

twas

Ifakara Health Institute

IFAKARA, TANZANIA



EXCELLENCE IN SCIENCE

*Profiles of Research Institutions
in Developing Countries*

PUBLISHED BY TWAS,
THE ACADEMY OF SCIENCES
FOR THE DEVELOPING WORLD

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Published by TWAS, the academy of sciences for the developing world

ICTP Campus, Strada Costiera 11, 34151 Trieste, Italy

tel: +39 040 2240327, fax: +39 040 224559

e-mail: info@twas.org, website: www.twas.org

TWAS Executive Director

Mohamed H.A. Hassan

TWAS Public Information Office

Daniel Schaffer, Gisela Isten, Tasia Asakawa, Brian Smith

Design & Art Direction

Studio Link, Trieste (www.studio-link.it)

Printing

Stella Arti Grafiche, Trieste

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Foreword

For the past decade, **TWAS, the academy of sciences for the developing world**, in collaboration with several other organizations and funding agencies – including the United Nations Development Programme’s Special Unit for South-South Cooperation (UNDP-SSC), the Global Environment Facility (GEF) and the Packard Foundation – has developed a large number of profiles of scientific institutions of excellence in the developing world. The profiles have been published as books (by Harvard University Press and Kluwer Academic Publishers), as articles (in *Environment Magazine*) and as news stories (in the *TWAS Newsletter*). To date, more than 150 institutions have been examined. Each profile details how the institutions have developed and how their research programmes are organized. Each points to their strengths, probes their weaknesses – and, most importantly – examines how their experience can offer valuable insights for other institutions seeking to build their scientific capacity.

The ultimate purpose of this decade-long initiative is to showcase the high level of scientific excellence taking place in the developing world and to illustrate how science is being put to work to address critical social needs in the South. In this way, we hope that this expanding series of best practices in the applications of science can serve as a valuable ‘blueprint’ for policy-makers and those involved in the administration of national science policies.

The case study that follows – which examines the work of Ifakara Health Institute in Tanzania – is one such successful scientific institution in Africa.

Dismal statistics about the state of science and society in Africa abound, and publications that detail the difficult circumstances the people of Africa face are large in number. A less-examined trend, however, has been the increasing emphasis that Africa is placing on science and technology as primary engines of sustainable growth. This trend can be detected in the growing investments that a number of African countries are making in research and development. It is discernible, as well, in the increasing number of scientific institutions of excellence in Africa that are making significant contributions to their societies.

Yet, it is also true that the investments remain too small and the number of scientific institutions of excellence in Africa too few. Progress, moreover, has been uneven and fragile. Reversals in fortune are not uncommon. And the global economic crisis, which began in mid-2008, has placed the future at risk even for those African countries that have made significant strides forward. Nevertheless what is happening is encouraging. TWAS hopes to explore these promising developments in its profiles of scientific institutions of excellence that are leading the way for a better future on the continent.

Daniel Schaffer

TWAS Public Information Officer

Trieste, Italy



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Introduction and History



In the heart of the lush Kilombero Valley in southern Tanzania lies the market town of Ifakara. There, some 60,000 people live in 12,000 rural households scattered across the landscape. It is a peaceful place, sleepy and remote, a far cry from the noise and pollution that marks Tanzania's larger city, Dar Es Salaam.

Over the past 50 years, Ifakara has undergone a transformation. Stone houses now line the roadways in place of the mud and straw huts that were commonplace not so long ago. The town has its own bank branch, and its people are healthier and wealthier than in the past. Globalization has encouraged international corporations (for example, Illovo Sugar) to take an interest in the valley, creating job opportunities for the locals. Fields of sugar cane bound for South Africa and other foreign markets grow side-by-side with small household vegetable plots tended by women with babies strapped to their backs.

But not all of Ifakara's transformation has come down the potholed road from Morogoro, the regional capital and home to more than 200,000 people. In fact, a large part of the transformation originated half a kilometre outside the town centre thanks to the Ifakara Health Institute (IHI).

IHI began as a field research institute sponsored by the Swiss. Today, it is Tanzania's foremost health research institution – an organization so well equipped and staffed that it can win funding from donors based on its scientific excellence, and not just its unique location or the disease burden shouldered by residents in nearby households. Only a handful of such institutions can be found on the continent, and none is as old as IHI.

IFAKARA HEALTH INSTITUTE (IHI)

- *P. O. Box 53, Mlabani Passage, Ifakara, Tanzania*
- *tel: +255 232 625 164 or +255 232 625 377*
- *fax: +255 232 625 312*
- *e-mail: ifakara@ihi.or.tz*
- *website: www.ihi.or.tz*

The institute's history dates back to the late 1940s. By then, European missionaries, including a group from Switzerland, had lived in Ifakara for more than a quarter century. The village also had a reasonably well-equipped hospital, St. Francis, which had evolved from a maternity clinic founded by nuns in 1937.

When researchers from the Swiss Tropical Institute in Basel, Switzerland, started looking for a field office, Ifakara was a logical choice. The valley suffered from every tropical disease imaginable and help was hard to come by. All the research stations of other European institutes were located in the north of the country or in the capital city of Morogoro.

Rudolf Geigy was the first researcher to set foot in Ifakara. He did so in 1949. Eight years later, he opened the Swiss Tropical Institute Field Laboratory (STIFL) in Ifakara. At the beginning, scientists in Europe, who wanted to 'discover' Africa and its diseases, set the institute's research priorities. The involvement of Tanzanians in STIFL's operations was first limited to sample collection and help with such things as transportation and construction.



“ IHI started out as a field research institute sponsored by the Swiss. Today, it is Tanzania's foremost health research institution – an organization so well equipped and staffed that it can win funding from donors based on its scientific excellence. ”

RUDOLF GEIGY (1902–1995), Ifakara’s first researcher



- *Rudolf Geigy (1902–1995), founding director of the Swiss Tropical Institute in Basel, visited Ifakara for the first time in 1949. The zoologist was searching for a location to conduct fieldwork on tropical diseases and the remote village in the malaria-ridden Kilombero Valley fit the bill.*

Geigy established a second home in Ifakara a short distance from the laboratory. The locals knew him as “Bwana Ngiri”, Mr Warthog, due to his obsessive interest in that animal.

Geigy was crucial to Ifakara’s involvement in the local community, and it was his discussion with Julius Nyerere, later Tanzania’s first president, in the late 1950s, that laid the foundation for the Rural Aid Centre, which subsequently trained hundreds of medical officers for Tanzania’s rural areas.

Geigy died in 1995, but his legacy lives on. The R. Geigy Foundation, an amalgamation of two charitable funds that he helped establish, bestows awards to promising young researchers whose work is furthering the understanding, prevention and treatment of tropical diseases.

However, times were changing. In the late 1950s, the years of British rule were drawing to a close. Independence was imminent for the country, which at the time was known as Tanganyika.

Mindful that the institute should not idly watch these transformations from the sidelines, Geigy spoke to Julius Kambarage Nyerere, who later became Tanzania’s first president, asking him what he wanted from the Ifakara laboratory. Nyerere’s answer was help in training medical officers who could serve the country’s vast rural areas. In 1961, the same year as Tanzania’s independence, the Rural Aid Centre, designed to educate medical officers, was built in Ifakara.

In the decades that followed, regular discussions took place between the Swiss researchers in Ifakara and government officials in Dar Es Salaam about transferring the institute into Tanzanian hands. There was never any doubt that this was the way to go – but for a long time Tanzanian authorities felt they did not have the institutional capacity to run the institute effectively.

