



Grand Challenges Canada®  
Grands Défis Canada

## All Projects, Listed by Health Priority

### IMPROVING NUTRITION

#### Promoting Exclusive Breastfeeding

**\* KEMRI, Kenya (Implementation country: Kenya) (Grant #0529):** *The Linda Kizazi Project: A multi-faceted, community-based approach to promoting and supporting exclusive breastfeeding in Kibera slums in Nairobi*

In Sub-Saharan Africa, roughly 12 of every 100 children die before age five. Exclusive breastfeeding for six months is an effective way to save many of those lives but only about one-third of babies in the region are exclusively breastfed and in Kenya's Kibera slums, where poverty forces mothers to resume work soon after delivery, the rate is 2%. The Linda Kizazi project will foster a Baby-Friendly Community in Kibera, creating both a personal saving plan for mothers and links to breastfeeding-friendly ways to generate income in those crucial first six months of their baby's life.

**Video:** <http://bit.ly/1smjdqX>, **Pictures:**

#### Therapeutic Foods/Vitamin and Mineral Supplements

**\* A lucky little fish to fight iron deficiency among women in Cambodia**  
**Lucky Iron Fish, Guelph (Implementation country: Cambodia) (#0355-05-30)**  
*Total new transition-to-scale investment: \$860,000*

In Cambodia, six in 10 women are anemic due to iron deficiency in their diets, causing premature labour, hemorrhaging during childbirth and the impaired brain development of their babies. Usually obtained through red meat or other iron-rich foods, a small chunk of iron added to water in the cooking pot can release a life-saving iron supplement. But attempts to persuade mothers to do so were unsuccessful. On a 2008 study mission in Cambodia, University of Guelph researcher Chris Charles thought of creating a piece of iron shaped like a local river fish believed to bring good luck and fortune. His simple idea succeeded beyond all expectations. Women happily placed the Lucky Iron Fish in their cooking pots and, in the months that followed, anemia in the village fell dramatically. A Lucky Iron Fish is small enough to be stirred easily but large enough to provide about 75 per cent of daily iron requirements.

“The results are stunning,” says Dr. Alastair Summerlee, President of the University of Guelph and Chair of the Board of Directors of Lucky Iron Fish. “Initial results show a huge decrease in anemia and the village women say they feel good, experience no dizziness and have fewer headaches. The iron fish is incredibly powerful.” Small businesses across Cambodia will produce and distribute the fish with quality control measures in place. About 7.5 cm (3 inches) long, and made from recycled material at a cost of about \$5 each, the iron fish provides health benefits for roughly three years.

“Our goal is to produce 10,000 Lucky Iron Fish this year and another 50,000 next year,” says Gavin Armstrong, President and CEO of Lucky Iron Fish.

“U.S. President Herbert Hoover once famously promised his constituents ‘a chicken in every pot.’ We have no chicken to offer but hope that one day a Lucky Iron Fish will be in every pot in Cambodian villages, saving and improving lives through the enriched intake of iron in food and drinks.” Taking the project to scale offers profound potential health benefits to many women in Cambodia, with potential markets throughout the world. Grand Challenges Canada’s \$500,000 loan to Lucky Iron Fish is part of a total scale-up financing package of \$860,000, and augments earlier commitments of equity investors Innovation Guelph and the University of Guelph. **Video:** <http://bit.ly/1oJbyTr>. **Pictures:** <http://bit.ly/1198Cyr>. *Contact details, see below.*  
*Grant Number: 0355-05-30*

**\* University of British Columbia, Canada (Implementation country: Cambodia) (#0490):**  
*Thiamin-fortified fish sauce as a means of combating infantile beriberi in rural Cambodia*

Low levels of the vitamin thiamin (B1) in the diet of breastfeeding mothers in Southeast Asia results in widespread beriberi disease in their infants, causing heart failure and thousands of child deaths. In Cambodia alone, the problem kills about 700 children per year. The project will introduce fortified fish sauce to mothers’ diets, a simple, cost-effective and sustainable way to raise maternal blood and breast milk thiamin levels, helping to lower the rate of infantile beriberi.

**\* Kwame Nkrumah University of Science and Technology, Ghana (Implementation country: Ghana) (#0512):** *Promoting nutritious egg consumption in rural Ghana: a new paradigm in healthy childhood*

In Sub-Saharan Africa, malnourishment affects the growth, brain development and cognitive ability of millions of children. Infants that do not receive enough omega-3 fatty acids in the womb are at the risk of developing vision and nerve problems. This project will create a source of low-cost omega-3-fatty acid eggs.

**Video:** <http://bit.ly/1nJuku0>, **Pictures:** <http://bit.ly/1nvO1oT>.

**\* National Institute for Medical Research, Tanzania (Implementation country: Tanzania) (#0559):** *Reducing micronutrient deficiency in children below two years by supplementing complimentary food with Moringa oleifera leaf powder in Tanzania*

In Tanzania children under age two consume too little iron-rich food and anemia is widespread – about 81%. This project will supplement complimentary food with locally available Moringa Oleifera tree leaves powder, rich in essential nutrients (including Vitamin A) for improved health.  
**Video:** <http://youtu.be/LpFoVfigiQw>, **Pictures:** <http://bit.ly/1174cbm>.



**\* Summit Pharmaceuticals Limited, Kenya (Implementation country: Kenya) (#0528):**  
*Cowpea Promotion and Post-Harvest Project for East Africa (COPPEA)*

Cowpea (AKA black-eyed pea) is a high-protein superfood, well-suited to growing in even the dry, poor soil conditions of sub-Saharan Africa. It isn't widely consumed in the region, however, due to the flatulence it causes – a problem that could be reduced by sugar-reducing enzymes, or by soaking and other techniques. With partners at the University of Guelph, cowpea-based hummus, flour and other products will be tested, with product promotion through social groups, retail outlets and other avenues.

