health experts and representatives of donor governments and non-governmental organizations working on this issue.

In Tanzania, the team spoke with both local and international organizations, including The Capacity Project, I-Tech, and the Clinton Foundation. For comparative case studies, team members interviewed leaders of the United Kingdom’s Department for International Development-sponsored Emergency Human Resources Program in Malawi, the Global AIDS Program in Namibia, the Medical Education Cooperation with Cuba (MEDICC) program, and the Carter Center’s Ethiopia Public Health Training Initiative.

We extensively applied the knowledge developed by the Touch Foundation over the course of five years’ work at Weill Bugando, one of Tanzania’s leading hospitals and medical universities. The experience of successful investments in faculty, management, infrastructure, and operational systems at Bugando provided a model of success that other Tanzanian training institutions could replicate. This work also helped identify opportunities for policy change that would further enhance the impact of such efforts.

Despite our efforts, the severe – and well-known – shortage of reliable data in this field has a significant impact on an analytic approach and any resulting conclusions. We therefore gave significant weighting toward first-hand information gleaned from interviews or site visits, increasing directional accuracy if not the absolute precision of the data. While such an approach is more time-consuming and expensive, we believe it gives greater credibility to our proposed solutions.

**The challenge of a molecular system**

This report lays out a number of practical ways in which health worker training capacity in Tanzania can be expanded, resulting in a doubling of health worker production within seven years. The action plans generated during this research can be implemented now. Plans such as these were a key demand of the Global Health Workforce Alliance (GHWA) conference in Uganda in March 2008, which led to the Kampala Declaration. In Tanzania, the plans now exist and are part of government policy, but at the time of publishing, implementation is stalled due to a lack of sufficiently flexible resources to carry them out.
And training is only the first in a series of stages of human resource management. Hiring, deployment, retention, and professional development of health workers are all essential to maximize the impact of expanded training on the overall size and strength of the workforce. Further, while health workers are the necessary prerequisite without which health systems cannot function, when the systems themselves are dysfunctional, health workers are severely hampered in their ability to treat – and save – their patients.

In short, a strategy of scaling health worker training in the absence of comprehensive health system reform will not deliver a sustained improvement in health outcomes.

Health worker training can therefore be seen to be another vertical initiative, requiring enabling mechanisms to be developed simultaneously: health system management, finance, procurement, supply chain logistics, staff retention and development, infrastructure planning and development – indeed, all the other elements of a robust health system. In the structure of a molecule, removing, weakening, or even strengthening a single component or covalent bond between two components dramatically alters the properties and effects of the entire particle; such is also true of a health system.

While the beneficial effects of many vertical initiatives such as infant vaccinations or disease-specific programs are therefore compelling, the long-term sustainability of the existing health system (or the impact of such programs outside their field of concentration) are not always adequately addressed.

We therefore tackled this problem in the Lake Zone Initiative, which presents a number of approaches designed to strengthen essential health system components – in tandem with health workforce creation – such that investments in either are not lost over the long term.

**ABOUT THE TOUCH FOUNDATION**

The Touch Foundation is a secular, non-profit 501(c)(3) organization that aims to improve access to basic health care in sub-Saharan Africa by working with our partners to overcome two fundamental problems:

- Critical shortage of health care workers – doctors, nurses, pharmacists, and lab technicians
- Weaknesses of existing health systems – transportation, communication, management, medical supplies, infection control, and data analysis

Touch Foundation’s approach to solving these problems is unique in that we combine the best of private and public sector approaches and expertise, leveraged from our partnerships with governments, corporations, development partners, and nonprofits. Our model is to engage local leaders from the beginning in order to help rebuild their existing healthcare system, rather than building a parallel one.

We have begun our work in Tanzania, an East African country acutely affected by this workforce shortage. Since our incorporation in 2004, we have worked with our Tanzanian partners to expand Weill Bugando’s university and 900-bed teaching hospital in Mwanza, Tanzania, growing it from an inaugural ten MD students in 2004 to eight hundred students in eight disciplines in 2008-09.
Acknowledgments

The authors gratefully acknowledge the Tanzanian Ministry of Health and Social Welfare for their generous assistance in data collection, analysis, and arranging interviews; the ministry-led HRH Taskforce for their thoughtful feedback on our recommendations; Dr. Charles Majinge, director-general of the Bugando Medical Centre; Professor Jacob Mtamaji, principal of the Weill Bugando University College of Health Sciences; Dr. Frederick Kigadye, executive secretary of health with the Tanzanian Episcopal Conference and former director of hospital services for the Tanzanian government; and all of the principals, deans, hospital directors, faculty, and students who assisted our team in their data collection and analysis.

We also gratefully acknowledge the assistance of consultants from McKinsey & Company’s health systems and global health practices in London, Philadelphia and New York for their direct support and assistance to the team.

The lead authors who directed the work were Angus O’Shea, Touch Foundation Executive Director, and Lowell Bryan, serving in his dual capacity as a Director of McKinsey & Company and President of the Touch Foundation. Amanda Rawls, Eliza Golden, and Rachel Cecil are commended for their considerable efforts toward the production of this report.

*The opinions expressed in the report are those of the authors and may not necessarily represent the opinions of McKinsey & Company or the directors or employees of, or donors to, the Touch Foundation.*

---

**GLOSSARY**

- AHO: Accelerated Health Officer
- AMC: Academic Medical Center
- AMO: Assistant Medical Officer
- BSP: Basic Service Provider
- CA: Clinical Assistant
- CHAI: Clinton HIV/AIDS Initiative
- CO: Clinical Officer
- DALY: Disability Adjusted Life Years
- DFID: Department for International Development (UK)
- EN: Enrolled Nurses
- GHWA: Global Health Workforce Alliance
- HEW: Health Extension Worker
- HRH: Human Resources for Health
- HRHSP: Human Resources for Health Strategic Plan
- HASSP: Health Sector Strategic Plan
- IAHS: Institute of Allied Health Services
- IFC: International Finance Corporation
- JAHSR: Joint Annual Health Sector Review
- MDGS: Millennium Development Goals
- MKUKUTA: National Strategy for Growth and Reduction of Poverty
- MMAM: Primary Health Services Development Programme
- MO: Medical Officer
- MTEF: Medium Term Expenditure Framework
- RN: Registered Nurse
- TSPAS: Tanzanian Service Provision Assessment Survey
- UN: United Nations
- WHO: World Health Organization
Executive Summary

Availability of trained health care workers is now fully accepted as one of the critical factors in improving health outcomes and saving lives. Intelligent investment in health workers can rapidly improve economic and social development. A simple intervention by a first-line worker without high-end skills (e.g., prescribing a treatment for diarrhea or dressing a wound correctly) can literally mean the difference between life and death.

Health care workers counsel, assess, diagnose, vaccinate, treat, prescribe, dispense, refer, and operate. But they are in short supply in the developing world. Governments and the global community have become increasingly aware of the shortage of skilled health workers—‘human resources for health’ (HRH)—and its dire health implications for hundreds of millions of people. The 2004 Joint Learning Initiative and the World Health Organization’s (WHO) 2006 World Health Report, Working Together for Health, have documented the magnitude of the crisis and its implications for health outcomes in the developing world.

While the WHO has determined that 23 skilled clinical health workers per ten thousand people is the minimum ratio to provide the basic standard of health care needed to meet the United Nations’ (UN) Millennium Development Goals (MDGs), the number in Tanzania is a little over five.

By this measure, the situation in Tanzania has grown progressively worse in the past fifteen years. Since 1994, the health worker density had fallen from roughly 28 to 15 per 10,000 people in 2002, before reaching its present low. To meet the WHO standard, Tanzania needs seventy to eighty thousand additional clinical health workers—now. Despite numerous initiatives and a government that well recognizes the issue as absolutely critical, the country has not been able to reverse this trend.

Increasing training capacity

Since the publication of the 2006 WHO World Health Report, international interest in and advocacy for health workforce development has continued to grow. For example, the World Bank has developed a research area focusing exclusively on the health workforce; the Global Health Workforce Alliance (GHWA) convened the first Global Forum on HRH in Kampala in March 2008; and the British medical journal The Lancet devoted an entire issue to the crisis just a month earlier.

Most recently, in July 2008 the United States Congress reauthorized the President’s Emergency Plan for AIDS Relief (PEPFAR) and in so doing called for investment in pre-service training to create 140,000 general health care workers deemed essential to achieve success of its HIV/AIDS-specific objectives.

A common theme in these analyses has been the importance of scaling up pre-service training in building a sustainable health workforce.

---

2 Christoph Kurowski et al., “Human Resources for Health: Requirements and Availability in the Context of Scaling-Up Priority Interventions in Low Income Countries—Case studies from Tanzania and Chad” (London School of Hygiene and Tropical Medicine) Jan 2003: 24.
In 2003, McKinsey & Company conducted an analysis of the situation in Tanzania and published a report, *Acting Now to Overcome Tanzania’s Greatest Health Challenge: Addressing the Gap in Human Resources for Health,* which suggested that a three-pronged strategy is both required and feasible: first, create a targeted recruitment program to capture more of the current training output; second, increase productivity per existing health worker by as much as 75 percent; and third and in parallel to the first and second, increase training capacity by at least fifty percent for the system to remain at current capacity relative to the population.

In 2006, Touch and McKinsey published a joint study analyzing the health workforce crisis in Tanzania, *Investing in Tanzanian Human Resources for Health: An HRH study for the Touch Foundation.* We concluded that interventions targeting expansion of pre-service training were the essential first step toward growing a robust health workforce in the country, particularly given the lead times required for health workforce creation. Further, we discovered that investing in indigenous health worker training was highly cost-effective, particularly when compared with importing health workers from abroad.

We recognize President Kikwete’s aspiration to double the country’s health worker training capacity – later documented in the January 2008 Human Resources for Health Strategic Plan (HRHSP) and the Primary Health Services Development Programme (*Mpango wa Maendeleo wa Afya ya Msingi* – MMAM) – and proposed a rapid expansion of existing health worker training institutions as the first step toward achieving Tanzanian health policy.

**Translating policy into action**

Despite international interest and national political will, Tanzania has not yet launched a comprehensive and actionable training expansion program. The MMAM and HRHSP policies called for doubling health worker training but did not connect this with a concrete set of activities and investments for doing so.

The lack of data on which to base business cases and costed implementation plans inhibited the health ministry’s ability to seek funding. And the interdependencies between expansions in training capacity, overall supply/demand trends for health workers, and planned construction of new health care facilities were not fully documented for use in workforce planning.

Recognizing these issues, the Tanzanian government asked the Touch Foundation for support in developing an action plan that could help make the strategy a reality. We found that successfully developing such an action plan required three components:

- Physical, on-site assessment of Tanzania’s training institutions to determine their potential for expansion
- Evaluation of system-wide opportunities to increase training capacity, and
- Development of an analytical model that links overall training capacity to the effect of related improvements on overall health worker supply and, therefore, to the government’s ability to expand health services as outlined in the MMAM.

---

In early 2008, a joint McKinsey and Touch Foundation team performed extensive field research and analysis to test the 2006 hypothesis that Tanzania could double its training capacity by 2015 and to create implementation plans for scaling up Tanzania’s training programs. After assessing 39 of Tanzania’s 97 health worker training institutions,9 we concluded that targeted interventions to expand training capacity would increase output of the training system by ninety to one hundred percent. These interventions would require an initial investment of roughly $50 million and an ongoing annual cost of around $10 million.

Specifically, this means that in the tenth year following the implementation of this program, Tanzania would be graduating about 7,500 health care workers per year versus the 2009 rate of about 3,850. However, because it takes years from the first increase in student intake until those students enter the workforce (the ‘pipeline’ effect), the full impact of increased training capacity will not be evident until five to six years after the new program is initiated.

Further, current attrition rates in the health care workforce (averaging about thirteen percent of those in service annually) mean that about 75 percent of the workers graduating are being used to replace existing workers rather than adding to the health care population. In combination, therefore, both the pipeline effect and high attrition rates limit the near-term impact that increased training capacity can have.

Despite this, we found that adoption of this plan could nearly double the health care workforce by the tenth year (from 25,400 to 48,000 if implementation begins in 2010). If voluntary attrition could be halved, the health care workforce could grow to 52,000 by Year Ten, or more than double its current size. We examined this critical issue of retention in our Lake Zone diagnostic.