During the 1980s, a handover date still seemed elusive. The country's institutions were still evolving, and the options for what form the institute would take under Tanzanian rule were limited. Either it could come under direct government control, in which case bureaucracy would likely impede its potential for creative research, or it could be set up as an independent entity largely separated from the Tanzanian health system.

As the 1990s dawned, the transfer finally seemed imminent. An opening up of Tanzania's economy made it possible to establish the new entity as a 'trust' with formal ties to both Tanzania's Ministry of Health and the Swiss Tropical Institute, yet with a high degree of autonomy.

In 1990, the Tanzanian Ministry of Health endorsed the integration of the STIFL into the country's National Institute for Medical Research (NIMR). The following year, STIFL was renamed the Ifakara Centre and designated an affiliate of NIMR. In 1996, it was finally made into a trust: the Ifakara Health Research and Development Centre (IHRDC). This was the name it kept until 2008, when it was re-branded the Ifakara Health Institute.

The name change was more than a matter of semantics. During the 1990s, there was an influx of funding and prestigious research jobs. Local scientific talent, nurtured



“ Today, IHI employs nearly 600 full-time staff in six sites across Tanzania. ”

through the years, were given senior positions, a trend that culminated in the first Tanzanian scientific director being appointed in 1993. The institute also intensified its commitment both to the local community and the country at large.

Today, IHI employs nearly 600 full-time staff in six sites across Tanzania. Its annual budget, which is growing rapidly, currently stands at USD20 million. It is projected to reach nearly USD28 million by 2011/2012. IHI's efforts in the Kilombero valley have reduced the incidence of severe malaria to the point where the clinical malaria research

was moved to another site – Bagamoyo on the coast of the Indian Ocean– in order to continue field-site studies on the disease.

IHI's governance structure has served as a model for other institutes that have switched from European to local hands, including the Manhica Health Research Centre in Mozambique and centres in Navrongo and Kintampo in Ghana.

Despite IHI's success, several challenges, not surprisingly, remain. One is to ensure that the research continues to

reflect local, and not just international, priorities. A second challenge is how to fulfil the institute's potential as a source of information for the Tanzanian government. A third challenge is how to entice talented scientists to stay when they could earn far more abroad. A fourth and final challenge is to balance the institute's funding so that capital expenses are not overlooked and the centre's resources are not over-stretched.

But these challenges are dwarfed by IHI's contributions to research and knowledge transfer, and its influence on international health policy.



What IHI Does

IHI is more than just a research institute. It also engages in research training, seeks ways of turning scientific knowledge into health benefits and evaluates national health policies.

More widely, IHI combines health research, training and medical practice in Tanzania. The institute is managed by a Board of Trustees, which is chaired by officials from the Commission for Science and Technology. Other board members hail from Tanzania's Ministry of Health and Social Welfare, the National Institute for Medical Research, the Swiss Agency for Development and Cooperation, the Swiss Tropical Institute, and representatives from nongovernmental organizations (NGOs) and local government. The board of trustees meets twice a year, and is overseen by the IHI Board of Governors. A management committee, consisting of current and former IHI staff, handles day-to-day operations.



The institute employs nearly 600 staff in six branches spread out across the country: Ifakara, Bagamoyo, Dar Es Salaam, Rufiji, Mtwara and Kigoma. This structure has grown from the original single site in Ifakara. It allows IHI to conduct research in a variety of rural settings, reflecting the diverse nature of Tanzania's population.

That the institute began in remote Ifakara is significant. In economic development circles, this makes it a 'peripheral' institute, meaning it is not located in a major political or economic hub of the country. Experience shows that peripheral research institutes are often better placed to do research that matters to the poorest and unhealthiest people in developing countries – people who most often live in rural areas.

IHI Ifakara is the largest and oldest of the six IHI sites. The institute is located just outside the town of Ifakara in southern Tanzania, in the Morogoro region, a seven-hour drive from Dar Es Salaam. It lies on the Tanzania-Zambia Railway (TAZARA), which connects Tanzania's commercial capital with Lusaka in Zambia. But trains are unreliable. There is an airstrip outside of town, but no scheduled flights go there.

The site itself is adjacent to the St. Francis Hospital and houses more than a third of IHI's staff. It boasts a molecular biology laboratory, 'screen houses' to carry out studies on live mosquitoes and the institute's first HIV treatment programme.

IHI Bagamoyo, which opened in 2005, is the institute's second biggest site, employing more than 100 staff. It is situated on the coast of the Indian Ocean, 50 nautical miles from one of Tanzania's most famous tourist destinations – the island of Zanzibar. The site is linked with the Bagamoyo District Hospital. It is here that IHI does most of its clinical malaria work.

Less than an hour's drive north from Dar Es Salaam, Bagamoyo is a more accessible site than Ifakara. Hence, it receives a great deal of capital investment and is growing rapidly. It offers training courses in clinical epidemiology and other critical fields of study. A world-class pharmacology research unit for Phase 1 trials is being constructed on a

“*Experience shows that peripheral research institutes are often better placed to do research that matters to the poorest and unhealthiest people in developing countries.*”

LONG-TERM VIEW

- *In a country as diverse as Tanzania, health policies must be tailored to the needs of specific regions to be effective. Since 1997, IHI has been collecting health data on hundreds of thousands of Tanzanians, creating a ‘health’ census that has become a unique resource for researchers worldwide.*

The Demographic Surveillance System (DSS) started in Ifakara, but eventually extended to Kigoma (on the shore of Lake Tanganyika) and Rufiji (on the coast). Today, it covers more than 250,000 people. The surveys take place every four months, with staff recording births, pregnancies, deaths and migration.

The census work sometimes assumes a detective-like quality. For all deaths recorded by the DSS, surveyors conduct ‘verbal autopsies’ – in-depth interviews with the person who took care of the deceased. The information is then submitted to clinicians who assess the cause of death.

The surveys have allowed Tanzanian health policies to be responsive to the needs of a district. In Kigoma, for example, HIV incidence is lower than in either of the other two DSS sites, but anaemia and malaria remain critical health problems. Meanwhile, in both Ifakara and on the coast, HIV is a problem. But Ifakara is poorer, making it more susceptible to the socio-economic impacts of the disease.

The DSS surveys also aid in tracking new health threats such as climate change and drug resistance. The information gives health policy-makers a fighting chance to address emerging problems rapidly.



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20-hectare plot recently acquired by the institute. There is only one other such unit on the continent, in South Africa. Researchers at the facility, among other responsibilities, will work on identifying counterfeit drugs.

IHI Dar Es Salaam, established in 1997, is the administrative heart of the Ifakara Health Institute. It is located in the Mikocheni area, a comfortable distance from the grid-locked centre and near the main routes in and out of the city. However, the current location is becoming too small for the nearly 100 staff that work there, and a move to a larger site in the city – perhaps near a university – is under discussion.

IHI Rufiji is situated in the town of Ikwiriri, in the Rufiji district on the coast of Tanzania, south of Dar Es Salaam. The site has nearly 70 staff working on collecting data on people living in the region (see “Long-term view” on facing page). An operating theatre, specializing in Caesarean births, is being built in Rufiji to deal with the high rates of maternal death due to late delivery complications.

IHI Kigoma lies on the shore of Lake Tanganyika in western Tanzania in a busy port town with the same name. It houses 40 staff and, like IHI Rufiji, collects data on people living in the region. The site was opened in 2007.

