RESEARCH FOR GLOBAL DEVELOPMENT

EXAMPLES OF NWO-WOTRO FUNDED RESEARCH
ABOUT WOTRO SCIENCE FOR GLOBAL DEVELOPMENT

WOTRO Science for Global Development is a division of the Netherlands Organization for Scientific Research (NWO). WOTRO programmes, funds and monitors innovative research on global issues, with a focus on sustainable development and poverty reduction. WOTRO's research projects are carried out by interdisciplinary teams of researchers from the North and South and in close collaboration with non-academic stakeholders.

www.nwo.nl/wotro

Research for Global Development: Examples of NWO-WOTRO funded research

Published by
WOTRO Science for Global Development, The Hague, the Netherlands

Text and interviews
Koen Kusters, Wereld in Woorden Global Research and Reporting, Haarlem
Domien Huijbregts, NWO-WOTRO
Greg Marinovich, Storytaxi

Editing, design and layout
Contactivity bv, Leiden

Printer
Drukkerij Holland, Alphen a/d Rijn

All articles were published in 2011 and 2012 on the website www.researchforglobaldevelopment.nl
Science for global development is more pertinent than ever. Despite the rapid growth in an increasing number of emerging economies, global inequalities intensify and worldwide over two billion people remain mired in poverty. There is a continuing and growing need for the solutions, technologies and insights that science can bring.

WOTRO believes that high-quality knowledge can contribute to change, and can help in realizing equity, social justice and sustainability. For that reason, WOTRO seeks to promote the generation, sharing and use of validated knowledge to meet global societal challenges and enhance the quality of life in developing countries. WOTRO aims to combine scientific excellence with development relevance.

This joint pursuit of development relevance and scientific excellence can lead to unexpected synergies. It makes research highly exciting and deeply rewarding. It advances knowledge sharing across disciplines, and between researchers, policy makers and practitioners. It results in demonstrable development impact.

Opportunities for enhancing synergies of social relevance and scientific excellence are growing. Development discourse is widening to embrace emerging topics of global concern, such as climate change and resource depletion. These concerns call for – and offer exciting opportunities for – interdisciplinary research that addresses interrelated causes and involves multiple stakeholders.

Meeting global challenges requires research in multiple sites and through diverse international partnerships. This necessarily entails knowledge of and research in developing countries. Such research, then, not only meets local development challenges but also contributes to solutions for problems we face all over the world.

Development-oriented research nevertheless suffers from a lack of visibility. It does not always receive the attention it deserves, neither in the development sector nor in the wider scientific community. We need to highlight the contributions that such research can make, both to awaken the interest of policy makers and practitioners and to inspire new researchers to embark upon such projects.

To that effect, WOTRO in 2011 launched an online campaign to showcase outstanding research that produces knowledge for addressing development challenges. This campaign (www.researchforglobaldevelopment.nl) presented examples, both in the form of articles and short videos, of successful research endeavors with demonstrable development impact.
We have now compiled these stories in this book to present them as testimony of what science can accomplish. They not only demonstrate the development relevance of the research but also reveal the motivation, commitment and enthusiasm of the research teams. We trust the booklet will be of interest to you and will allow you to share in the feelings of excitement and promise that development-oriented research invokes.

Wiebe Bijker,  
Chair WOTRO Board  

Henk Molenaar,  
Executive Director WOTRO
CONTENTS

Foreword 3

The war on weeds – Jonne Rodenburg 6
Increasing rice production in Africa

‘I just called to say I love you’ – Mirjam de Bruijn 12
Mobile phones and the emotional side of development

Fighting the right virus – Susan Aitken 18
Developing an affordable HIV drug resistance test for Africa

Poor people as guinea pigs – Erwin Bulte 24
Assessing the impact of development projects

Why the Blue Nile carries brown waters – Hermen Smit and Yasir Salih 30
A closer look at soil particles

Breaking the cycle – Pieter Hooimeijer and Ignace Habimana Kabano 36
Reproductive health and poverty decline in Rwanda

Who owns the seed? – Bram De Jonge 42
How intellectual property rights affect food security

Reaching the poor – Rob Baltussen 48
Towards universal coverage in Ghana’s health insurance scheme

‘People will jump in front of a bullet to save your life’ – Rivke Jaffe 54
Criminal leaders govern the streets of Jamaica

Biofuels from family farms – Madeleine Florin 60
Towards a more realistic and fair production of biomass for energy

Battling the brain drain – Victor Mwapasa 66
Capacity building in Malawi’s medical research sector

‘You get what you pay for’ – Tausi Kida 72
Healthcare liberalization and urban poverty in Tanzania
Increasing rice production in Africa

THE WAR ON WEEDS

In his search for solutions to the problem of weeds that limit African rice production, Jonne Rodenburg works at many levels, from genetic research to production systems. One of his findings is that farmers’ practices and considerations must be included in crop and weed management strategies. There is no silver bullet or one-size-fits-all solution.
In his many publications, Jonne Rodenburg has presented some frightening statistics. Perhaps the most alarming are those on the losses in African rice due to uncontrolled weeds. In lowland areas, as much as 28%–74% of the rice crop may be lost, while in upland systems the losses can be 48%–100%! Weeds represent a huge threat to food security in Africa, and indeed worldwide. One of the emerging culprits is the parasitic weed *Striga hermonthica*, also known as witchweed, an attractive plant with bright pink-purple flowers. ‘You could almost grow it as a houseplant,’ Rodenburg says.

As urbanization is changing the patterns of nutrition across Africa, rice is rapidly becoming one of the most important staple crops. More and more people are migrating from the countryside to the cities, where it is not practical to consume traditional staple crops, like sorghum, because they take too long to prepare. Rice is more suitable for consumption in the cities. This means that there is tremendous pressure to increase the production of rice. Already about half of the rice consumed in Africa is imported. It is therefore essential that regional production increases in the coming decades.

In Africa there is still enough land that could be turned to agricultural use. New land is being used for rice production, for instance in lowland valleys where seasonal floods mean that rice is the only viable crop. But land previously used for maize and sorghum production is also increasingly being used to grow rice. These new environments are the habitats of parasitic weeds. One could say that rice is encroaching on the territory of weeds like *Striga hermonthica* and *Striga asiatica* in upland areas (rainfed dry land rice), and of another killer weed known as Rhamphicarpa fistulosa in inland valleys (rainfed lowland rice).

**KNOW YOUR ENEMY**

Jonne Rodenburg received his PhD in 2005 for a WOTRO-financed study of resistance and tolerance against *Striga* in sorghum, a genus of numerous species of grasses. At the Africa Rice Center, he is facing his old adversary once again. In all wars it is vital to know your enemy, and this is particularly true in the war against weeds. ‘We are studying various kinds of weed. We want to understand their biology and their ecology. In the knowledge of how these plants live, reproduce and compete with rice lie the keys to effective weed management strategies.’ While much of the research is done at the Center’s laboratories and fields in Africa, more sophisticated research, at the cell and even gene level, for example, is conducted at his alma mater Wageningen University in the Netherlands, and the University of Sheffield in the United Kingdom.

Crops can fight parasitic weeds in two ways: resistance and tolerance. Resistance refers to the abilities of the host plant to keep parasites at arm’s length. Tolerance is the ability of
plants to cope with certain parasites. Considerable attention has been given to increasing resistance, Rodenburg says, but less so to tolerance. Rodenburg and his team are looking at ways to integrate both mechanisms. ‘Resistance to certain parasitic weeds is usually temporary, and after some time resistance will inevitably break down. Tolerance enables the parasitic weed to grow and reproduce, but also lowers crop production losses due to infection. Combining both mechanisms, reducing infection through resistance and reducing negative effects of infection through tolerance, would result in the most stable defence.’

In the war on weeds, the stakes are high. Rice is an important element in global food security. It is the only staple food that can be produced in wet and dry conditions. In Africa, rice is grown in irrigated and rainfed lowlands as well as in rainfed upland areas, and the potential for increasing production is huge. No wonder that Chinese and Korean companies are currently buying huge stretches of land in Africa for rice production.

ADAPTATION
At the Africa Rice Center in Dar es Salaam, Tanzania, Rodenburg and his team are screening a large number of rice varieties to determine their ability to fight different kinds of weed (normal as well as parasitic ones). ‘We have come a long way in this process,’ says Rodenburg. ‘On the basis of our findings we can advise farmers on what varieties to use in certain conditions.’ But knowledge of rice varieties and their interactions with different kinds of weed is not static. Faced with changing climatic conditions, farmers constantly have to adapt their production methods. More rain, less rain, higher temperatures, higher CO₂ levels – all of these factors will have an impact on how crops and weeds interact. Farmers can never take things for granted.
In the war on weeds, the stakes are high. Rice is important for global food security, as it is the only staple that can be produced in wet and dry conditions.

Rodenburg and his team recently discovered that Striga seems to be able to adapt to new rice varieties – clearly it is smart as well as deadly. ‘It appeared that all the newly introduced varieties were resistant to the Striga we found in some rice fields, whereas the local varieties that had been grown for over 30 years in these Striga-infested fields were devastated by the parasite. Moreover, the same local varieties proved to be quite resistant to Striga from other localities. It looks very much as if this particular Striga ecotype has adapted to the local rice variety.’ This is pretty exciting stuff, Rodenburg explains enthusiastically. ‘We will certainly explore this further. How long does it take for Striga to adapt to new cultivars? How does the process of overcoming resistance take place? The answers we find could very well contribute to more sustainable solutions to help farmers in Africa fight these noxious parasites.’

The Africa Rice Center aims to assist small-scale farmers, and this poses several other challenges. ‘There are many ways to fight weeds. For farmers with resources, knowledge and skills at their disposal, weeds don’t have to be a major problem. But it is different for resource-poor African farmers. These people are often illiterate, have few financial resources, live in remote areas and are often difficult to reach by extension and crop protection services. Fertilizers, pesticides and herbicides are usually not available to them, and even if they are, farmers don’t know how to use them. Using too much or too little herbicide, or in the wrong phase of the production cycle, will have adverse effects.

The results of Rodenburg’s research and that of his colleagues are now being used by an outreach programme organized by the Center. Through radio broadcasts and farmer instruction videos in local languages, farmers throughout Africa can learn about weeds and weed management and practical ways to implement the findings.

**PRACTICAL SOLUTIONS**

In a recent study, one of Rodenburg’s PhD students examined the controversial System of Rice Intensification (SRI). This alternative, but rather rigid method of rice cultivation,
involving the use of greater distances between plants and intermittent irrigation, was developed in Madagascar more than 40 years ago, but recently SRI has found new supporters in Asia and elsewhere who claim that SRI results in higher yields with lower water inputs. Although there is scant scientific evidence to support these claims, which in turn causes widespread controversy, Rodenburg is reluctant to discard any opportunity to address the challenge of augmenting rice production in Africa.

Rodenburg’s work with his PhD student involved testing four rice production practices simultaneously with farmers on their own farms under similar conditions. The first system involved the methods used by farmers (‘farmer practice’). The second used best management practice, whereby the farmers applied the most recent management recommendations. The third was SRI, and the fourth was a mix whereby farmers were free to choose from the techniques used in the other three systems. The results were striking, Rodenburg says. The ‘farmer practice’ yielded the lowest production, but the other three scored about the same.

That the labour-intensive SRI could yield about the same as the input-intensive best management practice was to be expected. The surprise was that when farmers were able to make use of modern techniques, and combine and adapt them following their own considerations and experiences, their production levels remained high but with fewer (water and herbicide) inputs and less labour, thus creating a superior management system. ‘Even the farmers themselves were surprised that without much extra labour and expensive inputs compared to their own usual practice, they were able to get much higher rice yields from their land.’ For Rodenburg this was further evidence that the development of effective strategies for marginal farmers in Africa – or anywhere else – must involve the farmers themselves. The results of this study were published in Agricultural Systems, a leading journal, in 2012.

Some of the team’s research results are promising and at times even exciting, but silver bullets and one-size-fits-all solutions don’t exist, Rodenburg says. ‘There is enormous pressure from the outside world to come up with such solutions. I try not to give in. Flexibility is vital. We shouldn’t put all our money on just one solution, and at the same time, in the search for global food security we don’t have the luxury of being able to exclude any technology beforehand.’ The approach adopted by Rodenburg and the Africa Rice Center is to reach out to farmers, provide them with new potential technologies and management strategies and to encourage farmers to experiment with them. ‘Especially in view of climate change, it is important that farmers keep all their options open and are able to adapt quickly to new circumstances.’