9 The reported number of health worker training schools in Tanzania varies widely. According to the 2007 draft HRHSP, based upon the 2005 School Bulletin, Tanzania has 87 health worker training centers. The MMAM cites 116. The number 97 comes from the 87 in the HRHSP, with some of the institutions listed in that document subdivided into their component programs, when our field work found them to be functionally independent.
Enabling system-wide support

School-specific optimization efforts, however, cannot succeed without simultaneous system-wide changes to support those improvements. We identified four such initiatives:

- Encourage and subsidize off-campus housing for students.
- Encourage faculty members to continue teaching beyond the national retirement age of 60.
- Provide incentives for successful MD students to teach in exchange for priority entry to a post-graduate specialization.
- Rationalize tuition to ensure that income per student covers the full cost of students’ education.

The Ministry of Health and Social Welfare (the Ministry) has already undertaken several system-wide curricular changes that will have a direct impact on training throughput. These revisions include shortening the nursing certificate and diploma programs (from three to two years and from four to three years, respectively), and adding a new Clinical Assistant (CA) cadre, with two years’ training. The net effect will be to increase throughput of Enrolled Nurses (EN) by 33 percent and Registered Nurses (RN) by 25 percent, adding over five hundred additional health workers at the primary care level per year.

Using the data analysis tool we developed, the Tanzanian government will be able to monitor the impact of the training improvements on a year-by-year basis, linking training system improvements with the available supply of health workers in each cadre. The tool can enable decision makers to identify the tradeoffs necessary for the Tanzanian government to achieve its goals. This framework will allow Tanzania to set a pace for the expansion of care facilities that mirrors the available supply of workers to staff them, minimizing the waste and political risk of brand-new dispensaries sitting unable to open, awaiting staff to operate them.

Furthering transformational change

Expanding capacity is essential, but by itself it will not enable Tanzania to achieve its own ambitious health workforce staffing goals or meet the applicable WHO standards. The deficit is now nearly 90,000 health workers, according to WHO guidelines. This corresponds closely to the vacancies that will be created with the staffing demands of the new MMAM policy, which calls for more than 140,000 workers by 2017 to staff new facilities as well as the existing dispensaries, health centres, and hospitals.

Even with the implementation of Twiga, the country will have just 48,000 workers in 2019, leaving a gap of over 92,000 when population growth is taken into account. Cutting attrition rates in half could add perhaps four thousand to the workforce. Yet a gap of over 88,000 would remain.

No silver bullets

While it was tempting to search for a system-wide ‘silver bullet’ solution to help alleviate the remaining health workforce gap, we have not been able to identify any such quick fix in the course of this work or in the experience of either McKinsey or the Touch Foundation in Tanzania over the past six years.

We did, however, identify a set of transformational opportunities that could significantly narrow the gap. The first set of options involves transforming the training system over the next two to four years by relieving fundamental constraints on the current system, as follows:

- **Shorten the training pipeline.** Training a health worker takes an average of three years and no less than two. It would be worthwhile to seek new

---

*Based on the WHO guidelines for health worker density, demand in 2019 will be 140,480 skilled health workers, of which 115,900 must have clinical skills, indicating that the MMAM policy is aligned with international standards and Tanzania’s needs to meet the MDGs.*
approaches to decreasing the time required to educate new, lower-skilled, health care workers. For example, creation of a condensed, skills-based curriculum for a lowest-skilled clinical cadre to effectively deliver primary health care services could produce an additional seven thousand health workers per year. If implemented by 2013, this opportunity could essentially close the gap in health workers – though care would need to be taken to ensure that rapid training conferred sufficient clinical skills to enable the workers to be effective in delivering appropriate primary care.

- **Augment capacity with technology.** Virtual learning techniques, such as DVD training programs, could expand training capacity if used in conjunction with increased clinical rotations at district and regional hospitals. Such approaches could also be used to continue in-service training for workers trained on accelerated schedules.

- **Ensure financial sustainability.** Student fees at most private and all government schools do not cover the full cost of education, let alone the incremental cost of continued investment for sustainability. Raising student fees and optimizing the government’s approach to cost sharing, financial aid, or student loans could help schools expand in a methodical way, potentially at minimal additional cost to the government, and enable the expansion of training capacity to be increasingly self-financing.

While additional analysis is required to determine the precise impact of each of these initiatives, all three are scalable, depending in part on the level of investment. Moreover, all three of these initiatives complement each other. If successfully implemented, in combination, they have the potential to enable Tanzania to achieve its objectives and deliver increased services to its people.

**Capabilities, leadership, and funding are required**

Optimizing the existing training system and refining the new training approaches will require skilled project management, achievable annual targets for improved throughput, and a thoughtful implementation plan to support ongoing evaluation and modification.

The Ministry cannot do this independently, however, given its already stretched resources. Collaboration in both funding and execution is critical. Training institutions, zonal leadership, the Ministry, donors, and advisors must work systematically toward a common goal and within a common framework.

**Implementation starting now**

Transformational approaches to health worker training will be necessary to generate a health workforce that meets the minimum WHO ratio. But substantial progress in workforce expansion, driven by a doubling of training capacity, can be achieved through optimizing the existing training system, and realizing a small set of key initiatives targeting teaching staff and student housing – the primary constraints on capacity.

Funding permitting, this facility-level optimization can begin immediately, allowing Tanzania to make significant progress while it continues to assess and design more transformational initiatives. Our data collection methodology and analysis were not revolutionary, but we believe we filled an exceedingly important gap too often left unaddressed. Our aim was to provide the necessary technical assistance to make the leap from ambitious strategies to executable action plans.
Meeting the challenge outside Tanzania

Our assessment of capacity to scale up health worker training relies primarily on fieldwork conducted within Tanzania, and our recommendations are designed to address that nation’s specific needs. But we believe that a similar approach can and should be applied successfully to other countries and health systems. The key issues that arise in Tanzania are not so different from those in the rest of Africa or, indeed, in emerging economies in Asia, South America, or other parts of the world.

The solutions we propose for Tanzania can leverage existing institutions to apply fundamental, proven interventions to increase the health workforce and start improving health outcomes within five years. Further, by relying on existing personnel and infrastructure, they promote local ownership by the institutions – one of the key ingredients necessary for any sustained solution. And finally, additional capacity will strengthen other initiatives, either disease-specific or system-wide, without altering the underlying system structure and therefore risking the creation of unpredictable consequences.
Context

A global crisis

The global public health and international development communities have identified the severe shortage of skilled health workers as a crucial obstacle to improving health outcomes worldwide. Significant evidence indicates that the density of health workers within a population directly affects health outcomes for the population, particularly on rates of maternal mortality, infant mortality, under-five mortality, and immunization coverage.\(^{11}\)

The World Health Organization (WHO) estimates that an additional 4.3 million health workers are necessary to combat current health crises around the globe, with more than 800,000 of these workers needed in Africa alone.\(^{12}\)

Several factors have contributed to this critical shortage. Structural adjustment policies in the 1980s and 1990s pressured governments to reduce public sector workforces, resulting in reduced health sector employment. In Tanzania, for instance, the government implemented a public sector hiring freeze in 1993 that substantially affected health worker demand. In 1998 the freeze was partially lifted for priority sectors, including health, but it was not abolished until 2003. The Ministry has stated that between 1995 and 2005, only sixteen percent of the reported 23,474 staff produced by the health training institutions were employed by the public sector.\(^{13}\)

The freeze led not only to reduced hiring but also to decreased enrollment in medical training. A 2006 labor market survey conducted by the Ministry in conjunction with the Capacity Project indicated that in the decade affected by the freeze (from 1996 to 2005), only 721 physicians graduated from Tanzanian medical schools, severely limiting supply.\(^{14}\) Health crises such as HIV/AIDS have not only increased the need for health workers in developing nations but have also eroded the existing health worker population and further compromised already poor working conditions.

At the same time, the growth of aging populations in wealthy countries has increased the global demand for health workers. In both rich and poor nations, inadequate planning and insufficient investment in health worker education has left countries unable to meet health care demand. Wealthy countries recruit foreign health workers to meet their workforce needs, exacerbating the health worker shortage in developing countries where the disease burden is greatest and the ability to provide competitive compensation is lowest. Africa bears 24 percent of the world’s disease burden with only three percent of the world’s health workers (Exhibit 1).\(^{15}\)

The 2004 Joint Learning Initiative and the 2006 WHO World Health Report brought the crisis of the global health workforce to center stage. Describing health workers as the linchpin of all efforts to overcome health crises and meet the Millennium

\(^{11}\) Crisp 689-91.
\(^{13}\) MMAM 12.
Development Goals (MDGs) for health, these reports declared the target clinical health worker density of 23 workers per ten thousand people. They demonstrated that without immediate investment in health workers, this target – and the better health it represents – cannot be achieved.16

Creating and retaining a sufficient, productive health workforce involves comprehensive management across a continuum of activities. Recruitment and retention depend heavily upon perceived desirability of the health worker profession, determined not only by salary and benefits but also by opportunities for continued personal development and professional advancement. Efficient hiring, deployment, and funding of the workforce require effective management mechanisms that do not yet exist in many countries.

Any successful strategy for resolving the health workforce crisis must consider all of these stages alongside the increased production of health workers.

The pipeline problem

The length of health worker training programs – ranging from two to five years, with the average program lasting three – translates into a significant lag time between students’ entry into a training program and their entry into the health workforce. This ‘pipeline’ effect accentuates the importance of scaling up the production capacity of the health training

---

16 See Joint Learning Initiative (JLI) Human resources for health: overcoming the crisis (Cambridge: Global Equity Initiative, 2004); World Health Report 2006.11.
system as soon as possible: on average, students entering training programs this year will not begin treating patients for at least three years (Exhibit 2).17

The pipeline effect is one of the primary constraints limiting the speed with which the health workforce can expand. One solution is to shorten the training time for certain cadres of health workers, either by revising the curricula in favor of less classroom training and more on-the-job training, or by replacing the current training altogether.

Programs to address specific diseases have used the latter approach successfully, rapidly training workers in the subset of skills needed to address a circumscribed set of issues. Recent HIV programs are an excellent example: workers are trained at the local level to counsel, test, diagnose, treat, and monitor HIV-positive patients.

Many countries have taken this approach in other disease and disability areas as well, training community-level health workers in as little as six weeks to perform core tasks. For example, a childrens’ health worker can be trained to perform a package of tasks including baby weighing, vaccinations, and distribution of rehydration salts and mosquito nets.

But while the reality of the pipeline effect demands scaling up production as soon as possible, nations focusing primarily on the immediate need for expanded training capacity should simultaneously develop programs to address the other key areas of health workforce management. High-quality training, combined with placement, support, compensation, supervision, development, and promotion of staff, will create a robust system for retaining and strengthening the health care workforce.

More training is needed

In March 2008, the Global Health Workforce Alliance (GHWA) launched a task force of expert health policymakers from around the world to identify and encourage accelerated training initiatives.18

Several countries and NGOs have responded to this call for action. Education and training programs in Ethiopia and Malawi are pioneering initiatives to rapidly increase the supply of health workers at various levels. With a government priority to expand access to basic health services, Ethiopia launched a program that aims to train 30,000 Health Extension Workers (HEW) by 2009. Malawi’s six-year Emergency Human Resources Program, supported by the Global Fund and the United Kingdom’s Department for International Development (DFID), seeks to double the number of nurses and triple the number of doctors in training.

But despite ambitious targets and well-intentioned plans, many countries facing health workforce shortages still struggle to translate strategy and ambition into action. While donor governments and NGOs aim to support government priorities, complex bureaucracies and multiple funding priorities frequently hinder planning and result in implementation paralysis. These obstacles can be further complicated.