IHI Mtwara is the institute’s smallest site, located in Tanzania’s most southeasterly region, Mtwara. It was launched in 2000 to manage the largest survey ever conducted in Tanzania to monitor maternal and newborn health in the region. The survey sought to shed light on existing services, as well as on community practices, beliefs and barriers



Salim Abdulla, IHI director

- Salim Abdulla joined IHI in 1996 to work on his PhD. The Swiss Tropical Institute – a long-term funding partner of IHI – supported his studies. Prior to his appointment as IHI Director in December 2008, he had founded and managed the IHI research and training centre in Bagamoyo.

According to Abdulla, one of the institute's main challenges has been to increase IHI's visibility inside Tanzania. "IHI is known very much outside Tanzania, but not so much in the country," he says.

This ignorance extended to him early in his career, he recalls. Despite earning his medical degree in Dar Es Salaam, he did not hear about IHI until he had left his home country for the United Kingdom to seek a master's degree in epidemiology. "I wanted to build a career in research", he says, "and I was told IHI is the place to come by mentors in London, residing thousands of kilometres from the institute."

Today, Abdulla is an internationally recognised malaria researcher. He has published extensively on malaria intervention strategies, including an article in the New England Journal of Medicine on the safety of RTS,S, the most advanced malaria vaccine to date. He received the centenary medal of the UK's Royal Society of Tropical Medicine and Hygiene in 2007.

No single factor accounts for IHI's success, Abdulla says, although nurturing its Tanzanian identity and research focus has been key. Equally important have been efforts to forge effective partnerships with international donors.

"Many people ask how we got so big in such a short time. It's because we didn't try to do everything ourselves. We focused on the things that we did well, and allowed our partners to help with the things that we could not do."



to care. IHI Mtwara has recently launched a new study – improving newborn survival in southern Tanzania (INSIST) – in collaboration with the London School of Hygiene and Tropical Medicine, Tanzania's Ministry of Health and Social Welfare, Save the Children Fund, UNICEF and the World Health Organization (WHO).

World-Class Research Institute

The institute has always been best known for its work on malaria. However this is far from being all that it does.

IHI researchers publish on average 25 scientific articles each year – and the number is growing.

For many years, IHI's research portfolio evolved without any strategic direction. Projects were determined by available funding and the individual interests of the researchers. Over the years, however, IHI has increasingly sought to address critical societal problems and, more specifically, to fight Tanzanian health issues on a broader front.

As a result, IHI is increasingly focusing on health challenges identified as important by the Tanzanian government and the people living in communities near each of the institute's facilities. This has meant working on a wider range of diseases, but also making sure research translates into tangible health outcomes.



IHI has assumed a growing interest in combating HIV and tuberculosis – the two leading causes of death for adults in the country. It has also begun to probe health issues brought on by changing lifestyles. Less active lives, combined with “Western-style” diets high in fat and salt, are contributing to an increase in such chronic illnesses as diabetes and heart disease.

IHI is also extending its research from merely understanding the medical cause of health problems to evaluating treatment protocols and helping to ensure that government health plans and service delivery systems operate efficiently.

This shift from pure to applied research is reflected in the institute’s strategic plan for 2008–2013, which outlines four ‘thematic areas’ for IHI’s research operations:

- *Biomedical and environmental research.* This encompasses the study of modes of transmission, immunology and molecular biology with a particular focus – at least initially – on malaria. IHI wants its research to invent new tools for surveillance, prevention and diagnostics.
- *Intervention, efficacy and effectiveness.* This includes clinical trials, surveillance of disease patterns and evaluation of the effectiveness of treatments. During the next few years, IHI plans to expand these activities, with a particular focus on child and maternal health.
- *Health systems.* The aim here is to improve the efficiency of Tanzania’s health programmes, investigating how people pay for their medical care, who receives treatment, whether there are sufficient numbers of trained medical staff and if communities get value for their money.
- *Programme monitoring and evaluation.* This objective addresses what may be the most important job for an institute that wants to translate research into health benefits: examining which interventions work and why. The institute is aiming for such research to account for 25% of its total budget.

These four thematic areas are complemented by cross-cutting priorities. One such priority is neonatal and maternal health, where success is proving elusive. Mortality rates for children under five years of age in Tanzania country have fallen by a third since 2000, but maternal mortality has remained the same since the 1990s.

Malaria – net benefits

Research into the nature, prevention and treatment of malaria has been at the core of IHI's activities since the institute was founded in the 1950s. And for good reason – when Swiss researchers first came to Ifakara, malaria killed more children than any other disease.

IHI's malaria research ranges from clinical trials of new malaria vaccines to monitoring the impact and safety of existing drugs. The institute also conducts studies on how malaria is transmitted, as well as on mosquito behaviour. Ifakara housed the first African malaria vaccine trial from 1992 to 1994. In May 2009, IHI researchers inoculated the first child in an international Phase 3 trial of RTS,S, the most sophisticated malaria vaccine to date. This is the first step in a study that will include up to 16,000 children across Africa.

IHI is also well known for the Kilombero Net Project (Kinet), which set a new standard for the use of insecticide-treated bed nets to fight this killer disease. The project began



“ IHI's malaria research ranges from clinical trials of new vaccines to monitoring the impact and safety of existing drugs. ”

in 1996 with a six-month study of local attitudes towards the use of bed nets to combat malaria. Using social marketing, the researchers then sensitized communities to the benefits of nets and succeeded in selling 65,000 nets in the valley over the following three years. The Kinet project led to a 27% reduction in child mortality. On a national scale, this would translate into 30,000 children saved each year. The Kinet experience has helped shape WHO protocols on the best ways of treating and preventing malaria in poor regions.

Decades of anti-malaria intervention projects in Ifakara have reduced the incidence of the disease to the extent that IHI's clinical malaria work has had to move to Bagamoyo on the coast to continue its field studies. The effect of this is measured not just in the town's health, but also in its wealth. Malaria leaves deep economic scars on a community. Sick parents cannot work, and if their children fall ill they may have to travel many kilometres to seek treatment that they can ill afford in the first place. By reducing the disease burden in Ifakara, IHI researchers have made a significant contribution to the peoples' ability to earn a livelihood.

Yet, if Ifakara is a beacon of hope in sub-Saharan Africa's difficult fight against malaria, there is still a long way to go. A survey conducted in 2007 found that nearly 20% of all Tanzanian children under the age of five are infected with malaria. In some parts of the country, this proportion rises to nearly 40%. Malaria remains a real and present danger. Control techniques, pioneered by IHI, will need to be deployed in combination with other strategies, over a number of years, for malaria to be truly brought under control.



KAFURUKI SHUBIS, site director, IHI Bagamoyo



- *Kafuruki Shubis, a Tanzanian by birth, graduated from the University of Dundee in Scotland in 2004 with a degree in medicine. He trained as a clinician at Bugando Medical Centre in Mwanza in southern Tanzania. Shubis joined IHI in 2007 as a training coordinator, but has recently been placed in charge of the Bagamoyo site. He is also site coordinator for the RTS,S malaria vaccine study.*

Hunt for a vaccine

IHI has been involved in the global hunt for a malaria vaccine since the very beginning. It was one of the sites to test Spf66, the first vaccine to undergo field trials in 1992. The trial showed a disappointing 31% efficacy rate and problems with a low immunogenicity – the ability to provoke an immune response.

In May 2009, IHI was the first institution to begin vaccinating children. The most promising candidate to date is a vaccine known as RTS,S. While RTS,S also showed low immunogenicity at the early stage, the vaccine was subsequently combined with antigens from Hepatitis B, which resulted in a stronger immunological response. IHI researchers hope it will give 50% of the inoculated children immunity against malaria.

