

# CHARTING CHANGE

November/December 2018

## INNOVATION NATIONS

**13** Incredible ways  
research is improving  
lives in

**THE DEVELOPING**

# WORLD

including...

**BUILDING  
A BETTER  
WHEELCHAIR  
IN UGANDA**

**TRANSFORMING  
MINE WASTE  
IN MOROCCO**

**CREATING  
COOLER CITIES  
IN INDIA**

**+** much more





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Watch for the latest Charting Change stories every month at [idrc.cangeo.ca](http://idrc.cangeo.ca).

The stories in this digest fall under one of three colour-coded categories, each representing an IDRC program: Agriculture and Environment 🌱 (green); Inclusive Economies 💰 (orange); and Technology and Innovation 📡 (red).

The boundaries and names shown on the maps do not imply official endorsement or acceptance by IDRC.

CANADIAN  
Geographic

## EDUCATION

Each story in this digest is complemented by a lesson plan that can be downloaded as a PDF. The lessons can be used in classrooms from Grade 7 to Grade 12 and were written by one of Canadian Geographic Education's 21,000 members. To see all 13 lesson plans, visit [idrc.cangeo.ca/education](http://idrc.cangeo.ca/education).



# INNOVATION: AT THE HEART OF CHANGING LIVES AND LIVELIHOODS

A message from Jean Lebel, president of the International Development Research Centre (IDRC)

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The stories featured in this annual digest demonstrate how researchers from Canada and the Global South are driving innovation. They reinforce the value of locally adapted innovation and the difference it can make in peoples' lives when we find new solutions to long-standing challenges.

Canada's International Development Research Centre has supported research for development across sectors and around the world since 1970. This gives us a bird's-eye view that allows us to nurture innovations in one area and identify potential partners who can help to develop, adapt and scale that innovation to benefit the people who need it the most.

This digest provides a sense of the breadth and depth of these innovations. You will learn about how scientists in Morocco are turning huge slag piles of coal mining waste into bricks that can eliminate an environmental blight and transform the city of Jerada in the process (page 24). You will also learn about how scientists in Latin America and Canada are collaborating to develop a portable diagnostic technology that could be a game-changer in the battle against diseases such as Zika (page 14). Meanwhile, in India, researchers have discovered how a natural compound called hexanal can prevent fruit crops from spoiling, improving the lives of farmers (page 22).

We are proud to share these stories. First, they are innovations that are changing lives and deserve to be recognized. Second, Canadians should be proud of these innovations and *Canadian Geographic* is the perfect partner to collaborate with in sharing them with Canadian audiences. Lastly, we recognize the value of creating space for future innovation and collaboration. By sharing the innovations we have supported, we hope that others will learn about them and recognize opportunities for even more impacts and new partnerships.

This digest is a compilation of the content that has appeared on *Canadian Geographic's* Charting Change blog ([idrc.cangeo.ca](http://idrc.cangeo.ca)) over the past year. Visit the blog to read the stories that have been published in previous years, to download lesson plans for Grades 7 to 12 and to follow new stories about IDRC's work in the developing world that will continue to be published each and every month.



People are empowered when they have the knowledge, resources and agency to make decisions and take actions that can improve their lives and their communities. In Canada and in developing countries, IDRC supports research that builds evidence, promotes informed decisions and facilitates opportunity to help create a world that is supportive of equality, equity, diversity and prosperity.



Tanzanian farmers discuss what they've learned from an IDRC-funded project that disseminates information about improved legume technologies via radio campaigns, social media and text messages.  
(Photo: IDRC/Bartay)







## PULSE POWER

In Ethiopia, protein-rich crops of pulses such as chickpeas are no longer playing second fiddle to maize and wheat, a shift that's transforming lives

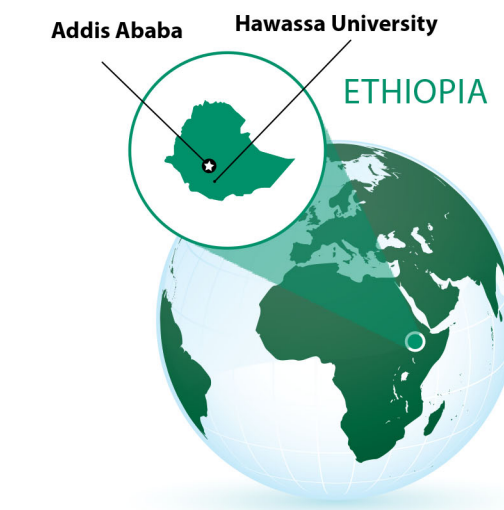
By Brian Banks

**T**here have been many milestones in the 10 years that Carol Henry, the assistant dean for nutrition and dietetics at the University of Saskatchewan's College of Pharmacy and Nutrition, has been working to alleviate food insecurity and malnutrition in southern Ethiopia — an area long plagued by drought, poor soils and low protein-yielding crop selection and agricultural practices.

Early on, partnering with colleagues at Hawassa University, 275 kilometres south of the country's capital, Addis Ababa, her efforts centred on expanding teaching in farming practices and nutrition, institutional and community capacity-building, and research into crop development and effective social outreach. Her goal? To create a system that can provide local households with the knowledge and materials they need to augment traditional cereal crops and cereal-based diets with high-yielding crops of nutrient-rich pulses, such as beans or chickpeas.

But in the last three years, the emphasis of Henry's work has shifted from developing that knowledge to applying it on a larger scale. And on her latest visit to the region in December 2017, she saw evidence of these practices taking hold — and bringing the expected nutritional, social and economic benefits in the process.

"In 2016, we were in Ethiopia in May and June, and there was widespread drought," she explains. "One set of female farmers said that while we'd



taught them well, they didn't have the beans they needed to make food that would complement their cereal-based diet. So we arranged for the university to give each of the women two kilograms of haricot beans, some fertilizer and training to plant and grow the beans. When I went back in 2017, one woman had, from the two kilos, reaped 80 kilos of beans. Another one had produced 70 kilos, and so on."

This "set" of female farmers numbered 368. It's a significant total, yet just a fraction of the 10,000 women farmers, and 70,000 farmers overall, reached in the latest phase of this pulse-based food security project, which is financed by the Canadian International Food Security Research Fund, a joint program of IDRC and Global Affairs Canada, and is ending in 2018.

"We asked the women what they're doing with the beans," Henry continues. "Most of them said





*Sefiya Heliso harvests chickpeas in southern Ethiopia. Heliso is participating in a project that is encouraging people to grow and eat pulses such as chickpeas to help improve food security in the country.*

“ Women say, ‘We’re equal partners, we make decisions on what to sell, what to eat and what to store.’ ”

they ate some, saved some to plant next year and sold some.”

The carryover for subsequent years is essential if the changes are to be self-sustaining. It’s also a reflection of the program’s success in overcoming a spectrum of obstacles to the acceptance and use of pulses.

Traditionally, many Ethiopian small farmers only grow crops such as maize and wheat. As a result, their diets, especially those of young children, consist largely of cereal-based porridge, which lacks micronutrients and essential proteins such as lysine. Pulses, chickpeas especially, are sometimes grown for sale, but not for eating. The aim of Henry’s program has been to encourage widespread planting of higher-quality pulse crops in addition to the cereals, and then to combine pulses with cereal in the porridge to boost its protein content.

Along with testing to determine which pulses would grow best in local conditions and instructing farmers how to produce them, Henry and the Hawassa University team (which included about 200 graduate students trained over the years in agronomics and nutrition) also encouraged pulse consumption, showing people how to incorporate

pulses into their diets. “In poor areas, there’s always this challenge of people wanting to sell so that they can make money,” says Henry. “We had to show farmers that it was important for them to feed their families, especially children and mothers.”