---


by budgeting processes (both donor and government) that lack transparency, and by an absence of clear guidelines governing allocation and tracking of funds. ¹⁹

The state of health and the health workforce in Tanzania

Even in the context of the global shortage of skilled health workers, Tanzania stands out as a place of critical need. A nation of over forty million people, Tanzania is in the grip of a health workforce crisis. It has just 5.2 clinical health workers per ten thousand people, one-fifth of the target ratio proposed by the WHO. The devastating results are evident in common health outcomes, such as maternal mortality rates, which, although improving, remain nearly seventy percent higher than in neighboring Kenya. ²⁰

A variety of both communicable and non-communicable diseases drive the health care crisis in Tanzania. According to most recent estimates by the WHO, the top three communicable diseases – HIV/AIDS, malaria, and TB – collectively account for forty percent of losses of Disability Adjusted Life Years (DALY) in Tanzania. ²¹ The DALY data measures not just life expectancy but also disabilities that effectively destroy years of healthy life. A number of disease-specific programs have emerged, funded by large foundations and multilateral donors, to provide diagnosis and treatment of these plagues.

Other significant drivers of the health care crisis include maternal and perinatal conditions, physical

¹⁹ For more on challenges of donor funding in the health sector, including fragmentation, unpredictability, short time horizons, and narrow focus, see Jaap Koot and Rik Peeperkorn, “The Health Sector in the 21st Century; putting health systems strengthening in perspective,” forthcoming: 8-9.

²⁰ As of February 2009, UNICEF reported maternal mortality rates (adjusted for under-reporting and misclassification) to be 950 deaths per 100,000 live births in Tanzania, and 560 per 100,000 in Kenya <http://www.unicef.com>.


²² Source: WHO DALY estimates 2002; team analysis based on extensive qualitative and quantitative field work.
trauma, and diarrheal diseases, which together amount to another quarter of DALY loss (Exhibit 3).22 Indeed, over half the losses suffered by the Tanzanian people are not presently addressed through disease-specific programs and could be significantly reduced by increasing access to basic primary care.

The devastating impact of much of Tanzania’s primary disease burden, therefore, could be dramatically reduced if timely diagnosis and appropriate treatment were available. In Tanzania, as in so many of its neighboring countries, the key bottleneck preventing effective health care delivery is not necessarily drugs or facilities but rather the number of skilled health workers providing care in those facilities.

Tanzania’s health workforce has declined even as its population has soared. In 1994, as the public sector hiring freeze took effect, Tanzania had 67,600 health workers for 28.8 million people. By 2001 this ratio had fallen to 48,500 health workers for a population of 34.5 million, and today, the country has roughly 25,000 health workers for more than forty million people.23

In less than fifteen years, the proportion of health workers to total population has fallen by 75 percent. In 2004, the Joint Learning Initiative reported that Tanzania had the world’s lowest coverage of physicians, with only 0.2 Medical Officers (MOs) or specialists per ten thousand people.24 By the time of the 2006 Service Provision Assessment, that figure had climbed slightly to 0.425 – still desperately low. Overall, the total health workforce has shown an accelerated decline since 2001-02 (Exhibit 4).26

While the figures for physicians are shocking, the health workforce in Tanzania faces extreme shortages

---

22 Ottar Maestad Human Resources for Health in Tanzania (Chr. Michelson Institute (CMI Report), 2006); 2008 Twiga model (see note 17); HRH census 2002.
25 Source: CMI Report; team analysis based on extensive qualitative and quantitative field work.
26 Staffing Establishment 2005.
at all levels of care. The workforce can be categorized into three large segments: clinical non-nursing staff, nursing staff, and diagnostic and support staff. The national Staffing Establishments determine how many of each cadre of worker each facility type needs. For example, the lowest-level facility, the dispensary, is supposed to be staffed by eight workers, of whom five are lower-skilled nurses and two are lower-skilled clinical staff.

At the other end of the spectrum, a referral hospital is supposed to be staffed by 1,423 workers, of whom 150 (11 percent) are specialists or MOS, 1,004 (71 percent) are nursing staff, and 244 (17 percent) are diagnostic or support staff.27 While the official Staffing Establishment sets a high standard for staffing levels in hospitals, health centres, and dispensaries, these institutions routinely operate with only a fraction of the prescribed staff. Depending on the level of facility, an Assistant Medical Officer (AMO) or CO may act as the lead physician. Clinical Officers may even perform basic surgeries such as caesarean sections or hernia repairs.28

This discrepancy between official standards and reality in practice raises the question of what the ideal skill mix is for Tanzania and how it would translate into a workforce pyramid designed for the country’s needs. We did not directly address the question of the ideal workforce pyramid for Tanzania’s health

---

27 Interviews with medical staff at Bugando Medical Centre.
A long way to go
per 1,000 population

<table>
<thead>
<tr>
<th>Country</th>
<th>Lower-skilled</th>
<th>Mid-level</th>
<th>Higher-skilled</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>8.96</td>
<td>11.79</td>
<td>2.41</td>
</tr>
<tr>
<td>South Africa</td>
<td>0.19</td>
<td>4.12</td>
<td>0.72</td>
</tr>
<tr>
<td>Sub-Saharan Africa</td>
<td>0.24</td>
<td>0.86</td>
<td>0.12</td>
</tr>
<tr>
<td>Tanzania</td>
<td>0.25</td>
<td>0.53</td>
<td>0.07</td>
</tr>
</tbody>
</table>

- Lower-skilled workers: community health workers for SSA and South Africa; clinical assistants, medical attendants, and MCH aides for Tanzania; medical assistants and nursing aides for the US
- Mid-level workers: nurses, laboratory technicians, and pharmacists in all countries; includes clinical officers in Tanzania
- Higher skilled workers: physicians in the US; physicians and substitute doctors / AMOs in South Africa, SSA, and Tanzania

Policy frameworks

The Tanzanian government is committed to improving equity of access to quality health services nationwide by 2017, and to reaching health outcome targets in line with the MDGs by 2015. These goals are a common thread running through the recent suite of health policies and strategic plans, including the 2007 MMAM, the 2008 HRHSP, and the more general 2005 National Strategy for Growth and Reduction of Poverty (MKUKUTA). Text is being finalized for the third Health Sector Strategic Plan (HSSP III). In line with the 2007 Joint Annual Health Sector Review (JAHSR), the draft text highlights health worker training as a key component of improving health outcomes.

---

30 MMAM 12.
31 MMAM 12, 15.
The evolution of Tanzanian policy from 2003 to the present reflects the increasing awareness of the critical link between the availability of health workers and improved health outcomes.

The Twiga Initiative

Recognizing the need to focus on health worker supply in order to achieve progress on health indicators, the Ministry developed the Twiga Initiative in 2006 “to strengthen the [health workforce] production capacity in Tanzania” and grow the health workforce. It has now been incorporated into the MMAM policy, which states as a strategic objective the expansion of workforce production.

An examination of the policy impetus for the Twiga Initiative reveals sources of current momentum for increased capacity. The MMAM has set forth ten-year targets in three areas: health system strengthening, increasing human resources for health, and improving health outcomes. The May 2007 version of the MMAM stated targets including the construction of 5,853 new health care facilities (dispensaries, health centres, and district hospitals) and expanded staffing requirements in all facilities. This will result in an official demand of over 140,000 health care workers by 2017 – six times current availability, but still less than half the existing workforce in South Africa, a country of equal population size (Exhibit 6).

The current system in Tanzania trains roughly four thousand health workers per year across all cadres. Of these, fifteen to twenty percent never join the health care system, and the Lake Zone diagnostic team tells us that another ten percent will leave within the first year. At the same time, the system loses at least thirteen to fifteen percent of its workforce every year to retirement, death, attrition to non-health jobs, and temporary departure to facilitate upgrade to a higher cadre.

As a result, sixty percent of each year’s new entrants are simply replacing departed workers rather than augmenting the workforce. The MMAM policy therefore calls for a comprehensive assessment of Tanzania’s current health worker training capacity, followed by the development of aggressive plans to dramatically scale up training capacity across all cadres.

The Twiga Initiative was designed to achieve exactly that.

---

32 In the final draft of the MMAM, targets for new facility construction have been combined with targets for renovation of existing facilities (see policy table p. 18). We believe the new target still reflects planned construction of 5201 new facilities, and staffing of 652 constructed but currently un-opened and unstaffed facilities.
34 Average annual attrition rates were calculated based on interviews with school principals, students, independent consultants, and MOHSW officials, as well as published statistics from the WHO.
Methodology

Developing an action plan requires building upon the existing human resources fact base, collecting new quantitative and qualitative data, and using both to develop a practical program that can be implemented within the existing health care training system. To this end, the team designed a rigorous, evidence-based methodology, which we used to evaluate the health workforce situation at both local and national levels.

Filling the knowledge gap

Before beginning fieldwork, the team’s first step was to research and prioritize potential intervention points. The Ministry published a number of documents outlining the existing situation on the ground, which the team used to create a baseline model of current capacity and network structure. These documents highlighted several specific knowledge gaps at the national level, where local data was often limited or out-of-date.

The team also undertook an exhaustive review of related health workforce programs and studies, whose findings helped to cement our assumptions and approach. Throughout the fieldwork component the team held several phone and in-person discussions with Tanzanian and international organizations with related expertise, and built upon the Touch Foundation’s organizational knowledge from more than four years’ work at Bugando’s university hospital in Mwanza.

These sources provided a broad understanding of existing obstacles to health worker training in Tanzania and potential interventions that could overcome them. Based on their cost-effectiveness, feasibility, and timing, possible solutions evolved into three distinct action groups:

- School-specific improvements to expand training capacity
- System-wide enablers (national policy changes and incentive programs)
- Transformational reforms of the national approach to health worker training (primarily by instituting a broad-based virtual learning program)

All three types of interventions have the potential to substantially increase the number of skilled health workers trained in Tanzania. However, given the Ministry’s need for a near-term action plan, team analysis suggested that pursuing school-specific improvements in combination with system-wide enablers was the best initial approach. We therefore focused on qualitative and quantitative data that might inform such a plan.

Our aim was to offer action with immediate impact, as well as the ability to leverage existing resources, create local accountability, support the government’s existing strategic plan, and balance our efforts across cadres.

---


37 Organizations such as the Capacity Project and I-Tech are doing related system-strengthening work in Tanzania, while the Carter Center’s work in Ethiopia, the Global AIDS Program in Namibia, and the United Kingdom’s Department for International Development (DFID) work in Malawi provide interesting comparative examples.
Given the interdependency between school-specific and system-wide initiatives, the team combined bottom-up and top-down data collection to ensure a comprehensive, practical solution.

**Bottom-up data collection**

Since official data was often insufficient, the team embarked on field visits to obtain an accurate view of the current situation on the ground, determine each institution’s ability to increase training capacity, and identify system-wide enablers to supplement local efforts.

To achieve this, the field team was divided into several small groups that fanned out across the country, spending seven weeks visiting 39 of Tanzania’s 97 different health worker training schools and affiliated health care facilities, many more than once. Training schools can be grouped together according to numerous criteria: geography, size of student body, type and number of programs offered, ownership and funding, and so forth. The team attempted to cover a broad cross-section of schools by all of those measures. For example, we visited schools in fourteen of Tanzania’s 21 regions, covering rural areas with only one or two schools, as well as urban settings with as many as eight institutions (Exhibit 7a).

Nearly half of the training schools are privately owned and operated, of which a substantial majority are faith-based (Exhibit 7b). This has significant implications for funding any proposed expansion, as well as for applicability of system-wide policy changes. The team therefore made a point of visiting schools of all types. Single-program schools make up 91 percent of Tanzania’s training institutions. To ensure applicability of our findings across Tanzania, we visited a significant number of these in addition to all the large, multi-program training complexes.

---

Our analysis covered multiple levels of health worker, from basic diagnostic or support staff to specialists, including training timelines (Exhibit 8). In addition to studying pre-service training at each school, we gathered data on in-service upgrading programs that allow health workers to return to school for more-advanced degrees. These programs represent an attractive method of rapidly scaling up the skill level of the existing health workforce, converting lower-skilled to mid-level and mid-level to higher-skilled workers without requiring the full training time of starting from scratch.

Overall, we covered nearly sixty percent of Tanzania’s annual student intake of core cadres (Exhibit 9).

Interview guide and data request

For these visits, the team developed a detailed interview guide and data request to assure comprehensive and consistent data collection. Primary interviews were held with the school principal, followed by discussions with other faculty, administrators, hospital staff, and students, when available, to triangulate the data and increase confidence in its accuracy.

The purpose of the complementary interview guide and data request tools was to confirm previously gathered data, determine whether each school was operating at capacity, and identify specific obstacles inhibiting growth.