RTS,S, however, is unlikely to be a panacea for the disease. One promising strategy for the future is DNA vaccines, whereby sections of the parasite's genome are introduced into cells in the host's own body, giving it a sophisticated built-in defence against malaria.

FEELING THE STING

- IHI researchers have made great strides in understanding the behaviour of malaria-carrying mosquitoes. For example, they have developed methods of combating the insects by using fungi and have also investigated which repellents are the most effective.

The research is done in large 'screen houses' where mosquitoes can be studied in 'semi-field' conditions. Inside the screens the researchers have constructed huts similar to those occupied by locals in the community.

To facilitate their studies, IHI researchers breed thousands of mosquitoes and volunteers feed the mosquitoes by extending their arms inside the net cages. To protect their own health and ensure that the experimental mosquito colony itself is kept malaria-free, volunteers are checked for malaria each week before serving dinner to the bloodsuckers.



SNAPSHOT

“ The Ifakara Health Institute, a living example of sustained institutional capacity building in basic and applied research, has been a career springboard for young scientists. ”

HIV – joining the battle

The prevalence of HIV in Tanzania's population is about 7%. Although this is much lower than some countries in sub-Saharan Africa, it still makes AIDS the leading cause of death among adults. Some regions – for example, Mbeya, on the Zambia border, and Iringa, along the main truck route – are zones that are particularly afflicted with the disease.

After doing little to combat the problem, Tanzania's government began rolling out a national treatment plan in 2004. Supported by such global HIV/AIDS programmes as the Global Fund and President's Emergency Plan for AIDS Relief, established by former US president George W. Bush, the plan provides treatment and care to a large number of Tanzanians. Yet it is still woefully inadequate, especially in terms of reaching the many million Tanzanians who live in rural settings.

Little is known about the best way of providing anti-retroviral (ARV) treatments in rural areas. That's why in 2004, the Swiss Tropical Institute began construction on Tanzania's first rural HIV care and treatment centre (CTC) in Ifakara, in collaboration with the St. Francis Designated District Hospital, IHI and Tunajali Family Health International, a US-based charity.

The Chronic Disease Clinic Ifakara (CDCI) aims to implement and improve care and treatment according to the National AIDS Control Programme (NACP); support programme outreach with an advocacy and referral system to satellite sites; and build a platform for capacity building and knowledge transfer within the health care system



and local community – in other words, by linking health-care workers, policy-makers and patients living with HIV/AIDS in the best possible way.

“If we want to tackle this epidemic we have to target rural people. They comprise about 70% of all the inhabitants of sub-Saharan Africa,” says Erik Mossdorf, a clinical epidemiologist who has been seconded by the Swiss Tropical Institute to IHI to oversee the centre’s development for two years, before handing it over to Tanzanian administrators.

The CDCI is IHI’s first official foray into HIV/AIDS research. Before 2004, the institute conducted co-infection studies on malaria and HIV, but little other research. The centre now offers voluntary testing and counselling as well as dispensing ARVs. It sees up to 120 patients and carries out 30 to 40 HIV tests every day.

“The aim is to become a centre of excellence in running rural HIV programmes,” says Boniphace Jullu, a research scientist at IHI’s laboratory in Ifakara. At first, the centre will focus on the molecular classification of the particular strains of HIV that exist in the Kilombero and Ulanga districts, examining whether the strains show potential resistance to any of the drug combinations in the national treatment regimen.

The centre has enrolled 4,500 people with HIV infection, 3,200 of whom are being examined on a monthly basis. About 60% receive anti-retro viral treatment.

HIV/AIDS is an expensive disease to treat. As a consequence, the government of Tanzania cannot afford to treat the disease on its own. First line treatment costs about USD250 per year, rising to USD4,000 per year for more sophisticated regimens. In total, CDCI dispenses drugs worth around USD1 million each year.





CHEAPER WAY

- *The high cost of ARV treatments is an incentive for researchers in developing countries to find cheaper alternatives. A study at IHI is examining how, by treating parasitic worm infections, people infected with HIV can stave off the time they need ARVs.*

Such worm infections as hookworm or schistosomiasis weaken the body's defences, making it less able to fight off other infections. By treating these infections, researchers at IHI hope to see patients with HIV coping months, or even years, longer without having to start taking ARVs.

Since worm treatments cost less than USD1 dollar per year per patient to administer, it has the potential to save lives by making the most of developing countries' meagre resources.

S N A P S H O T

The CDCI is the only rural centre in Tanzania where people receive HIV/AIDS treatment. "This is relatively easy in university hospitals in Dar Es Salaam, but it is difficult to accomplish in district hospitals in rural areas," says Marcel Tanner, director of the STI.

Much remains to be done. Reaching children is a challenge. It is also difficult to follow up on mother-to-child risk factors in a place where only 40% of births take place in hospitals. Moreover, experience derived from malaria reduction efforts in Ifakara shows that sensitizing communities to ways of preventing disease is a long and tortuous process.

To engage the community and improve local understanding of the disease, IHI is applying to the Global Fund for incidence and advocacy funding. The institute is also interested in developing public-private partnerships with the area's two largest employers, Illovo Sugar Company and Kilombero Valley Teak Company. The goal is to organize voluntary counselling and testing days and a referral system to CDCI for additional care and treatment.



Health systems – improving access

Cutting-edge research on malaria vaccines may have boosted IHI's international reputation. But if the institute were to focus only on this type of research, it would neglect part of its remit – making a difference for the people of Tanzania.

IHI's research infrastructure and skills render it an ideal place to carry out health system research to help ensure health programmes are reaching the intended population.

The cost of health care is a major constraint for the success of health programmes, especially in rural areas. To improve the prospects for health care among poor or vulnerable people, Tanzania's government introduced the Community Health Fund in the mid-1990s. The fund is a form of health insurance that allows households to pay an agreed-upon amount of money each year in return for free access to basic medical services. Funds are deposited in the district headquarters. Each health-facility governing committee can apply to and draw cash from the funds to purchase drugs and medical supplies or carry out renovations.

Membership, which is voluntary, offers a good way for poor people to offset the risk of having to come up with out-of-pocket payments when they fall sick. Nevertheless, the scheme's success has been limited in some communities. A 2007 IHI study found that one barrier to participation was the perception that the quality of health services being 'bought into' was low. Unless facilities are improved, many people will not see the benefits of joining.

That is why there is an ongoing project to improve the quality of health care being offered by the facilities. IHI is also testing a micro-financing scheme targeting women

groups in Kilombero and Ulanga. The groups receive from 2.5 to 3.0 million Tsh (USD2,000 to USD3,000) to invest in activities that will improve their income and hence ability to afford health care.

Bringing HIV diagnostics to the field

Diagnosing HIV is a delicate affair, best done using fresh blood plasma in a laboratory environment. But in rural Africa, many at-risk people – in particular children – go untested because of the cost and effort involved in travelling to hospitals or clinics. Moreover, the collection of fresh samples in the field is difficult since access to cool storage is needed during transportation and samples risk being broken on the pot-holed roads.

To improve HIV diagnostics in hard-to-reach areas, IHI has pioneered a diagnostic tool that uses dried blood samples. In 2007, researchers from IHI and Switzerland co-authored a paper evaluating the suitability of the so-called HIV-1 p24 Antigen Assay that uses dried blood spot testing for field use in Tanzania.

The study found a good correlation between the test results using the dried blood samples and those using plasma. Although more research is needed, the authors believe that the p24 assays constitute an important advancement in the diagnosis of HIV in low-resource countries.