**Video:** <http://bit.ly/SUx4L0>, **Pictures:** <http://bit.ly/1kSgfri>.

**\* University of Saskatchewan, Canada (Implementation country: Bangladesh) (#0495):**  
*Fortifying Dal to Alleviate Fe Deficiency in South Asia*

Iron is vital to early childhood health, growth and development, and for lifelong wellness, lowering the risk of diarrhea, measles, malaria and pneumonia. Yet a lack of iron is the world's most widespread micronutrient deficiency. This project will fortify a common staple – dal (dehulled lentil, pea, chickpea) – to triple iron intake in the diets of high-risk populations.

**Video:** <http://bit.ly/1mRlg3H>, **Pictures:** <http://bit.ly/1uJyE0w>.

**\* PROINPA Foundation, Bolivia (Implementation country: Bolivia) (#0508):** *Green cañahua plants to fight malnutrition*

In Bolivia, 33% of women of childbearing age, 59.8% of children under five and 78% of children under two have anemia. Iron deficiency affects more than 50% of the indigenous population and 80% of indigenous children under two. At least 11% of young children in Bolivia suffer from Vitamin A deficiency. This project will produce a cultivation and consumption plan for green cañahua plants (*Chenopodium pallidicaule* Allen) to increase the availability of high-quality protein, iron, calcium and Vitamin A in the diet of women and children in highland regions.

**Video:** <http://bit.ly/1jDpNsT>, **Pictures:** .

**\* The Infectious Diseases Institute Limited, implemented by Global Health Economics, Uganda (Implementation country: Uganda) (#0566):** *Improving child nutrition in urban slums in Uganda*

By developing a local nutritional supplement, along with a rewards system to incentivize companies to pay for and sustain its production and free distribution, this project will improve nutritional status among children ages six months to five years in slums.

**Video:** <http://bit.ly/1hJJ0Ep>, **Pictures:** <http://bit.ly/1ml886u>.

## Food Security and Safety

**\* Aspire Canada, McGill University, Montreal, Canada (Implementation country: Kenya) (#0479):** *Developing Novel Edible-Insect Farming Technologies to Address Food Insecurity in Slums*

Hundreds of edible species of ants, beetles, moths and other insects, rich in protein and iron (see <http://bit.ly/1qam0HU>), are only seasonally available for millions of people who consume them. This project will develop and distribute insect farming technologies to make this cheap, nutritious and safe food source available for year-round consumption in Kenya's slum conditions, reducing malnutrition and high rates of anemia, especially among pregnant women. **Video:** <http://bit.ly/1g1CsGe>, **Pictures:** <http://bit.ly/1oxszzJ>.

**\* ADAM – Asociacion de Desarrollo Agricola y Microempresarial Guatemala (Implementation country: Guatemala) (#0514):** *InspiraFarms – Integrated innovation to tackle food safety*

InspiraFarms will reduce health burden caused by food-borne diseases through scalable, low-cost food safety certification technologies.

**Video:** <http://bit.ly/1g3BSrj>, **Pictures:** <http://bit.ly/Qm8fFm>.

**\* Practical Action Nepal (Implementation country: Nepal) (#0533):** *Addressing Malnutrition through Integrated Rice–Duck Farming in Nepal*

This project fostering integrated rice–duck farming in Nepal will raise incomes through higher productivity and lower fertilizer costs, along with other farm input costs, while reducing malnutrition by providing a continuous supply of protein and vitamin-enriched food. About half of Nepalese children under five years are malnourished (45% are underweight, 43% have stunted growth) and the problem is most severe among smallholder farm families.

**Video:** <http://bit.ly/1mOOd5W> **Pictures:** .

**\* African Center for Innovation and Leadership Development, Nigeria (Implementation country: Nigeria) (#0534):** *Mobile Application for Improved Nutrition, Community Engagement and Trust with Farmers*

Malnutrition, which affects over 230 million Africans, is attributed in part to a lack of trust in, and access to critical information about, new agricultural technologies, development programs and sustainable practices, and low farmer participation in the innovation process. A mobile application developed in Kenya and Nigeria to address the problem of malnutrition by linking farmers with key players in the agricultural sector, in order to facilitate access to relevant information that will improve crop yields, intake of nutritious crops and, ultimately, enhance rural livelihoods. **Video:** <http://bit.ly/QEzVpl>, **Pictures:** .

## WATER AND SANITATION

**\* Loving the loo: New marketing strategy targets sanitation in rural Nepal iDE, Winnipeg (Implementation country: Nepal) (#0354-05-40)**  
*Total new **transition-to-scale** investment: \$2.2 million*

iDE, a Winnipeg based non-profit organization that supports business opportunities in the developing world, will work with Nepali small business owners and local entrepreneurs to scale up the production, marketing and sale of simple latrines, using a novel approach successfully

demonstrated in Cambodia and Nepal: marketing simple, low-cost toilets as a status symbol and sanitation as an affordable source of pride.

“The traditional approach – standard public health messages coupled with giveaway programs that sideline local businesses – is not working”, says Stu Taylor, iDE’s Director of Performance Measurement. “Our experience shows that when you make sanitation affordable and desirable for users – and profitable for businesses – it just takes off.” iDE’s marketing approach is complemented by training for small-scale local producers and entrepreneurs to produce and sell simple-design, low-cost latrines, easily installed within a few hours. Profitability will encourage other entrepreneurs to develop new designs to attract even more customers.