---

39 Shortened curricula reducing by one year both registered and enrolled nurse programs, were expected to be implemented in 2008.
Once school-specific bottlenecks were identified, the team and interviewees collectively assessed what resources would be needed to alleviate them. This dual qualitative/quantitative approach helped ensure that we recognized all existing expansion opportunities at each institution, and helped fill and update crucial gaps in official records. We modified these tools several times throughout as hypotheses and data trends shifted with new knowledge.

Filtering and analysis

After testing various documentation templates, the team designed a school-specific ‘scorecard’ to record relevant data, analyze key bottlenecks, and cost out potential solutions for each institution. Information collected from the Quantity Surveyor and the Director of Policy and Planning at the Ministry determined overall cost assumptions.

We considered it vital for all school-specific recommendations to maintain or improve current training quality. Therefore, for the few schools that had recently expanded without adjusting for quality control, recommendations were focused on the inputs necessary to raise quality rather than a continued increase in student intake.

The top-down perspective

The team also explored government perspectives on improving and expanding health worker training nationally. This involved interviewing key stakeholders within the Ministry as well as the then Ministry of Higher Education, Science, and Technology. Many officials were former highly tenured clinical professionals and instructors and were constructive thought-partners in discussing...
the challenges that on-the-ground realities would pose to high-level policies and ambitious strategies.

We used early meetings to identify existing governmental initiatives relevant to health workforce training capacity and to gauge officials’ views on how best to increase training throughput. From these conversations, we discovered several system-wide policy opportunities that could significantly supplement any individual school-specific efforts to increase capacity.

These initiatives were continuously refined throughout the project, ultimately allowing the team to narrow our focus to a small number of high-potential policy proposals. As the team developed these recommendations for school-specific and system-wide efforts, later conversations became forums for testing and refining our ideas.

**Working together**

We dedicated a substantial amount of time to vetting final results with key stakeholders in the government and at the individual schools, usually during repeat visits. This approach ensured that leadership at both national and local levels owned and believed in the proposed solutions.

It also helped ensure that leaders were motivated to take the necessary steps toward implementation, including conducting internal negotiations to increase spending on increasing workforce production, incorporating school optimization into national strategic plans, and using the recommendations and action plans to seek external funding.

**The toolkit**

To assist the Ministry in assessing the remaining 58 schools, the team prepared a school ‘toolkit’, which provides detailed steps for successful school visits, data collection, and preparation of actionable expansion plans. In addition to the interview guide, data request, and scorecard, the toolkit includes a complex spreadsheet-based health workforce supply-and-demand model to estimate the impact of our suggestions on training throughput ten years into the future, as well as calculate the one-time and ongoing operating costs of implementation.

Accompanying this larger supply-and-demand model is a simpler institution-level cost model, which enables easy and consistent cost projections of all possible school-specific interventions. The toolkit also includes a detailed user guide for each component listed above.

**A replicable process**

The proven adaptability of these tools in the field indicates that they are applicable and replicable in other settings. This overall methodology ensures a comprehensive perspective grounded in locally gathered facts across the country, and its relative simplicity makes it easily exportable to other nations facing similar challenges.

A useful next step would be to develop the toolkit further into an online-based model complete with inputs based on care pathways, clinical guidelines, and their human resource requirements, as well as population demographics, etc., to make the model truly applicable to other countries experiencing health workforce shortages.

In the meantime, the school-specific data collection has helped the Ministry gain access to local information that will inform future policy initiatives and spur other health workforce interventions. The analytical model, school toolkit, and working relationships built at the local and national levels will facilitate the transfer of implementation management to the country’s health leadership and enable them to conduct such reviews in the future.
FACULTY SHORTAGE AS AN IMPEDIMENT TO GROWTH
The Sengerema Clinical Officer Training Centre (COTC) is a faith-based institution that currently trains 177 CO students in a three-year program. The school uses the neighboring Geita District Hospital for clinical training and conducts fieldwork at health centres and dispensaries throughout the region. As a result, faculty members are constantly away from the school, making it difficult for it to have more than one or two classes per semester.

Sengerema COTC is currently expanding dormitory and classroom infrastructure with financial aid from CORDAID, a Dutch development assistance agency. Although these improvements should help expand the school’s capacity, the already over-stretched faculty cannot handle a student-body increase.

Hiring three additional full-time faculty would fill the current teaching gap and allow Sengerema COTC to grow in capacity by approximately 35 percent. By investing $6,000 up front and $24,000 per year in faculty salaries, Sengerema COTC could overcome this one remaining impediment to optimizing capacity, creating 63 places and, within three years, enabling another 30 to 40 dispensaries in Tanzania to be staffed with a qualified health worker.

Policy-level improvements to increase faculty resources and shorten training times for certain cadres can expand capacity yet further, and the addition of new training programs leveraging existing resources at certain schools can contribute an additional 30 to 35 percent increase, resulting in an overall doubling of student intake.

Even so, the anticipated increase in the health workforce will be insufficient to meet either the government of Tanzania’s facility staffing goals, or the international guidelines for health worker density. Bridging the remaining health worker gap will require innovative approaches to human resource management, as well as transformational approaches to health worker training and operational strategies to address attrition. Medium- and long-term initiatives will need to address the question of adding new schools and use the optimal health worker pyramid to set priorities for cadre development.

Six major constraints
Through our detailed field interviews and data requests, we identified six main limitations to scaling up health worker training capacity in Tanzania, affecting both national and local efforts.

1. **Students:** Challenges include lack of qualified supply, student fee structures, lack of student

Findings
Overall, our team found that a handful of primary constraints are hindering the growth of the Tanzanian health worker training network. These constraints operate at both school-specific and system-wide levels and center on limited faculty, infrastructure, applicant, and financial resources. We then designed a set of high-priority interventions to target these constraints.

While the specific constraints – and recommended interventions – vary from school to school, for the system as a whole, this set of initiatives for optimizing the existing training network provides the most promising near-term avenue to achieving dramatic expansion of the health workforce.

Such optimization alone can result in a 65 to 70 percent increase in intake across existing schools.

Policy-level improvements to increase faculty resources and shorten training times for certain cadres can expand capacity yet further, and the addition of new training programs leveraging existing resources at certain schools can contribute an additional 30 to 35 percent increase, resulting in an overall doubling of student intake.

Even so, the anticipated increase in the health workforce will be insufficient to meet either the government of Tanzania’s facility staffing goals, or the international guidelines for health worker density. Bridging the remaining health worker gap will require innovative approaches to human resource management, as well as transformational approaches to health worker training and operational strategies to address attrition. Medium- and long-term initiatives will need to address the question of adding new schools and use the optimal health worker pyramid to set priorities for cadre development.

Six major constraints
Through our detailed field interviews and data requests, we identified six main limitations to scaling up health worker training capacity in Tanzania, affecting both national and local efforts.

1. **Students:** Challenges include lack of qualified supply, student fee structures, lack of student
financing arrangements, and pre- and post-graduation attrition.

2. **Non-clinical faculty**: There is an enormous faculty gap in Tanzania. The training system does not provide competitive incentives – salaries, placement, support, professional growth, or job satisfaction – and health care graduates are often lost to emigration and more lucrative employment with NGOs or in non-health-related fields.

3. **Clinical faculty**: There is also a significant gap in clinical faculty in Tanzania. Worse, with clinical rounds as their primary responsibility and with systemic disincentives (similar to those of non-clinical staff), clinical faculty and staff often regard clinical teaching responsibilities as a burden.

**EXHIBIT 10**

**A sample action plan**

<table>
<thead>
<tr>
<th>Context</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong>: KCMC is one of the country’s largest facilities, combining a private university (Tumaini) with 7 programs and 16 programs at the government allied health school</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Key bottlenecks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students – Significantly under funded due to successful applicants’ inability to pay (109 students below capacity now)</td>
</tr>
<tr>
<td>Non-clinical infrastructure – Would need more dorms/classrooms, but currently in process of $2m expansion</td>
</tr>
<tr>
<td>Clinical faculty – Number of specialists limits numbers for higher level programs, particularly MDs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Description of institution and constraints to increasing capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total one-time costs ($ thousands)</strong></td>
</tr>
<tr>
<td><strong>Year 0</strong></td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>3000</td>
</tr>
<tr>
<td><strong>Upfront activities and investments</strong></td>
</tr>
<tr>
<td>624</td>
</tr>
<tr>
<td><strong>Incremental ongoing activities and costs</strong></td>
</tr>
<tr>
<td>216</td>
</tr>
<tr>
<td>47</td>
</tr>
<tr>
<td>398</td>
</tr>
<tr>
<td><strong>Total operational costs for incremental students</strong></td>
</tr>
<tr>
<td><strong>Year 0</strong></td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td><strong>Total students</strong></td>
</tr>
<tr>
<td><strong>With Debottlenecking</strong></td>
</tr>
<tr>
<td><strong>Without Debottlenecking</strong></td>
</tr>
<tr>
<td><strong>Overall impact on number of students at school</strong></td>
</tr>
<tr>
<td><strong>Total student intake, by cadre</strong></td>
</tr>
<tr>
<td><strong>Change in total students: 652 +1129</strong></td>
</tr>
</tbody>
</table>

4. **Non-clinical infrastructure**: The most prominent infrastructure challenge we identified is the need for more housing, either on or off-campus, followed closely by lack of classrooms, laboratories, equipment, and transportation.

5. **Clinical infrastructure**: Many of the smaller health care facilities lack either the patient volume or physical space to accommodate a larger number of students, assuming appropriate faculty can be found or created.

6. **Financial resources**: Many individual schools lack control over the amount and flow of resources, creating difficulties in planning for future maintenance and expansion.

During the data collection process, we discovered that each institution suffers from a unique combination of these obstacles, rendering it impossible to create
blanket policies that address them sufficiently. In response, we emphasize the need to tackle these specific needs on a school-by-school basis, supported by the implementation of Ministry-led, system-wide enablers.

Given this need for institution-specific interventions, our final recommendations included action plans for each school visited, complete with final costing and student output estimates based on the ten-year timeline set for meeting the MMAM targets. These detailed plans provide both the government and the school with a concise document that links school-specific investments with precise increases in training output (Exhibit 10).

Doubling training capacity

The data gathered in the field shows that, through an ambitious yet practical action plan combining system-wide and school-specific improvements, Tanzania can nearly double the intake of the training network.

Doing so will require implementation of condensed curricula for nurses and COs, already under development by the Ministry, as well as other system-wide policy changes to provide student housing and increase teacher supply. These policies will enable schools to maximize throughput in their existing programs and to add new programs where appropriate. Such system optimization will increase student intake to over 7,500 per year with upfront costs of roughly $50 million and ongoing annual costs of around $10 million.41

To achieve the full potential impact of school expansion, the Ministry and its partners must complete the analysis and devise action plans for the remaining 58 schools not assessed in this phase of the diagnostic.

School-specific action plans

Despite each school’s unique set of circumstances, most schools fit into one of four types: academic medical centers (universities with Medical Officer (MO) and post-graduate programs), large training complexes (multiple-cadre programs), small private or faith-based schools, and small public schools (one- or two-cadre programs).

Schools within each type often share common constraints. Identifying these themes allowed us to extrapolate our findings to the other 58 health training schools and thus to model the overall impact of system-wide and school-specific efforts.

Academic medical centers

Academic medical centers (AMCs), which include a university and affiliated teaching hospital, tend to lack

---

41 Costs were determined through interviews with individual school principals, data collected from the principal Quantity Surveyor at the Ministry, and the Touch Foundation’s experience overseeing school expansion projects at Bugando’s university.
the managerial and administrative manpower needed to operate such large, complex institutions.

Professors and department heads at the Muhimbili University of Health and Allied Sciences (Muhimbili) and Bugando universities, for example, lack administrative support and spend precious time recording grades and typing syllabi rather than preparing for lectures or meeting with students. Clinical faculty members are also stretched at large AMCSs, torn between the huge demand for treatment in their specialities and their training responsibilities.