ABOUT THE PROJECT
Jonne Rodenburg received a WOTRO Individual PhD grant for his research, and he obtained his PhD in 2005. His thesis, ‘The role of sorghum genotype in the interaction with the parasitic weed *Striga hermonthica*’, is available online at the Wageningen UR E-depot: http://edepot.wur.nl/121726
RESEARCH INSTITUTES

- Africa Rice Center, Benin/Senegal/Tanzania
- Wageningen University and Research Centre, the Netherlands
- University of Sheffield, UK
- University of California – Santa Cruz, USA
- Centre de Coopération Internationale en Recherche Agronomique pour le Développement, France
- International Rice Research Institute, Philippines
- International Crop Research Institute for the Semi-Arid Tropic, India
- International Centre for Insect Physiology and Ecology, Kenya
- Michael Okpara University of Agriculture – Umudike, Nigeria
- University for Development Studies, Ghana
- Université d’Abomey-Calavi, Benin
- Institut National de Recherche Agronomique du Bénin, Benin
- Centre National du Recherche Agronomique, Côte d’Ivoire
- Sokoine University of Agriculture, Tanzania
- Mikocheni Agricultural Research Institute, Tanzania

SOURCE ARTICLES


RELEVANT ARTICLES

Mobile phones and the emotional side of development

‘I JUST CALLED TO SAY I LOVE YOU’

Mobile phones offer economic and political opportunities to people in Africa, but they also provide a sense of belonging and self-determination. Social scientists are now analyzing how people adopt these new technologies, generating information that companies and NGOs can use, while at the same time questioning conventional concepts of development.
Sitting in a small house in Bamenda, north-west Cameroon, Mirjam de Bruijn is talking to an old woman, when suddenly a mobile phone rings. The woman’s son, who lives in the Netherlands, is just calling to say hello. ‘I will never forget the expression on her face at that moment,’ says Mirjam. ‘She literally radiated happiness, and it was then I realized that mobile phones have a huge emotional impact. They make life less hard.’

MODERN COMMUNICATION TECHNOLOGIES
Mirjam de Bruijn is an anthropologist and professor of African studies. Together with Inge Brinkman and Francis Nyamnjoh, she is coordinator of ‘Mobile Africa Revisited’, a joint research project involving the African Studies Centre in Leiden, the Langaa Research and Publishing Common Initiative Group in Cameroon and other groups across Africa. The research team, whose members include cultural anthropologists, historians and communication scientists, are studying the ways in which people in Africa are using mobile phones and the internet to shape their lives. Although the uptake of modern communication technologies in Africa has exploded in recent years, little is known about their implications on the lives of ordinary people.

‘We have found ourselves in the midst of a global real-life laboratory,’ says de Bruijn. ‘Developments are moving extremely rapidly, which is why this research is so fascinating.’ Not only is the topic innovative, but so too are some of the approaches. The team uses video, for example, to stimulate discussions and to disseminate their findings to the public. Another innovative aspect of the research is that mobile phones themselves are treated as a source of information. The contact details, pictures and movies stored in mobile phones can say a lot about their owners and their social environment and relationships. Hence, the contents of a phone can reveal a great deal about the social life of its owner. The phone is literally opened – with the permission of its owner, of course – and people are asked about who they talk to and about what.

Based on a wide range of case studies, de Bruijn and her team have found that histories of mobility can help in understanding contemporary migration patterns and the ways people adopt modern forms of communication. In many remote regions mobility has long been a part of people’s way of life. Traditional hunters, for example, leave their home villages for long periods, hoping to return with a catch. The recent flows of migrants to the United States and Europe are essentially extensions of such cultures of mobility.

Today, many African migrants are part of ‘transnational families’. They live in different countries but their relations and connections allow them to ignore national localities, and their mobile phones play a crucial role in maintaining intimate relationships. These
long-distance relationships are as much a part of their social life as those with people nearby. To understand social change it is therefore not enough to examine the situation in a particular location, but requires attention to their connections with people in other parts of the world. As de Bruijn puts it, ‘Mobile people live in communication, rather than in location.’

THE IMPACT OF MOBILE PHONES
One important finding of the Mobile Africa Revisited project is that pastoralists in remote areas of Africa adopted mobile phones much more quickly than commonly thought. They suit their way of life. Travelling long distances used to be the only way that pastoralists could communicate with people outside their own clan, but now they simply use a phone to call someone in town. Checking on the security situation, for example, has become extremely important for pastoralists in recent years, providing information that helps them to make decisions about where it is safe to take their cattle.

The researchers have also found that the introduction of mobiles and smartphones in remote regions is having a positive impact on literacy levels. Text messaging and internet access enable people to improve their reading and writing skills, and – perhaps even more important – these technologies highlight the importance of being able to read and write.
The contact details, pictures and movies stored in mobile phones can say a lot about their owners and their social environment and relationships.

The introduction of new communication technologies can have political consequences as well. A good example is the Arabic Spring, in which social media played an important role. But the impact at a smaller scale in terms of political empowerment should not be underestimated either. A farmer in a village can now hear about local and national political developments from relatives in other parts of the country. And smartphones allow people to access international news websites. In some communities, de Bruijn and her colleagues have even found a new type of ‘messenger’ – young people with smartphones who have become vital sources of information. They found, for example, young men in remote villages in Chad – a country until recently in the midst of a civil war – using their phones to access an independent news website to find out whether rebel groups were heading in their direction.

The researchers have documented many more examples of the opportunities that communication technologies offer to people in remote parts of Africa. But their impact should not be measured in economic terms alone, de Bruijn warns. Using a mobile phone to call a relative abroad is usually expensive. It makes little sense from a purely economic point of view, but it makes a lot of sense from an emotional perspective. ‘Living in poverty may negatively affect your material well-being, but you may be even worse off emotionally without relationships,’ says de Bruijn. ‘Mobile phones can give people a sense of identity, and may improve their ability to shape their own lives. Imagine a girl in Sudan who manages to evade the restrictions of her family by secretly calling her boyfriend. The space to make her own choices and to express herself has grown, which increases her sense of self-determination.’

THE IMPACT OF RESEARCH
Mobile Africa Revisited is generating ideas that are being picked up by other people and organizations, such as development NGOs, says de Bruijn. ‘In a discussion with a Dutch NGO that is working with African pastoralists we shared our findings about the
opportunities that mobile phones offer to pastoralist societies, and the ways they adopt these technologies. It appeared they had never thought about that! Based on these discussions, the NGO started a project focusing on improving the access of pastoralists to mobile telephony.

The research is also generating information that is relevant for civil society watchdogs. In Chad, for example, researchers found that the government occasionally asked the phone company to shut down the network in order to prevent rebel groups communicating during military actions. The company obeys, because it depends on the government for its operating licence. For the same reason, the company is also said to ‘illegally’ pass on personal information about their customers to the security police. Civil society groups can use information about such questionable practices to put pressure on companies to act responsibly. In Cameroon, the researchers are now in contact with a group of lawyers who have started an initiative to address such issues.

Just like NGOs, companies are interested in the research results, and large ones like Sony-Ericsson are closely following the Mobile Africa Revisited project. So far, telephone and network providers have been particularly interested in the finding that a single phone in Africa is used much more intensively than a phone in Europe or North America. This is because African phone owners tend to lend their phones to family members and neighbours, and because many people who own a phone start small roadside businesses, where other people can make a call by paying a few coins. Researchers have labelled this the ‘single-owner, multiple-user’ principle. Mobile phone companies appear to be very pleased with this finding, as it has helped them to redefine their marketing strategies.

Capacity building is another form of impact – and an extremely important one, as the levels of education in Africa are still far below international standards. Providing high-quality education opportunities to African students has been a major objective of the project from the outset. As well as three European MA students, the project involves five African MA students, and no less than seven PhD students from South Africa, Chad, Mali, Cameroon, Angola, Sudan and Senegal. These students will take up professional positions in academia, politics, civil society or business, where they can use their acquired knowledge, skills and experience to benefit their home countries.

IMMIGRATION, INTEGRATION, WELL-BEING
Mobile Africa Revisited may also provide insights that are relevant for societal debates within the Netherlands, de Bruijn suggests. As an example she cites a study that explored the ways in which African immigrants in the Netherlands use modern communication
technologies to maintain contact with friends and relatives back home. The study found that increased access to mobile phones, both here and back in their home countries, is resulting in a decreasing need among immigrants to get to know people in their immediate neighbourhood. This obviously presents a challenge for integration, as immigrant communities become increasingly inward-looking.

But there may be positive sides too. ‘By maintaining relationships with relatives and friends back home, people also maintain their sense of identity,’ says de Bruijn. ‘This can be crucial for immigrants to feel emotionally equipped to face the challenges of living in a new society. Such findings raise questions about what integration really means in a globalized world. Indeed, the common notion of integration may have become old-fashioned, as it is being overtaken by modern technological opportunities.’

Such insights from studies of the impact of mobile phones are challenging existing ideas about various aspects of well-being, de Bruijn believes. The findings so far suggest that the most important impact of mobile phones may very well be an emotional one. ‘While development is usually perceived in terms of access to assets, a focus on well-being would perhaps be more appropriate,’ she says. ‘It means that attention should also be paid to people’s sense of belonging, identity and emotional relations.’

**RESEARCH INSTITUTES**
- Langaa Research and Publication Centre, Bamenda, Cameroon
- Centre for Research in Anthropology and Human Sciences (CRASH), N’Djamena, Chad
- University of Cape Town, South Africa
- Université du Mali, Bamako, Mali
- Leiden University, Institute for History, the Netherlands
- African Studies Centre, Leiden, the Netherlands

**SOURCE ARTICLES**
Developing an affordable HIV drug resistance test for Africa

FIGHTING THE RIGHT VIRUS

The prices of HIV drugs have fallen dramatically in recent years. However, tests for drug resistance of the virus – important for monitoring the epidemic – remain very expensive. South African PhD student Susan Aitken and other scientists joined forces with private companies to develop a HIV drug resistance test that was affordable, simple and could be used in any lab in Africa.
Significant progress was made in the late 1990s in improving and extending the lives of people infected with HIV. A new, effective combination therapy called HAART (Highly Active Antiretroviral Therapy) caused the number of people dying from AIDS-related illnesses to drop dramatically. As long as HIV patients adhered to a strict daily regimen of drugs, their disease became controllable. However, at an average cost of US$10,000 to US$15,000 per person per year, this successful treatment remained largely confined to the West. In the early years of the 21st century, according to the World Health Organization (WHO), only 2% of people suffering from HIV in developing countries received these life-saving drugs.

This situation changed radically in subsequent years. Pharmaceutical companies were under pressure to reduce the cost of their medication, most notably by western HIV/AIDS activists, the International AIDS Society and the WHO. The combined impact of their efforts was immense: according to WHO figures, in 2002 only 300,000 people in low- and middle-income countries received antiretroviral therapy, but by 2011 this number had increased to more than 6.5 million.

This change, though it dramatically improved the lives of many, also had an important downside: as medication use increased, so did drug-resistant HIV-1. ‘This has to do with the specific character of both the treatment of HIV and with the HIV virus itself,’ says Susan Aitken, a virologist from South Africa and PhD student at the University Medical Centre Utrecht in the Netherlands.

**AFFORDABLE RESISTANCE TEST**

Aitken is working on a project called ART-A, which stands for Affordable Resistance Test for Africa. ‘Someone with HIV,’ she explains, ‘has to remain on medication for the rest of his or her life. Taking pills every day, year in, year out is crucial to keep the virus from replicating and to prevent the emergence of drug resistance. But this is no easy task. There are various reasons for treatment interruptions. Patients may stop taking their medication because the treatment has made them feel healthier again. More frequent reasons, however, are drug shortages at African pharmacies, weak patient support systems, interactions with other drugs that weaken the HIV drugs and the use of sub-optimal HIV drugs that are cheaper but have an array of side effects and therefore are difficult to continue taking.’