“When people see the toilet’s attractive design and how easy it is to keep clean, this has become a product that people actually aspire to,” says iDE Nepal Country Director Luke Colavito. “We’ve already seen that, once a few people buy these toilets, their neighbours feel a need to keep up and buy one too, generating more sales.” Thanks to a \$1 million Grand Challenges Canada grant, iDE has leveraged an additional \$1.2 million through partnerships with UNICEF and other donor investments. Over the next three years, iDE aims to facilitate the production and sale of 100,000 toilets, improving the lives of an estimated 500,000 people in Nepal, while demonstrating a viable model to tackle this urgent public health crisis. Some 2.5 billion people worldwide lack adequate sanitation and hygiene, resulting in extensive health problems. Diarrhea, for example, is the world’s second leading cause of death among children under five – 1.5 million each year.

**Pictures:** <http://bit.ly/RwBmY0>, **Video:** N/A. Contact details, see below.

**\* Summit Pharmaceuticals Limited, Kenya (Implementation country: Kenya) (#0530):**  
*Reduce incidences of child mortality due to water-borne illnesses, and increase access to clean water*

Contaminated water is blamed for widespread diseases, such as rotavirus, diarrhea and dysentery, contributing to approximately a third of deaths among rural school-age children in Kenya. This project has created a biomass stove featuring an innovative, built-in jacket that can be filled with five litres of water that helps insulate the stove, making it more fuel efficient, and allows the user to boil water and cook simultaneously. **Video:** <http://bit.ly/1ldXEoL>, **Pictures:** .

**\* University of Ontario Institute of Technology, Canada (Implementation country: Bangladesh) (#0494):** *Affordable and simple paper-based arsenic detection tests*

A 2008 WHO report estimated that up to 70 million people in Bangladesh drink water that contains unsafe arsenic levels. A simple, low-cost, paper-based test for arsenic developed by this project will help forewarn people when water’s arsenic content exceeds safe levels.

**Video:** <http://bit.ly/1qwSUmu>, **Pictures:** <http://bit.ly/1gfU7EN>.

**\* H2O for All, Oakville, Canada (Implementation country: Dominican Republic) (#0475):**  
*Synergy for Water Now*

In the Dominican Republic, an estimated 55% of deaths of children under five were attributed to diarrhea, due in part to water contamination caused by severe flooding episodes. This project is creating an affordable ceramic water filtration process involving silver and copper nanoparticles.

**Video:** <http://bit.ly/1ooLcsp>, **Pictures:** <http://bit.ly/1jHT4Ss>.

\* **University of Victoria, Canada (Implementation country: El Salvador) (#0504):** *Affordable, long-term detection of water quality using a modular microsphere-based system*

An affordable, stable monitoring system developed by this project will detect pathogens in water supplies, signalled by a simple, immediate readout colour change from red to purple.

**Video:** <http://bit.ly/1I9NLti>, **Pictures:** <http://bit.ly/1kXasj9>.

\* **University of Waterloo, Canada (Implementation country: Philippines) (#0505):** *Year-round Provision of Access to Safe Water in Northern Samar, Philippines*

In 15 flood-prone villages of the Catubig municipal area of the Philippines, this project will build a modular, low-cost biofiltration system to provide a year-round supply of safe water and to develop a business model for commercializing the technology.

**Video:** <http://bit.ly/1I4FSW1>, **Pictures:** .

\* **SODIS Foundation, Bolivia (Implementation country: Bolivia) (#0509)** *Clean water for all: A sustainable distribution strategy for maintenance-free water filters for indigenous population of TIPNIS via a corporate social responsibility model*

This project will leverage a corporate social responsibility model to finance the sustainable production and distribution of a novel, durable water-treatment product for vulnerable families in hard-to-reach communities that depend on turbid river water.

**Video:** ., **Pictures:** <http://bit.ly/1suaBR5>.

\* **Twothirds Water Inc., Canada (Implementation country: Philippines) (#0483):** *Tapp – A water filtration device for developing countries*

In developing countries, the most common way of treating household water is to boil it, which results in other risks, such as lung disease, burns, fire-hazards and deforestation. A simple, user-friendly household water filter developed by this project, in combination with an innovative business model, offers the promise of safe drinking water for millions of families in developing countries. **Video:** ., **Pictures:** <http://bit.ly/1hCf9hp>.

\* **NuPhysics Consulting Canada (Implementation country: Philippines) (#0501):** *VisuFLUID – Computer Software for Sanitation and Wastewater Treatment Facility Design*

A software tool developed by this project will offer an integrated approach to optimize sanitation solutions in developing countries by modelling local soil, water quality, and environmental conditions, essential to designing effective, small-scale sanitation systems in developing countries.

**Video:** <http://bit.ly/1omHe3I>, **Pictures:** .

\* **Ifakara Health Institute, Tanzania (Implementation country: Tanzania) (#0554):** *An innovative chlorine dosing mechanism for ceramic filter pots to achieve complete household-level drinking water treatment for low-income communities*

Household-level water treatment reduces diarrhoeal disease risk by 36% (compared to 17% for water source interventions). Locally-made ceramic water filters are affordable and effective for removing bacteria but not viruses. An innovative way of dosing ceramic filter pots with chlorine developed by this project will remove the microbial pathogens and reduce diarrhoeal disease.

**Video:** <http://bit.ly/1mP6BeR>, **Pictures:** .

**\* National Metal and Materials Technology Center, Thailand (Implementation country: Thailand) (#0562):** *UpWater: Breakthrough Point-of-use Water Treatment and Sustainable Health Betterment for Under-resourced Communities*

The innovators are tackling the global problem of unsafe drinking water, which kills millions of people per year, especially young children. The proposed solution of UpWater, is not just a water-treatment technology. UpWater endeavors to give communities a jumpstart on their paths toward long-term health betterment, by integrating appropriate innovations, social transformation and sustainable business models.