**Large training complexes**

At large training complexes, student and faculty accommodations are often the most significant bottleneck. Students are housed entirely on campus and no additional space or off-campus housing is available. This is most noticeable at the three integrated programs in Mbeya – AMO, Dental Therapy, and Operating Theatre Management – where additional dormitories or off-campus housing would result immediately in a fifty percent increase in student intake. Such an increase would also allow Mbeya to accommodate additional programs, such as a CO school that could piggyback on the AMO program. At most large training complexes, current staffing is sufficient to handle this near-term increase. The one glaring exception is the Mvumi training complex, where currently there is only half the faculty and staff needed to support the existing Laboratory Assistant program.

**Small private institutions**

Motivated by tight and infrequent funding, small private institutions tend to be the most efficiently run facilities. These schools have a small number of permanent, dedicated faculty members already stretched to their limits to accommodate the students. Adding students would in most cases require additional part-time or full-time staff, as well as new dormitories and classrooms. Since most private school students are not eligible for government cost-sharing schemes or loans, these institutions occasionally allow students to remain without paying full fees or are unable to fill all available spots, both of which deplete school budgets.

**Small public schools**

Like small private schools, small public schools suffer from overstretched faculty and infrastructure. Consequently, investments in human resources, classrooms, teaching materials, and dormitories are necessary to scale up training capacity. A handful of small public institutions have excess capacity resulting from a lack of interested applicants or because they are transitioning from one type of training program to another.

For example, the Musoma CO Training Centre (COTC) recently switched from in-service to pre-service training, but in January 2008 it had not yet received the 2007 incoming class. Due to the difficulty of centrally tracking regional placements and irregular communication between school staff and government officials, the Musoma COTC’s principal had no idea when his students would arrive.

While these common themes helped us maximize site visits, construct the analytical model, and inform policy recommendations, the varied situations in Sengerema and Mvumi emphasize the continued need for the school-specific action plans. Musoma illustrates a wider issue: a distinct lack of management capacity creates dysfunction and impedes efficiency in the existing system. While a strategy to address this is urgently needed, we felt it beyond the initial scope of this work.

In the meantime, by focusing at the detailed level, clear strategic policy parameters in the training area can also be addressed. Such school-specific, grassroots plans can enable significant progress toward increased training capacity (Exhibit 11).
New cadres and curricula

In response to these challenges, the Ministry has launched new initiatives that will increase health worker training capacity and feed into the overall Twiga program.

The first is the development of a new cadre, Clinical Assistants (CAS), using a condensed curriculum consisting of one year spent in the classroom and a second year spent in field internships. The Ministry designed this cadre to be the leading care provider at the dispensary level, ranking above the two nurses and one laboratory technician also required at each new facility.

The second is a revised, modularized, and shortened nursing curriculum that will reduce the Enrolled Nurse (EN) training from three years to two, and Registered Nurse (RN) training from four years to three. The new curriculum was implemented nationally with the 2008 intake. Once implementation is complete, the combined impact will be a 25 to 35 percent increase in annual intake.

Additionally, because official staffing requirements can prevent the Ministry from opening new health care facilities before they can be fully staffed, it may be useful to devise interim staffing guidelines to permit new facilities to open provisionally with a reduced staff. This would enable Tanzania to maximize the number of new dispensaries and increase access to health care across the country, gradually increasing staffing at each facility as the supply of skilled health workers grows.

These two initiatives are crucial to rapidly increasing the number of front line workers available to staff the new dispensaries planned in the MMAM. They will help broaden access to health care across the country and, along with the interim staffing requirements, maximize the number of new facilities that can be constructed, staffed, and opened in the near term.

System-wide policy shifts to enable growth

Network optimization also depends on government-led system-wide initiatives. Through conversations at the Ministry and in combination with data and thoughts from Tanzanians in the field, the team developed several policy opportunities to address major constraints and supplement the work being done at the local level. The team identified four immediately implementable system-wide changes.

1. Encourage and subsidize off-campus housing.
2. Transition from opt-in contractual employment for retirees (essentially mandatory retirement with a cumbersome appeals process) to opt-out automatic rehiring.
3. Provide full funding for successful MD students to complete masters programs in exchange for a commitment to teach.
4. Raise costs for foreign students, especially at nursing and CO schools with higher shares of foreign students.

---

42 Source: 2008 Twiga model (see note 17); team analysis.
Reducing attrition

At the present rates of pre-service and in-service attrition, nearly sixty percent of increased throughput will be soaked up by filling slots vacated through attrition. Even so, the workforce would double over ten years and the overall skill level of the health workforce would increase (Exhibit 12).

Overall loss from the workforce is a combination of voluntary and involuntary attrition. Voluntary attrition includes workers who choose to leave their posts to take public health positions with NGOs in Tanzania, who decide to work in health care outside of Tanzania, or who leave the health care field altogether. Involuntary attrition includes death in service, retirement, and approved absence for further education.

We found in our field research that voluntary causes account for over one-fifth of the annual workforce loss – i.e., eight thousand of the ~49,000 workers expected to be lost between 2009 and 2019. Cutting the voluntary attrition rate in half would reduce that number to four thousand, increasing the workforce in 2019 by almost ten percent to 52,000 (Exhibit 13).\(^{44}\)

However, if overall attrition rates could be halved – not only through curbing voluntary attrition but

---

43 Presumes average attrition of approximately five percent of graduates before entering into service (includes emigration and non-clinical work) and annual workforce loss through attrition, death, and retirement of approximately thirteen percent across all cadres.

44 Source: Ministry of Health Interviews; 2008 Twiga model (see note 17). Calculations based on halving both pre- and in-service attrition due to emigration and non-clinical work, without altering rates of annual workforce loss due to leave for upgrading coursework, death in service and retirement, across all cadres.
by preventing death-in-service through improved employee health care and infection control, raising
the retirement age from 55 to 60, and initiating on-site in-service upgrading courses – doubling intake
could result in a tripling of the workforce.

Further systemic opportunities

In addition to the four key system-wide enabling
initiatives and improved retention, we noted a
number of promising initiatives that could further
strengthen the health workforce in Tanzania. Many
of these ideas originated with principals at the
visited schools, Ministry officials, case examples
from similarly challenged sub-Saharan countries, or
through analysis and research.

While most of these ideas touch on training, they
often target other phases of the health worker
management cycle, from recruitment and placement
to productivity, promotion, and retention.

Optimize student selection and allocation

Enrolling students at schools in their home regions
whenever possible, particularly in co and equivalent
cadres, and instituting confirmation deadlines
for students to claim their spots at schools would
discourage attrition and enable schools to build
waiting lists to fill last-minute openings.

The net result would be a reduction of wastage in
training capacity by increasing the potential for
trained workers to live and work in the regions within
which they were trained.

Encourage healthy competition

Offering incentives, such as a $50,000 grant
competition for the school that best uses funds to
increase capacity, could encourage innovation. An
annual conference for principals of each school type
would also facilitate the sharing of best practices and
encourage information flow between schools.

While knowledge-sharing may seem counter-
intuitive from the point of view of competition,
it would actually stimulate growth since, at each
conference, school leaders would be under pressure to
demonstrate new and innovative thinking.

Invest in workplace improvements and teaching resources

Lack of teaching resources was consistently cited
by faculty as their greatest hardship – more often
even than low salary. Alleviating this problem could
improve both the retention rate of tutors and the
quality of training, as well as increase interest by
post-graduate workers in continuing to take part in
training programs as newly minted faculty.

Develop a ‘scheme of service’ for health educators

Health educators are classified and compensated
according to their clinical practitioner status, making
it difficult to design incentive schemes specific to
teachers.

Creating a separate classification for health educators
would enable greater flexibility. The Directorate of
Administration and Planning is currently developing
a scheme of service for health educators. It may be
beneficial to expand and upgrade this program.

Ensure prompt and consistent payment of salaries

Many health workers remain subject to a three-month
probationary period before they can receive their first
paycheck. Paying salaries from the start of service may
help keep new health workers in their first year of
service, a high-risk time for attrition.

Additionally, as the Lake Zone diagnostic team
determined, although many rural or regional
placements are funded on time, limited local
management capacity – combined with accountability
and delivery issues – often result in health workers
not being paid for up to two years after taking up their
posts.
Provide incentives for rural placement
At present, health workers are paid according to their level of training, with no differential for the varying challenges of different posts. Hardship pay for rural posts could facilitate the deployment of workers to unpopular areas and improve retention, along with incentives such as free accommodation (with ownership vesting after five years of service) and guaranteed education allowances for their children.

Permit periodic rotations of health workers
Health workers wishing to change posts must resign from their positions through the central health ministry and then reapply. As with financial incentives, simplifying the process of rotation between posts and prioritizing workers from hardship posts in staffing choices would decrease the risk of accepting a rural or hardship post.

Place graduates in home regions
Post selection has traditionally been centralized, based primarily on national need rather than applicant preference. The Ministry has begun to transition to district-based recruitment and deployment which, if based in part on the geographic origins and personal preferences of graduates, would improve their likelihood of reporting to and remaining at their post.

Invest in continuing education
Continuing education is essential to maintain knowledge and improve skills, and it creates a sense of a professional health worker community. Trainings designed to build or refresh skills should be scheduled during breaks in the school calendar to minimize conflicts between professional development and teaching responsibilities.

Additionally, funding individual tutors or faculty to reach a higher diploma or degree level as a reward for years of good service, or for other achievements, could boost morale, productivity, and retention, as well as incentivize increased interest in the health worker training system after graduation.

Develop a performance management system
When compensation and promotion reflect standardized achievement-based metrics, it is easier to use those tools as incentives to improve staff productivity and performance. Specific metrics, such as the percentage of students succeeding on standardized exams, could encourage high-quality teaching.

Annual staff evaluations with bonuses for exemplary performance can serve as a powerful tool to boost retention and morale. Similarly, promotions based on service and the quality of research conducted, rather than on standards such as number of published articles, help to create incentives targeting improved productivity and commitment.
Beyond Twiga

Even with successful implementation of Twiga and the resulting addition of 22,600 new health workers, Tanzania will fall short of its ambitious targets, being well below the WHO target of 23 health workers per ten thousand people. The country will still require 92,500 additional workers to provide a minimum standard of health care to its people (Exhibit 14), expected in 2019 to number over 50 million.

Within the ten-year time horizon, workforce expansion still faces three chief obstacles. First, once school-specific optimization has been achieved, the training network will be at maximum capacity, with no further opportunities for enlargement. Second, pipeline issues still dominate and are exacerbated, given that new schools face a minimum of two to three years’ development before they can admit their first student. And finally, the cost, based as it would be on brand new infrastructure, becomes almost insurmountable.

To further accelerate the growth in the health worker supply beyond Twiga, the team identified a handful of ‘game-changing’ or ‘transformational’ ideas that may help alleviate these constraints and pave the way to the production of a larger and more targeted health workforce. Many have been discussed at one time or another within the Ministry, but none has reached the action-plan stage.

Some of the most promising ideas are as follows:

- Rationalize student financing through creation of a national student loan program.
- Focus scarce resources on targeted cadres by defining the ideal composition of the workforce.
- Shorten the training pipeline by creating a Basic Service Provider cadre and accelerating AMO training.
- Improve access to faculty by enhancing national and international collaboration of medical training schools, sharing curricula and staff, and increasing technological support.
- Maximize use of limited training resources via virtual classroom learning and distributed clinical training.

While below we provide a number of initial thoughts toward developing these ideas, each requires a focused diagnostic, including substantial additional data collection and analysis, to determine its feasibility and applicability in Tanzania. Such diagnostics could be conducted in parallel with Twiga execution.

Our team found that the combination of virtual learning in the classroom and distributed clinical training would be less resource-intensive and more flexible in the long term than building either new multi-purpose training institutions or a large centralized institution for basic sciences teaching. Ministry officials have given significant thought to both options, and additional analysis is required to determine the most appropriate and cost-effective solution for Tanzania.

However, we concluded that building new schools from scratch would require more faculty and tutors in addition to significant new construction. Therefore, any options for maximizing existing resources should be exercised first.

40 Sources: Ministry of Health Interviews; Bryan 2006; HRHSP; 2008 Twiga model (see note 17); World Health Report 2006. Health workforce demand calculated based on WHO minimum density targets, 2005 staffing establishment for required ratio of diagnostic and support staff, and 2019 population based on expected annual growth rate of 2.09 percent.
Financing health worker training

We did not attempt to solve for all financial issues resulting from scaling up programs, but it is clear that financing is severely limited at national government and local training facility levels. Financing health worker training in Tanzania places a great burden on both students and the government. Student fees in Tanzania do not currently reflect the full cost of education, and limited subsidies often leave significant gaps in school resources.