HONORATHY URASSA, site director, IHI Ifakara



- *Honorathy Urassa comes from the Kilimanjaro region in northern Tanzania. When he joined IHI in 1988, there were no Tanzanian researchers. Locals working in the laboratories only laboured on the technical side of things – for example, preparing samples. Ifakara had only one street and modern stone houses were rare. Today, Mr Urassa is the site director of IHI Ifakara, the institute’s largest unit. “We don’t just do research, we’re part of the community,” he says.*

MAKING CHANGE HAPPEN

• *Translating research and knowledge into better health care takes a great deal of time and effort. It involves not only advances in medical research but also changing behaviour, combating prejudice and fulfilling the expectations of people who have been promised help.*

As the following three tales illustrate, IHI staff have needed three things to make change happen: solutions that last ('quick fixes' can do more harm than good), commitment to follow through on promises (making promises that are not met is often worse than doing nothing at all) and the goodwill of the community they were trying to help (medical researchers may have the scientific knowledge, but earning the trust of the people who are being served is essential for success).



S N A P S H O T

“ *IHI was instrumental in proving the effectiveness of insecticide-treated bed nets in rural areas. As simple as this strategy seems, sensitizing people to ways of protecting themselves against malaria took an enormous effort.* ”

Solutions that last

Efforts to reduce schistosomiasis, a parasitic disease, in the area around Ifakara marked an early success for IHI. Schistosomiasis (or bilharzia) is caused by flukes (or flatworms) that spend part of their lifecycle residing symbiotically in freshwater snails. From there, they migrate to other hosts, including humans. Schistosomiasis is most common in children, who are more likely to swim in rivers and dams. If left untreated, the illness can cause organ damage or compromise childhood development.

In the early 1990s, communities in the region identified schistosomiasis as a major health problem. Not only was it painful, but there was also a stigma attached to it. Infected children and adolescents would often urinate blood, which was interpreted as a sign of maturity. Many felt that the shame associated with this was worse than the pain the disease caused.

IHI staff began by asking school children about where they went swimming. They searched the sites for evidence of the parasite and taught children how avoiding stagnant water could reduce the risk of infection. They also boosted diagnostic and treatment programmes.

The programme focused on basic hygiene as well. Since the eggs of the parasite are carried into the water system along with human waste, IHI staff

showed people how to build better latrines. The institute provided the materials needed for the construction. Infection rates around Ifakara soon experienced a rapid decline.

The programme has had a lasting effect. Efforts to control and monitor the disease in rural areas surrounding Ifakara were disbanded years ago. Yet, schistosomiasis infection rates remain very low. The effort has proven to a big health gain for Ifakara's population.



Seeing things through

IHI was instrumental in proving the effectiveness of insecticide-treated bed nets in the fight against malaria in rural areas. As simple as this strategy seems, sensitizing people to ways of protecting themselves against malaria took an enormous effort.

The Understanding and Improving Access to Effective Malaria Treatment in Rural Tanzania (ACCESS) programme began in 2003. The first aim was to improve the understanding that the people of Ifakara had of the disease. The second aim was to improve the quality of care and drug access.

An early challenge was to convince communities of the devastating effect of the disease. Although it is the region's biggest childhood killer, communities did not see it as a life threat. Rather, they saw malaria as something that only happened in the rainy season, and often viewed fevers and convulsions breaking out at other times as a sign of witchcraft.



IHI's first step was to launch a sensitization campaign. Staff went to all the villages in the two districts of Kilombero and Ulanga that Ifakara straddles, targeting influential people – village elders, religious leaders, primary school teachers and police. Ordinary people were then engaged through performances by musicians and comedians, football tournaments

and chicken races. Billboards, posters, t-shirts, stickers and local radio spots were all used to reach as many people as possible.

The ACCESS programme also addressed the lack of malaria management training among health providers who dispense anti-malarial drugs in rural areas. A common challenge is a misdiagnosis of the disease. In addition, those short of cash often took inadequate or partial dosages. The programme trained shopkeepers to spot the signs and symptoms of malaria, and taught them the dangers of selling inadequate dosages.



The awareness and educational campaign has paid off. In 2006, there was a marked increase in the people who sought treatment for malaria. But these efforts were nearly wasted when health facilities started running out of drugs to treat those seeking help. People felt cheated. They had been told to seek treatment and were now being turned away. By addressing one problem, the ACCESS programme had created another.

The experience has shown how important it is to be responsive and sensitive to people's expectations when rolling out community health projects. Drug shortages are still a problem in most health facilities. The ACCESS programme tries to address this by building the capacity of Council Health Management Teams (CHMTs), Council Health Services Boards (CHSBs) and Health Facility Governing Committees (HFGCs) – local government agencies entrusted to supervise and manage health issues in the districts.

There are encouraging signs that the ACCESS programme is working. Today, 80% of children with severe malaria are sent to health facilities. Before ACCESS took off, the corresponding figure was just 30%.

“ *Although malaria is the region's biggest childhood killer, communities did not see it as a life threat. Rather, they saw it as something that only happened in the rainy season...* ”

Garnering community support

Health researchers working in rural areas need to foster a symbiotic relationship with the communities that surround them. Researchers must explain to patients involved in clinical trials or other research projects not only what they are doing, but why and how it will help the community become healthier and wealthier.

There are many stories of health researchers funded by rich donors who take advantage of their research subjects. In extreme cases, communities have been harmed by the reckless behaviour of researchers.

IHI staff take their responsibility to the community seriously. For example, in 2008, IHI Ifakara set up a community group that meets every three months to discuss issues arising from IHI's work in the community. It also calls on the institute to inform the community about its work. The community, in turn, elects the group's members. The only condition is that they are able to read and write, and are unaffiliated with IHI. At the board's first three meetings, drug shortages have been the main community complaint.

Boarder members – most of whom are farmers – say that IHI has meant a great deal to their communities. “It has helped reduce the patterns of malaria in the area,” says one man, a fish farmer.

Another man who grows rice – the region's only cash crop – says that IHI's efforts have helped communities financially. “Generally, when somebody fell sick they could not work. This was very common before. The introduction of drugs and sensitization means we manage to beat malaria at an earlier stage,” he says.



From Research to Policy

Conducting research in partnership with the community has improved public health around IHI sites. Yet, to reach people farther afield, the institute's findings will have to be translated into broader policies.

IHI has done this successfully for decades in the field of international development policy. Indeed its research has helped to shape many of the policies of the WHO.

Paradoxically, influencing national policy has proven more of a challenge. The reason is that while IHI always enjoyed a high profile in global health research circles, until recently it was virtually unknown in its own country.

This is gradually changing, however, as IHI redoubles efforts to ensure that research findings are communicated both to political leaders and the public at large. In the long term, IHI harbours ambitions of becoming a think tank as well as a centre of excellence in academic research.





In November 2008, Jakaya Kikwete became the second Tanzanian president to visit IHI in Ifakara. (President Nyerere was the first.) To their surprise and chagrin, staff heard the president say that he had not heard of IHI until a foreign colleague had congratulated him on the institute's excellent work.

Since Kikwete's visit, connections between IHI and the government have grown exponentially. The institute is routinely consulted on matters of health policy, and its former director, Hassan Mshinda, has been placed in charge of the country's key science advisory body, the Commission for Science and Technology (COSTECH). (See box: VIPs)

For its part, IHI is coordinating its research agenda with Tanzania's growth strategy *Vision 2025*, and with the global Millennium Development Goals (MDGs). It also is trying to make sure senior IHI staff have a good understanding of the policy context of IHI research.