When treatment is interrupted, the elusive virus immediately takes over again, Aitken says. ‘HIV is a retrovirus. These types of viruses are all about mass production. They replicate very quickly. To make matters worse, the virus does not check for errors during replication. It has a much higher error rate than other organisms. In other words, the virus mutates very
quickly. It is evolution in a pressure cooker. When a patient has limited access to medication, the pressure of the drugs on the virus decreases, giving it the chance to develop mutations that make the virus resistant to the medication. Once resistant, the virus can multiply in the presence of the medication, and could make the patient sick again.

Monitoring for drug resistance at the population level is therefore a crucial element for the evaluation of large-scale HIV treatment programmes. The tests make it possible to detect the presence of drug-resistant mutations in HIV obtained from the blood of infected individuals. This process, called genotyping, helps to evaluate the success of the treatment regimens and allows policy makers to make better-informed decisions regarding which standard HIV treatment regimens to use.

**EFFECTIVE TESTS**

A big problem is that while the prices of medication have dropped, monitoring viral replication and testing virus resistance remain extremely expensive and technically complex. This is where Susan Aitken and her fellow researchers come in. As part of the WOTRO-funded research project ART-A, their goal was to develop a simple yet effective test that could be used in Africa at a significantly lower cost than commercial tests.

Commercial tests are problem-ridden, according to Aitken. ‘They require plasma, which is part of our blood. In order to obtain it, someone needs to draw blood from the patient. Trained people are needed for this procedure. Then the blood needs to be centrifuged,
A protective patent for our findings guarantees that no company can commercialize the tests which requires a constant electricity supply. The plasma obtained by centrifuging the blood is highly unstable, however. Therefore it needs to be stored at –80°C in expensive freezers that require continuous power as well. Power failures can compromise the samples. Obviously all these factors contribute to higher costs. This, together with the fact that the tests themselves are very expensive and technically challenging, means that most of the time, these tests are not performed at all,’ says Aitken.

To address these challenges, the ART-A project focused on replacing the plasma with dried blood spots on specially prepared filter paper. Aitken and her colleagues were able to prove that this method of collecting samples can be used as a reliable and cheap alternative to the expensive plasma-based tests.

‘The idea of using dried blood spots for analysis is not new,’ says Aitken, ‘but most research on it is preliminary. Part of our research was aimed at determining how the virus in the dried blood would be affected by different storage conditions, for example. We especially looked at how the storage time and storage temperature affect the samples prior to analysis. This enabled us to find out how long and at which temperatures dried blood can be stored and still produce reliable test results.’

**A DOABLE CONCEPT**

The dried blood spots proved to have several advantages over traditional plasma. A small finger prick is all that is needed to collect a blood sample, for example. This is a much easier way of collecting samples than venipuncture. It also makes it possible to collect samples from patients in remote locations.

One of the most important findings was that there is no need for expensive freezers and centrifuges. ‘Our research has shown that the dried blood spots should be kept cold,’ says Aitken, ‘but that there is a two-week window in which you can keep them at room temperature without the virus becoming too degraded to be used for analysis. After these two weeks, the samples should be stored at –20°C. In Africa, this is a doable concept.’
means that samples can be simply sent in an envelope by mail to a central laboratory, even from very remote regions, removing the need for expensive, cooled transportation across the country.

To develop the tests, the researchers teamed up with a consortium of private companies, who provided the project with broad-based knowledge and a research resource base to address the questions that needed to be answered. ‘An important advantage of working with these private partners was that we gained insight into the criteria our tests would have to meet to ensure a quality product,’ says Aitken. ‘For example, we were able to use proprietary virus databases to ensure that our tests would be generally applicable to all the HIV variants found in Africa.’

**FOLLOW-UP**

The tests and methods developed by ART-A are now in the process of becoming provisionally patented. ‘By having a protective patent for our findings,’ says Aitken, ‘we can make sure that no company can commercialize them for excessive profit-making. We will make all our results and methods freely accessible on the internet.’

ART-A has received additional funding for consolidation of the results. The follow-up includes further improving the ART-A tests for actual field application in Africa and preparing production of the tests by African stakeholders.

Coming from South Africa, a country that has been hit hard by HIV/AIDS, Aitken is well aware of the destructive power of the disease and how important effective treatment is. ‘In South Africa, everybody knows someone who has HIV, be it a friend or someone you work with. You see how it affects them and their family. You also see how they are affected when the medication stops working and they become sick. This is also why I feel our research is so important. Because the method we developed makes testing easier and more affordable, I believe it will improve treatment and further reduce the number of people suffering from HIV and AIDS.’

**ABOUT THE PROJECT**

The Affordable Resistance Test for Africa (ART-A) was part of the Netherlands–African Partnership for Capacity Development and Clinical Interventions of Poverty-related Diseases (NACCAP), the Dutch contribution to the European and Developing Countries Clinical Trials Partnership (EDCTP). NACCAP focused on fighting diseases such as HIV/AIDS, malaria and tuberculosis by strengthening African R&D capacity. A report on the first phase of the programme, ‘NACCAP 2004–2011: Lessons learned,’ is available from the WOTRO website: www.nwo.nl/naccap. In 2012, ART-A was awarded additional funding for further improving and developing the test.

**PUBLIC AND PRIVATE PARTNERS**

- PharmAccess Foundation, Amsterdam, the Netherlands
- Amsterdam Institute for Global Health and Development (AIGHD), Amsterdam, the Netherlands
- University Medical Centre Utrecht, the Netherlands
- Centre de Recherche Public de la Santé, Luxembourg
- University of the Witwatersrand, Johannesburg, South Africa
• Janssen Diagnostics BVBA (formerly Virco), Belgium
• Contract Laboratory Services, South Africa
• Joint Clinical Research Centre, Uganda

RELEVANT PUBLICATIONS


Assessing the impact of development projects

POOR PEOPLE AS GUINEA PIGS?

Erwin Bulte has adopted a revolutionary approach for assessing the impact of development interventions through social experiments. These assessments provide governments and NGOs with robust data that they can use to focus their efforts on what really works.
The international community is spending hundreds of millions of dollars on development aid, but the effects of their interventions are seldom measured systematically. Measuring impact is extremely difficult, not least because you generally do not know what would have happened without the intervention. Even if you can measure change, it is usually impossible to prove a causal relationship with a particular intervention, as there are so many other variables that could have contributed to the change.

In recent years, development aid organizations have increasingly been expected to demonstrate impact, but have lacked the proper tools and methods to do so in a systematic way. They must have looked with envy at medical researchers. In the medical sciences, it is common to measure the effect of interventions. The introduction of new medicines, for example, involves sophisticated experimental approaches and yields robust results. Either the medicine works, or it doesn’t. The core of the experimental approach is the random selection of a treatment group (those who receive the medical treatment) and a control group (those who do not receive the treatment). Unfortunately it is not possible to apply such an approach to development projects. Or is it?

MEASURING IMPACT

Erwin Bulte thinks it is possible. He is involved in a large number of research projects in collaboration with NGOs, governments and multilateral organizations, measuring the impacts of their development interventions on the lives of ordinary people using a truly experimental approach.

Early in his career, Bulte was especially interested in the relationship between natural resources and development, but over the years more and more of his findings indicated that local institutions are more important than biophysical circumstances in determining development opportunities. Consequently, he gradually focused his attention on the relation between development processes and the characteristics of local institutions such as the accountability of local governments, the level of tenure security, local norms of cooperation and solidarity, and the quality of regulation and judicial systems. ‘The problem with this type of research, however, is that most of these local institutions are interconnected. It’s like a plate of spaghetti,’ says Bulte. ‘But to understand development, we have to know more precisely which institutions are the crucial ones.’ And that is how Bulte came to the idea of experimental approaches to assess development interventions.

The reasoning is simple. If you are able to measure the impact of development projects that are directed at different local institutions, you will learn a lot about development.
processes in general. Inspired by the scientific possibilities this approach would offer, Bulte became involved in numerous projects with development organizations. These organizations received him with open arms, as they were looking for better ways to measure the impact of their interventions. And Bulte had ambitious plans. He believed that impact should best be measured in a systematic and controlled manner, and at a sufficiently large scale. Indeed, much like a medical trial.

Bulte adopted an innovative approach that is based on treatment and control groups. He works closely with the intervening organizations and helps them to design their projects as social experiments, i.e. they randomly select a large number of people or villages to receive the intervention and an equally large number as the control group. The intervention could, for example, be the creation of a local farmers’ organization, the launch of a microcredit project or the introduction of a new seed variety. Bulte and his colleagues then measure the impact of the intervention in both the treatment and control communities using a large range of indicators, including income, health and education levels. They are then able to find out what works in a particular context, for whom, and under what circumstances. Eventually this information enables practitioners to tailor interventions in the future.

**INNOVATION PLATFORMS**

As an example Bulte mentions the ‘innovation platforms’ being developed by the Forum for Agricultural Research in Africa (FARA). These innovation platforms are established
The data showed that poverty levels had gone down in the treatment villages, in a statistically significant manner at the village level and are meant to provide a place for all relevant stakeholders in the village – farmers, traders, entrepreneurs, village leaders and women’s groups – to come together and discuss their problems, needs and possible solutions. This discussion is then used as the basis for designing agricultural support and building new local institutions.

FARA asked Bulte and his team to help monitor the effects by comparing the developments in villages with and without the innovation platforms. Bulte jumped at the challenge, and is now involved in an experiment to measure the impact of 36 innovation platforms, covering a total of 540 villages and 5400 households in seven African countries.

The first results were quite surprising, says Bulte. ‘I really had not expected to see any significant changes between the control and treatment villages – not that soon at least. But the data clearly showed that poverty levels had gone down in the treatment villages, in a statistically significant manner.’ Thinking about the possible reasons for this success, Bulte realized that the result simply confirmed the pivotal importance of local institutions in determining development processes. ‘After all, these platforms enable people to address exactly those local institutions that they consider to be the main bottlenecks in their particular village, which can be very different from those in a neighbouring village.’

DOUBLE-BLIND EXPERIMENTS
People usually know when they are in the treatment group in these experiments. But even double-blind experiments are possible. Recently Bulte started a project in the village of Morogoro in Tanzania, where they are experimenting with the double-blind method for the first time. In Morogoro, local farmers grow cowpeas for their own consumption and for sale on the local market. Hoping to increase the farmers’ yields, agricultural specialists developed a new variety of cowpea, which performed significantly better than the traditional variety in the laboratory. But this does not automatically mean that the ‘improved variety’ will perform better under real-life circumstances, and so field tests are needed.
Such agricultural trials are not new, and are fairly straightforward. But the problem is that they do not take a potential placebo effect into account: farmers who know they are part of an agricultural trial may adjust their behaviour. They may, for example, spend more (or less) time weeding and apply more (or less) fertilizer than they would normally have done, or they may plant the improved variety on higher (or lower) quality plots. As a result, analysts will confuse the effect of the improved cowpea variety with the behavioural response of the farmers.

In Morogoro, Bulte and his team therefore designed a double-blind experiment. In addition to the standard treatment and control groups, a random sample of farmers received common peas and another random sample received the new seed variety. But neither the farmers nor the extension workers who distributed the seeds knew which variety they were handling. According to Bulte, double-blind trials are truly innovative when applied in social experiments and allow researchers to identify placebo effects. He expects that their experiment in Tanzania will be the first step towards a major methodological improvement in impact assessments.

**THEORY AND PRACTICE**

Is it ethical to randomly assign people to control or treatment groups? Bulte is prepared for this question, and his answer is clear: ‘Yes. It is the only way to learn. Any intervention includes and excludes people. The only thing we ask is that the people who receive treatment and those who don’t are randomly selected. This actually makes it fairer. And in the end our work will improve the intervention in the future. No costs, just benefits.’

Bulte has been working in developing countries for more than 20 years. ‘I have seen many examples of worthwhile interventions, but I have also seen many projects that were poorly designed and not successful at all. This made me interested in the question of impact. Part of our new research agenda now enables us to explore what factors are conducive to successful interventions.’ For Bulte the main challenge is to form a bridge between hands-on impact assessment work and the more lofty academic theories. ‘I am continuously switching between working on grand academic theories and working with organizations in the field on questions of impact. And the best thing is, they reinforce each other.’