As such, facilities are left without resources for expansion or maintenance. Adjusting student fees to reflect the full cost of education would provide sufficient resources for schools to plan for and finance their own growth. However, higher fees without support would make attendance difficult for many students. Both government-provided financial aid and private student loan programs for all cadres are needed to ensure that health education remains accessible to all qualified applicants.

One option we designed to address this issue is the development of a private student loan program.

Private loans

A competitively priced student loan program would increase the overall flow of funds to teaching institutions, making school expansion sustainable without limiting access to education. Successful examples of this approach have been initiated by the International Finance Corporation (IFC) in partnership with private-sector banks in both South America and Asia through a compelling retail business model.

The potential for a similar student loan programs in Tanzania can only be ascertained by assessing risk, determining political interest and public acceptance, and identifying collaborative partners, including banks and multilateral organizations.

Of course, prerequisites for such a loan scheme include, at a minimum, a commercial bank willing to operate it. High interest rates, the norm in Africa, are prohibitive. The bank will need to be confident of its financial risks, such as default rates, and the extent to which these risks are manageable. An efficient collection scheme, a legal framework, and appropriate
**Applicability**

Some policy adaptations may be required to apply the scheme in Tanzania. However, despite the potential for resistance from some government, training institution, and student levels, there is clear interest in and need for such a program.

There is a clear budgetary advantage to the government and the training institutions. Students are already accustomed to paying a contribution for their studies, and they currently do so without recourse to competitively priced loans. That institutions will transfer a greater proportion of training costs to the students is likely to be accepted with the right supporting framework.

**Defining the optimal workforce pyramid**

There are a number of ways to determine the optimal health worker skill mix (and population) in a country. Our team first calculated the projected 2019 health worker gap from the official government Staffing Establishment by number and type of open facilities per year, as envisaged in the MMAM policy.

The WHO target of 23 workers per ten thousand people is a global measure based on research linking clinical health worker density to patients attended. Other

---

analyses have sought to generate decisive figures for the optimal skill mix based on tasks performed in pursuit of MDGs or national mortality reduction goals.\(^{46}\)

The current staffing shortage is so severe across all cadres of health workers in Tanzania that there should be a push to maximize training capacity in every existing institution. Nonetheless, because this will be insufficient for Tanzania to meet its health workforce needs, the country will need a means of focusing increased resources (however limited) on priority areas, based on national and global health targets. The current workforce is heavily weighted in favor of nurses, and blanket growth will accentuate this bias, whether reflective of national staffing needs or not (Exhibit 15).

**Define the pyramid...**

An assessment of the optimal health worker pyramid might begin with a survey of the disease profile across Tanzania and then break down the six major care pathways (maternity, children, HIV/AIDS, malaria, TB, trauma) into subcategories. In children, for example, this breakdown would involve distinguishing between vaccinations or perhaps treating diarrheal diseases. The net result might be the identification of around thirty discrete areas that form the core primary care needs of the country.

After breaking down the data by district, primarily on geographical and social lines, the net result would identify not just the needs for Tanzania as a whole but also the outer edges of any continuum on which health care worker staffing decisions are made.

Once this information is evaluated together with the skill mix of the existing pool of cadres in Tanzania, and then compared to the needed activities for each of the thirty care pathways, a detailed outline of training needs would result. It should be assessed using recognized WHO guidelines on clinical requirements modified for local interpretation and multiplied for the amount of time needed for each treatment.

...to define the task

The resulting model would be a robust declaration of the human resources necessary to meet the health conditions of the country, providing the number of full-time equivalent clinical assistants, nurses, AMOS, physicians, and other workers necessary to meet the primary care challenge.

We recommend, as a starting point, the assessment tool developed by Kurowski in 2007, which helps not only to project workforce demands but to modify the underlying skills development process informing his projections.\(^{47}\) The results could then be used to develop an action plan to modify the training system and fully align curricula with packages of needed skills, including the potential addition of new cadres or construction of new schools.

---

\(^{46}\) Kurowski 2007 explores one approach to projecting future human resource needs based on the skill sets and productivity of different cadres of health workers in Tanzania.
At the same time, the findings could be used to establish *interim* staffing requirements – a minimum skill set required to open a care facility, pending the growth of the workforce to the point at which real staffing levels can be met.

Interim staffing requirements would affect the rate of new facility construction: under the current guidelines, by 2019 Tanzania will be able to bring existing facilities up to standard and staff 741 new facilities. However, by adopting interim staffing levels, by 2019 the system could support 2,360 new facilities, each with roughly half the officially required staff (Exhibit 16).

**Shortening the pipeline**

Training a health worker takes an average of three years, and at present in Tanzania, a minimum of two. We projected that it will take roughly four years to feel a significant impact on Tanzania’s health workforce from this optimization process. According to the Ministry’s estimated timeline for building new dispensaries, construction will dramatically outpace production of new staff.

---

**Primary care providers**

The existence of a lowest-skilled, but formally employed, clinical health worker category that can be rapidly trained to handle most primary cases at the dispensary level would reduce the delay in health worker production, enabling new facilities to open sooner.

Similarly, another type of rapidly trained health worker might serve as an intermediary between the local community and dispensaries or health centres, helping rural Tanzanians distinguish between conditions that can be treated at home and those that require professional treatment in a health centre or hospital.

Given experiences in other countries, training time for these roles could be a fraction of what current curricula require. For instance, a skills-based curriculum featuring a six-month classroom component followed by six months of supervision and mentoring in the field would reduce training time by fifty percent over the current minimum (one year in the classroom for a CA). Placing these workers in pairs in dispensary facilities would permit all the new dispensaries envisioned in the MMAM policy to open within three years, providing access to basic health care for thousands of people (Exhibit 17).

**Accelerated AMO training**

In addition to creating a new basic service provider, curricula for existing cadres could also be shortened to increase output. Just as the Ministry has recently shortened the training time of both RNS and ENs and created the new CA cadre based on a shortened CO program, it can accelerate AMO training.

Currently, all AMO students are upgrading their skills after three years of CO training and at least two years of clinical work in the field. However, by starting a parallel program training AMOs through their CO program but directly out of secondary school, Tanzania could significantly expand this cadre of substitute doctors.
**Improving faculty access through institutional collaboration**

The severe shortage of faculty is the primary factor limiting further health worker training expansion in Tanzania. Maximal use can be made of the existing faculty resources through two types of institutional collaboration: national and international.

Through national collaboration between the five Tanzanian universities and dozens of allied health schools, the country can develop a program to share limited teaching resources. Presently, sharing does exist but tends to be informal, inefficient, and tailored to faculty availability rather than curriculum requirements.

A national system enables faculty sharing, which can take place either through a formalized system of faculty circuit-riding or through systematizing national curriculum development to enable broad

---

**ETHIOPIA’S PRIMARY CARE PROVIDERS**

Health officers in Ethiopia are substitute doctors, with a role very similar to that of AMOs in Tanzania. When Ethiopia launched an ambitious plan to increase access to health facilities, a dramatic increase in the number of Health Officers to manage these facilities was called for.

Created with the support of the Carter Center, Ethiopia’s Accelerated Health Officer (AHO) program is furthering this objective by networking Ethiopia’s universities, developing a targeted curriculum tailored to the country’s disease profile, and making use of hospitals previously unused for clinical training. To enable the use of the equivalent of regional and district hospitals for clinical training, the administrators of the AHO program evaluated facilities and made selective upgrades to ensure that each had sufficient teaching space and an appropriate variety of clinical professionals on staff.

The AHO program is also linked to Ethiopia’s Health Extension Worker (HEW) program, which aims to place 30,000 workers – all women – in rural villages under the supervision of an AHO. The HEWs are trained for one year in special training sites all over Ethiopia.
implementation of e-Learning methodologies, hence levering those faculty that do exist.

Through international institutional collaboration with an emphasis on north-south linkages, Tanzania could develop a global academic exchange program that would augment national teaching capacity and contribute to innovative curriculum development.

Such exchange exists now but tends to be poorly coordinated and based on the availability and desire of international staff rather than on the actual needs of each institution. A focus on the potential for increased institutional collaboration should include identifying not only potential collaboration partners, but also promising substantive focus areas and possible avenues for funding.

**Maximizing limited teaching resources**

In an optimized training network, the availability of trainers – tutors, mentors, faculty, and clinical supervisors – will be the main factor limiting further expansion. We suggest that this constraint can be partly overcome with virtual learning and decentralized training techniques (Exhibit 18), as adopted in many other countries.

These could include both prerecorded lectures and the use of staff at clinical care facilities not currently affiliated with training programs as supervisors for clinical practice.

**Virtual classroom learning**

Building on the national and international collaboration possibilities described above, a virtual learning program could further extend the reach of limited teaching resources by enabling faculty to provide electronic versions of their lectures to remote schools, where students could then benefit from the training without changing geographies. Distance learning is currently being used in some in-service and short disease-specific courses in Tanzania, so any replication or expansion of those efforts would need to take into account any findings and recommendations from a recent assessment by i-TECH and the Ministry.48

What is necessary is an assessment of the potential for virtual learning in the Tanzanian context (including technological and infrastructure challenges and ways to overcome those challenges). The assessment would also focus on opportunities to link virtual learning to the curriculum changes suggested by the pyramid analysis.

Lecturers would need to be selected based on their expertise in the field and would sign up for a curriculum agreed upon by all affected training institutions or relevant professional associations. A standardized national curriculum in biochemistry, for example, would make it possible to use prerecorded lectures at schools where there currently is no biochemistry professor. Taped instruction could also extend teaching to remote areas, eliminating the need for students to be centrally located near large training institutions.

---

To ensure that students absorb the material, tutors would need to be available to answer questions, and weekly self-assessments could be administered to measure student progress.

The primary implementation challenge is the availability of sufficient technological infrastructure and support able to design and run a reliable information and communication technology (ICT)-based training program. Such a program forms the foundation of Weill Cornell’s new medical college in Doha, Qatar, for example, and could be used as the framework for such a program in Tanzania.

**Distributed clinical training**

Similarly, distributed clinical training would make use of the regional and district hospitals currently employed as care facilities only and not as training sites.

Clinical staff and clinical infrastructure are two of the six constraints to scaling up training capacity at schools across the country. At present, not all of the regional and district hospitals are used as clinical training facilities, leaving significant untapped training capacity in the remaining facilities.

**EMPLOYING DISTRIBUTED TRAINING AT BUGANDO**

Tanzania’s five university-based medical schools would provide a strong foundation for employing distributed training. The Weill Bugando university uses the tertiary referral hospital of the Lake Zone – Bugando Medical Centre – as its teaching hospital. However, by accessing the medical officers and specialists working in the six regional and 46 district hospitals of the Lake Zone, Bugando could focus its growth on classroom teaching and building non-clinical capacity, while dramatically multiplying the number of students it prepares for clinical practice in the zone.

This approach would have the secondary effect of improving patient care in the utilized hospitals, as well as increasing the potential that graduates would choose to stay to practice in those geographic locations.
Touch Foundation

Creating organized, rotational clinical training programs in these underused hospitals would increase the number of training sites, allowing schools for whom clinical capacity is a bottleneck to expand dramatically. Additionally, this rotational scheme would expose students to a broader range of potential sites for future employment.

It would also be necessary to assess healthcare facilities to determine which are promising clinical training sites and what additional inputs would be needed (e.g., training physicians in teaching techniques, providing student housing and transport, etc.) to ensure success for any implementation program.

Using clinical staff at these facilities to supervise and train students might require training in teaching methods, as well as upgrading skills, depending on the cadre being taught. Based on the current distribution of specialists and supervisory staff, regional hospitals might be more appropriate for MO and AMO training, whereas district hospitals might better suit nurses and COS.
Implementation

Our approach was designed as part of a three-phase process moving from the strategic objective of expanding health worker training to the realization of that goal. The three phases (broadly defined) are necessary for every project or activity geared toward improving health outcomes more generally, and are as follows:

- Conduct an initial diagnostic in which the problem is defined and relevant data is collected.
- Develop an action plan in which the collected data is analyzed to create an implementable work plan.
- Undertake an execution phase, in which the work plan is implemented and initial results are measured.