In June 2009, IHI launched an electronic library on its website, containing scientific publications about Tanzania, relevant policy documents and surveys, presentations and photographs from the institute. The library is powered by Greenstone, an open-source software package produced by the New Zealand Digital Library Project at the University of Waikato, and developed and distributed in cooperation with UNESCO and the non-governmental organization Human Info.

"I would like to see more undertakings like this, so that we have better evidence for stronger health policies and optimized implementation," said Peter Mbunji from the Ministry of Health and Social Welfare at the launch of the e-library.

Having an impact

The Interdisciplinary Monitoring Programme for Anti-malarial Combination Therapy (IMPACT) is one of IHI's programmes designed to inform government policy. IMPACT evaluates the rollout of effective – but costly – artemisin-based combination therapies (ACTs) to fight malaria in Tanzania.

ACTs are the gold standard in malaria treatment. They were introduced in 2007 in Tanzania to replace sulphadoxine pyrimethamine (SP), which had been used previously. In clinical studies, ACT has a much higher success rate in combating malaria than SP, which was reflected in testing carried out by IMPACT. Indeed ACT achieved an efficacy rate of more than 90%, compared with below 60% for SP.

IMPACT officials have found that a change of treatment policy must be closely followed by information campaigns to ensure that the benefits shown in the laboratory find their way to the communities that the research is intended to serve. If patients and health workers are not properly educated, new treatments may be dispensed and/or taken in the wrong doses. The media – most notably, radio and newspapers – were found to be effective ways of informing the public about the new drugs.

Another programme investigating the effects of the new malaria regimen is the Artemether/Lumefantrine In Vulnerable populations: Exploring the health impact (ALIVE) programme. This programme focuses on evaluating the effects of the treatments in children under the age of five.

The outcomes of both the IMPACT and ALIVE programmes will not be limited to Tanzania. They will be of use in other African countries wanting to make sure health investments achieve the greatest possible impact.

“*IHI is helping the ministry of health implement its strategies.*”

Taking science to the public

Having forged strong links with the Tanzanian government, IHI is also looking beyond the policy-making community to the intended beneficiaries of the institute's efforts – the public.

One initiative that is being discussed is to add value to IHI's extensive data sets by placing them in a central repository. The repository would be open to public searches. IHI researchers would facilitate the process by creating a simple interface to help people find the data they need. "The expected audience includes district managers, policy-makers, scholars and other interested parties," says Henry Mwangika, an IT researcher working at IHI. Funding for the initiative has not yet been obtained, but advocates are hopeful that it will soon be forthcoming.



“*If patients and health workers are not properly educated, new treatments may be dispensed or taken in the wrong doses.*”

VIPS

• IHI's previous Tanzanian directors have gone on to become influential people in domestic and international policy circles. As lifelong ambassadors of IHI they have enhanced the institute's international reputation both abroad and at home.



- **Andrew Kitua** became IHI's first Tanzanian director in 1993. Prior to that he completed a master's degree in epidemiology at the London School of Tropical Medicine and Hygiene, followed by a PhD degree in clinical epidemiology at University of Basel in Switzerland.

After four years as IHI's director, Kitua was appointed director general of the National Institute for Medical Research (NIMR), a Tanzanian parastatal organization. In that role, he helped found the Global Forum for Health Research, a lobby group dedicated to obtaining additional support for medical research and public health initiatives.

Kitua has also served on WHO's scientific and technical advisory committee, giving Tanzania a voice in the formulation of global health policy. He retired from NIMR in 2009.



- **Hassan Mshinda**, who took over from Kitua in 1997, followed an academic path very similar to that of his predecessor. He has a master's degree in applied parasitology and medical technology from the University of Liverpool, and a doctorate degree in epidemiology from the University of Basel.

Mshinda led IHI until 2008, when he was appointed by Tanzania's president, Jakaya Kikwete, to head the Commission for Science and Technology (COSTECH), which advises the Tanzanian government on scientific issues.

In his new role, Mshinda has the president's ear and plays a key role in the coordination of the country's science effort. He remains chairman of IHI's board of governors.

“ We want the public to know about the things that are going on here. ”

CELEBRITY APPEAL

• *As a successful research institute catering for the world's poor, IHI enjoys extra publicity from celebrity visitors.*

In August 2008, Hollywood action hero Will Smith and his actress wife Jada Pinkett Smith visited IHI-Bagamoyo. The Independence Day star is a goodwill ambassador for Malaria No More, a US-based charity working to end malaria's grip on the African continent.

Visiting kids in the pediatric ward, Smith said the research team in Bagamoyo is doing "a wonderful job to save the lives of many children".

Bagamoyo also hosted Koffi Olomide, a famed singer, producer and composer from the Democratic Republic of Congo, in June 2009. Koffi, an internationally renowned performer of the central African musical style soukous, is the goodwill ambassador for the African Malaria Network Trust (AMANET).

"I am proud that such a big research centre like this exists in Africa. I am also proud that Africa has leading scientists in the fight against malaria," he said.

In August 2009, IHI hosted a visit by WHO's director general, Margaret Chan, who was shown the contribution that IHI has made to the development of a successful malaria vaccine. The visit is a tribute to the growing public profile of IHI and its research.



S N A P S H O T

“ *When your former boss becomes the man in charge of science in your country, that is great news.* ”

Training

When the IHI first got off the ground in the 1950s, all trained scientific staff were European. This has changed over time. Today, IHI trains much of its scientific staff in-house.

But filling staff positions to meet IH's rapidly growing needs has not been easy. In 1981, the institute had a staff of nine, one of whom was an academic. In 1993, the number had grown to 88, 15 of whom were academics. Today, the staff number nearly 600 of whom about 100 are academics.

Since it is not a university, IHI does not have the ability to award its own degrees. And Tanzania's own university system is not equipped to fully train the top-class researchers required by an institute of IHI's calibre.

The solution is to partner with academic and funding institutions to create a talent pool upon which the institute can draw. This has advanced efforts for North-South collaboration at IHI, as PhD projects are often 'twinned' with projects in the funder's country, leading to close working relationships.



TOMORROW'S RESEARCH STARS

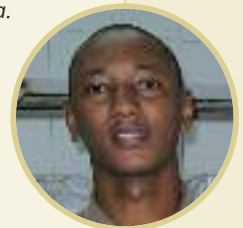
- **Sheilla Ogoma's** interest in science was born out of a desire to make a difference. Malaria is a big problem in her village in rural Kenya, and she wanted to be part of the solution.

After completing her undergraduate degree at the University of Nairobi, Ogoma was one of only three Kenyans to receive a scholarship to do a two-year master's degree involving a year of classroom training in Nairobi and a year of laboratory research in Ifakara. Her master's project has focused on identifying how mosquitoes enter huts where people or livestock sleep. Her findings that they prefer to enter through the eaves rather than the door will help researchers design suitable screening practices for dwellings.

Ogoma is about to embark on a PhD degree in infectious diseases with the London School of Tropical Medicine and Hygiene. But she will spend only a few months of her 3.5-year degree programme in London. The remainder of the time will be spent in Ifakara. The future is bright for the driven young researcher. "I'm committed to stay in science," she says.

- **Deodatus Maliti**, or "Deo", is principal laboratory technician at IHI Ifakara. He completed his bachelor's degree in Dar Es Salaam in 2007, and has been accepted into a master's degree programme at the University of Liverpool in the UK. Upon earning his PhD, Maliti plans to return to IHI. "Opportunities here are great. You receive a research education far beyond what you would receive at a university," he explains. "Even presidents and parliamentarians come here. I cannot imagine working anywhere else."