**Video:** <http://bit.ly/1sFbOoJ>, **Pictures:** <http://bit.ly/1joMLDT>.

**\* University of Calgary, Canada (Implementation country: Tanzania) (#0570):** *Neglected voices, neglected diseases: igniting youth-driven innovation in sanitation solutions for Maasai pastoralists*

Worldwide, 1.1 billion people practice open defecation, resulting in diarrheal diseases – a leading cause of death among children under five. This is a major problem among rural Tanzania’s Maasai people. This project will engage and train local youth and community members in scientific data collection to guide development of locally conceived, implemented and evaluated sanitation solutions to open defecation.

**Video:** <http://bit.ly/1jcJJn2>, **Pictures:** <http://bit.ly/1gfUyPm>.

**\* Université Laval, Canada (Implementation country: India) (#0484):** *Safe excreta disposal in humanitarian emergencies*

In humanitarian emergencies, a lack of access to adequate sanitation is compounded by crowded, unhygienic conditions, where the spread of diarrhoeal diseases can be a major contributor to the overall sickness and death. This project will develop a sludge treatment system for the safe disposal of excreta in humanitarian emergencies, safeguarding both public health and the environment.

**Video:** <http://bit.ly/1mRIEz2>, **Pictures:** .

**\* Ifakara Health Institute, Tanzania (Implementation country: Tanzania) (#0553):** *A novel rice husk-fired furnace to sterilize human excreta and create a safe faecal fertilizer business that will motivate up-take of improved ecological sanitation*

A novel rice husk-fired furnace developed by this project will sterilize human excreta and produce a safe agricultural fertilizer. The efforts include a sustainable business model to creating market demand and sales to farmers in Tanzania, a country where only 24% have improved sanitation facilities.

**Video:** <http://bit.ly/1iPsA1v> , **Pictures:** <http://bit.ly/1mJw8lk>

**\* Fresh Life Initiative Limited, Kenya (Implementation country: Kenya) (#0527):** *Fresh Life Initiative: Sustainable Sanitation in Urban Slums*

In Kenya's slums, 8 million people using unhygienic sanitation options and practices dump 4 million tons of faecal sludge into the environment each year and negatively affect community health. A dense network of accessible, affordable and hygienic toilets will be franchised by this project for slum residents, to run as profitable, sustainable businesses, removing the waste hazard and converting it into saleable by-products.

**Video:** <http://bit.ly/1smkfDh>, **Pictures:** <http://bit.ly/1g3pMic>.

**\* Design Association for International Development (DesignAID), Bangladesh (Implementation country: Bangladesh) (#0474):** *The Incinerator Initiative: Managing medical waste in low-resource settings*

High equipment costs prohibit the appropriate incineration and safe disposal of medical waste for many hospitals in resource-poor countries, leading to contaminated supplies and sharps being landfilled or dumped on roadsides, infecting animals and people with agents that can lead to sepsis, hepatitis and HIV. A modular, low-cost incineration system developed by this project will be locally built and adapted to meet hospital waste disposal needs.

**Video:** <http://bit.ly/1mitN2v>, **Pictures:** <http://bit.ly/1fU9JTz>.

## **Malaria, Childhood Illness**

**\* Using mobile phones to fight malaria in Tanzania**  
**Mennonite Economic Development Associates (MEDA), Waterloo, and Queen's University, Kingston, Canada (Implementation country: Tanzania) (#321-05-43)**  
*Total new transition-to-scale investment, all sources: \$1.5 million*

In 2012, there were an estimated 207 million cases of malaria worldwide. In Tanzania, the disease causes roughly 100,000 deaths each year, an overwhelming majority of them children under five. Pregnant women and young children are at highest risk by far. Since 2011, the Tanzania National Voucher Scheme (TNVS) has used mobile phone text messaging to provide pregnant women with an electronic voucher redeemable at participating retailers for long-lasting insecticidal bed nets, for a nominal fee (33 cents). The scheme has made a significant impact on malaria control in Tanzania but gaps remain – about 40% of women do not redeem the e-voucher, puzzling researchers: do they have enough nets in the home? Did they misplace their e-voucher? Could they not even afford the modest price? Do they understand the protection a net offers? Waterloo, Ontario-based Mennonite Economic Development Associates (MEDA), an international economic development organization that creates business solutions to poverty, is an implementing partner of the TNVS. With the help of a global health researcher at Queen's University, the organization wants to increase the efficiency of the distribution system, focus it more intensively in areas of high malarial risk and examine how the remarkable text-based delivery system could be applied to additional health threats of growing importance, such as hypertension. MEDA and Dr. Karen Yeates of Queens University have designed a cluster randomized trial that will test the effectiveness of a text message (SMS) dialogue with the women who are issued an e-voucher, sending them reminders to redeem them for nets. The team will also collect data about usage and barriers, and investigate potential solutions. This will not only indicate if SMS is an effective method to ensure redemption but will also investigate



why some women do not redeem their net voucher. Involving the end user will ultimately lead to better management and improve the electronic delivery method, reducing the burden of malaria for women and children.

“Africa’s health challenges, like malaria and hypertension, are challenges too big for a government or the private sector to solve alone,” notes Thom Dixon, Director Business of Health at MEDA. “With Grand Challenges Canada’s funding, the team can apply action-oriented market research skills that lead to more effective commercial bed-net delivery and promotion, so more households – particularly those with pregnant women and children – sleep safely under bed nets. Moreover, the funds will enable piloting of e-vouchers to fight hypertension, a growing threat in Africa.”