‘Without a good theory about how development works, we will never know how to promote it,’ says Bulte. ‘So, assessing the impact of development aid is crucial not only for improving future interventions, but also for building more robust development theories. And, in the end, nothing is as practical as a good theory.’
COLLABORATING INSTITUTES

- The World Bank
- Forum for Agricultural Research in Africa (FARA)
- ZOA Refugee Care
- Wageningen University and Research Center, the Netherlands

RELEVANT PUBLICATIONS

WHY THE BLUE NILE CARRIES BROWN WATERS

The Blue Nile carries topsoil eroded from the mountains of Ethiopia and deposits it downstream in Sudan. For farmers in both countries it is a lose–lose situation. Hermen Smit and Yasir Salih are looking for ways to improve soil conservation and water management across the region.
The Nile is the world’s longest and perhaps most famous river. It carries water and fertile sediment into Egypt, allowing one of the earliest civilizations to develop along its banks. Without the river, there would have been no pyramids. The Nile and its two major tributaries, the White Nile and the Blue Nile, support millions of people in no less than nine countries. The water is vitally important, for example, for the people in the lowlands of northern Sudan and Egypt, located at the edge of the Sahara desert. As the populations in these areas grow, however, access to the river’s water is increasingly contested. Furthermore, the availability of water downstream is threatened due to soil eroded from mountain slopes further upstream.

This is especially true in the case of the Blue Nile, which flows from the Ethiopian highlands to Sudan. No less than 95% of the sediment carried by the Blue Nile originate in the Ethiopian highlands, where the increasing pressure on land for agriculture and the associated deforestation are causing massive soil erosion. Ethiopian farmers are seeing large parts of their fields being washed away by the rains. The soil is then carried for over 900 kilometres all the way to Sudan, where it accumulates in reservoirs and irrigation channels, causing problems for farmers who depend on the waters of the Blue Nile for agricultural production.

**THE BLUE NILE PROJECT**

This relation between upland erosion and access to water in the lowlands is the focus of the Blue Nile research project of the Institute for Water Education (UNESCO-IHE). Hermen Smit is one of seven PhD students working with the project, which is relevant to almost 20 million people, including 15 million small-scale farmers in the Ethiopian highlands who are losing large areas of farmland to erosion, and another four million farmers in Sudan who are affected by sedimentation. ‘For a Dutch water manager, the scale of these problems present quite a challenge’ says Smit, who used to work for a water board in the Netherlands. ‘Effective erosion control and improved water management in the Blue Nile basin are urgently needed’.

In an effort to find better ways to tackle these problems, researchers with the Blue Nile project are looking at the interactions between social, cultural, political and physical factors. Smit is trying to understand, for example, how arrangements among communities, and between them and the government, have developed over time, why farmers continue to use particular farming practices and how different groups respond to the problems. In response to the loss of productive land due to erosion, for example, he has found that more and more young people from the Ethiopian highlands are leaving the agricultural sector. Rather than investing in better soil and water management, they
try their luck in non-farm sectors, such as by setting up small trading businesses, or by moving to the city. ‘This means they may not have an interest in preventing erosion,’ Smit says. ‘We need to understand these dynamics and preferences before we introduce erosion control measures.’

**FILLING UP RESERVOIRS**

Sedimentation, or siltation – the deposition of fine silt and clay particles – is not necessarily a bad thing. The silt left behind by the annual floods of the Nile used to fertilize the land, and has long been crucial for agriculture, especially in Egypt. In recent decades, however, the amount of silt carried by the river has risen dramatically. Siltation has turned from a virtue into a problem.

The deposition of soil particles starts when the flow of the water slows down, and is a particular problem when this occurs in irrigation channels and the reservoirs in Sudan. The Roseires reservoir, for example, is used to irrigate one million hectares of land, to control floods and to generate hydropower, but has already lost one third of its capacity due to sedimentation. The sediments are also threatening the Gezira irrigation scheme, one of the largest irrigation projects in the world, which serves around 4 million farmers. The irrigation channels are filling up so fast that they need to be cleaned every year. This is currently costing more than half of the budget of the Sudanese Ministry of Irrigation and
Engineers can use the model to predict how sedimentation will affect the capacity of reservoirs and how the dams will influence downstream sedimentation rates.

Water Resources, and even this is not enough. The smallest channels at the tail end of the scheme are not reached by the government’s excavators and they are now choked with sediment so that many farmers are experiencing water shortages, and rapidly declining production.

Ultimately, trying to remove the sediment is a pointless exercise. Huge sums of money are being spent each year to fight the symptoms, but the cause of the problem remains. The only way to tackle the problem effectively is to go back to its source. But where to start? This is one of the questions that prompted Yasir Salih, from Sudan, to look for a solution. Salih, like Hermen Smit, is a PhD candidate working with the Blue Nile project.

**FINDING THE RIGHT MATCH**

Virtually all of the sediment carried by the Blue Nile originates in the Ethiopian highlands. That much is already known, but Salih wanted to know more precisely where the soil particles are coming from. As part of his research, Salih collects soil samples from reservoirs and canals in Sudan, as well as from farms in Ethiopia. He then goes back to the laboratory to conduct chemical analyses of the finest soil particles, from which he can determine the unique properties of each sample. With this information in hand, he starts looking for matches – which sample from Sudan has the same chemical properties as one from Ethiopia. He is then able to identify the source of the soil deposits – even down to the exact farm plot in Ethiopia – and the hotspots of soil erosion. ‘These are the areas where erosion control is most urgent. If you focus your attention there, you will solve not only the problem of erosion in Ethiopia, but also the sedimentation problem in Sudan.’

**PREDICTING THE FUTURE**

Besides taking soil samples from river banks and river beds, Salih collects so-called river profiles, for which he needs information on a range of physical parameters such as the
river flow, width and depth at various locations. He is the first scientist to collect this type of data in this part of the world, and is using the information to develop a model that will be able to predict sediment flows and deposits. This sophisticated work involves two computer simulation models and an enormous database with physical measurements.

The model he is developing has numerous possible applications. ‘Suddenly everybody is interested in my data’, he says with a smile. This is because there are many developments in the area. Ethiopia, for example, is planning to build several dams on the Blue Nile. With Salih’s model, engineers will be able to predict how sedimentation will affect the capacity of the storage reservoirs and how the construction of the dams will influence downstream sedimentation rates. Engineers and policy makers can use these scenarios to optimize the design of dams on the Blue Nile.

BASED IN DELFT
When they are not in the field, Salih and Smit spend most of their time at the UNESCO-IHE building in the old city centre of Delft, the Netherlands, where hundreds of students from all over the world come for research and to study, and they have one thing in common: their interest in water management. UNESCO-IHE is one of the world’s foremost water education centres, with a long history and expertise in water management. ‘It’s perhaps no surprise it is located in the Netherlands’, says Smit.

In the laboratory in the basement of the UNESCO-IHE building, surrounded by soil samples and hundreds of test tubes, Salih describes his home on the banks of the Blue Nile where he used to go swimming. He remembers the water getting muddier each year, and also his father complaining. ‘My family had some small fields near the river, but over time it became difficult for him to pump water from the river to irrigate the land. Due to sedimentation, the course of the river changed and moved away from his plots. He used to say that the river was running away from us’. Today, some 20 years later, Salih is still intrigued by the phenomenon. Together with six other PhD students based in Delft, he hopes to contribute to a permanent solution to the problems that farmers like his father are still experiencing on a daily basis in both Sudan and Ethiopia.

ABOUT THE PROJECT
The research carried out by Hermen Smit and Yasir Salih is part of the WOTRO Integrated Programme ‘Blue Nile Hydrosolidarities: Understanding upstream—downstream links in the Blue Nile Basin’. The multidisciplinary Integrated Programmes (IPs) are carried out by teams of researchers from the Netherlands and developing countries. In the past six years, WOTRO has funded more than 40 IPs.

RESEARCH INSTITUTES
- Addis Ababa University, Ethiopia
- Institute for Environmental Studies, Vrije Universiteit Amsterdam, the Netherlands
- UNESCO-IHE Institute for Water Education, Delft, the Netherlands
- University of Khartoum, Sudan
SOURCE ARTICLES


RELEVANT ARTICLES


Like many African countries, Rwanda is caught in a vicious cycle. Poverty is causing the country’s population to grow, and that in turn is increasing poverty. Additional investments in key sectors are often seen as the way out of this trap. Researchers Pieter Hooimeijer and Ignace Habimana Kabano show that investing in reproductive health services can be another way to improve the quality of life.
Poverty and high population growth seem to go hand in hand. According to the United Nations Population Fund, over the past 70 years, high fertility and poverty have been strongly correlated. The countries with the highest poverty levels are generally those with the most rapidly growing populations and the highest fertility levels. This correlation has been widely studied. Findings show that families with low incomes tend to see children as a form of security for their old age. Having many children, however, also means having to spend more money on food, housing and clothing, leaving less for investments that will improve the overall welfare of the family. This population-poverty trap has many poor people firmly in its grip.

Rwanda is no exception to this rule. With 11.5 million inhabitants, it is Africa’s most densely populated country, while its annual population growth of 2.8% puts it in the top 20 of the world’s fastest-growing nations. More than half of the Rwandan population lives below the poverty line, despite the fact that the country’s economy grew by an average of about 6% per year in the past few years.

VISION 2020
In a bid to reverse Rwanda’s fate, the government launched a programme called Vision 2020. The programme aimed to shift the country away from subsistence agriculture and extreme poverty, and towards a more modern economy and sustainable human development. The new policy marked the beginning of a new era after a period of post-genocide recovery, says Pieter Hooimeijer, professor of human geography and demography at Utrecht University. ‘The civil war in the early 1990s, which culminated in the genocide in 1994, obviously left the country in a state of devastation. One million people were killed, and two million fled the country. An all-out effort to rebuild the country’s basic structures took place in the first post-war years. With Vision 2020 and the policies that followed from it, Rwanda tried to make the transition from recovery to sustainable human development.’

The new policy was a response to Rwanda being trapped in a vicious cycle of extreme poverty, which led to high population growth, which in turn increased poverty. It was assumed that the best way of breaking this cycle was to generate a ‘big push’: attracting additional foreign direct investment in key sectors of the economy, thereby encouraging economic development and reducing poverty and population growth.

The question whether this mechanism would also work the other way around, was the starting point of a research programme about reproductive health and poverty decline, in which Hooimeijer is principal investigator. ‘The ideas underlying Vision 2020 were well
defined; he says, 'but it is taking a long time for their impact to be felt. Our question was: is there an alternative way of breaking the cycle in Rwanda? If you start by reducing population growth by improving reproductive health services, would this then lead to less poverty and eventually more economic growth?'

FROM MACRO TO MICRO
To answer this question, Hooimeijer and his colleagues decided to shift the focus from the macro to the micro level. ‘Seen from the perspective of the country as a whole, the relation between reproductive health services, reduced poverty and improved economic development is highly contested in the literature. It seems to work in some countries, but not in others. To determine why this is so, and to see how it works in Rwanda, we have analyzed the impact at the level of individual households. The hypothesis is that fewer children per family positively affects households in a number of ways. We assumed that this would benefit the health of both the mother and the children, and that the educational achievements of the children would improve as well. Together, these effects increase income, which eventually increases consumption, which ultimately leads to economic development.’

For one of the Rwandan PhD students involved in the research, the first question was whether improving access to modern contraceptives in particular would reduce
Improved reproductive health services reduce child mortality and the desired family size, while improving the health of the mother and the family as a whole.

Population growth. This was done by analyzing the differences between the desired and actual number of children for a period of over 20 years. The findings are compelling, says Hooimeijer. ‘We found that in the aftermath of the genocide, for many people, having smaller families certainly was not a priority. More than 50% of the women indicated that they wanted to have six or more children. After the recovery started, this changed rapidly. Analysis shows that by 2005 the desired number of children had fallen to an average of around four. At the same time, the number of births remained much higher, which can be explained by the lack of access to modern contraceptives. As soon as investments were made to improve access, the number of birth immediately declined.’

CHILD MORTALITY

Ignace Habimana Kabano, PhD student and lecturer in demography at the National University of Rwanda, is a member of Hooimeijer’s research team. He tested a second hypothesis about the relation between improved reproductive health services and lower population growth. He investigated how, in the case of Rwanda, infant mortality affects birth intervals and the desired family size. Kabano was able to show that experiencing the death of a child before or shortly after birth, immediately raises the ideal number of children a family desires. ‘There are several ways in which child mortality raises the desired number of children,’ he explains. ‘One of the most important is that when parents lose a child, they often not only want to replace it, but also to have as many children as possible in anticipation of other potential child deaths. Having many children simply means leaving room for death.’