- **Alex John** and **Salum Aziza** are laboratory assistants working with mosquito identification at IHI Ifakara. They received their undergraduate degrees in 2008 from the University of Dar Es Salaam: John in molecular biology, Aziza in biotechnology. Both have applied to master's degrees programmes and both want to keep doing research on tropical diseases. John says he would like to work in molecular biology, with vaccine resistance. Aziza says he would like to do the same – but he would also like to go into the study of malaria vectors.





- **Beatrice Chipwaza** is a laboratory scientist working at IHI Ifakara. She did her undergraduate degree at nearby Sokoine University in Morogoro and completed a master's degree in Belgium in molecular biology. Before coming to Ifakara, she worked as a veterinary research officer in the Ministry of Livestock and Fisheries. She is seeking entrance into a PhD programme to continue her research career.

"We've drawn on funding from a variety of sources to get people trained in other institutions, both local and international," says IHI's director Salim Abdulla. "That has created opportunities that wouldn't otherwise exist."

Today, a training component is almost always included in research projects, and IHI encourages talented young Tanzanians to join the institute upon graduation.

In fact, IHI welcomes students from all over the world to come and pursue their research in Tanzania. It also offers training courses, accredited through formal partnerships with national universities. At Bagamoyo, for example, IHI runs training courses in clinical epidemiology.

Training health professionals

In addition to training researchers, IHI also plays a key role in the training of health professionals in Tanzania. The Rural Aid Centre, set up by Rudolf Geigy, was handed over to the Tanzanian government in 1978. It has evolved into a public-private partnership between the Tanzanian Ministry of Health, Novartis Foundation for Sustainable Development and the Swiss Tropical Institute. The centre, which is now called the Tanzanian Training Centre for International Health, offers courses in partnership with Columbia University, in the US, and the University of Athens, in Greece.

From the centre's creation until 2008 it has produced more than 1,750 health professionals for Tanzania.



Understanding mosquitoes

To understand the spread of malaria and who is at risk of contracting it, one must understand mosquitoes. That is why IHI is conducting so much research into mosquito behaviour. For example, institute researchers are investigating how the insects enter traditional rural huts, how they identify their victims and where they breed.

Such research has resulted in a variety of anti-malarial strategies that focus on preventing people from being bitten, rather than on treating the disease. The most important finding was the widespread success of using insecticide treated bed nets (ITNs) in the region around Ifakara in the mid-1990s. Building on this success, IHI researchers continue to work on identifying the best repelling agents and the most efficient ways to screen off a house or hut.

IHI research is also contributing to the development of a number of innovative biological control measures of malaria-transmitting mosquitoes. For example, certain species of fish that eat mosquito larvae present an eco-friendly way of controlling insect populations. Ongoing IHI research is also evaluating how mosquitoes can be safely and effectively infected with insect-killing fungi.

Price of Success

IHI receives funding from both development agencies and the Tanzanian government. But most of its budget comes from competitive grants. In 2008–2009, the institute's grant income was USD16.4 million, compared with USD3 million for core support.

Attracting grant funding has not been a problem for the institute – quite the opposite, in fact. Grant income is expected to increase to USD18 million in 2009–2010, and the number could grow to USD25 million by 2012–2013.

Reasons for IHI's success are twofold. First, because the institute was never set up as a government institution with a large amount of core funding, fundraising has been one of its highest priorities. “We either secure funding or we don't exist,” says Salim Abdulla.

The other reason is that IHI has worked very hard to diversify its funding portfolio, approaching new partners all the time.



But grant-winning success has been both a blessing and a curse. Between 2003 and 2008, IHI's income from grants rose from around USD3 million to about USD16 million, putting a huge strain on the institute's scientific infrastructure.

According to its strategic plan for 2008–2013, IHI will seek to slow the rapid influx of funding and ensure that the grants, which are awarded, include a higher percentage for overhead. For now, the overhead sought ranges from 8% to 15% of the total request. This is much lower than the overhead received by most research organizations in developed countries. In the UK, for example, government funding agencies usually pay researchers 40% overhead.

PRIZES AND AWARDS

• *In 2008, IHI became one of four African institutions to share the Prince of Asturias Award for International Cooperation. The award, funded by the Spanish government, is given to individuals and organizations that contribute to the “global pool of knowledge while fostering solidarity.” Salim Abdulla and his predecessor Hassan Mshinda travelled to Oveido to accept the award in October 2008.*

In 2007, Abdulla received the centenary medal from the UK's Royal Society of Tropical Medicine and Hygiene for achievements in tropical medicine by a scientist under the age of 45.



S N A P S H O T



MONEY MATTERS

• In March 2009, Tanzania's president Jakaya Kikwete announced that the government's budget for 2009–2010 would contain a significant increase for science and technology.

Kikwete's promise to increase the budget to 1% of GDP raised some eyebrows – not least because it would more than triple previous years' science allocations, which has hovered around 0.3% of the country's gross domestic product (GDP). In real terms, the budget would increase expenditures to nearly USD220 million.

If just a fraction of this money could go towards meeting IHI's overhead and support its monitoring and evaluation work, it would help the institute manage its expansion.

Tanzania's 2009–2010 budget proposal was unveiled in June 2009. But as this booklet went to press, there was no detailed budget breakdown available for science and technology. Nor was there any indication of how a potential increase would be distributed between Tanzania's researchers.

Nevertheless, IHI's researchers are positive that the future will bring additional national funding to their institute. "What is taking time is making the administrative arrangements for funding. But I think it will go on very well," says Salim Abdulla.

SNAPSHOT

“ Because the institute was never set up as a government institution with a large amount of core funding, fundraising has always been one of its highest priorities. ”

Effective Partnerships

The Ifakara Health Institute would not be where it is today without its fruitful partnerships with foreign institutions and funders.

“Many people ask: ‘How did you get so big in such a brief time?’ I tell them that it’s because we didn’t try to do everything ourselves,” says Salim Abdulla.

Not surprisingly, IHI’s most important partnership has been with the Swiss Tropical Institute (STI). Until 1981, the STI and a private foundation, the Basel Foundation, covered all of the institute’s expenses.

STI is still co-financing many of IHI’s research projects. Moreover, since 2008, STI has distributed 400,000 Swiss Francs (USD370,000) to the institute in core funding – money it received from the Swiss government. In addition, STI provides IHI 100,000 to 200,000 Swiss Francs per year out of its own pocket for non-earmarked block grants.

STI also continues to make in-kind contributions to the IHI. For example, it will give the institute the equivalent of 300,000 Swiss Francs over the next 3 years for administrative assistance, largely by paying the salaries of personnel who are seconded to IHI.



IHI has also received funding from a variety of sources, including the Wellcome Trust in the UK, Bill and Melinda Gates Foundation, Canada's International Development Research Council (IDRC), Biotechnology and Biological Sciences Research Council (BBSRC) in the UK, International Atomic Energy Agency (IAEA), Novartis Foundation, UK's Comic Relief Charity, the European Union and the Global Fund to Fight HIV, Tuberculosis and Malaria.

"You develop partnerships that allow you to grow," says Abdulla. "If you focus on the things that you do well, and allow your partners to help you with the things that you cannot do, you will be very successful."

Striking a balance

Research institutes in developing countries that depend on external funding often face a dilemma. Taking on contract research for overseas partners can be lucrative. But if such contracts dominate the research agenda, an institute's own scientists can lose their unique voice and become mere technicians and enablers.

At IHI, a key issue has been to make sure each institute stays Tanzanian at its core, despite the majority of funding coming from abroad. "It is not about whether we are asked to do something, or if we are saying what we want to do. It's about who we are," says Abdulla.