“The innovation lies in the fact that we are putting the people most at risk – pregnant women – in the driver’s seat, enabling them to help us create a better system, and to improve not only their lives but the lives of other people,” says Dr. Yeates. Grand Challenges Canada is awarding a \$792,000 grant, supplementing funds secured by MEDA, generating a total investment of \$1.5 million.

**Video:** <http://bit.ly/1jTy7En>, **Pictures:** <http://bit.ly/1nx18q7>. For contact details, see below.

**\* HealthBridge Canada (Implementation country: Tanzania) (#0476):** *Diagnosing fevers better: Improving diagnosis of febrile illnesses by uniting disease ecology and satellite imagery*

A lack of diagnostic tools and skills in Tanzanian health facilities are blamed for widespread malaria misdiagnosis, which fails the patient’s need, wastes precious resources and contributes to drug resistance. As many as 45% of arboviral infections in the country are misdiagnosed as malaria. Automatically updated local estimates of the relative transmission risk of malaria and arboviral infections, delivered via mobile phone text messages to rural health workers, will help to better inform clinical diagnoses.

**Video:** <http://bit.ly/1gjyLw2>, **Pictures:** .

**\* University of Alberta, Canada (Implementation country: Kenya) (#0485):** *Detection of bacteria in food and water in low-resource settings with low-cost, portable electrochemical, paper-based devices*

A low-cost, paper-based device developed by this project will help detect E. coli bacteria and other pathogens in food and water in low-resource settings.

**Video:** <http://bit.ly/QEB4gw>, **Pictures:** .

**\* University of Alberta, Canada (Implementation country: Uganda) (#0486):** *A finger prick blood biomarker to replace chest x-ray for pneumonia diagnosis*

Compared with industrialized countries, nations of Africa and Asia report two to 10 times the rate of child pneumonia, the killer of 2.1 million children each year. A bedside finger prick blood test developed by this project will improve pneumonia diagnosis where chest x-rays, essential for pneumonia diagnosis and management, are unavailable, saving lives and resources.

**Video:** <http://bit.ly/1iJSjZ6>, **Pictures:** .

**\* University of British Columbia, Canada (Implementation country: India) (#0488):** *Cheap drugs for bad bugs: engineering natural product synthesis*

By engineering bacteria, this project aims to produce natural, low-cost drugs for the developing world. The prototype objective: an antibiotic called violacein, which may help treat diseases such as leishmaniasis and malaria, but stalled in clinical development due to its high cost.

**Video:** <http://bit.ly/1mSjctl>, **Pictures:** .

**\* BioDiaspora Inc., Canada (Implementation country: India) (#0471):** *Advanced Decision Support for Infectious Disease Management in India*

New infectious diseases are emerging faster than ever, while many previously controlled diseases are re-emerging. BioDiaspora is a real-time decision support tool for managing the risk of infectious diseases, integrating and synthesizing big data about location and context. This advanced predictive analytics tool will be introduced to India.

**Video:** <http://bit.ly/1gfnvRa>, **Pictures:** <http://bit.ly/1joMWyY>.

**\* Ifakara Health Institute, Tanzania (Implementation country: Tanzania) (#0551):** *Developing a home-based geo-information system to optimize local level interventions against malaria mosquitoes*

In Tanzania, malaria affects 12 million and kills about 70,000 citizens yearly. Techniques for mapping intra-village variations, which would allow targeting of hotspots of residual transmission, are lacking. A home-based geo-information system developed by this project will identify the hotspots and focus elimination efforts.

**Video:** <http://bit.ly/1nB7Uxw>, **Pictures:** .

**\* Ifakara Health Institute, Tanzania (Implementation country: Tanzania) (#0555):** *Homemade, fruit-based, toxic sugar lures against malaria mosquitoes in Tanzania*

A simple way to lure, trap and kill malarial mosquitos with a deadly fruit meal in a device easy to make at home from plastic drink bottles. Manufacture of the traps creates a potential village income opportunity.

**Video:** <http://bit.ly/113BIOh>, **Pictures:** .

**\* National Institute for Medical Research, Tanzania (Implementation country: Tanzania) (#0560):** *Use of live, potted lemon grass for outdoor mosquito control*

This project will promote placement of lemon grass (*Cymbopogon citratus*) around houses as a way to drive off mosquitos and reduce malaria.

**Video:** <http://bit.ly/1smmMO2>, **Pictures:** .

**\* National Institute of Metrology, Thailand (Implementation country: Thailand) (#0561):** *Low-cost Point-of-Care Medical Diagnostics for the Third World Market*

Chronic health conditions, such as cardiovascular disease, kidney failure, cancer and diabetes, are treatable but go largely undiagnosed and early diagnosis is key. An inexpensive, hand-held,

point-of-care device similar to a glucose meter developed by this project will enable local testing for a suite of health markers, at less than \$0.10 per patient.

**Video:** <http://bit.ly/QBpanL>, **Pictures:** <http://bit.ly/1174grL>.

**\* Institut de Recherche en Sciences, Burkina Faso (Implementation country: Burkina Faso) (#0510):** *Completing the Integrated Innovation of the Lehmann Trap to Reduce Malaria*

This innovative fabric mosquito trap fitted into a window works like a lobster trap: the insect enters easily through a funnel but cannot escape, offering a way to control malaria with an environmentally-friendly technology that can be easily and broadly manufactured.

**Video:** <http://bit.ly/QEzL1e>, **Pictures:** <http://bit.ly/1joMsJq>.

**\* Ifakara Health Institute, Tanzania (Implementation country: Tanzania) (#0556):**  
*Developing a combined Rapid Diagnostic Test (cRDT) for bloodstream bacterial infections and malaria in children: a tool for improving diagnosis of non-malarial fevers and rational use of antibiotics in rural settings*

A lack of simple, reliable biomarkers for bacterial infections – a major cause of infant mortality – leads to frequent misdiagnosis of malaria, the incorrect prescription of antibiotics and eventually reduced drug effectiveness. This project's rapid test for bedside diagnosis of bacterial illness will help improve misdiagnosis of non-malarial fevers.