In weighing the sustainability of the changes, Henry is encouraged by the number of local partners from government, NGOs and the private sector that have joined in the effort since work began in 1997. She believes such support enabled them to reach beyond their original 70,000-farmer goal. “We had [the Canadian NGO] Farm Radio International work with us, providing messages on production and nutrition education. Their goal was to reach 135,000 farmers.” In a country of 100 million, she says more is needed. “But given the resources that we have, that’s pretty big for us.”

Henry also emphasizes that the program’s societal benefits go beyond food. “Several of the women I met in December said that their husbands used to sell what they planted. But now that they have their own pulse crops they say, ‘We’re equal partners, we make decisions on what to sell, what to eat and what to store.’ It was really good to see that these women could be so liberated just by having their own beans.”



## GIVING ARTISANS ACCESS

How Artisan Hub is helping connect traditional craftspeople in developing countries to new and potentially lucrative foreign markets

By Niki Wilson

**I**n a small straw-roofed hut in Bangladesh's Narayanganj district, two women sit in front of a bamboo loom. Their hands fly back and forth across sections of fine threads, transforming them into a sheer, vibrantly patterned cotton fabric. They are practicing the ancient art of jamdani weaving and will work on this piece for up to six months. When it's finished, it will be sold into a high-end domestic market, perhaps as a wedding sari. Despite the product's quality, however, the women will struggle to sell it far beyond Bangladesh's borders.

Breaking down export barriers and helping rural cottage-industry textile producers in eight developing countries — Bangladesh, Cambodia, Ethiopia, Haiti, Lesotho, Madagascar, Nepal and Uganda — tap into the benefits of overseas markets is the motivation behind Artisan Hub, a program TFO (Trade Facilitation Office) Canada launched in 2016 in collaboration with IDRC and with financial support from Global Affairs Canada.

In the case of jamdani fabric, an Artisan Hub market-entry assessment revealed that the cloth has many qualities that appeal to international consumers. It's eco-friendly, breathable and attractive to a growing number of people interested in supporting handicrafts from developing nations — particularly those made by local women who are paid a fair wage. What's more, the fabric is a literal work of art, its intricate design and renowned quality earning it



a place on UNESCO's list of items that represent the intangible cultural heritage of humanity. "Craftsmanship is learned through individual supervision by a master craftsman, and apprenticeship takes two to three years," says Rafat Alam, an assistant professor of economics at Grant MacEwan University in Edmonton and co-author of the assessment. "What's missing," he adds, "is the connection with buyers and designers in modern markets."

Jamdani is typically designed as traditional clothing in Bangladesh and culturally similar countries. "To bring this product to the Canadian market, the industry needs to diversify," says Alam. This means understanding the tastes and preferences of western buyers and developing modern products that appeal to them.

And that's not the only hurdle. Alam says companies that produce the fabric also have





*A woman weaves jamdani in Bangladesh. The fabric, which UNESCO has recognized as an item that represents the intangible cultural heritage of humanity, is one of many handicrafts on the Artisan Hub website.*

## “What’s missing is the connection with buyers and designers in modern markets.”

much to learn about how to export and market it to foreign consumers, which would require training and technical assistance.

Artisan Hub aims to address these challenges by creating opportunities for jamdani producers to meet with western designers to learn how to produce clothing and home decor that has a more modern design. In August 2017, the program helped 30 artisans from the eight countries attend the Apparel Textile Sourcing Show in Toronto, where they exhibited their wares and connected with buyers and designers.

In November 2017, members of the Artisan Hub team from TFO Canada and IDRC went to the World Ethical Apparel Round Table conference in Toronto, met Canadian designers and showed them Artisan Hub products. “We gave a presentation on the artisans and the traditional textiles they make, and how these industries are empowering youth and women,” says Mylène Bordeleau, a program management officer with IDRC.

This type of empowerment is important in an industry currently experiencing production declines in rural areas. That’s because there are fewer young people apprenticing for the craft, says Alam. If left unchecked, this trend could threaten a disconnection with an important cultural practice that supports tight community networks and a sense of identity. Fair compensation, ethical work standards and sustainability from product diversification can all help grow an industry on which millions of livelihoods depend.

Trade policies that empower jamdani producers may also be part of the answer. Bordeleau hopes that as projects such as Artisan Hub document their effectiveness, this evidence can be shared broadly with other organizations that help rural cottage industries expand into new markets. “Ultimately,” she says, “we want to see policies and programs become more supportive to specialty textile artisans.”



# TUNING INTO HOW THE BRAIN LEARNS

Researchers in Canada, Israel and India believe music can offer clues about the ability of the brain to transfer learning

By Alanna Mitchell

**S**cientists have made great advances in the past few decades in decoding how the brain works, using magnetic waves to peer deep inside the organ to see precisely which parts of it are firing when, and why.

But the answer to one question has remained stubbornly elusive: if you teach a person to be an expert in, say, playing the piano, can that level of expertise be easily transferred to, say, learning a language? In neuroscience, the ability to transfer learning is known as “generalization.”

“The Holy Grail, the real thing we don’t have, is how to gain generalization when we train people,” says Merav Ahissar, professor of psychology and cognitive sciences with the Edmond and Lily Safra Center for Brain Sciences at the Hebrew University of Jerusalem in Israel. “Almost everyone improves dramatically when they are trained; they learn what you teach them. But generalization is rare.”

To see if she can pinpoint what aspects of training aid generalization, Ahissar is linking up with colleagues Robert Zatorre of the Montreal Neurological Institute and Hospital, and Nandini Singh of the National Brain Research Centre in Manesar, India, to develop several experiments.

Funding for their project comes from the Joint Canada-Israel Health Research Program, administered by IDRC, the Canadian Institutes of Health Research, the Israel Science Foundation and the private Canadian philanthropic Azrieli Foundation. The \$35-million, seven-year program, which will support biomedical research and



initially focus on neuroscience, is aimed at fostering collaboration among researchers from Canada, Israel and low- and middle-income countries.

Ahissar, Zatorre and Singh opted to run experiments based on the ability of their subjects to learn music. That’s partly because Zatorre has been studying the brain’s response to music for nearly 30 years. It’s a rich domain, he says, pointing to the example of someone who sings a song recently heard. It seems simple, but requires an extremely complex roster of neural skills, including remembering the notes and using motor skills to convert those sounds into song.

As well, the brains of trained musicians are among the most extensively studied in the world, so scientists already have research they can build on.

Ahissar, Zatorre and Singh’s study will examine whether musicians trained in Western music automatically understand the more tonally





*A magnetic resonance imaging scan at the neuroimaging unit of the Edmond and Lily Safra Center for Brain Sciences at the Hebrew University of Jerusalem, Israel. Researchers at the centre are collaborating with colleagues in Canada and India on brain research.*

**“ This research project provides the chance of watching the brain as it learns complicated Indian music. ”**

complex music of India. Zatorre says it's the most exploratory part of the research, but it also may be the most illuminating.

Western music has octaves with 12 intervals, while Indian octaves have between 20 and 22, Zatorre says. A common critique of brain research on musicians is that they come from a single musical background.

Studying musicians from both Western and Indian backgrounds could provide valuable clues to the question of which parts of training just help the brain learn a musical system and which can be transferred to other areas of learning. “I freely admit that this aspect of cross-cultural learning is in a way the most interesting,” says Zatorre. “We don't know what will happen.”

Singh is most excited about this part of the study. Indian raga music, one of the oldest musical traditions, is primarily aural, she explains, without much fixed written notation, and that makes it tough to study. As well, Indian culture has long rejected the idea of scientifically studying how music is learned; music has been considered “god-gifted,” she says. This research

project provides the chance of watching the brain as it learns complicated Indian music, perhaps beginning to build a grammar of how that learning takes place, she says.