Here, another vicious cycle comes into play. ‘Child mortality leads to shorter intervals between pregnancies,’ says Kabano, ‘as many parents want to replace the deceased child immediately. Because this gives the mother no time to recuperate from her first pregnancy, this increases the chance of another unsuccessful pregnancy. This in turn leads to increased mortality among unborn and newborn children, and also of the

Women with their babies on International Women’s Day, Rwanda.
mothers themselves. Our study has shown that decreasing child mortality through improved reproductive health services reduces the desired family size, while improving the health of the mother, the children and the family as a whole.

In 2000, the Rwandan government intensified its efforts to provide all children in the country with free education. Another study within the research programme showed that while the policy created more equal opportunities for children from extremely poor families, the quality of the free education was severely hampered by high population growth. ‘Almost all children, both boys and girls, go to school,’ says Hooimeijer, ‘but very few of them actually pass the final examination. The current policy allows them to remain in primary school even after they turn 13. We found that more than a third of the pupils in primary education are aged between 13 and 18.

At first sight, this looks like a very good development as these teenagers still have a chance to finish their primary education. However, at the national level, Rwanda’s schools are seriously overcrowded, which obviously has negative consequences for the quality of education. At the household level, we found that it’s the children from the wealthier families that stay at school, while poorer families suffer from a clear crowding out effect: there is little chance that the oldest child in a poor family with five children will finish primary education.’

Hooimeijer concludes that ‘having many brothers and sisters is actually hampering education at the individual level. At the national level, high population growth means that much of the investment in education is actually aimed at keeping children at school rather than getting them diplomas. So, both at the national and household levels, having many children is also impeding educational achievement. Reducing population growth can improve the quality of education, leading to a better educated and therefore more productive and eventually less poor population.’

The results of the various PhD studies in the research programme clearly prove the effectiveness of and the need for investing in reproductive health services, says Hooimeijer. ‘We were able to show that there is fertile ground in Rwanda for reducing population growth by improving access to contraceptives. We have also shown that improved maternal healthcare leads to lower mother and child mortality rates, which leads to women wanting fewer children, and in turn to smaller families, a less crowded school system and higher quality education.’

The research that is needed to determine to what extent these improvements would promote economic development at the national level is still in progress, but the first

ABOUT THE PROJECT
The project ‘Breaking the cycle: Reproductive health and poverty decline in Rwanda’ is part of the Population, Reproductive Health and Economic Development (PopDev) research programme, a joint initiative of WOTRO and the William and Flora Hewlett Foundation. The programme is exploring the impact of reproductive health and population dynamics on poverty and economic growth in the least developing countries.
results, however, indicate clear and positive connections between the two. According to the research team, this shows that reducing population growth by improving reproductive health services is an important instrument in increasing the country’s overall welfare. ‘Population policies are often contested,’ says Hooimeijer. ‘I think this cynicism is unwarranted. We have proven that there is something to say for strict family planning programmes that enable women to have less children and that can help to reduce population growth and contribute in the short run to improving the quality of life.’

The results of the research programme’s various studies have caught the attention of the Rwandese government and other stakeholders. At a recent stakeholder meeting in Kigali, the research team discussed the outcomes with state officials and representatives of several NGOs working in the field, says Hooimeijer. ‘This research encourages them to further pursue reproductive health policies. The type of knowledge that our study provides can help Rwanda to move away from that devastating past to a better future.’

RESEARCH INSTITUTES
• Utrecht University, the Netherlands
• National University of Rwanda
• Tilburg University, the Netherlands

RELEVANT PUBLICATIONS
How intellectual property rights hamper food security

WHO OWNS THE SEED?

To ensure global food security, farmers need better seed. Biotechnology can help, but in some cases the protection of this new knowledge is having unwanted effects. Bram de Jonge found that intellectual property rights can block poor farmers’ access to improved seed, with negative effects on the fight against hunger in the world.

BRAM DE JONGE

holds a Master’s degree in culture and science studies from Maastricht University, the Netherlands, and another in environmental philosophy from Lancaster University, UK. In 2009, he obtained his PhD from Wageningen University, where his research focused on ethical issues in access and benefit-sharing policies. His current work at Wageningen University’s Law & Governance Group and the CSG Centre for Society & Life Sciences at Radboud University Nijmegen concentrates on intellectual property rights, research policy and international development.

KEYWORDS

intellectual property rights, patents, biotechnology, food security, improved seeds, policy, innovation, small-scale farmers, Millennium Development Goals
In 2000, after almost ten years of high-tech laboratory work, Dutch and Indonesian scientists managed to develop a new shallot variety that proved resistant to a major pest: the beet armyworm. This was an important scientific breakthrough with a potentially huge impact. The destructive worm was causing thousands of Indonesian farmers who were cultivating shallots to lose a large part of their harvest every year, and the introduction of a resistant variety was expected to increase their yields substantially. But the improved seeds never made it to the farmer’s fields. One of the main reasons was that the new seed variety was subject to patents that were in the hands of big multinationals. Bram de Jonge and colleagues from Wageningen University and Research Centre documented the case in a study of the impact of intellectual property rights on food security.

Patents, like copyrights and trademarks, are intellectual property rights, providing the holder of the right with temporary, exclusive control over the commercialization of an invention. These rights can apply to any invention or innovation, including an improved seed variety, and are useful for encouraging research and development activities. After all, why would anyone invest in an invention if other parties can walk away with the results? But de Jonge’s research has shown that intellectual property rights can also have unwanted effects, as they can have a negative impact on poor farmers in developing countries. The fact that the improved shallot seeds never reached their destination in Indonesia is one of the four remarkable examples documented in de Jonge and colleagues’ study.

BIOTECHNOLOGY TO FIGHT HUNGER

With the Millennium Development Goals, the international community committed itself to halve the proportion of people suffering from hunger by 2015. To meet this goal, it is crucial that smallholder farmers in developing countries increase their production of food; and for this to happen, it is vital that they have access to seed. Seed quality determines the germination and health of food crops, while the genetic information embedded in seed enables crops to withstand pests and diseases. ‘If you want to fight hunger, you will have to do a lot of different things,’ says de Jonge. ‘One of these is making sure that farmers have access to new and better varieties of seed that are adapted to local conditions.’

Farmers have been improving their seed varieties since the advent of agriculture, for example by cross breeding. And not without success. Improved seed varieties have been responsible for some of the major leaps forward in agricultural production and food security in the world throughout human history. The possibilities of improving
seed varieties increased significantly from the 1970s onwards through the use of biotechnologies based on advances in molecular biology. ‘Agricultural research focused on developing better seed is indispensable in the fight against hunger, and biotechnology can be a major help,’ says de Jonge. The world’s population is expected to reach 9 billion by 2050, all of whom will have to eat. This represents a challenge of epic proportions, especially considering the limited availability of agricultural land, fresh water and other resources. According to de Jonge, who has a PhD in the field of bioethics, biotechnology can be an important tool in meeting this challenge, not only for large-scale commercial production, but also for the small-scale farmers who play a crucial role in the world’s food supply.

De Jonge’s research shows that intellectual property rights can block the use of biotechnology for the benefit of small-scale farmers. He explains that some court decisions in the United States in the 1980s made it possible to apply for patents on gene sequences and constructs. Suddenly people could earn lots of money with agricultural biotechnology research. This was an enormous boost for biotechnology industries, and resulted in an explosion of patents. Most patent laws imply that the patented material can be used freely for fundamental research, but its use for other purposes will be subject to payment. De Jonge: ‘To develop a new seed variety, you are likely to be using patented genetic constructs and technologies. As long as you are doing fundamental research, you don’t have to worry about them. But as soon as you want to bring an improved variety to
To fight hunger, small-scale farmers need to have access to new varieties of seed that are better adapted to local conditions in the market, the patents suddenly become an issue. If you want to start using a patented invention for product development, you will have to pay the patent holder. This can make the end product too expensive, especially when it concerns a food crop such as cassava that is important for small-scale farmers who do not constitute a strong commercial market.

**PATENTLY ABSURD**

So what happened to the shallot variety that could resist the beet armyworm and significantly improve the yields of poor farmers in Indonesia? Nothing really, and that is exactly the problem. It was only once the seed had been successfully developed, and the researchers began to look for a company to bring it to the market, that they began to check whether there were any patents involved. They found about 15, and they had to apply for permission from the multinationals that owned some of these patents. The researchers wrote letters to the patent owners, but they did not respond. ‘These big companies probably receive thousands of letters like these,’ de Jonge says, ‘and they have no interest in answering. They often concern crops and markets that are of no commercial interest to them so investing time in answering these letters would be a waste of their money.’ The situation concerning the intellectual property rights attached to the new shallot seed thus remained uncertain, and as a result no private party was willing to take the technology further. ‘You could of course go ahead with the new variety. But then you risk having lawyers from a big company that own some of the patents knocking on your door at a certain point, and you can be sure that a lawsuit will cost a lot of money.’

It seems absurd that inventions that could improve the lives of poor people are blocked for such reasons, but that is the reality, as de Jonge discovered. He is still struck by scientists’ lack of awareness during the early stages of their research. ‘Of course, it makes no sense for people to just go ahead with their research, spend a lot of money, only to find out later that they are not allowed to bring the end result to the market.’ But de Jonge
also understands that a scientist doing exciting, fundamental research does not want to be bothered with potential future constraints. This is why research institutions need to increase awareness of and develop procedures related to intellectual property rights.

**PATENT LANDSCAPE**

Intellectual property rights are a relatively new, but rapidly developing phenomenon, and their effects on agricultural development have hardly been studied. De Jonge and his colleagues thus entered unexplored territory. They found a staggering lack of reflection on the unwanted effects of intellectual property rights.

De Jonge cannot stress enough that research institutes and funding agencies need to become much more aware of the possible impact of intellectual property rights on the application of inventions for development purposes. Once aware, they can take several steps. First, scientists should be encouraged to assess the ‘patent landscape’ before they start their research. This ‘freedom to operate’ analysis entails determining whether particular actions, such as using certain seeds or research techniques, can be performed without infringing the intellectual property rights of others.

Second, research institutes can ensure that their own inventions remain freely available for humanitarian purposes. This is something that can be determined when they enter into negotiations with companies about licensing a certain invention. At this stage, it is common practice to include provisions in the contract that allow free use of the invention for scientific and education purposes. In exactly the same way, research institutes can include a provision stating that the invention can also be used freely for development purposes. This is known as a humanitarian licensing strategy. ‘It comes down to market segmentation,’ de Jonge says. ‘You have a commercial market and a market for the poor, and these markets must be divided. If they are not, then humanitarian projects may be subjected to the laws of the commercial market, which is something they cannot afford.’

The study by Bram de Jonge and his colleagues has exposed a yawning knowledge gap, as very little is known about the exact impact of intellectual property rights on food security. They pinpointed many things that can and should be improved. Consequently, their research has received high-profile attention since publication of the study. Questions were raised in Dutch parliament about the study’s conclusions. In response, the Dutch government endorsed the main findings of the study and stressed the need for more expertise on intellectual property rights and development. Both researchers and research managers have responded to the study with great interest and slight discomfort as well. Clearly, they cannot ignore the findings, and will need to act upon it.
De Jonge himself believes it is unacceptable that intellectual property rights are benefitting research institutes and big companies in the developed world, while simultaneously hampering – albeit unintentionally – the fight against hunger. ‘Intellectual property may seem a dry topic,’ he says. ‘But in the end it is about justice. It is about the real lives of real people.’

RESEARCH INSTITUTES
- Tilburg University, the Netherlands
- Wageningen University and Research Centre, the Netherlands
- Amsterdam Institute for Global Health and Development, University of Amsterdam, the Netherlands
- PharmAccess International Foundation, Amsterdam, the Netherlands
- ACODE, Advocates Coalition for Development and Environment, Uganda
- University of Cape Town, South Africa

RELEVANT PUBLICATIONS
REACHING THE POOR

In 2003, Ghana was one of the first African countries to introduce a national health insurance scheme. Within five years, over 7 million people, about 35% of the population, had enrolled. Most of them, however, were from richer households, while enrolment among the poor remained low. Researcher Rob Baltussen and his team have investigated ways to increase enrolment among the poor as well.
It was one of the main promises made by John Kufuor during the presidential election campaign in 2001: to implement a health insurance system for all Ghanaian citizens. It was the first time that an African government decided to introduce such a national health insurance scheme. The aim was to replace the highly unpopular system of user fees, or on-the-spot cash payments that patients had to make in order to be treated by a doctor.