**Video:** N/A, **Pictures:** <http://bit.ly/1qD7FEc>.

## HIV/AIDS

**\* The Infectious Diseases Institute Limited, implemented by Global Health Economics, Uganda (Implementation country: Uganda) (#0565):** *Development of a mobile phone gaming application to increase knowledge of HIV/AIDS prevention*

Developed by this project, a cell phone gaming app for HIV prevention animates behavioural situations based on local popular culture. Gamers role-play these situations and receive tangible rewards for good behaviour and penalties for bad behaviour.

**Video:** <http://bit.ly/1nJm1OE>, **Pictures:** <http://bit.ly/1oLtUDd>.

**\* University of British Columbia, Canada (Implementation country: Thailand) (#0487):**  
*Discovery of new HIV1 viroporin inhibitors from local natural products*

Anti-Retroviral Therapy (ART) has significantly reduced HIV1-related illness and death, but less than half of patients in many low and middle income countries have access to it. Using electrophysiology (EP) and cell assays, this project aims to discover natural products from Southeast Asia that block HIV1, leading to local, affordable therapies.

**Video:** <http://bit.ly/1ldFxPz>, **Pictures:** .

**\* McGill University, Canada (Implementation country: Tanzania) (#0478):** *Turning hope into action: youth peer health education in rural Tanzania*

Almost one in six people are HIV-positive in Njombe – a region with Tanzania’s most uninformed population when it comes to the disease, according to surveys, and the country’s highest rate of infection, now increasing among young adults. The area has no formal HIV education program and many children are orphans lacking parental guidance. This project will expand a pilot-tested, site-crafted, formally evaluated HIV/AIDS youth peer health educator program into primary schools in HIV-ravaged rural Tanzania, to empower youth in making healthy decisions.

**Video:** <http://bit.ly/1ilyGMG>, **Pictures:** <http://bit.ly/1j3AAgu>.

### Reducing Indoor Air Pollution

**\* Universidad del Valle, GenteGas S.A. Guatemala (Implementation country: Guatemala) (#0515):** *Delivering affordable gas stoves and household health education to low-income families exposed to toxic levels of woodsmoke*

Household air pollution (HAP) from burning wood, charcoal, dung, agricultural waste and other solid biomass cooking fuels affects 2.7 billion people worldwide – 38% of humanity – and causes 4 million premature deaths a year. That’s more than HIV/AIDS, malaria and tuberculosis (TB) combined. Exposure to HAP is associated with pneumonia, COPD, lung cancer, TB, cardiovascular disease, adverse pregnancy outcomes and cataracts. This project is the first social enterprise to offer market-based affordable gas stoves to low-income families exposed to toxic levels of woodsmoke. This project’s novel approach deploys women entrepreneurs to sell gas stoves and provide education about HAP.

**Video:** <http://bit.ly/1oLHFj>, **Pictures:** <http://bit.ly/1joMvVr>.

**\* International Union Against TB and Lung Disease, India (Implementation country: India) (#0520):** *Cookstoves for carbon credits*

This project will finance the use of energy-efficient cookstoves in India through the sale of carbon credits in the international carbon market.

**Video:** <http://bit.ly/1mOLp8V>, **Pictures:** .

**\* OneBreath, Inc. India (Implementation country: India) (#0522):** *Cost-effective mechanical ventilation for emerging markets*

OneBreath aims to commercialize a high-precision, highly reliable, low-cost, mechanical ventilator to fill a critical healthcare gap in India, where respiratory illness is a leading cause of hospitalization and death. Over 50% of the world’s pneumonia deaths occur in India, where ventilators remain out of reach for many hospitals.

**Video:** <http://bit.ly/1jTjYT>. **Pictures:** .

**\* BURN Manufacturing, Kenya (Implementation country: Kenya) (#0526):** *Clean cookstoves*

Urban households in East Africa continue to rely on charcoal and spend up 50% of their income to purchase fuel. BURN designs and locally mass-produces clean-burning cookstoves that offer a 50 to 70 per cent reduction in fuel consumption, carbon and particulate matter.

**Video:** <http://bit.ly/SUxLE0>, **Pictures:** <http://bit.ly/1iwl1vj>.

**\* Prakti Design Pvt. Ltd., Sarbagya India (Implementation country: Nepal) (#0523):**  
*Development of Multi-Fuel Stove Capable of Using Dung, Wood, and Agricultural Waste Fuel Cleanly and Efficiently*

Some 665 million people in India and 22 million in Nepal cook with solid fuels, leading to diseases that cause 4 million premature deaths, mostly among poor women and children, every year. A commercially-viable multi-fuel stove developed by this project will be optimized for burning dung, wood and agricultural waste, reducing toxic emissions by over 90%.

**Video:** <http://bit.ly/1mSEPOJ>, **Pictures:** .

### Combating Cancer

**\* University of Saskatchewan (Implementation country: Vietnam) (#0496):** *Developing a low-cost device for breast cancer detection in Vietnam using ultra wideband technology*

Breast cancer kills more women than any other cancers in Vietnam, where screening programs are not popular nor readily available and are expensive, especially for those in remote areas. A low-cost device and computer software developed by this project to screen for breast cancer will provide a mammography alternative.