The team is still designing the studies, but Zatorre is determined to develop novel ways of training the experimental subjects. In a typical experiment, the subject hears a tone over and over for hours, a bore. In place of only rote memory, Zatorre is trying to build some pleasurable rewards into the experiment for those who learn well. That's one of the primary ways video games work, he notes — they reward players by giving them points or extra tools to achieve their goals, encouraging them to keep playing.

Eventually, any findings could be used to help hard-of-hearing elderly people learn to hear better. As well, the study may help dyslexics, some of whom have trouble learning to read because they have trouble distinguishing one sound from another.

“We're going to take the best protocol and apply it to special populations,” says Ahissar. “But we still have lots of questions.”



## MUKURU RISING

How a new designation could transform the Nairobi slum and help end the 'poverty penalty' its residents face

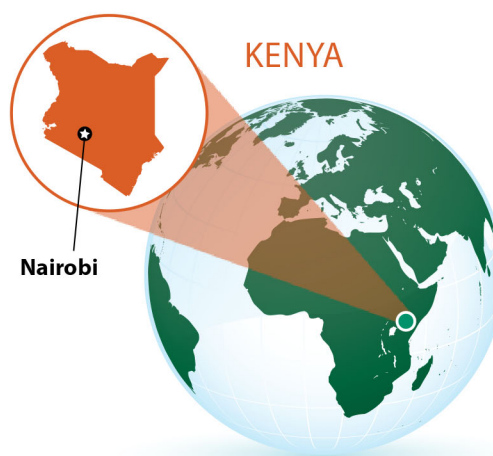
By Alanna Mitchell

**J**ane Weru, executive director of Akiba Mashinani Trust, knew something was seriously wrong in 2011 when residents of Nairobi's Mukuru neighbourhood started showing up at her office in the Kenyan capital.

They were being evicted from their homes in great numbers. And by homes, they meant one-room shacks made of rusted corrugated iron sheeting in informal settlements densely packed on land once slated for light industrial activity. Typically measuring three metres by three metres, some had dirt floors. One common means of eviction was night-time arson, forcing the residents to flee. Often, residents were prevented from going back into their homes by gangs who protected the property until the landlord had swiftly rebuilt the home and installed new tenants.

Weru, a lawyer and human rights activist whose organization is a housing development and finance agency affiliated with Slum Dwellers International, an advocacy group for the urban poor in Africa, Asia and Latin America, began plotting how she could help. Because Kenya had passed a constitution in 2010 enshrining economic and social rights, she knew there were new legal avenues for challenging the evictions.

But before she could know what the legal redress was, she had to know who owned the land in Mukuru and who lived there. She and her organization began to amass evidence, a continuing research project that IDRC has helped support with a two-year grant of \$633,600.



Weru says some of the findings shocked her. For one thing, they discovered that there were more than 100,000 households in Mukuru, each housing three people, for a total of about 300,000 residents. Not only that, but there was a total lack of basic services. Few homes had access to toilets. Only about 3,000 had shared pit latrines which were emptied manually, Weru says.

Equally as disturbing was the fact that 94 per cent of the people were renting. They often paid rent to people who owned the structures but not the land underneath. The land was owned privately, often by well-connected members of the Kenyan elite, including government officials, civil servants and business owners. Many had been allowed to purchase the land for roads, railway activities or utilities, but had never followed through on those developments. The evictions were happening because the land had suddenly become more valuable.





*Researchers with the Akiba Mashinani Trust examine a map of Nairobi's Mukuru slum. In August 2017, activists succeeded in having the settlement designated as a special planning area, the first step in a process that could help transform the slum and the lives of its 300,000 residents.*

“ They were paying astronomical prices for the little unsafe water they were able to get. ”

Because residents were settled on private land, they had no access to city services. That meant they were paying astronomical prices for the little unsafe water they were able to get — sometimes as much as six times more than people who lived in serviced areas of Nairobi.

It amounted to a “poverty penalty,” the researchers found. It also meant that a massive amount of money was circulating in Mukuru that could conceptually be put toward raising the standard of living rather than paying exorbitant prices for necessities. One research team calculated that money freed up from these extra costs could come to US\$500 million over 10 years.

Armed with the research and evidence of what was happening, Weru and Jack Makau, director of Slum Dwellers International in Kenya, petitioned the city of Nairobi to designate the Mukuru district as a special planning area. They succeeded on Aug. 11, 2017, a landmark day for the advocates.

The move triggered a two-year planning process that will call on the resources not only

of the city, but also of 27 other organizations to develop solutions for Mukuru. “We think all these organizations will reach that capacity to benefit the people of Mukuru,” says Makau.

The residents are also heavily involved, say Makau and Weru. Neighbourhood associations representing 8,000 Mukuru families are offering suggestions. People in the community continue to collect evidence and data for the new plan. “People need to have a consultative process to agree on what to do,” Weru says.

Over time, Makau and Weru can envision people in Mukuru being secure in higher-quality rental homes. Perhaps they could own homes, aided by mortgages geared to their incomes. They would also have basic services including toilets and water, playgrounds and public spaces.

Expectations are high. One research project asked 6,000 school children what they would like to see in Mukuru. The students leapt past safe houses, toilets and running water. They dreamed of a zoo, fancy malls and amusement parks.



## ZEROING IN ON ZIKA

Latin American and Canadian scientists are working on a portable diagnostic technology that could be a game-changer in the battle against diseases such as Zika

By Brian Banks

**Z**ika. Dengue. Yellow Fever. Chikungunya. In the developed world, these mosquito-borne infections are the stuff of fearful headlines, graphic images and stories of outbreaks in faraway lands.

But in rural and low-income areas of Latin America, where these pathogens are endemic, they're a clear and present danger.

Yet the viruses' presence in these regions is only part of the problem. Compounding the threat is the fact that diseases such as Zika and dengue are hard to isolate and tell apart without sophisticated testing in labs located in just a handful of large urban centres. That leads to long delays between disease outbreaks and their diagnosis and treatment.

"You want to be able to contain an outbreak as soon as you can," says Keith Pardee, Canada Research Chair in synthetic biology and human health and an assistant professor at the Leslie Dan Faculty of Pharmacy at the University of Toronto. "But right now, when someone has symptoms of infection, those samples are put on ice and transported to larger centres. In outbreaks, that infrastructure can be overwhelmed or basically just isn't in the right place."

Pardee's solution? He's leading the development of a portable diagnostic technology that can distinguish different diseases — and different strains of those diseases — as accurately as the



current laboratory gold standard, yet is easily deployed to the site of an outbreak, requires no sophisticated equipment or technical skill to run and yields results in hours, not days or weeks.

His team is now midway through a three-year project jointly funded by IDRC and the Canadian Institutes of Health Research to refine the technology and begin field-testing and trials with three national research labs in Brazil, Ecuador and Colombia. This project is focused specifically on Zika but Pardee says the technology can be easily adapted to target dengue, Chikungunya, yellow fever, Ebola or even HIV.

The science of synthetic biology underlying this work is cutting edge, involving CRISPR gene editing and programmable gene circuit-based sensors extracted from cells and freeze-dried for non-refrigerated transport. But the application is incredibly simple. A nurse or doctor merely has to take a prick of blood or a urine sample from





*Darius Rackus, a member of Keith Pardee's lab at the University of Toronto, assembles portable diagnostic equipment that will be used to test for Zika and other diseases in South America.*

“ You want to be able to contain an outbreak as soon as you can. ”

a patient, put a drop on a microchip cartridge and insert it in a small, portable machine. Within hours, a paper readout changes colour — think litmus paper or a pregnancy test — to indicate the presence or absence of the virus.

“In Brazil, few Zika cases are laboratory-confirmed because of the lack of resources and the fact that current diagnostic technology is expensive and requires special equipment,” says Lindomar Peña, a principal investigator in the virology department at the Oswaldo Cruz Foundation in Rio de Janeiro, one of Pardee's partners in Latin America.