‘As in many other African countries, Ghanaians have really suffered from this system of user fees,’ says Rob Baltussen, associate professor of health economics at Radboud University Nijmegen Medical Centre, and coordinator of the NWO-WOTRO project Reaching the poor in Ghana’s National Health Insurance Scheme. ‘Many studies have shown that for poor households such payments represent a huge barrier to the use of healthcare services. If people need to consult a doctor or require urgent hospital treatment, they may have to borrow money from family members or even sell valuable possessions such as livestock. The high cost of medical treatment can easily push many households into poverty. Obtaining insurance could therefore have an enormous impact.’

Citizens enrolled in the scheme pay annual premiums that cover the cost of treatment, and so no longer have to pay user fees on the spot. For the Ghanaian government, replacing the system of user fees with a national insurance scheme was seen as a way not only to improve access to healthcare, but to reduce poverty as well.

COMMUNITY-BASED HEALTH
Ghanaians were already familiar with community-based health insurance schemes of various kinds, Baltussen notes. ‘Most of them were associated with churches or women’s groups and did very well in terms of enrolling people and offering financial protection to their members. The government decided to make use of that experience to build the national scheme, which was eventually introduced in 2003.’

Around five years later, more than 7 million Ghanaians, about 35% of the population, had enrolled in the national scheme. ‘This may seem a rather low rate of uptake, but if you consider where the country started from, it was quite an achievement,’ says Baltussen. The problem was that the vast majority of those enrolling in the scheme were from the richer sections of society. ‘When we started our research project in 2008,’ says Baltussen, ‘we found that 48% of rich households had health insurance cover, compared with only 21% of poor households. This was a significant problem, because high healthcare bills can be especially problematic for poor households. So we took this situation as the starting point of our research and decided to focus on the question of how to encourage enrolment among the poor.’

Under the health insurance system, Ghanaians don’t have to pay before being admitted to a hospital.
BARRIERS TO ENROLMENT

For Baltussen and his international and interdisciplinary team, the first step was to identify the main barriers to enrolment. Why were poor people choosing not to enrol in the health insurance scheme?

To answer that question, Baltussen’s team reviewed the literature and organized discussions in a number of communities. ‘We found that the reasons for deciding not to enrol can differ enormously from one community to another. All barriers arise from the interplay between healthcare providers, the management of the health insurance system and communities. But within this space, the range of explanations can be huge.’

In one community, for example, people said they did not trust the management of the system, while others complained that they were not aware of the opening hours of the insurance office. Another community had a problem with the nurses and doctors at the local clinic and the quality of the care they provide. Elsewhere, the health centre was simply too far away, or the village head had advised community members not to join.
We were able to show that households with health insurance are much less likely to fall into poverty

the insurance scheme. ‘We realized that if you want to tackle these problems, a one-size-fits-all approach for the whole of Ghana would be inappropriate. Instead, you need local solutions to local problems.’

PROBLEM-SOLVING GROUPS
The team came up with the idea of organizing multi-stakeholder problem-solving groups, with representatives of the local hospital or health clinic, the health insurance scheme management and the communities. ‘We hoped that these groups would work together to identify why poor households were not enrolling in the scheme, and to think about solutions to remove the barriers’, says Baltussen. ‘Each group was then given a limited budget to set up an information campaign to promote the concept of risk sharing, for example, or to resolve logistical problems in the issuing of insurance cards.’

To assess the effectiveness of these groups, Baltussen’s team used a cluster randomized controlled trial, a technique that is not often used in health systems research. ‘We organized problem-solving groups in 15 communities and also observed 15 other communities where we did not intervene. The groups met regularly, every one or two months, over a period of two years. In that time, most of the groups identified five or six problems and implemented solutions. One of our researchers, a Ghanaian PhD student in anthropology, observed the processes and the discussions within the groups.’

The problem-solving groups proved to have a significant impact by addressing the barriers to enrolment and building trust between the parties involved. As a result, the researchers found that in those communities the percentage of people enrolled in the health insurance scheme had increased by 21% among the whole population, and by 32% among the poorest households. The team also compared the members of communities with and without the problem-solving groups in terms of their out-of-pocket medical expenditures, their use of healthcare services, and their levels of poverty. They found that the villages where the problem-solving groups had been organized had fared much better in all respects.
HOUSEHOLD SURVEY

In addition to assessing the effectiveness of the problem-solving groups at community level, Baltussen’s team examined the broader economic impacts of the national health insurance scheme by following a group of people over time. Two Ghanaian PhD students, both health economists, carried out a survey of 3000 households in 2009, and again in 2011. ‘With these surveys,’ says Baltussen, ‘we were able to monitor the dynamics of these households in terms of their choice of whether to enrol in the insurance scheme, their expenditure patterns, and how they performed in terms of income and levels of poverty.’

The results of the household survey clearly showed the beneficial effects of having a national health insurance scheme with high coverage. ‘We were able to show that households with health insurance are much less likely to fall into poverty’, says Baltussen. The researchers found that for many households enrolment in the scheme could reduce out-of-pocket expenditures by as much as 86%. Moreover, enrolment greatly reduced so-called catastrophic medical expenditures, where a household has to spend more than 40% of its income on health.

POLICY QUESTIONS

The research findings were welcomed by Ghanaian policy makers. ‘We discussed our results with them and other stakeholders at various stages in the project,’ says Baltussen. ‘There was a close match between the problems we were addressing and the questions they were dealing with. We were able to show that introducing a national health insurance scheme is indeed an effective way to reduce poverty, and that community problem-solving groups can help to encourage poor households to enrol in the scheme.’

At the same time, the findings sparked new questions, for example related to the relatively high cost of organizing problem-solving groups. Further research is needed to examine the possibility of transforming the national health insurance scheme into a system in which everyone is automatically enrolled, and how this could be financed. ‘These are major questions, not only for Ghana, but for almost all countries in Africa,’ Baltussen says. ‘When you consider that 90% of the global research budget on health issues is spent in Western countries, where only 10% of the disease burden is, continued investments in this type of research are essential.’

ABOUT THE PROJECT

The research project ‘Reaching the poor in Ghana’s National Health Insurance Scheme’ (2008–2013) was funded by NWO-WOTRO as part of the Integrated Programmes subsidy scheme. The scheme offers grants to medium-sized research programmes (maximum €700,000), where integrated sets of projects are conducted by PhD students or postdoctoral researchers from the Netherlands and developing countries. All research is aimed at either development issues in a broad sense or at achieving the UN Millennium Development Goals.

RESEARCH INSTITUTES

- Radboud University Nijmegen Medical Centre, the Netherlands
- University of Ghana, Legon
• University of Amsterdam, the Netherlands
• Ghana Health Service, Lagos

RELEVANT PUBLICATIONS
Criminal leaders govern the streets of Jamaica

‘PEOPLE WILL JUMP IN FRONT OF A BULLET TO SAVE YOUR LIFE’

Criminal leaders in Jamaica offer services to city residents very similar to those normally provided by the government. Rivke Jaffe warns that political rhetoric promoting small government and big societies could lead to governance systems that are neither peaceful nor democratic.
Driving through Kingston, the capital of Jamaica, you may come across graffiti celebrating Christopher ‘Dudus’ Coke. Before he was extradited to the United States to face drug and arms trafficking charges, Dudus was the ‘big boss’ in Tivoli Gardens – a neighbourhood of West Kingston – and allegedly one of the city’s most prominent criminal leaders. People there still talk about him, saying he was just and fair, the chosen one, the one who was here for us. ‘After God, Dudus comes next,’ reads one cardboard sign brandished by a woman protesting against his extradition.

STATE-LIKE ENTITIES
Criminal leaders in Jamaica are known as ‘dons’ – just like in the mafia films – and each don controls a certain neighbourhood. Rivke Jaffe, currently working as a researcher at the University of Amsterdam, has been doing research in Jamaica for more than a decade. She argues that the role dons play in impoverished neighbourhoods resembles that of a formal government. They provide welfare, for instance. If inner-city residents are in need of cash to pay a hospital bill or school fees, they can turn to the don for help. The don can also help you find a job, for instance by pressuring local businesses to take you on. His most important role, however, is to provide security and an informal justice system. ‘If something is stolen from you, or your daughter is raped, you can go to the don,’ says Jaffe. ‘Most people don’t trust the police, who are seen as corrupt and biased. It’s much easier and more efficient to go to the don.’ The don will listen to different sides of the story on a particular case and will eventually deliver his verdict. If someone is found guilty, he will see to it that punishment is administered.

In return for the don’s services, the residents are expected to pay ‘taxes’. Whether you are a minibus driver, sell products at the local market or have a shop – someone from the don’s organization will come by on a regular basis to collect money. The relationship between residents and the don is thus characterized by both rights and responsibilities – similar to the relationship between citizens and the formal state. Jaffe suggests that we can understand this as criminal citizenship.

RESEARCH ON THE STREETS OF KINGSTON
Between 2001 and 2005, Rivke Jaffe conducted her PhD research on urban environmental problems in inner-city neighbourhoods in Kingston, Jamaica, and Willemstad, Curacao. At her office she explains that even then crime seemed to be an unavoidable topic. ‘I would go into the neighbourhoods and ask people about garbage and sewage, but they would always end up talking about crime. So eventually I thought: I should do some research on this.’

A woman yells at soldiers searching for Christopher ‘Dudus’ Coke, in Kingston, Jamaica, May 2010.
Jaffe is currently finishing a three-year research project on the relationship between dons, inner-city residents and the formal government. As an anthropologist, she explores this relationship from the perspective of the people involved – the everyday street perspective. Outsiders might see this as a courageous endeavour. But Jaffe feels at ease in Kingston's downtown neighbourhoods. ‘I was lucky to be introduced to a Kingston neighbourhood that had been run by a prominent don who was a relative of someone I had known for many years. That connection gives me a sense of safety. But I still need to be careful. Relaxed yet alert.’ She points out that her research is not about the things you see in gangster movies: guns, drugs, gang violence and extortion. ‘I try to de-sensationalize the topic by emphasizing that people are just trying to survive in a situation in which the state, to their mind, only functions for rich people. It’s something that could happen to us too, if we were in that situation.’

**SYMBIOSIS**

Jaffe's research shows that dons not only function much like the state, but also that their rule is closely intertwined with formal politics. This has its roots in the so-called ‘garrison politics’ that emerged in Jamaica in the 1940s. Back then, the two main political parties – the People’s National Party (PNP) and the Jamaica Labour Party (JLP) – began to develop links with strongmen in inner-city neighbourhoods. These men were expected to secure votes for ‘their’ party, and in return they received money and weapons. As a result, Kingston, and especially its impoverished areas, became divided between JLP.
The system was created by politicians in the 1940s as an electoral strategy. But they created a monster they can no longer control

and PNP communities. From the 1960s onwards, the political affiliations of the various neighbourhoods were further strengthened when the two parties started developing housing projects for their supporters. This strong political polarization between neighbourhoods continues to this day, and almost every don is linked to one of the two parties. It is said that every member of parliament is likely to have the number of their constituency's don in their mobile phone.

Although dons can accumulate wealth independently through extortion ('taxation') and other illegal activities, they still have strong links with politicians. In exchange for being loyal to political parties, the dons receive a measure of political protection and are awarded lucrative government contracts. Most politicians urge a crackdown on criminal organizations. However, for many of them it is difficult to disentangle themselves from a long-established symbiotic relationship, as the dons are still a crucial factor for winning votes in downtown neighbourhoods. ‘The system was created by politicians in the 1940s as an electoral strategy,’ says Jaffe. ‘But they created a monster that they can no longer control.’

**SMALL GOVERNMENT, BIG SOCIETY**

Money flows from government agencies and politicians to the dons and, in exchange, the governance of these neighbourhoods is no longer entirely the responsibility of the state. According to Jaffe, this can be seen as a form of neoliberal governance. The government has outsourced responsibilities – in this case the rule over specific spaces and populations – to non-state actors. While Jaffe’s work focuses on Jamaica, she sees clear parallels in other parts of the world, such as in Italy, a number of US cities, Brazil, South Africa and Mexico.