**Video:** <http://bit.ly/RAP9wh>, **Pictures:** .

**\* The Infectious Diseases Institute Limited, implemented by Global Health Economics, Uganda (Implementation country: Uganda) (#0563):** *Using routine immunization to increase access to cervical cancer screening in rural Uganda*

A cervical cancer screening program developed by this project, for women bringing children for routine immunization in rural Uganda, will increase awareness and early diagnosis, and will reduce morbidity and mortality from the disease.

**Video:** <http://bit.ly/RCdDoS>, **Pictures:** <http://bit.ly/1oLsUz9>.

### STRENGTHENING HEALTH SYSTEMS

**\* Implementing neonatal intensive care methods in Guyana to save lives of neonates with respiratory distress, Guyana Help the Kids (GHTK), Toronto (Implementation country: Guyana) (#0320-05-10)**

*Total new **transition-to-scale** investment: \$600,000*

One third of child deaths in Guyana result from respiratory distress or bacterial infection in the first few weeks of life. Although infant mortality rates have improved in Guyana, the numbers today correspond with those in the U.S. and Canada in the early 1970s, before the extensive availability of neonatal intensive care units. Slightly under half of all babies in Guyana are born in the nation's largest city and capital, at Georgetown Public Hospital Corporation (GPHC). GPHC has a neonatal intensive care unit (NICU) but mortality remains high, due to problems of insufficient education, limited experience and minimal equipment. With the Ministry of Health of Guyana as a partner, Guyana Help the Kids (GHTK) is receiving a \$350,000 Grand Challenges Canada grant to augment \$250,000 from its own resources for equipment, education, and support to physicians and staff, to improve the survival rate of high-risk neonates in Guyana. The project will lift and sustain the level of neonatal intensive care at GPHC, and will develop a

national neonatal network and transportation system. Neonatal-related infrastructure will expand, and education provided to physicians and nurses throughout Guyana – in particular those at the five network hospitals, which account for more than 80 per cent of all deliveries in the nation.

“We intend to significantly decrease neonatal mortality by empowering Guyanese healthcare providers through education and technology, which will ensure sustainability,” says Dr. Narendra Singh, founder of Guyana Help the Kids.

**Video:** N/A, **Pictures:** <http://bit.ly/1hCUHwH>. For contact details, see below.

**\* University of Rwanda (Implementation country: Rwanda) (Project #0549):** *Mobile doctor educator: enabling access to medical and health education in Rwanda*

Rwanda, population 11 million, has only one medical school. This program will develop mobile medical and health education programs for ongoing training of healthcare professionals.

**Video:** <http://bit.ly/1jD3Yty>, **Pictures:** <http://bit.ly/1kXaBmN>.

**\* Mercy Ships Canada (Implementation countries: Congo, Guinea) (#0482):** *Sterile Processing Education in Developing Countries – Phase 1*

Incidence of post-operative infection in developing countries occurs in 5 to 50 percent of patients. Neonatal infection rates are 3 to 20 times higher than in industrialized nations. This project will supply low cost sterilizers and provide education for health workers sterilizing surgical instruments, with a focus on improving operating room infection control practices and reducing the incidence of post-operative infections in West African countries such as Guinea and Republic of the Congo.

**Video:** <http://bit.ly/1jD7vrl>, **Pictures:** <http://bit.ly/1su9lbf>.

**\* University of the Philippines (Implementation country: Philippines) (#0547):** *Palm ultrasound integrated with smart phone to decrease maternal mortality in three rural regions in the Philippines*

In the Philippines, where between 55 and 73 per cent of babies born in 2011 were delivered at home, maternal and infant mortality rates remain high. Mothers die from hemorrhage, sepsis, obstructed labour, hypertensive disorders in pregnancy, and complications of unsafe abortion. A mobile phone app developed by this project will use ultrasound results to help identify pregnant women at risk in labour and will relay information to an appropriate health provider.

**Video:** <http://bit.ly/RQFlic>, **Pictures:** <http://bit.ly/1s9W6je>.

**\* Uganda Development Health Associates Uganda (Implementation country: Uganda) (#0567):** *Testing the feasibility of using third-trimester ultrasound scans to identify high-risk pregnancies as a focus for maternal and neonatal illness reduction*

This project will create a clinic-based, midwife-led basic ultrasound system to identify high-risk third trimester pregnancies that should be referred to an emergency obstetric facility for delivery. Such conditions may include common causes of obstructed labour, and antepartum and postpartum hemorrhage.

**Video:** <http://bit.ly/1hI4otX>, **Pictures:** <http://bit.ly/1odwsfY>.

**\* Centre Hospitalier Universitaire de Sherbrooke, Canada (Implementation country: Haiti) (#0473):** *Pessary in the prevention of spontaneous preterm birth in developing countries*

Every year, more than one million of an estimated 15 million babies born preterm die from preterm-related complications, and many that do survive face life-long disabilities or health complications. A pessary (silicone ring) placed around the cervix (during the second part of the pregnancy) in high-risk mothers may help prevent prematurity. This project's goal is to adapt to resource-low countries, validate and then disseminate this technique.

**Video:** <http://bit.ly/QEhxB>, **Pictures:** .

**\* CEL Ventures Private Limited India (Implementation country: India) (#0516):** *An mobile phone-based platform for use in community settings to support early identification and management of children at risk of developing neurodevelopmental impairments*

In developing countries, more than 200 million children under five years fail to reach their developmental and cognitive potential. Early identification and intervention for children at risk of neurodevelopmental impairments can make the difference between lifelong disability and fulfillment of developmental potential. However, access to such care is non-existent in rural communities. This project seeks to bridge this access gap through mobile phone technology that will empower lay health workers to identify at-risk children and to support families with intervention opportunities for timely management and care.