Peña's lab was one of the first to detect Zika in Brazil in 2016 and report its related neurological and developmental defects. He says he is “thrilled” to be working with Pardee and his peers at Ecuador's National Institute of Public Health Research and El Bosque University in Colombia, calling it “a great opportunity” to overcome their current diagnostic limitations.

The first phase of their joint work, which was expected to be running at full capacity

by August 2018, is focused on comparing the accuracy of Pardee's technology with the gold-standard diagnostic process on patient samples gathered in affected areas. Samples are processed using small portable computers built by two research assistants in Pardee's lab. That data is then uploaded to the cloud so Pardee can compile and analyze it. A low-end industrial version of the same computer would cost at least \$15,000, says Pardee, but “we built ours for \$300 to \$350.”

The project's second field phase, slated to start in January 2019, will see the portable devices taken out of the labs and into the countryside. “This box, if you put a battery on it, can run for nine hours,” says Pardee. “So you could literally have it in your car and do this anywhere.”

By the time the project ends, Pardee hopes to have screened 3,000 patient samples in the lab and done 100 to 200 tests in the field. “For it to become a certified diagnostic technology there's still quite a bit of work to do,” he says. “But we're on the road to that.”



## DRAMATIC DELIVERY

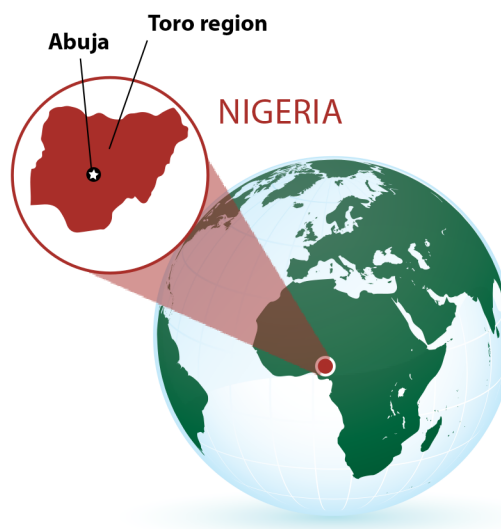
How soap-opera-style videos are helping educate couples in northern Nigeria about maternal and child health

By Alanna Mitchell

**T**he peppy music starts, and all of a sudden we get a glimpse of life in a northern Nigerian village. Three women are sitting cross-legged in the shade against a wall, heads covered with colourful scarves. One strips leaves from a branch; the other two are preparing food in large shallow dishes. Behind them, two men in long tunics and matching loose pants are standing, energetically tearing branches into lengths. You can almost feel the heat.

Slowly, a fourth woman enters the frame. She is heavily pregnant, struggling under the weight of a bowl on her head. The other women eye her carefully, and then one begins to talk to her. The men eventually get into the act, gesturing animatedly to each other. Finally, the scene shifts to the village chief, resplendent in a turquoise tunic and light head covering, white scarf trailing over his left shoulder. He looks directly at the audience, explaining earnestly, one arm resting on a wall as the music fades.

The scene being played out is neither from a documentary nor an ad. Rather, it's a four-and-a-half-minute video on possible pregnancy complications resulting from heavy physical work, and it's just one part of an innovative five-year, \$943,000 pilot project aimed at forestalling problems during pregnancy by educating couples in their own homes in the Toro region of the northern Nigerian state of Bauchi. The project, which began in 2015, is part of the



seven-year, \$36-million Innovating for Maternal and Child Health in Africa initiative funded by IDRC, Global Affairs Canada and the Canadian Institutes of Health Research.

Nigeria's maternal death rate is one of the highest in the world, with about 58,000 deaths per year, says Anne Cockcroft, an associate professor in the department of family medicine at McGill University in Montreal who works with the NGO Community Information and Epidemiological Technologies and is one of the project's leaders.

The impact of that number of deaths cascades through Nigerian society, says Nafissatou Diop, a senior program specialist in the maternal and child health program at the International Development Research Centre who helps oversee the project and manages the Innovating for Maternal and Child Health in Africa initiative.





*Two women share maternal and child health information during a home visit in Bauchi state, Nigeria.*

## “ The whole community suffers if the mother is not there. ”

“The whole community suffers if the mother is not there,” she says.

The videos are perhaps the most inventive element of the project, which takes a different tack than the traditional aim of increasing access to formal obstetric care. Each video is modelled after the soap operas that are so popular among Nigerians. That means not only do they have a cheerful soundtrack, but also a recurring cast of characters.

Rather than lecture on such subjects as vaccination and domestic abuse, the characters act out scenarios in which both men and women in the village discover health facts. The village chief, a respected leader, appears at the end of each video to present evidence about the video's topic.

The project has other novel elements, too. It focuses on both men and women rather than on women alone, with male members of the project team conducting home visits to speak to husbands and female members visiting mothers-to-be. It's during these house calls that couples watch the videos on the visitor's smartphone. Multiple visits are made to each home during each pregnancy, which reinforces

how couples can make a big difference in their own households to the fate of mothers and babies. This partner-focused approach will be provided to every pregnant couple in the six wards in the Toro region where the pilot project is taking place. By December 2017, the program had already reached nearly 18,000 pregnant couples, says Yagana Mohammed Gidado, branch president of the Bauchi state chapter of the Federation of Muslim Women in Nigeria and leader of the project on the ground.

Gidado says that the program is helping husbands and wives communicate better. One 58-year-old father of 12 told researchers that the program had encouraged him to listen to his wife, who felt more comfortable sharing ideas and sitting with him whenever she wanted.

Meanwhile, early findings on the project's impact on the health of mothers and babies are encouraging, says Cockcroft. Nigerian state governments are currently examining the results to see whether the pilot project could be expanded — something Gidado believes there is a demand for. “People are begging us to come and do it in their wards,” she says.



# FROM DISASTER, A NEW DIGITAL ECONOMY FOR HAITI

In the wake of the devastating 2010 earthquake, online opportunities are arising that could help resurrect the Caribbean nation

By Alanna Mitchell

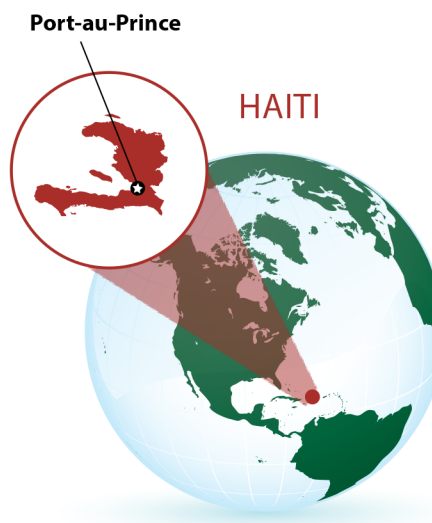
**H**aitians were already the poorest people in the Western Hemisphere when a massive earthquake struck just southwest of the capital Port-au-Prince on Jan. 12, 2010.

It was devastating. As many as 300,000 died and more than a million were left homeless. Infrastructure was shattered. Many survivors fled the country to find work elsewhere, especially if they were highly trained. The workforce was torn apart.

Today, nearly three in five of Haiti's 10 million citizens live below the poverty line and nearly a quarter live in abject poverty. Unemployment is a fact of life for many. How do the poorest in the country find jobs when local opportunities are so scarce?

In another era, a country such as Haiti might have sought international loans to build physical structures: an industrial plant, some boats and a wharf. But today, as giant businesses such as Amazon, Netflix and Facebook drive a new digital industrial revolution, possibilities are emerging in Haiti that could never have existed before.