Jaffe tries to go beyond the Jamaican case alone, using her research results to reflect on general theories about hybrid states and new types of citizenship – concepts that are
crucially important in this era of globalization, in which the roles of nation states and civil society are changing rapidly. Addressing these phenomena from the perspective of people’s everyday realities is important in order to understand how global trends take shape at the local level. ‘In a context of globalization and the strong neoliberal ideology that has been dominant for several decades, it is important to think through what might be the ultimate consequence of saying that citizens should take care of their own needs and should only turn to the state as a last resort,’ says Jaffe. ‘In many countries, including the United Kingdom and the Netherlands, politicians promote small government and big society, but this is not without risk.’

Jaffe sees the Jamaican case as an example of what can happen when the government stops providing the services that people have come to expect from the state, particularly when this is combined with a large group of people who feel socially excluded, who feel that the government is only there for certain groups. ‘People who lose trust in the formal state start looking around for different forms of leadership, for someone who says: “I am here for you. I am not one of those elite politicians.” And this is not unique to Jamaica.’

FEAR AND LOVE IN JAMAICA
Back in Jamaica, many dons can count on the loyalty and support of the residents of their neighbourhoods. They have come to trust their dons more than they trust politicians. The dons are popular because they provide their residents, who feel abandoned by the state, with the feeling that they matter. Moreover, in many of these inner-city neighbourhoods, the system works – at least in comparison with the malfunctioning state. This does not mean that donmanship is the preferred system. Most people Jaffe speaks to in downtown Kingston would prefer a formal state that provides jobs, welfare, security and justice. True, some dons are seen as heroes, but their rule is often associated with violence, fear and oppression. Moreover, the system is not democratic, as Jaffe points out. ‘If you have a bad don, what do you do? You cannot vote him out. You’re stuck with him. The only thing you can try to do is start rumours, for instance about his masculinity, which may affect his status.’

In May 2010, Dudus, whose nickname is ‘The President’, was extradited to the United States after the Jamaican government came under heavy pressure from the opposition, civil society and the US authorities. When the Jamaican prime minister announced this decision, Tivoli Gardens residents reacted angrily. They led a street protest waving signs with texts like ‘Jesus died for us, we will die for Dudus’. Armed men began to barricade the community, blocking off the entrances and placing booby traps and improvised explosive devices. Eventually the police and army entered the neighbourhood in search
of Dudus, killing at least 73 citizens. In 2012, Dudus was sentenced by a Federal Court in New York City to 23 years in prison.

The events of May 2010 are illustrative of Dudus’ popularity as a leader. He was known as a good don: he did not tax his citizens too harshly, was fair, and provided justice, welfare, security and stability in his neighbourhood. Indeed, he was a don that people were willing to die for. As one of Kingston’s other dons explained to Jaffe in an interview: ‘If you want to be a good leader, it’s not enough to have the people fear you. They should love you as well. If they fear you, they’ll do what you say. But if they love you, they’ll jump in front of a bullet to save your life.’

RESEARCH INSTITUTES
• Institute of Cultural Anthropology and Development Sociology, Leiden University, the Netherlands
• University of the West Indies, Jamaica
• University of Technology, Jamaica

SOURCE ARTICLES

RELEVANT ARTICLES
Towards a more realistic and fair production of biomass for energy

BIOFUELS FROM FAMILY FARMS

Biofuel production in developing countries has increased dramatically in recent years, but the benefits tend to remain concentrated in the hands of large-scale companies. Policies to include smallholder farmers will only be successful if they acknowledge the great variety of farming systems, says researcher Madeleine Florin.
The figures speak for themselves. According to a 2009 United Nations report on biofuels, the annual production of bio-ethanol for transport fuel increased threefold between 2000 and 2007. In the same time span, the production of biodiesel even expanded eleven-fold. ‘Biofuels have already been around for a long time, but it is only in the last ten years or so that they have really shown up on the radar,’ says Madeleine Florin, researcher at Wageningen University. This had to do with the need to reduce greenhouse gas emissions. At the same time, issues of energy sovereignty and energy security became more prominent. These factors explain the hype.

According to Florin, the initial optimism about biofuels being cleaner and safer alternatives to fossil fuels soon evolved into a debate that highlighted concerns about the sustainability of this energy source. ‘The most prominent concern was the issue of competition for resources for the production of fuel, food and feed. Questions were also raised about the potential environmental effects, such as water depletion, soil erosion and the loss of biodiversity:’

WHO BENEFITS?

Much research is focusing on the sustainability issues such as these. The research programme Florin is involved in, however, also focuses on another topic that is fuelling the debate: the extent to which smallholder farmers in developing countries are actually profiting from the increasing demand for biomass. ‘It was acknowledged, at least in Europe, that meeting biofuel production targets meant importing biomass from tropical countries in Africa and Latin America,’ says Florin. Because of this, biofuels are often promoted as a means to further economic development in rural parts of developing countries. This claim, however, is also up for discussion. It really depends on who benefits. Does the increasing demand for biomass actually benefit smallholder farmers, or do the benefits stay concentrated in the hands of a few?’

To make a realistic assessment of whether and how smallholder farmers can incorporate energy crops into their farm systems in a sustainable way, Florin and her African and Latin American co-researchers studied different types of family farms in Brazil and Mozambique. ‘Both countries are at the forefront of biofuel development as both have shown considerable initiative to develop biofuel policies aimed at rural development,’ Florin says. The nature of these policies is proving to be very different, however. Brazilian policy, for example, explicitly aims for ‘social inclusion’, which means that it is attempting to include smallholder farmers in the biodiesel production process. Mozambican biofuel policies, on the other hand, are geared to attracting private investments in rural parts of the country and promoting sustainable development principles, such as providing
assistance to smallholders. Florin explains how this difference plays out in practice. ‘In Brazil you have a more centralized development of production facilities. These factories are seeking to buy biomass from farmers in the region. In Mozambique the situation is quite different: you have private companies coming in that do not only build biodiesel factories, but also produce the biomass themselves.’

Within these different settings, the research team investigated institutional arrangements and the various existing farming systems. ‘We focused not only on laws and local policies,’ says Florin, ‘but also on other questions such as what sort of crops do farmers grow, what kind of livestock do they keep and what constraints do households face? The study
revealed a great variety in farming systems. That there is such a broad range is important information if you want to discover the trade-offs that smallholder farmers have to consider when deciding whether or not to start producing biomass for biofuel.‘

TRADE-OFFS
In her own fieldwork in Brazil, Florin looked at small-scale cattle farmers in semi-arid areas who were faced with the prospect of signing contracts with biodiesel producers so they could produce castor beans. It turned out that far fewer farmers than expected decided to participate in the scheme. ‘What we found was that, at least for these type of farmers, a very important risk reduction strategy is to grow and save maize to feed their cattle in the dry season,’ Florin explains. ‘To produce castor beans the farmer would have to sacrifice some of the land they now use to grow maize. Yes, producing castor beans could generate more income, but it would also mean less animal feed. The cattle are the most important asset for dealing with dry periods, as the animals are more resilient to drought than crops. Insight into such trade-offs at the farm level helps us understand whether energy crop production can actually meet the development objectives of smallholder farmers.’

According to Florin, the case of the cattle farmers illustrates that Brazilian policy, despite its intentions, is so far not leading to the effective inclusion of family farms in biodiesel production systems. ‘As it is now, it’s the well-established soybean farmers that are profiting from the social inclusion policies. These types of family farmers are able to benefit by simply having an additional market where they can sell their crops. For smallholder farmers, switching to the production of biomass for biofuel is a much bigger leap.’

This brings Florin to what she sees as the core message of the research: there is too little awareness of the great variety of farming systems and a knowledge gap when it comes to the threats and opportunities associated with producing energy crops. ‘If you were to
make a general conclusion about biofuels, it would have to be that each case is different. This actually is an important finding. It means that policy makers should take into account the heterogeneity of farming systems. Only then can policies be designed that genuinely promote the social inclusion of marginalized smallholder farmers.

A HOLISTIC APPROACH
A more holistic approach is needed to be able to understand whether and to what extent producing energy crops can bring more prosperity to rural areas of developing countries, Florin believes. ‘Estimates of the opportunities connected to using biomass for biofuel are often optimistic. Focusing on the whole makes the assessment of potential options more realistic. Instead of looking at one sort of crop, or one sort of field, we need to look at the whole farming system, including the entire bioproduction chain.’

Florin feels that the focus of the debate about biofuel needs to shift more in the direction of smallholder farmers. ‘The fact that smallholder farmers are often marginalized groups in society justifies why we should focus on them. As it is now, they do not have a strong voice in how things play out. Our research has attempted to uncover what might happen to their livelihoods under various circumstances. It is important that this becomes part of the biofuel debate. My aim is to try and balance the perspectives.’

ABOUT THE PROJECT
The research project ‘Biomass for fuel: Opportunity or threat to food and feed security? Case studies from farms in Brazil and Mozambique’ is funded by NWO-WOTRO as part of the Integrated Programmes subsidy scheme. This scheme offers grants to medium-sized research programmes (max. € 700,000), where integrated sets of projects are conducted by PhD or postdoctoral researchers from the Netherlands and developing countries. All research is aimed at either development issues in a broad sense or the UN Millennium Development Goals. Research plans are developed in international workshops with potential end-users and other stakeholders.

RESEARCH INSTITUTES
• Wageningen University and Research Center, the Netherlands
• University of São Paulo, Brazil
• Federal University of Viçosa, Brazil
• Eduardo Mondlane University, Mozambique

RELEVANT PUBLICATIONS
• Florin, M.J., van de Ven, G.W.J. and van Ittersum, M.K., 2009. Indicating and assessing the sustainability of biomass (for biofuel) production on family farms. VII International PENSA Conference, São Paulo, Brazil.

Capacity building in Malawi’s medical research sector

BATTLING THE BRAIN DRAIN

Malawi is one of the world’s most densely populated, yet least developed nations. HIV/AIDS, tuberculosis and malaria all pose a serious threat to the country’s rural population. To fight these diseases Victor Mwapasa teamed up with Malawian and Dutch scientists to develop a research support centre that would address the country’s health challenges from within.
The University of Malawi’s College of Medicine (CoM), based in the city of Blantyre, is Malawi’s only medical school. For many years, it has attracted significant numbers of foreign medical and scientific researchers specializing in tropical diseases and HIV/AIDS. At the same time, however, few Malawian graduates from the CoM envisaged a career in locally based scientific research. Rather, most of them saw their future either in private practice as doctors and internists, or as clinical practitioners in the public health sector. Many qualified Malawians left for the apparently greener pastures of Europe and the United States, further impoverishing the country. Consequently, there were no African researchers for the young students to emulate. ‘During my years as a medical student, we only used to have good role models in internal medicine, and everybody aspired to be like them,’ recalls Victor Mwapasa, one of the founders of the Malawian Research Support Centre (RSC). ‘I used to marvel at these surgeons, I wanted to be a surgeon myself.’

After qualifying as a doctor, Mwapasa went to work for the state as a district health officer. Most doctors work in an almost triage situation, beset by disease, poverty and a chronic lack of resources. ‘That was when I really appreciated the gravity of the problems; seeing the number of children that were dying from malaria, and the impact of tuberculosis and HIV. I was treating one patient after the other. I decided to do research and identify tools that would fight these diseases.’

**NORTH–SOUTH COLLABORATION**

Sponsored by the government, Mwapasa left Malawi to study for a PhD in the United States. On attaining his title, he returned to Malawi, fired up to tackle the diseases that plagued his fellow countrymen. For the government the problem was how to retain a highly trained Malawian scientist who could easily find lucrative work anywhere in the world. The College of Medicine guaranteed him and another PhD returnee, Kamija Phiri, salaries for two years, while they applied for international research grants to get their careers as researchers going. Initially the two men collaborated with the Dutch researcher Michael Boele van Hensbroek. In spite of this, the university board and the scientists expressed concern that Malawi’s indigenous research capabilities were not being developed. There was also an imperative to find solutions to the urgent health needs of a rural population mired in poverty.