**Video:** <http://bit.ly/1nAPsFk>. **Pictures:** .

**\* Embrace Innovations India (Implementation country: India) (#0517):** *Giving every baby an equal chance of a healthy life: high-quality neonatal care in rural areas using a community-based approach*

Hypothermia is a major problem faced by over 20 million low-birthweight and premature babies born worldwide each year, mostly in developing countries where access to incubators is limited. To replace current local solutions (hot water bottles, hot coals, light bulbs), a portable, low-cost warmer created by this project works without electricity and is intended for use in rural homes. The goal is to deploy this technology through government health workers.

**Video:** <http://bit.ly/1I4ybPC>. **Pictures:** .

**\* University of British Columbia, Canada (Implementation country: Uganda) (#0489):** *The Post Discharge Survival Project*

Some five to 10 per cent of African children with a serious infection die in hospital. Alarming, an even higher percentage of children die in the weeks after their discharge. Doctors and parents are often unaware of this period of high vulnerability and are poorly equipped to identify or handle recurrent illness. A mobile phone application developed by this project for hospital use will help to identify at-risk children who need referral to a community health worker, while parents will receive a discharge kit to help guide care for their recovering child.

**Video:** <http://bit.ly/1jThV5T>, **Pictures:** <http://bit.ly/1ml8vxJ>.

**\* Doctors For You, India (Implementation country: India) (#0521):** *ArogyaCare & KMES : An efficient, responsive, integrated and sustainable model of medical emergency care for low- and middle-income countries, being implemented in Kolkata, the most densely populated city in India, by Mission Arogya*

In developing countries, in absence of 911 emergency systems, medical emergency is provided by isolated providers with varying capability, resulting in inefficient and fragmented emergency care. Often patient needs to wait for ambulances and/or is taken by public transport without receiving any paramedic care to a hospital, where proper emergency facilities and products like blood may not be available, causing serious delays in treatment and loss of life. This project aims to strengthen, standardize and integrate these emergency services under a centralized medical emergency system to help co-ordinate the emergency retrieval as well as empower citizens for crowd-sourced quick response to cater to critical patients within golden hour of emergency. Initially, the two primary arm of emergency will be integrated 1. Hospital Emergency & ICU and 2. Ambulances & Paramedics, followed by the Blood Banks. Due to the recent emphasis in Maternal & Child Healthcare in India, proper infrastructure for institutional delivery and Neonatal Intensive Care Units (NICU or Special Newborn Child Unit (SNCU)) have been developed in Hospitals, both public and private. As such, while this integrated, responsive emergency system will benefit all, it will be specifically beneficial to mothers and infants from all strata of society during Acute Labor and Neonatal Emergencies.

**Video:** <http://bit.ly/1jzggTE>, **Pictures:** <http://bit.ly/1I743EO>.

### **Expand Access to Services**

**\* Philippine Business for Social Progress (Implementation country: Philippines) (#0545):** *Brokering for the Poor: Business Solution for Safe Motherhood*

A low-cost “safe motherhood insurance program” being started in the Philippines to overcome financial barriers that often delay poor women from getting appropriate care in labour. Working with insurance companies, the project represents a novel potential business model to further reduce the rate of maternal mortality worldwide.

**Video** <http://bit.ly/1nFeHDG> , **Pictures:** <http://bit.ly/1oxrYhx>)

**\* Cape Breton University (Implementation country: South Sudan) (#0472):** *Micro-franchised community health workers extending maternal and child healthcare in South Sudan*

With just 124 doctors serving 10 million people, South Sudan has one of the world's worst child (135 in 1,000) and maternal (2,054 in 100,000) mortality rates. A public-private system of micro-franchised mobile health workers, created by this project in partnership with the local government and South Sudanese-Canadian doctors, will help extend healthcare throughout South Sudan.

**Video:** <http://bit.ly/1nJmEF>, **Pictures:** <http://bit.ly/1kXaUON>.

**\* University of Saskatchewan, Canada (Implementation countries: Philippines, Russian Federation) (#0498):** *Pathways to Rural/Remote Health Capacity: Moving Technology from Education to Practice*



Deploying new technologies, this project will develop local healthcare-related capabilities by extending universities' abilities to offer nursing education in rural areas. Clinical practice students in rural and remote communities will have the opportunity to learn where they live.

**Video:** <http://bit.ly/1hHTq7H>, **Pictures:** <http://bit.ly/1nvNWS9>.

**\* University of Calgary, Canada (Implementation country: Uganda) (#0492):** *Engaging Unlicensed Drug Shops in Uganda*

This project will harness the potential of unlicensed drug shop owners to recognize malaria, pneumonia and diarrhea, and to deliver appropriate diagnostics and treatment that is affordable and accessible to families, helping to reduce Uganda's high death rate among children under five. Private drug shops, though poorly regulated, have proliferated in Uganda, offering a channel through which rudimentary help can be delivered.

**Video:** <http://bit.ly/1mOl3Ux>, **Pictures:** <http://bit.ly/Qm734T>.

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### **About Grand Challenges Canada**

*Grand Challenges Canada is dedicated to supporting Bold Ideas with Big Impact® in global health. We are funded by the Government of Canada; we support innovators in low- and middle-income countries and Canada. The bold ideas we support integrate science and technology, social and business innovation to find sustainable solutions to health challenges – we call this Integrated Innovation®. Grand Challenges Canada focuses on innovator-defined challenges through its Stars in Global Health program and on targeted challenges in its Saving Lives at Birth, Saving Brains and Global Mental Health programs. Grand Challenges Canada works closely with Canada's International Development Research Centre (IDRC), the Canadian Institutes of Health Research (CIHR) and the Department of Foreign Affairs, Trade and Development Canada (DFATD) to catalyze scale, sustainability and impact. We have a determined focus on results, and on saving and improving lives.*

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