One idea gaining traction is to train women under the age of 30 to provide computer services such as data processing and web tagging to international companies, which normally contract out those types of jobs to web-based consultants. Why not do the same for Haitian women, who could work flexible hours from their homes or from an employment centre? "There are interesting opportunities to be



explored," says Ben Petrazzini, a senior program specialist with IDRC in Uruguay. "Things are very different from the past."

IDRC is providing US\$800,000 over three years to prompt research on exactly what types of jobs could exist for young Haitian women in this new digital economy, what demand there is for them and whether they will last rather than being replaced by artificial intelligence over time. The program is known as AYITIC, a combination of *Ayiti*, which is the Haitian Creole name for the country, and TIC, which is French for ICT, or information and communications technology.

Course designers from the Caribbean Open Institute in Jamaica are specially tailoring classes to train Haitian women to work in the digital economy. The first 50 students are expected to be in class by May 2018,





*Women study at l'École Supérieure d'Infotronique d'Haïti. The school is one of the partners of the AYITIC program, which is helping train Haitian women to take part in the digital economy.*

“ The long-term goal is to convince young women that, like men, they can be part of the digital revolution. ”

graduating three months later. The project's initial phase will see about 300 Haitian women receive training by July 2019. Project leaders are already exploring whether companies owned by the Haitian diaspora in Canada and the United States would be willing to consider hiring these new trainees.

After that, the task will be to evaluate the program and see how it can be replicated in other Latin American countries, Petrazzini says, adding that IDRC is working with partners, including École Supérieure d'Infotronique d'Haïti and the Internet Addresses Registry for Latin America and Caribbean.

Over time, one of the project's aims is to attract investment to build up Haiti's Internet infrastructure and create an ICT cluster in the country, says Max Larson Henry, who coordinates AYITIC in Port-au-Prince and is president of L'Association Haïtienne pour le développement des Technologies de l'Information et de la Communication.

Currently, about 13 to 15 per cent of Haitians have access to the Internet, he says. Despite that, about 55 per cent of Haitians have smartphones, but many aren't continuously connected to the Internet because it's too expensive or not available. Nevertheless, young Haitians are adept at using the phones and the Internet when they can, and have developed digital skills on them.

The long-term goal is to convince young women that, like men, they can be part of the digital revolution. The stakes are huge. One person's employment can help support a family of four or five with food and school fees, Henry says. That's good for young women, good for their families and good for the economy as a whole.

But there's another motivation, too. If Haiti doesn't start creating opportunities for young workers, they could move away, which could further weaken the country's prospects for building its economy.

“This,” says Henry, “is the right thing to do.”



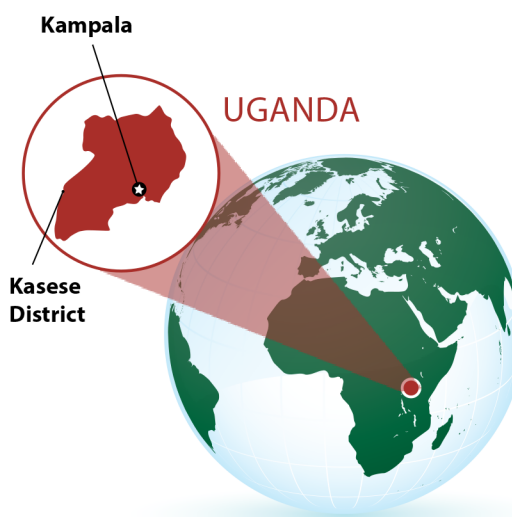
## THE WHEEL DEAL

Opportunities once beyond the grasp of Ugandans with disabilities are now within reach thanks to a specially designed wheelchair

By Niki Wilson

**T**he communities that dot the foothills beneath the Rwenzori Mountains in the Kasese District of southwestern Uganda are connected by rugged dirt roads that wind up, down and around lush, hilly terrain. Rocks, steep grades and, at times, slippery conditions make it a tough place for anyone to get around. But if you're one of the tens of thousands of people with disabilities that affect your mobility, it's almost impossible.

These roads, which can lead to school, jobs and general self-sufficiency, are off limits to those without a means to travel them, in part making these people "the poorest of the poor," says Navin Parekh, the Canadian co-founder of CanUgan, a non-profit organization that solves mobility issues for Ugandans with disabilities. Through CanUgan, Parekh raises funds to provide people in need with locally manufactured hand-pedalled tricycles, an idea he got during his stint as a volunteer in the country in 2010. In 2012, Parekh partnered with Bjarki Hallgrimsson and his students in the School of Industrial Design at Carleton University to redesign the tricycles with stronger frames that could hold a variety of income-generating attachments, such as solar-powered charging stations and maize mills. This work was done in consultation with local manufacturers to ensure the new designs worked on the ground and could be produced locally. Now, the team hopes to implement a



new design in the Kasese district: a tricycle-wheelchair combo.

The idea was born from observations made by Hallgrimsson's students on a follow-up visit in 2014 to assess the effectiveness of the first tricycle redesign. Parekh says that project, which was partly funded by IDRC, has received a lot of positive feedback because almost all of the people with tricycles are now able to support themselves with income-generating activities. For example, women with disabilities that live near the border with the Democratic Republic of the Congo have now started a cross-border trade, using their tricycles to move goods between the two countries. "Some of these women are now the main breadwinners in their families," says Parekh. "Some have bought their own homes." Other tricycle users make house calls as tailors, shoemakers and fruit and vegetable sellers.



*Locals from Uganda's Kasese District show off a new hand-pedalled tricycle that converts into a wheelchair.*

## “Tricycle users make house calls as tailors, shoemakers and fruit and vegetable sellers.”

But when the Carleton design students interviewed local women and visited an elementary school, they realized they'd solved only part of the mobility problem. “The tricycles are a good way to get people to their destination,” says Hallgrimsson. “But once they get there, they're crawling on the ground because there's no wheelchair for them.” The tricycles were simply too big to travel easily into homes, schools and markets.

To address that problem, student Jennifer Vandermeer designed a two-in-one tricycle-wheelchair. When it's in tricycle mode, the device allows a rider to cover long distances over bumpy terrain. But once the rider arrives at school, work or home, they can remove the front wheel and replace it with castors, turning it into a wheelchair, which helps the person enter buildings and manoeuvre in smaller spaces.

Vandermeer's design may also help alleviate the problem of access to wheelchairs in general. “Local people can't afford to buy wheelchairs,” says Hallgrimsson. Though well-meaning international organizations try to address this problem by sending second-hand or cheaply made wheelchairs to the region, these chairs aren't designed for the terrain and break down easily. Replacement parts aren't available and locals don't have the tools to fix them. “We

saw some of these donated wheelchairs sitting broken by people's houses,” says Hallgrimsson.

That's why working with local manufacturers is key. Through a grant awarded by the Swedish organization Promobilia, this summer Hallgrimsson and his students will consult with potential rural producers in Kasese District to ensure the two-in-one design can be made and maintained in rural settings by local people using local materials. That it can be made with the resources available in cities has already been proven in the Ugandan capital of Kampala, where a hospital has begun to manufacture the device from the designers' specs, which Hallgrimsson says will one day be freely available on the web. “We're not at a point where the rural people can do this yet, because they need training and better tools,” he adds. “We're working with CanUgan to help them increase their capacity.”

As was the case with the hand-pedalled tricycle redesign, follow-up with users will be an important part of ensuring success. Hallgrimsson says it's not uncommon for outside organizations to offer design assistance in communities like those in Kasese District, then end their involvement before the designs can be tested and tweaked. “Our philosophy has always been to see projects through to a point where they are working for local people,” he says. “We're in it for the long haul.”