The timing was serendipitous, as Boele van Hensbroek had been exploring opportunities to promote equitable North–South collaboration. Together, he and Mwapasa developed a proposal involving the creation of a Research Support Centre (RSC). The idea was to establish a centre that would design and conduct clinical trials, manage grants and train local researchers, investigators and monitors to international standards. The ultimate
objective was to develop a strong domestic medical and scientific research capacity, and in particular to attract senior researchers who had left Malawi for opportunities outside Africa. The team submitted its proposal to the Netherlands–African Partnership for Capacity Development and Clinical Interventions against Poverty-related diseases (NACCAP). It was approved in 2005, as the goals of the project closely corresponded with NACCAP's own objective: to strengthen African R&D capacity in the field of poverty-related diseases by investing in joint research activities and clinical trials in Africa at locally owned facilities.

Thus, in 2006, the college launched its fledgling institution. Kamija Phiri was one of the lead researchers on the centre's two inaugural projects. He ran a project that looked at severe anaemia, which often occurs in children as a result of malarial infection. A trial was set up to test the efficacy of an intermittent therapy to prevent anaemia. The therapy proved to be successful: the project showed a 30% to 40% reduction in the death rates of children within the parameters of the trial. A second study was set up to test whether iron supplements can safely be used to treat anaemia in HIV-infected children, because such supplements may also increase a child's susceptibility to other infectious diseases.

During the first trials that were funded and developed by the RSC, the teams faced many challenges. Logistics and bureaucratic issues substantially delayed the launch of the
research. They also found very few qualified Malawians able to work as senior researchers. In fact, Phiri found it impossible to recruit a Malawian for his project, and a Nigerian doctor and PhD student had to be brought in. This was a pointed reminder of just how important it was to encourage qualified Malawians to work in Malawi. In spite of this, several aspects of the trials were successful: the trials themselves were successfully conducted despite requiring some adaptation, and researchers, investigators and monitors were trained on the job, thus empowering Malawians for future studies. These studies taught the RSC how to improve their financial and data management. The research findings were published in the *New England Journal of Medicine* and *The Lancet*, and Kamija Phiri and his fellow researchers are currently busy writing an implementation plan for the Malawian government to fight anaemia in young children.

These achievements did not go unnoticed. ‘Outsiders, such as our colleagues,’ says Victor Mwapasa, ‘who did not think highly trained Malawians would return and lead successful research careers saw that we had come back, and that our research projects were evolving. We were going to major research conferences and presenting data from Malawian research conducted at the RSC. It kind of worked like a magnet. People realized that if we could work here and be happy, so could they.’

**CHALLENGES**

The major advantage Mwapasa and Phiri enjoyed during their research was that they had worked as clinicians in rural Malawi before studying for their PhDs. As a consequence, they knew which questions were vital in addressing the pressing health issues in rural areas. Another advantage was that they now had the support of the RSC’s administrative staff, which enabled them to concentrate on their scientific work, rather than having to deal with administrative and financial matters. Mwapasa recalls the sea change brought about by RSC support: ‘Before the centre was established, if you received a research grant, you were the accountant, the procurement officer, and doing everything as the senior research scientist. That was not making the most efficient use of a scientist’s time.’
Within a few years, Mwapasa rose from being a researcher to becoming director of the centre. He took office at a critical period. Part of NACCAP’s funding requirements was that the centre become self-sufficient within three years, but this was extended to four years due to logistical issues in the project’s start-up. Mwapasa’s two predecessors had set up the centre, but had not yet managed to get the buy-in of the majority of researchers who were meant to work under the auspices of the university’s College of Medicine. Usually, the conditions of research grants stipulate that about 8% to 10% of the funds should go to the university for administration and overhead costs. Prior to the RSC project, few, if any such fees were paid. Often, they were used instead to further the aims of the research.

**CHANNELLING FUNDS**

Mwapasa was given responsibility to change this system, just as the end of NACCAP funding loomed. So, in addition to leading his own research, Mwapasa also had to convince sceptical scientists working under the auspices of the College of Medicine to channel their grants through the RSC. If the research centre was not able to maintain control over the research projects, it would be unable to manage them, nor could it be held liable for the administration fee that would enable the centre to be self-sustainable.

It proved to be a difficult task, yet Mwapasa was determined that the centre would succeed, despite heated disputes even with close friends in the local research community. ‘In the United States and internationally, 40% of grant money goes to the university, into the general funds. These kinds of things result in tricky situations. Researchers are supposed to pay an overhead fee to the institution so that institutions like ours can comply with the donors’ requirements. You need accountants and finance officers. You have to train these people and pay them. You must have a functional ethics committee. We saw that here, we were a bit more fragile. The engine for our sustainability is made up of the same people who win our grants. We couldn’t afford to upset them.’ But upset them Mwapasa did. One of the critical factors to ensure the success of the centre, and thus reverse the brain drain of researchers, was to create a database of all grants and funds coming through the CoM. They underestimated the resistance they would face. ‘It sounds simple, but it has taken us a long time. We underestimated how long it would take to change the mindset.’ By January 2011, the RSC finally had an almost complete database of all research being carried out at the university, and at affiliate institutes. As it turned out, the CoM was only recovering 10% of what it should have.

At the start of 2012, the RSC had gone from a challenging and possibly endangered experiment to a successful institution. Almost all research conducted in association with the College of Medicine now goes through the centre, and all new projects have to go
through it as well. One of the key successes of the centre is that research duplication has largely ceased. ‘For a country that is as poor as Malawi, research is costly,’ Mwapasa says. ‘There are not many doctors, nurses or lab technicians around, so if some of them are unwittingly duplicating other people’s research, they are not contributing to new solutions to health problems in an efficient way.’

Today, the centre is on solid footing, despite the global recession. Mwapasa has stepped down as director to return to full-time research, and was succeeded by Kamija Phiri. There are 13 senior Malawian researchers with grants going through the RSC, some of which are for private funded projects. This has ensured that the centre is self-sufficient, and can build on its achievements. This success is why the Malawian RSC is seen as a model for other countries in Southern Africa. Similar centres have been established in Harare, Zimbabwe and in Lusaka, Zambia. The Harare centre is run by a former director of the Malawian RSC, a Zimbabwean, and the Lusaka centre is having a dedicated building constructed. This may well give the diaspora of highly educated Africans more reason to return home.

**RESEARCH INSTITUTES**
- Academic Medical Centre / Emma Children’s Hospital, Amsterdam, the Netherlands
- University of Malawi, College of Medicine, Malawi
- Liverpool School of Tropical Medicine, UK

**RELEVANT PUBLICATIONS**
Healthcare liberalization and urban poverty in Tanzania

‘YOU GET WHAT YOU PAY FOR’

The healthcare sector in Tanzania has gone through two significant reforms in the recent past. First, in 1977, the government banned the private sector from the provision of medical services and started delivering free healthcare to all Tanzanian citizens. In the late 1980s, however, the country was hit by an economic crisis and the government was no longer able to provide the services for free.
Tausi Kida grew up in Dar es Salaam, the capital of Tanzania, where her father worked as a medical professor and later became the director general of the National Hospital. She decided to study economics, but a fascination with the health sector appeared to be in her blood. Living in the capital, Kida noticed the difficulties that poor people were facing in order to pay for medical services. The government seemed little interested in the urban healthcare sector, however, assuming the market would take care of things. Little was known about the actual functioning of the healthcare market in the capital, partly because most health research and interventions were focused on rural areas.

Kida realized there was a need to fill this gap and decided to study for a PhD on the economics of urban healthcare at the International Institute of Social Studies (ISS) in The Hague, the Netherlands. Her study focused on the relation between Tanzania’s liberalization policies, poverty and access to medical services in the urban context. At the ISS in The Hague she talks about her research and its relevance for Tanzanian healthcare policies.

**UNINTENDED EFFECTS**

The intention of the reforms, reintroducing the private sector, was to move the better-off towards private facilities, thereby freeing up the subsidized public healthcare facilities for the use of the poor. Kida’s research uncovered, however, that to a large extent the reforms had had the opposite effect. To her surprise, she found that about half of the urban poor in Dar es Salaam depend on private health centres rather than the subsidized public dispensaries. This is because there are far too few public health facilities, and the few that do exist are congested and the services they provide are inadequate. In view of this rather unexpected finding, Kida asked herself: If the poor go to private dispensaries, what type of services do they get there? And the answer was: You get what you pay for. If you pay very little, you receive little. ‘It means that the poor are excluded from decent healthcare services,’ she says.

Kida’s main conclusion is that the urban healthcare market in Tanzania is completely segmented. In fact, there are essentially two distinct markets: one for the better-off and another for the poor. Health facilities that serve the latter market – usually located in squatter areas – have had to adjust their services in order to accommodate their poor clientele. The logical consequence is that the services are poor as well. Medical centres are often dirty, provide cheap medicines (sometimes even fake ones) and are understaffed. Related to this, Kida found that numerous private facilities had emerged that operate completely illegally, outside the view of the government, and thus are not subject to any kind of quality control. At these centres, unqualified staff perform all services, which
implies great risks for the patients. Nevertheless, a large number of urban poor depend on these centres, without even knowing that they are illegal. They go there because they are cheap, and they often offer care on credit. The government’s capacity to monitor these activities is limited and these private providers take advantage of that.

OUT-OF-POCKET PAYMENTS
Besides liberalization, an important element of the health sector reforms in the early 1990s was the introduction of out-of-pocket payments, which meant that people had to pay cash for medical services they received at both private and public facilities. The most
vulnerable groups (poor old people, pregnant women and under-fives) are exempted from these payments at the public health centres. But this so-called exemption system does not work well in practice. Kida found, for instance, that more than 50% of under-fives receive care in private centres, even though they are legally entitled to receive free care at the public centres. This is because many poor people are not aware of the exemption system. And those who are aware of it do not know how to make use of it, as it involves an onerous administrative procedure to obtain the exemption letter. In the reality of everyday life, if a poor person falls sick and urgently needs care, there is no time to go through such a procedure. Moreover, even if someone finds his or her way through the exemption system, the public health centre may not be able to provide the treatment needed due to shortages of drugs and qualified personnel.

‘There is an urgent need for a second wave of reforms to make sure that the poor are no longer suffering,’ says Kida. ‘You have to realize that 90% of all Tanzanians are not covered by any kind of insurance. Whenever they fall sick, they have to be able to pay cash in order to receive treatment. With major and chronic illnesses, this quickly becomes a family or community issue – people help each other out with financing healthcare. But what do they do when all their neighbours, relatives and friends are poor as well? In such circumstances you often see that families sell all they have to make sure that the sick person can receive the care he or she needs.’

GOVERNMENT ACTION
Municipal authorities are now improving the monitoring of private healthcare services to make sure that they meet national standards. Moreover, the Tanzanian government is taking action to get rid of the illegal health centres that Kida discovered, and a number of illegal dispensaries in Dar es Salaam have already been closed down. Isn’t it better to receive illegal care than no care at all? ‘No,’ Kida says without hesitation, ‘it is good that these illegal centres are closed.’ She believes they are simply too dangerous for the poor.

Community health funds ensure that poor people will always be able to receive medical treatment whenever they need it.
who make use of them. While the illegal centres must close, the government should at the same time introduce new measures to ensure that the poor have access to decent healthcare, Kida argues. And the first steps are being taken.

One of the most important measures taken by the government has been the introduction of prepaid systems, such as community health funds. In such a fund each household in a community deposits an amount of money, such as the equivalent of ten US dollars each year. If someone falls sick, he or she can access the fund in order to receive treatment at a specified facility. It works like insurance; all households in the community contribute, while only some of them will actually access the fund. This ensures that poor people will always be able to receive medical treatment whenever they need it.

Until recently, community health funds existed only in rural areas, where they were introduced by the Ministry of Health, but Kida’s research has effectively shown that the urban poor are just as much in need of such protective mechanisms. In response to Kida’s findings, the Tanzanian government has started piloting community health funds in several cities. Although Kida acknowledges that the operation of these community funds is not without challenges, she thinks that their introduction in urban areas is a major step forward. ‘The government has realized that the way the healthcare market was functioning had detrimental effects for the urban poor’, she says. ‘Fortunately they took the results of my research very seriously’.

RESEARCH INSTITUTES
- Economic and Social Research Foundation (ESRF), Tanzania
- International Institute of Social Studies (ISS) of Erasmus University Rotterdam, the Netherlands
- Research on Poverty Alleviation (REPOA), Tanzania

SOURCES

RELEVANT ARTICLES