IHI could perhaps grow faster and win more international prizes if it recruited top researchers from around the world. But the price, the institute's officials believe, would be too high.

"We want to keep this institution as primarily Tanzanian, and that comes with a cost. You can accept contract research up to a point, and you can balance international activities with activities that are primarily focused on local issues. But if we primarily address international issues, we cannot say this is a Tanzanian institute," Abdulla says.

One way of avoiding losing local identity is to run auxiliary studies when conducting research that has external direction. For example, the institute's prestigious RTS,S malaria vaccine trial is a form of contract research. But IHI scientists are doing additional studies alongside it that cater to their own interests and address local needs. That way, IHI can combine an international profile with local interests.

GOOD PRACTICE

• *The Swiss Tropical Institute's experience with IHI inspired the following principles of the Swiss Guidelines for Research in Partnership with Developing Countries, a document published in 1998. According to these principles, a North-South research partnership should:*

- 1. Decide on the objectives together*
- 2. Build up mutual trust*
- 3. Exchange information and develop networks*
- 4. Share responsibility*
- 5. Promote transparency*
- 6. Monitor and evaluate collaboration*
- 7. Disseminate and apply results*
- 8. Share profits equitably*
- 9. Increase research capacity*
- 10. Build on achievements*



S N A P S H O T

“ *If you focus on the things that you do well, and allow your partners to help you with the things that you cannot do, you will be very successful.* ”

Future Bright

All things considered, the future looks bright for IHI. There is no sign that the interest from funders will diminish any time soon, and IHI's growing relationship with Tanzania's government is likely to strengthen its mission to bring health benefits to the country's entire population.

Many of IHI's plans for the future – including the construction of new facilities, investing more funding on health systems research, and working more closely with policy-makers – have been outlined in previous sections. But two additional issues should be mentioned.



Salary review

Tanzania, like many other countries in Africa, suffers from brain drain. The best minds often leave the country for better opportunities elsewhere. While IHI has long enjoyed training partnerships with institutions abroad, allowing it to make use of overseas training without the staff loss that often accompanies it, academic salaries at IHI remain far below those offered by institutions in the developed North.

This has resulted in an evolutionary process that has ensured that only the most committed have remained at IHI, says Salim Abdulla. "It's natural selection, producing dedicated people," he says.

But this attitude will not allow IHI to hire well-trained academics at the rate it needs to grow and still remain a Tanzanian institute at the core. Therefore, the institute is undertaking a salary review to be completed by the end of 2009. The review will most likely result in higher pay for most of the institute's academic staff.

Intellectual property

A second issue is how to handle intellectual property (IP) emanating from IHI's work. The institute does not have people in-house to deal with IP on a day-to-day basis. IP advice is obtained from external advisers or by using the resources of IHI's funding partners, which often have access to IP experts.

However, a dedicated in-house IP person may be hired in a few years' time, says Salim Abdulla.

IHI is about to draw up a strategy designating how IP generated at the institute should be used. Since it is a not-for-profit organization, it is likely that IP will become an 'influence stream' designed to strengthen IHI's voice in international and national policy circles, rather than a potential 'revenue stream' by creating a policy framework for the sale of patents.

However, should the institute discover a lucrative new product or process, it would reinvest any revenues in new product development, say Abdulla.

Conclusion

IHI's extraordinary transformation from a European field station to Tanzanian centre of excellence has come to symbolize the very best of North-South cooperation in science.

The practices developed at IHI are by no means restricted to applications in the health science sector. The ambition of aiming for international excellence while addressing local problems should be equally rewarding for institutions focusing on agriculture, water, sustainable energy, pharmaceuticals and other critical science-related issues.

One of the reasons the IHI experiment has proven successful has been the pragmatism and patience of the people involved – from Tanzania's first president Julius K. Nyerere and IHI's founder Rudolf Geigy to the people who currently run the organization. Although the transfer from Swiss to Tanzanian ownership was a long-term goal, the institute was not handed over until the right people and institutional structures were available. This restraint in the face of pressures to rapidly put right the wrongs of history shows good judgement and a type of long-term thinking worthy of emulation by others.

IHI's story also illustrates the importance of partnerships. In particular, the dedicated friendship and support of the Swiss Tropical Institute meant that IHI was never alone during its long journey of change. Although it is unwise for institutes to rely on such patronage for all of their financial support, several other health research institutions in Africa have the same setup – for example, the KEMRI-Wellcome institute in Kilifi, Kenya.

IHI has also consistently planned its future in a holistic manner, often sacrificing short-term goals for long-term success. Knowing that its future as a Tanzanian institution relies on access to dedicated young scientists, it has taken its training responsibilities seriously. There is no doubt that IHI is an asset to Tanzania's universities, and that

its attractiveness as an academic employer does a lot to combat scientific brain drain from the country.

But perhaps the most impressive – and difficult – balancing act IHI has had to perform is to weigh its ambition to do science at an international level of excellence against its desire to make a local impact. Putting its Tanzanian identity first was by no means an easy decision, nor perhaps the most financially lucrative outcome in the short term. But it has placed IHI in an ideal position to start bridging the chasm between science and policy-making not only in Tanzania, but across the African continent.



Acknowledgements

Linda Nordling, a Cape Town based journalist, the author of this booklet, and Daniel Schaffer, TWAS's public information officer, would like to thank the Ifakara Health Institute's staff for their dedication and patience in helping with its production.

An especially warm 'thank you' is extended to Mbarwa Kivuyo, head of IHI's information and communication unit, for his assistance with everything from booking bus tickets in Tanzania to setting up interviews in Dar Es Salaam and Bagamoyo, and to Boniphace Jullu for helping with logistics in Ifakara.

We are grateful to staff at the Swiss Tropical Institute, who were very helpful in providing information and shedding light on the history of IHI. Press releases and reports from both IHI and STI proved an invaluable source of information in the writing of this text.

TWAS

- *ICTP Campus, Strada Costiera 11, 34014 Trieste, Italy*
- *Tel: +39 040 2240 327*
- *Fax: +39 040 224 559*
- *e-mail: info@twas.org*
- *website: www.twas.org*

TWAS

TWAS, the academy of sciences for the developing world, is an autonomous international organization that promotes scientific capacity and excellence in the South. Founded in 1983 by a group of eminent scientists under the leadership of the late Nobel Laureate Abdus Salam, TWAS was officially launched in Trieste, Italy, in 1985, by the secretary-general of the United Nations.

TWAS has more than 900 members from 90 countries, over 85 percent of whom live and work in developing countries. A Council of 13 members is responsible for supervising the Academy affairs. TWAS is assisted in the administration and coordination of programmes by a small secretariat, headed by the executive director. The secretariat is located on the premises of the Abdus Salam International Centre for Theoretical Physics (ICTP) in Trieste, Italy. UNESCO is responsible for the administration of TWAS funds and staff. A major portion of TWAS funding is provided by the Ministry of Foreign Affairs of the government of Italy.

The main objectives of TWAS are to:

- recognize, support and promote excellence in scientific research in the South;
- provide promising scientists in the South with research facilities necessary for the advancement of their work;
- facilitate contacts between individual scientists and institutions in the South;
- encourage South-North cooperation between individuals and centres of scholarship.

To achieve these objectives, TWAS is involved in various activities and collaborates with a number of organizations, especially UNESCO, ICTP and the International Council for Science (ICSU).

For additional information, see www.twas.org.



EXCELLENCE IN SCIENCE

This series of booklets – published by TWAS, the academy of sciences for the developing world – highlights successful scientific institutions in the South and explains how their research has both been sustained over a number of years and how it is helping their host nations achieve sustainable economic development.