## STOPPING THE ROT

How a natural compound called hexanal is helping prevent India's lucrative fruit crops from spoiling

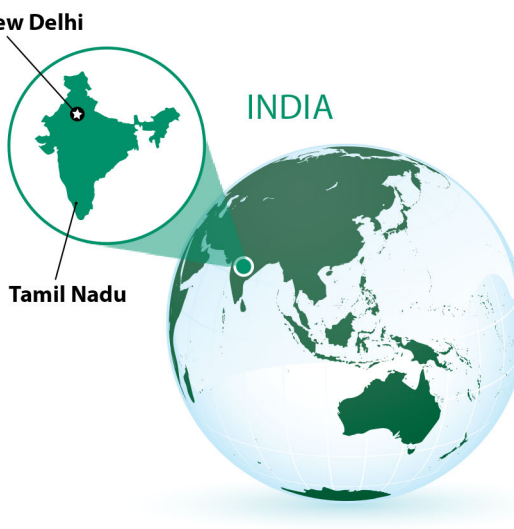
By Brian Owens

**I**ndia is the world's second-largest producer of tropical fruit and vegetables, but a huge amount of the harvest — up to 40 per cent — is lost to spoilage on the farm, in the warehouse and in transit before it ever reaches the consumer.

Mangoes, for example, can be a lucrative crop, but the entire harvest tends to ripen within a very short time. This causes a sudden glut on the market, driving down prices and leaving excess fruit to rot. "The fruit is ready on the tree, but there is no way to get it to market," says Jayasankar Subramanian, an agricultural biotechnologist at the University of Guelph.

To reduce the waste, researchers at India's Tamil Nadu Agricultural University and the University of Guelph in Canada are finding ways to use a natural substance called hexanal to slow ripening, get more fruit to market and improve the lives of farmers. "If we can give farmers a bigger window, it gives more stability to the pricing and more flexibility for packers and shippers," says Subramanian. The work is jointly funded by IDRC and Global Affairs Canada through the Canadian International Food Security Research Fund.

In 2012, Subramanian and K.S. Subramanian (no relation), a biochemist at Tamil Nadu Agricultural University, started testing hexanal on tropical fruits such as mangoes and bananas in India. Some varieties of mango



sprayed with hexanal stayed on the trees for an extra three weeks before needing to be picked, and after harvest they lasted three weeks longer in storage than unsprayed fruit. That delay brought big advantages for the farmers. Instead of harvesting at the same time as everyone else when prices are low, they could wait for prices to rise again as the glut cleared. "The longer you can retain the fruit on the trees, the higher the price," says K.S. Subramanian. Each day that the farmers could hold off on harvesting earned them an extra 1,000 (about \$18) rupees per acre.

The sprayed fruit was also more firmly attached to the trees, reducing losses to strong wind and rain, and had fewer pests and diseases, reducing the amount of rejected fruit from 50 per cent to less than 10 per



*A farmer in India sprays hexanal on mango trees. Hexanal is a naturally-occurring compound that's being used to prevent fruit crops in India from spoiling.*

“ If we can give farmers a bigger window, it gives more stability to the pricing and more flexibility for packers and shippers. ”

cent. Because they retained fruit better, each sprayed tree produced between five kilograms and six kilograms more fruit than the control trees. Bananas proved to be trickier because their thick skins and waxy coatings make field spraying ineffective. But dipping them in hexanal after harvest helped them to stay fresh for several weeks longer than usual.

The research involved 4,000 farms across the state of Tamil Nadu, 70 per cent of which were small or marginal farms of less than two hectares. The technology was popular with farmers, with 70 per cent of those involved saying they would like to keep using it in the future, says K.S. Subramanian.

The researchers are now working on embedding hexanal into tiny pores in nanoparticles that can be placed in a pouch in a packing box (much like the small desiccant packages found in shoeboxes) or made into a sticker that's placed on the fruit after harvest and continues to release hexanal during shipping, keeping the fruit fresher for longer. "It can close

down the ripening process significantly," says Jayasankar Subramanian.

The spray and dip technology is already starting to be accepted by agricultural regulators in India and Sri Lanka, says K.S. Subramanian, where it will soon be available commercially, with work continuing on the nanoparticles. Jayasankar Subramanian expects it to be approved in North America within 18 months, and in Costa Rica and Guatemala in 2019. The researchers also hope to expand the use of hexanal to Africa.

The work could have an impact on health as well. Because so much of the harvest is lost, people in India and Africa are not big consumers of the fruits and vegetables that they produce. Hexanal could help not only improve the economic outlook for farmers but also the diet of local people.

"If we can save up to 50 per cent of the losses, depending on the crop," says Jayasankar Subramanian, "that will translate into several billion dollars for the global economy and put more food on the table."



## WORKING WONDERS WITH MINE WASTE

How scientists in Morocco hope to turn huge slag piles of coal mining waste into bricks and transform the city of Jerada in the process

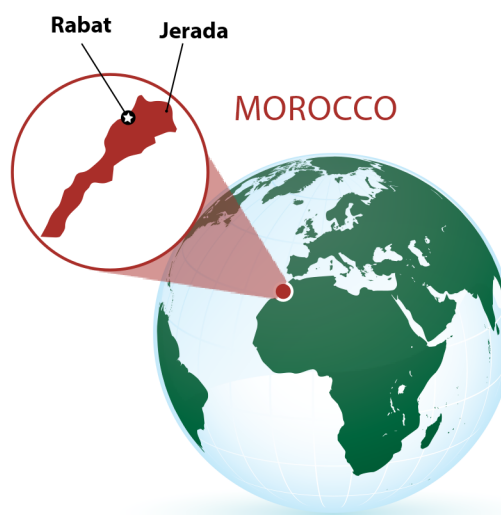
By Brian Owens

**T**he city of Jerada in northeastern Morocco exists because of coal. The city grew up around a major coal mine that opened early last century. But when the mine closed almost 20 years ago, the local economy collapsed and Jerada was left with huge piles of mining waste towering over its centre.

"It's a very old mine and there were no constraints on environmental waste management, so waste was deposited in the middle of the town," says Mostafa Benzaazoua, a professor at the Université du Québec en Abitibi-Témiscamingue's L'Institut de recherche en mines et environnement and a former Canada Research Chair in integrated management of mine waste. When it rains, the piles of waste leach acid into the water table.

The lack of jobs and the environmental pollution has led to social unrest in the region, so IDRC has been funding a project to try and clean up the waste and use it to develop new industries. "The city is very depressed, the population is angry," says Benzaazoua, who has been working on the project. "We're trying to lower the pressure."

Benzaazoua and his colleague Yassine Taha, a materials scientist at Mohammed VI Polytechnic University in Marrakech who is leading the project in Morocco, hope to do so by using the huge slag piles to produce bricks — a way of removing the waste and creating jobs at the same time. Taha has a personal connection



to the project. His father worked in Jerada's mine for 20 years and died from silicosis after decades of breathing in coal particles. "It's one of the reasons I started this, he says. "There's an emotional aspect for me."

Benzaazoua and Taha looked at the chemical composition of the mine waste and found that it contained the right kinds of materials to make high-quality bricks. But there was one problem — the waste still contained a fair amount of coal residue, which would affect the technical performance of the bricks. So they started by reprocessing the waste to concentrate the coal residue. What was left over was perfect for bricks. They checked for any possible environmental risks from the bricks, or any issues with construction standards, and found none. "It was an amazing result," says Taha. "The material is comparable





*Yassine Taha holds a brick that was produced in his lab using coal mining waste from the Moroccan city of Jerada.*

“The city is very depressed, the population is angry. We’re trying to lower the pressure.”

to the clays found near Montreal that are used in bricks.”

Additionally, the coal residue that’s recovered can be used to produce electricity. And since it’s anthracite coal, which burns cleaner than other kinds of coal, its environmental impact is low (at least as far as coal goes).