The school-specific action plans and system-wide initiatives outlined in this report are ready for the third phase. However, we were not able to complete diagnostics and draft action plans for all of the potential opportunities that grew out of the Twiga diagnostic, some of which we outlined in the previous chapter.

Rather than advocate immediate execution of all possible recommendations, therefore, this report advocates parallel activities based on the necessary next step of each identified recommendation – whether that next step be a data-gathering diagnostic, action planning, or full-blown execution.

Simultaneous implementation has the advantage of maximizing efficiency and speed of execution: when execution is complete (of one activity) efforts can begin on the activity for which action planning has just been finished, while planning begins on the activity for which the diagnostic has just ended.

This structure lends itself to a three-stage timeline – now, next, and soon – with each activity simultaneously progressing on its own trajectory.

To do now...

Implementation for each of the activities described in this section could begin as soon as resources are available for funding and support.

The 39 visited schools and system-wide initiatives: execution

Of our recommendations, the component ripe for execution is the action plans to optimize the 39 visited schools, as well as the attendant system-wide changes. Executing these plans will require the Ministry to secure sufficient funding, engage appropriate implementation partners, and ensure political support for recommended policy shifts.

This execution phase will include not only expanding existing programs but capitalizing on synergies to add new programs to existing schools. Throughout our research, the team identified several institutions that could achieve economies of scale and accommodate additional students with minimal investment, resulting in an annual student increase of ten to twenty percent over and above increased intake as a result of optimization.

Successful execution will require skilled project management and multilateral collaboration to ensure achievable annual targets for training throughput, as well as a multiyear implementation plan that includes ongoing evaluation and modification.
**Remaining schools: action planning**

While visiting the first 39 training institutions, we covered a broad cross-section of Tanzanian geography and population density. Extrapolating from schools of similar size, program, and current intake, we included the remaining 58 institutions in our projected total cost of school-specific optimization and in our assessment of optimization’s overall impact, even though we were not able to visit and assess them personally.\(^9\)

But accurate action and investment plans cannot be developed solely through extrapolation; each school is different and must be independently visited and assessed according to its specific expansion opportunities. We anticipate that this process would take approximately one year, and should be undertaken as a joint venture between the implementing partner and the Tanzanian government.

Once this joint team has developed the remaining school optimization plans, overall funding requirements may need to be adjusted before plans are implemented. However, given that we covered nearly sixty percent of Tanzanian health worker training capacity, we believe that any adjustments are likely to be minor.

**Transformational approaches: diagnostic and conceptual development**

The implementation of any new systemic or transformational approach will require rigorous data collection and analysis of feasibility, impact, and cost for Tanzania. This will entail answering such questions as follows:

- What data is required to conduct a complete cost-benefit analysis?
- Are there stakeholders either within or outside the government who would oppose this initiative, and could their opposition be overcome?
- How will teaching quality be maintained?
- What skills are essential for a dispensary worker?

This analysis does not, and should not, have to wait until the school optimization or more detailed system-wide initiatives are complete. Rather, the school optimization program can serve as a kick-off for a multiyear health workforce improvement plan that works on several fronts simultaneously.

In this way, implementation of phased implementation programs targeting either transformational approaches or supporting health worker management strengthening could be ready for launch by the time optimization is completed.

...to do next...

All of the above can begin immediately and relatively independently. The next stage is to work through the following set of issues.

**The 39 visited schools: monitoring and evaluation**

As we progress into later stages of implementation, it will be crucial to actively monitor previously executed scaling-up programs to ensure that they are progressing on schedule and having the anticipated impact, as well as to apply learnings from those activities to future endeavors.

**The remaining schools: execution**

Once action plans have been developed for the remaining training schools, execution of those plans can begin, following the pattern developed while executing plans for the initial 39 schools. Lessons learned from that initial execution phase would also be applied.

---

\(^9\) See note 9 for explanation of number of institutions.
Transformational approaches: action planning

For the five transformational activities described above – student financing, the workforce pyramid, shortening the pipeline, institutional collaboration with international universities, and virtual learning – the initial diagnostic studies will provide the data and analysis necessary to create implementable action plans.

New ideas: diagnostic and conceptual development

The above diagnostics of transformational ideas may also reveal other promising activities that will themselves require further investigation.

...and to do soon

Assuming no dramatic changes in policy or direction have occurred following further diagnostic programs, the following series of efforts will need to be undertaken.

All health training schools: monitoring and evaluation

As implementation progresses, monitoring and evaluation will assume an increasingly large role as more programs are executed and begin to generate results, as well as lessons for future activities.

Transformational approaches: execution

Implementation of the transformational approaches – student loans, the health worker pyramid, accelerated training, institutional collaboration, and virtual learning – would build on the findings and details discovered and planned for in the above diagnostic and action plan stages. Based on these earlier stages, execution strategy will vary by activity, from launching pilot programs in some cases to beginning national roll-out in others.

Implementation challenges

There are a number of challenges that Tanzania will need to overcome to achieve successful implementation. These challenges are particularly acute when it comes to ongoing primary data collection and analysis, decentralizing management and oversight, and ensuring stakeholder collaboration.50

Capacity constraints

Scarcce resources and the need to balance the interests of a vast array of internal stakeholders, as well as donors, NGOs, and other government ministries, have hindered the Ministry in systematically gathering and analyzing data, drafting evidence-based action plans, and implementing the policy on training expansion.

The recommendations of the Twiga diagnostic have been extrapolated to the entire training network, based on data collected at over one third of the nation’s training institutions. In order for this analysis to have lasting value, it must be coupled with the development of data collection systems,51 as well as analytical toolkits that link data to planning processes. This will enable government administrators to model out the implications of policy choices and implementation priorities before execution.

Decentralization

Implementing these recommendations spans many levels of administration, from the central Ministry to each individual school principal. Effective implementation requires balancing national direction and monitoring with local ownership and oversight. For a single Ministry department to monitor progress at nearly one hundred training institutions poses significant challenges. Further, a comprehensive training expansion program must involve not only

---


50 For more on one initiative to implement a computerized Human Resource Information System in sub-Saharan Africa, see The Capacity Project, Strengthening Human Resources Information Systems Aug. 2007.
public institutions, but also faith-based and private training facilities.

In the Tanzanian system, district or council health management teams develop strategic plans for Tanzania’s 113 districts, receive direct funding from international donors, and manage local training and other projects designed to meet their strategic objectives. Each of the 21 regional health management teams corresponds to the regional level of governance and sets similar strategic targets for its regions. Their primary responsibility is to oversee the district level of healthcare, however, so they receive no direct funding to implement programs.

A number of health-training-related activities are beginning to be governed at the zonal level as well, with ongoing efforts to build management capacity within the government’s eight Zonal Resource Centres.

Delegating primary responsibility for implementation to one of these middle administrative levels would enable more efficient use of the central Ministry, which can then track eight zones rather than nearly one hundred individual schools. This will also lay a foundation for the decentralization of other data-intensive responsibilities down the line, such as the recruitment, placement, and evaluation of health workers.

As the Ministry considers how to allocate implementation responsibilities, the comparative advantages of each potential level of institutional oversight should drive the decision-making process. For instance, national direction, oversight, and accreditation is important to ensure consistent quality of care, equity of service provision, and reliable national resource flows, and might be more appropriate for curriculum development, data analysis, policy and planning.

Conversely, local ownership ensures that local knowledge and relationships of trust are leveraged appropriately, enables rapid reaction to community needs, and might be more appropriate for overseeing construction and collecting primary data.

Information distribution

Responsibility for the health workforce does not reside solely within the Ministry. Changes to pre-service training will affect hiring, deployment, and retention. Planning and implementing training-related initiatives, therefore, will affect numerous stakeholders. Information flows between ministries, between directorates within each ministry, and between governmental and non-governmental stakeholders will be essential to achieve a comprehensive and broadly accepted capacity expansion.

Cost of system optimization

We project the cost of implementing the Twiga recommendations – both completing the action plans for the 39 visited schools and assessing, action planning, and executing plans for the remaining schools – to be around $52 million in one-time costs, with up to an additional $10 million in incremental annual costs (Exhibit 19).\(^\text{52}\)

But these figures do not indicate the full cost of implementation, as they do not take into account the impact that increased production of health workers will have on health worker salaries. This impact is not negligible: within ten years, salaries of the additional health workers will rise to approximately $122 million annually, roughly double the estimated cost of health worker salaries in 2007.\(^\text{53}\)

To put this into context, in 2006, the last year for which complete budget data is available, the health sector budget was $310 million (Le 388 billion), accounting

\(^\text{52}\) Source: 2008 Twiga Model (see note 17); team analysis through extensive qualitative and quantitative field work.
EXHIBIT 19
The implementation hurdle

<table>
<thead>
<tr>
<th>$, millions</th>
<th>2010</th>
<th>2015</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>55</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For nearly eleven percent of the Tanzanian government budget.\(^{54}\) Twenty-three percent of that budget – $71.5 million (TSH 89 billion) – was allocated to health worker compensation.\(^{55}\) This was equivalent to 2.3 percent of the general government expenditure that year, and a little over half of one percent of the Tanzanian GDP.

Since 2005, the Tanzanian health budget has grown annually by an average of 28 percent. Estimated figures for 2008 confirm that the health sector again accounts for 10.7 percent, with $518 million (TSH 648 billion) of the Tanzanian government budget of $4.85 billion (TSH 6.067 trillion). It now shows an allocation of $149 million (TSH 187.4 billion) for health worker compensation, an increase to nearly 29 percent of the health sector budget. This increase was created in part by doubling the percentage of GDP allocated to health worker compensation (to one percent).\(^{56}\)

If our recommendations are implemented and the health workforce grows as anticipated, the increase of $122 million (TSH 152 billion) would bring the allocation to health worker compensation to $267 million (TSH 334 billion) by 2018. If the Tanzanian economy continues to grow at its 2007 rate of 7.1 percent, however unlikely in the current climate, the government would be able to cover this additional cost without increasing beyond one percent of GDP pledged as in 2008 (Exhibit 20).\(^{57}\)

However, as this was nearly double the percentage of GDP allocated to this budget area in previous years, it remains to be seen whether this allocation of funds will be sustainable and whether the Tanzanian economy can maintain historical growth rates given global economic pressure.

Further, an expanded health care system will incur additional costs: construction and maintenance of new facilities, equipment and consumables in those facilities, subsidized drugs to stock new dispensaries, and so forth. So it is clear that rebuilding the health care training network using government resources alone is unlikely to be possible.

---

\(^{52}\) Last year for which salary information was available.


\(^{54}\) The $71.5m (TSH 89.3bn) was allocated $38.4m (TSH 47.9bn) to Local Government Authorities (LGAs), $7.25m (TSH 9bn) to Regional Administration, $5.1m (TSH 6.4bn) to the ministry HQ, and $20.7m (TSH 25.9bn) to Parastatals, including the largest hospitals.

\(^{55}\) The nominal 2007/08 Medium Term Expenditure Framework (MTEF) allocated TSH 178.4bn to Personnel Emoluments for the Health Sector, including TSH 113.3bn of the Local Government Authorities, TSH 16bn of the central ministry budget, and TSH 58.1bn of grants to parastals. However, nominal allocations exceeded actual expenditure by about ten percent in 2005, 2006, and 2007, suggesting that the total FY2008 MTEF budget of over TSH 682bn is not necessarily indicative of actual allocation and expenditure.

\(^{56}\) Source: 2008 Twiga Model (see note 17); team analysis through extensive qualitative and quantitative field work; CIA World Factbook; 2006 and 2008 MTEF and PER.

Monitoring and evaluation

A significant obstacle to government action to address health workforce issues is the lack of reliable information on the relative value of different policy approaches. Our research has yielded a set of metrics that apply not only to Tanzania but to the growing field of health workforce intervention, enabling nations to track the impact of policy on training-

program throughput, growth of the health workforce, health worker density, and health outcomes.