Taha estimates that the approximately 25 million tonnes of material in the Jerada waste piles could make more than four million bricks. “They are really big reserves,” he says, adding that the brick project could have multiple benefits for Jerada and the rest of northeastern Morocco. Producing the bricks will create jobs in a region that has one of the highest unemployment rates in the country; Taha says that when people saw his team working at the waste piles, many came to ask if there were jobs available. The piles also take up a great deal of space in the middle of the city, around 10 to 20 hectares. Using up the piles will free up space for new construction. And currently, the manufacture of bricks requires clay, which

comes from agricultural areas. Making bricks from mine waste will help conserve agricultural land, says Taha.

So far, Taha and Benzaazoua have managed to produce bricks in a pilot project, but they’re now looking to go further and develop larger-scale production that could employ between 100 and 200 people. Doing so, however, will require permits from the government to exploit the mine waste, which is a problem because no such permits exist. At least not yet: Taha and Benzaazoua are working with the government to develop the necessary laws that would allow for this type of brick production.

A bigger problem, says Benzaazoua, is finding investors to finance the project. Taha says they have one potential investor interested, and hope to attract more. But some of the very issues that they hope to address are discouraging investors from working in the region. “The social unrest makes it very difficult for investors,” he says. “They don’t always want to put their money in a place where people are not happy.”



# BREAKING THE BONDS OF CHILDHOOD MARRIAGE

How young girls in West Africa are helping themselves (and their communities) by changing cultural perspectives on childhood marriage

By Alanna Mitchell

**If you are female in the African countries of Niger and Mali, you are more likely to be married as a child than as an adult.**

In Niger, a country in West Africa, 76 per cent of girls become brides before they turn 18. In neighbouring Mali, the figure is 61 per cent. In many cases, the girls are only 13, says Ramata Thioune, a senior program specialist with IDRC based in Nairobi, Kenya. Some are married at 10.

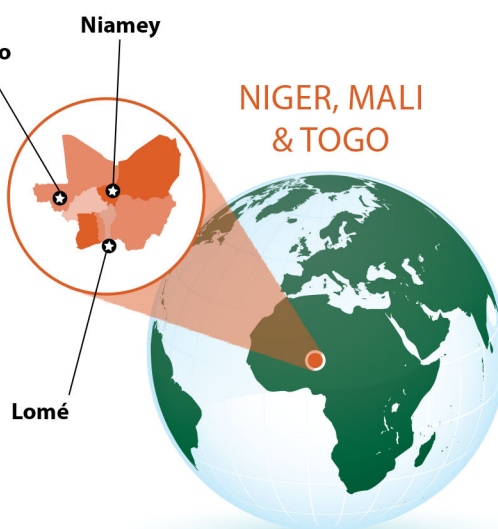
Niger and Mali are not alone. Six of the world's top 10 countries for early female marriage are in West Africa, Thioune says.

There is one bright spot. A 2017 UNICEF report found that, while still high, the rate of child marriage has dropped by a fifth across West and Central Africa since 1990.

But fast population growth in the same region means that the sheer number of girls is also growing and therefore so is the number of child brides. By 2050, the number of girls under the age of 18 will be 250 million, more than three times as many as in 1990. Even with declining rates of childhood marriage, that's still a lot of girls married too young.

The physical dangers are well documented, Thioune says. Child brides often become pregnant swiftly. Because they are not necessarily fully grown, rates of maternal and infant death are high. Obstetrical complications are common.

Not only that, but when these girls get married so early, they leave school, sharply



reducing their ability to earn money throughout their lives. They get left behind economically. So do their families, communities and nations.

What to do about such a complex issue?

A three-year, \$1.1-million IDRC-funded project with Women in Law and Development in Africa, (WILDAF), is trying to address the problem by teaching girls in Niger, Mali and Togo to become their own advocates.

The idea is to tell the girls about their own rights as women and as human beings and enhance their agency. "If we try to empower girls, they will be able to take initiatives and fight against early marriage in their community and their country," says Kafui Adjamagbo-Johnson, coordinator of WILDAF for West Africa, which manages the project.

The barriers are formidable because the program goes directly to the heart of how women are perceived within their communities.



*Women hold a poster promoting civil marriage during a forum about child marriage with traditional and religious leaders in Sokode, Togo.*

“ If we try to empower girls, they will be able to take initiatives and fight against early marriage in their community and their country. ”

Traditional beliefs dictate that women are made to serve men, Adjamagbo-Johnson says. Marriage is an agreement between two families, often for economic gain, rather than a love match. Because a husband must support his wife and her family, some families see early marriage as a way out of family poverty. Additionally, when a girl marries, the family saves the money it would have paid for her school fees.

Learning about their rights has been transformative for many in the pilot project, Adjamagbo-Johnson says. Girls became excited about the possibilities for them to remain at school, be trained and find work before getting married. It gave them confidence.

They also learned how to figure out which power brokers in their communities reinforce the traditional idea that girls should be married at a young age. Often, they are male family members or the father's older sister. In many

cases, they are also the village's traditional or religious leaders.

Then it's a question of teaching the girls how to reshape those views. The lessons get repeated over months.

Project leaders in each community taught young girls how to talk to people in positions of power. The girls then went into villages to practice their communication skills, using words and images to argue their case.

Eventually, some of the girls sought meetings with the traditional leaders in their communities to lay out the benefits of later marriage — and got them. Several of the girls attended a high-level meeting in Senegal to outline the case for later marriage and a handful also went to New York City to press their case at a meeting of the United Nations Commission on the Status of Women.

“The fact is that they are doing the work,” says Adjamagbo-Johnson. “And people are listening to them.”





## COOL SOLUTIONS

Cities in South Asia are sizzling, with low-income residents bearing the brunt of urban heat stress. But researchers are finding ways to help them adapt.

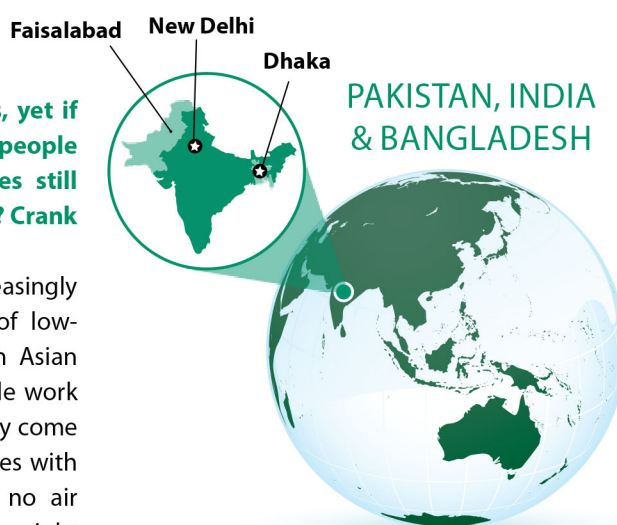
By Brian Banks

**C**limate change may be upon us, yet if you say, “heat wave,” a lot of people in developed Western countries still think, “Ah, summer.” Trouble sleeping? Crank up the a/c.

But it’s a different, distressing and increasingly dangerous story for tens of millions of low-income urban dwellers in major South Asian cities. Not only do many of these people work outdoors in intense heat by day, but they come home at night to small, cramped shanties with tin, concrete or stone-slab roofs and no air conditioning. For months at a time, overnight temperatures in these homes never fall below 30 C, higher still during heat waves. And, barring any intervention, these conditions are expected to worsen — producing more frequent catastrophes similar to the heat wave that caused more than 2,400 heat-related deaths in India in 2015.

“You can’t properly sleep, you can’t be productive the next day and if it continues for a long time it leads to health risks,” says Christian Siderius, a climate adaptation and water resources management expert with Netherlands-based Wageningen Environmental Research.