The MMAM policy is an ambitious call to action – to achieve better health outcomes across Tanzania by increasing equity of access to healthcare services nationwide. The recommendations in our approach take up this charge, laying out a plan of action for achieving a key first step – higher throughput from training facilities. This throughput metric is appropriate for a number of reasons: it is easy to implement, easy to cost, and easy to track from a central ministry.

But improving throughput is not sufficient to improve health outcomes for Tanzanians; graduating health workers must be recruited, hired, retained, and developed, and a number of supporting systems must be maintained. In formalizing an implementation plan, acknowledging and accounting for these equally important and challenging elements of a robust health system will be essential.

Placing and retaining workers

As noted, implementing solutions offered by our team should lead to a doubling of student intake within four years. Translating this increased intake into a proportionate growth of the health workforce depends almost entirely on attrition rates. This suggests that the Ministry will need to carefully track and respond to attrition rates in real time, to ensure that the increased throughput of the training system is not being lost to growing attrition.

Just as attrition rates affect the impact of increased student intake, the placement of graduates affects how an enlarged workforce improves access to health care; workers must be in the right jobs and in the right locations to make a difference. Hence, data must be collected at several points along the chain to ensure that the input of increased student intake results in the expected output of increased access to care.
Our team identified some of the types of data that could serve this purpose: number of workers of each cadre arriving at post, movement of workers from rural to urban areas, attrition from public to private clinics, and worker productivity. In any event, a serious approach to placing workers and ensuring they reach their posts will be critical in ensuring that investments in increasing capacity are not then lost.

**Measuring impact, modifying initiatives**

The **WHO** has demonstrated a correlation between health worker density and access to basic services, such as skilled birth attendance and childhood measles vaccinations. The wide variation of statistics on related health outcomes like maternal mortality, however, between countries with similar health workforce densities suggests that a number of other factors – for example, operational weaknesses like those noted above – also contribute to improved health outcomes.

So how will Tanzania and its donors know if this initiative is having a positive impact? The answer lies in additional information gathering. For example, a key Millennium Development Goal for health is maternal mortality. Gathering data on childbirth-related deaths and the number of attended births on a district-by-district basis would help the Ministry to determine both whether health outcomes are improving and whether improvements can be linked to increased worker density, number of attended births, or other factors, such as improved access to medicines or improved training.

Not only will this approach assist the Tanzanian government in future policy planning and prioritization, it will demonstrate to other governments and potential funders how significant the impact of pre-service training can be on the metrics they have pledged to improve, and against which they are ultimately judged.

Over the next ten years, the Tanzanian population is expected to grow from 41 million to 50.4 million. At that rate, doubling the health workforce will increase health-worker density by 62 percent, from 5.2 to 8.3 health workers per ten thousand people.

Even so, the increase may have limited impact on health outcomes unless Tanzania also bolsters systems for deployment and retention of workers in rural areas, ensures the reliability of drug supply, improves capacity at the primary care level, increases responsiveness of the referral system, and addresses other systemic weaknesses.
Conclusion

Our experience in Tanzania has shown that there is tremendous opportunity to increase the capacity for health worker production through tactical, on-the-ground assessments and optimization of existing training institutions.

We did not identify any silver bullet opportunities to immediately transform Tanzania’s health worker training system. Nor did we model any training expansion resulting from private sector investment, primarily because the enabling environment for such investment (such as loans schemes) does not yet exist. Instead we approached the problem from the perspective of the entire health economy. Direct private sector investment, perhaps underpinned by loan programs and other financing options, could enable a significant increase in supply and help close the gap sooner.

Still, our approach as it stands would help to double the capacity for health worker training over ten years at a cost of just over $150 million in total, exclusive of health worker salaries. This effort will require funding, successful implementation of system-wide initiatives that supplement local change, and oversight of engaged stakeholders at the local and national levels.

While we conducted our assessment of training capacity exclusively in Tanzania, we believe that this approach to scaling up health worker training capacity could be employed by any country with an existing health worker training system. The approach relies on building a strong business case for each institution, creating individual accountability at the school/institution level, and ensuring a specific, granular implementation plan that can be managed locally and monitored nationally. Although the range of potential impact is likely to differ from country to country, the principles and methodology are completely replicable.

It bears repeating that optimizing the existing training network is not sufficient to solve the health workforce crisis. Ministries of health in the developing world are likely to continue facing shortages many years into the future. Therefore it is important to combine implementation of near-term solutions such as network optimization with analysis and planning for longer-term transformational approaches. We firmly believe that, for countries with existing training systems, these approaches are complementary, not alternative, for continued development.

The core problem is that, even with an expanded training output, there will still be a dramatic chasm between supply and demand of the health workforce. This chasm can be bridged but requires improvements in productivity, career opportunities, resource availability and focus, and health worker retention. These problems will remain despite increased production.

The reality persists, therefore, that the governments of developing countries need to make difficult decisions on where to invest in health worker training and how to deploy and manage the relatively few health workers who are available. What cadres of workers are the best to scale up for a given country? Should countries scale up a balanced pyramid of workers or focus on cadres where there is a specific need? How should countries balance the staffing of a handful of advanced, central health care facilities against staffing a large number of dispensaries? How can they best ensure that the increased annual costs to support a larger workforce are covered?

While the analysis we conducted in Tanzania cannot directly answer these questions, linking training
capacity over time with the projected supply and demand of health workers is critical in framing the trade-offs that countries need to consider, allowing them to make informed decisions on how to best manage the challenges along the road from their current state to meeting the WHO target of 23 health workers per ten thousand people.

A skilled workforce is but one component of the complex health system molecule, along with access to medicine, diagnostic equipment, public health education, sufficient facilities, and so forth. But it is an essential piece – a cornerstone that could make achieving global health targets for reducing maternal death, childhood malaria, and HIV infection a reality.
Appendix – List of Interviewees

By the end of the diagnostic, we had conducted interviews with a large number of people across Tanzania both in government and in the health training sector. Within the Tanzanian government, interviewees included the Chief Medical Officer, many department directors, assistant directors under the department of Human Resources and Development, and numerous support staff.

At the Ministry of Higher Education, where universities are governed, we interviewed the Director of Higher Education and members of the Higher Education Loans Board. Those interviewed were not limited to but include the following.

**Professor Willbard Abeli**
Director of Higher Education
Ministry of Higher Education

**Professor M. About**
Associate Dean, School of Medicine
Muhimbili University of Health and Allied Sciences

**Ndosi Aston**
Director for Distance Learning
Kilimanjaro Christian Medical College

**Hadija Athumani**
Principal
Bagamoyo Nurse Training Centre

**Mama Eliaremisa Ayo**
Assistant Director, Nurse Training, Human Resources
Ministry of Health and Social Welfare

**Professor Mohammed Bakari**
Director of Undergraduate Students, School of Medicine
Muhimbili University of Health and Allied Sciences

**Rt. Rev. Bishop Aloysius Balina**
Chairman, Weill Bugando University College of Health Sciences
Diocese of Shinyanga

**Peter Michael Bendorra**
Acting Principal and Faculty member
Mbeya School of Theater Management

**Dr. Zacharia Berege**
Director of Hospital Services
Ministry of Health and Social Welfare

**Dr. Rene Bonsubre**
VSO Volunteer, CTC and OPD, Mtwara Regional Hospital; Instructor, Mtwara Clinical Officer Training Centre

**Mama Tabu Chando**
Director, Administration and Personnel
Ministry of Health and Social Welfare

**Edwin Chitage**
Medical Student, Year 3
Muhimbili University of Health and Allied Sciences

**Mary J. Chuwa**
Head, School of Nurse Tutors
Muhimbili University of Health and Allied Sciences

**Father Angelo Dutto**
Director, Institute of Medical Health Sciences (DMLS)
Ruhua University College (RURO)

**Dabney Evans**
Executive Director, Institute of Human Rights, Emory University

**Dr. Gemba**
Principal
Mbeya Dental School

**Matt Gordon**
Multilateral Policy Advisor
Department of International Development (DFID) UK

**Professor Ambrose F. Haule**
Associate Dean, School of Pharmacy
Muhimbili University of Health and Allied Sciences
Professor Jacob Mtabaji
Principal
Weill Bugando University College of Health Sciences

Dr. L.B. Mtani
Principal
Sengerema Clinical Officer Training Centre

Dr. Deo Mtasiwa
Chief Medical Officer
Ministry of Health and Social Welfare

Dr. Mteta
Dean, Faculty of Medicine
Kilimanjaro Christian Medical College

Dr. Elfuraha G.S. Mumghamba
Senior Lecturer, School of Dentistry
Muhimbili University of Health and Allied Sciences

Phebi Murusuri
Principal
Bukumbi School of Nursing and Midwifery

Dr. Amos Mwakilasa
Assistant Director, Continuing Ed., Human Resources
Ministry of Health and Social Welfare

Mama E. Mwakalukwa
Assistant Director, Planning, Human Resources
Ministry of Health and Social Welfare

Bumi Mwamasage
Assistant Director, Allied Health Training, Human Resources
Ministry of Health and Social Welfare

Dr. Emmanuel Mwandu
Chief Medical Officer
Kolando Nurse Training Centre

Osiah Mwasulama
Laboratory Director
Mbeya Referral Hospital

Zainab S. Nanyaro
Principal
Tanga Nurse Training Centre

Dr. Sydney Ndeki
Consultant, Zonal Training Centres
Ministry of Health and Social Welfare

Vernand Ndemetria
Training Coordinator – Nurse Training
Ministry of Health and Social Welfare

Dr. B. Ndawi
Director, Iranga Primary Healthcare Institute & Iranga Zonal Training Centre

Dr. Matthew Ndomondo
Acting Principal
Sengerema Nursing School

Edward Ngowi
Engineer, Office of the Director of Policy and Planning
Ministry of Health and Social Welfare

Dr. Emmanuel N’gwanjikai
Acting Principal
Tanga Assist. Medical Officer Training Centre

Dr. William Nyagwa
Chief of Party, Tanzania
The Capacity Project

Emily Nyakiha
Head, School of Nursing, Institute of Allied Health Sciences
Weill Bugando University College of Health Sciences

Mfungo Nyandigira
Head, School of Radiology, Institute of Allied Health Sciences
Weill Bugando University College of Health Sciences

Dr. Robert Peck
Clinical Instructor, Internal Medicine and Pediatrics
Weill Cornell Medical Centre at Weill Bugando University College of Health Sciences

Professor Abdulla Rajab
Senior Education Officer
Ministry of Higher Education

Dr. Eleuter R. Samky
Director-General
Mbeya Referral Hospital

Dr. Christian Schmidt
Pediatrics
Bugando Medical Centre

S.S. Senya
Director, Institute for Allied Health Sciences
Muhimbili University of Health and Allied Sciences

Mama Shamu
Principal
Mtwarra Nurse Training Centre

H.G. Shangali
Head, Allied Health Sciences School
Kilimanjaro Christian Medical College

Dr. Shayo
Administrative Director & Faculty Member
Mtwarra Clinical Officer Training Centre

Dr. Edward Siliyo
Instructor, School of Advanced Dental Officers
Muhimbili University of Health and Allied Sciences

Dr. Mark E. Swai
Pediatrician, Director of Hospital Services
Kilimanjaro Christian Medical Centre

Rwezaura Tibaijuka
Head, School of Pharmacy, Institute of Allied Health Sciences
Weill Bugando University College of Health Sciences

Leka Tingitana
Business Manager
Ifakara Health Training and Research Centre

Masiah Veneranda
Nurse Tutor
Bagamoyo Nurse Training Centre

Karin Anne Wiedenmayere
Senior Specialist, Pharmacy
Swiss Tropical Institute, Ifakara Health Training and Research Centre

Mavis L. Yengo
Academic Head, Advanced Nursing Studies Program
The Aga Khan University – Tanzanian Institute of Higher Education
**Bibliography**


Kurowski, Christoph, Kaspar Wyss, Salim Abdulla, N’Diekhor Yemadji and Anne Mills. “Human Resources for Health: Requirements and Availability in the Context of Scaling-Up Priority Interventions in Low-Income Countries – Case studies from Tanzania and Chad” (London: London School of Hygiene and Tropical Medicine, Jan. 2003).

Maestad, Ottar *Human Resources for Health in Tanzania* (Chr. Michelson Institute, 2006).