Since 2014, Siderius has been a lead researcher on a multifaceted project funded by IDRC and the United Kingdom’s Department for International Development that focuses on climate change impacts on water, resources and society in the Hindu Kush Himalayan region, including cities in the major downstream river basins. Specifically, he and a team of colleagues in Pakistan, India and Bangladesh have been studying urban heat



stress at household, neighbourhood and city-wide scales with a goal of developing solutions to help vulnerable people adapt to and manage the risks.

At one level, there’s a lot known on this topic, Siderius says. Planting trees for shade and painting walls white offers some relief, for example. “But what we found is that the evidence in South Asia and the evidence base for poor households was very meagre,” he explains. “People knew that some things helped, but we wanted to be able to say specifically what could help bring levels of heat stress in your home down by, for example, five degrees.”

Solutions, whether via the private sector, government or NGOs, also have to be extremely low-cost to be viable.

Getting those answers requires data. To obtain it, researchers outfitted cars with temperature and humidity sensors and every two weeks drove them through three cities — Delhi in India, Dhaka in Bangladesh and Faisalabad in



*A woman in Bhubaneswar's Mahavir Nagar slum wipes cold water over her face in an effort to cool off after coming out of her home on a day when the temperature reached 42.5 C, prompting a heat wave alert in the Eastern Indian city.*

“ We wanted to be able to say what could help bring levels of heat stress down by, for example, five degrees. ”

Pakistan — recording conditions in different neighbourhoods. In each city, they also installed temperature loggers in the bedrooms of 200 non-air-conditioned homes in different low-income neighbourhoods that took readings every 10 minutes.

The results, plotted on heat maps, paint a complicated but revealing picture that stands in stark contrast to government weather records, which show a single temperature for the entirety of one urban area, such as Delhi. Data that researchers collected in that city in 2016, for example, showed that average household temperatures were four degrees higher — 30 C compared to 26 C — than the weather office figure.

The differences between neighbourhoods were equally stark. “We started our survey in shaded [more affluent] areas and then went to east Delhi, where there are the densest, poorest neighbourhoods,” Siderius says. “During heat waves, some shaded neighbourhoods were six degrees cooler. Of course, it might be difficult to green the whole of Delhi, but it’s an indication that keeping your green area, keeping your shading, could be helpful in keeping temperatures down.”

Within homes, the biggest differences stem from building materials and ventilation. The worst homes, where researchers recorded average

indoor nighttime temperatures as high as 36 C during protracted heat waves, had no evaporative coolers, poor ventilation and metal roofs. Add perpendicular ventilation, Siderius says, and you get, on average, a two-degree drop. “If you have opposite ventilation — an open door and window, say — it drops another two degrees. Add an evaporative cooler and you get under 30 degrees.”

In 2017, Siderius’s group began working with a local NGO, the Mahilia Housing Trust, to test the effectiveness of prefabricated modular roofs made with non-conductive materials that are cheap, waterproof and easily removed. If the results are positive, they will be factored into the project’s final recommendations to local and regional governments.

Kallur Murali, an IDRC project officer in Delhi, says other recommendations will emphasize providing more publicly accessible water stations and revising public-access policies to make it easier for people working outdoors to find shelter in public parks and other shaded locations.

Ultimately, Siderius says, “No single measure is enough to keep a city like Delhi livable. You have to think about neighbourhoods, you have to think about housing construction and you have to understand people’s knowledge of how to cope.”



# IMPROVING AFRICA'S FOOD SECURITY

Food security expert Jemimah Njuki explains why women are poised to take a leading role in Africa's agriculture industry

By Niki Wilson

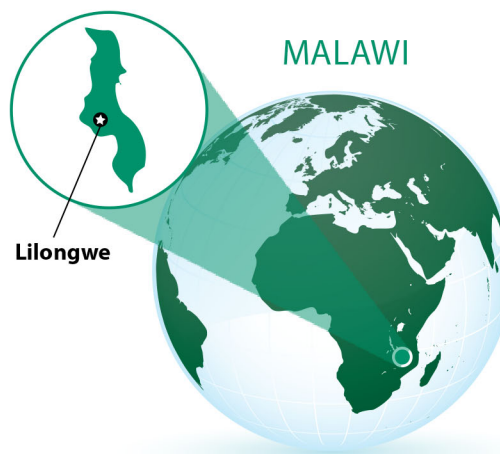
**A**sk Jemimah Njuki how to solve some of the biggest issues in African food security, and she'll give you one word: women.

"Women carry much of the production burden," says Njuki, a senior program specialist at IDRC who oversees a portfolio of projects on food security, gender equality and the empowerment of women in agriculture. "Yet they face major hurdles in achieving meaningful roles in leadership and along the food-production chain. We need to change the way we think about the whole global food system, so that women become more central to it and benefit equally."

Here, Njuki makes a case for more woman-led research and discusses innovative solutions to the big issues of labour burden and harmful gender norms.

## On the importance of women being involved in food security research

Here's what can happen when women aren't involved in decisions about what food security problems receive research support. It could be easy, for instance, to favour crops that make a lot of money from foreign trade. This is the case in Malawi, where they grow a lot of tobacco and the majority of profits go to men. Women, however, have much more control over a crop such as beans, which is a key crop



for local markets, domestic food and nutrition security. Women researchers are more likely to understand this nuance because it's part of their lived experience. Knowing this, they can place more attention on crops that empower women and increase their income.

## On alleviating the burden of unpaid work

Women in sub-Saharan Africa spend about 40 billion hours a year collecting firewood to cook food. This is time they could use for gainful employment, education, leisure, which is important for health, or to advance themselves in whatever way they want. A lot of this unpaid work leaves women without those choices.

One of the projects IDRC funded to alleviate some of that burden is the development of pre-cooked beans. Women use a lot of firewood and water to cook beans — it takes about three hours to put them on the table. These new





*Jemimah Njuki, a food security expert with IDRC, believes that greater involvement for African women in food security and agriculture research can benefit the whole continent.*

“ We need to change the way we think about the whole global food system, so that women become more central to it and benefit equally. ”

beans are made in a factory and are almost ready to eat. They are available as a dried good, and women can put them on the table in 10 to 15 minutes.

In addition to saving time, women can also now sell the beans to the factory. It took some work to create this market. Women needed access to new varieties of beans, and to credit so that they could purchase the seed. They had to organize themselves to produce enough to supply the market. We partnered with the Community Enterprises Development Organisation in Uganda, which worked with 25,000 farmers, 52 per cent of whom were women, to produce enough beans to supply to the factory. These women have increased their income by more than 30 per cent.

#### On changing gender norms

In many countries and cultures there are entrenched gender norms around how food is

allocated and shared. In some cultures, women eat last, or are not allowed to eat certain foods.

Gender norms also affect the roles women take on in food production and allocation, and can leave them at a disadvantage. For example, in Malawi and Zambia, there is a very clear division of roles in the fisheries sector. Men go out to fish, and women buy the fish from them to process and trade. But this creates a power imbalance; there have been cases of men wanting to be paid in sex.

To address that imbalance issue with the men, IDRC worked with a company that uses drama techniques to change norms and behaviour. As a result, we've seen the attitudes of men changing, and the cost of purchasing came down.

Men are seeing that when they work together with women as equals — when women participate in making decisions — their households improve and they make better investments in nutrition and education.



Canada's International Development Research Centre (IDRC) has been improving lives and livelihoods in the developing world since 1970 by investing in knowledge, innovations and solutions that have a lasting impact. The stories of the IDRC projects in this digest are global, but they're also Canadian, making them a natural fit for *Canadian Geographic*,

the mandate of which is to make Canada better known to Canadians and the world. The map below shows the 13 locations of the stories in the digest, each of which is colour-coded to represent one of IDRC's three main programs: Agriculture and Environment (green); Inclusive Economies (orange); and Technology and Innovation (red).

