

YIL FELLOWSHIP CAPSTONE PROJECTS 2019



YIL FELLOWSHIP Lagos, Nigeria

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Through the YIL Fellowship Capstone Projects, we will be confronting the greatest issues facing humanity by leading innovation in research, policy and public conversations and through these creating solutions and businesses that can change the world. The capstone projects have been broken into different challenges across many sectors as indicated below.

1. MODELS FOR ESTIMATING MATERNAL DEATH AND IMPACT OF EXISTING INTERVENTIONS ON MATERNAL DEATH:

Currently, there is a model to measure impact of the family planning interventions. This was developed by Marie Stopes International. This model can tell you the number of unplanned pregnancies prevented and abortion prevented. We need this kind of model that tell us number of maternal deaths averted based on our intervention. Currently the only method to measures maternal mortality is through NDHS surveys and it is done every 5 years.

We need a simple and cheap way of measuring decreases or increases in maternal mortality yearly without a survey. This might involve developing a tool for robust maternal mortality data collection and its use for action and intervention in real-time.

2. TOOLS, TECHNOLOGIES, AND APPROACHES TO END MATERNAL MORTALITY.

Irrespective of the remarkable achievements to improve maternal and child survival, 800 women still die each day from complications during pregnancy, childbirth, and in the postnatal period, out of which 99% maternal deaths occur in developing countries, most of which could be avoided ([WHO, Unicef, UNFPA, 2013](#); [Hogan et al., 2010](#)).

The majority of maternal deaths are still due to direct obstetric causes—that is, haemorrhage (27%), hypertensive disorders (14%), sepsis (11%), and complications of abortion (8%). However, a rising number of deaths are related to chronic health conditions in pregnancy, such as diabetes, HIV, malaria, cardiovascular conditions, and obesity.

A large number of maternal deaths in developing countries could be prevented through appropriate applications of existing health technologies. According to WHO, health technology can be defined as the use of organized knowledge and skills in the form of equipment, devices, supplies, medicines, information materials, educational tools, procedures, techniques, and methods to solve health related issues and improve standard of life. These technologies can play a central and supportive role in many situations.

In this challenge, we need approaches to end maternal mortality by 50% in 2 years' time.

An example of an idea in this category might be:

- Developing a new diagnostic tool that identifies at risk mothers with predisposition to obstetric/postpartum hemorrhage and provides prenatal and postnatal management options to avoid it.

- Developing a simulation program and training for educational purposes for health care professionals and mothers.

3. NEW APPROACHES TO END GENDER BASED VIOLENCE

Violence against women and girls is one of the most prevalent human rights violations in the world. It knows no social, economic or national boundaries. Worldwide, an estimated one in three women will experience physical or sexual abuse in her lifetime (WHO, 2013).

Gender-based violence (GBV) undermines the health, dignity, security and autonomy of its victims, yet it remains shrouded in a culture of silence. Victims of violence can suffer sexual and reproductive health consequences, including forced and unwanted pregnancies, unsafe abortions, traumatic fistula, sexually transmitted infections including HIV, and even death (UNFPA, 2017).

[WHO's data](#) also indicates that women who have been physically or sexually abused are 16 per cent more likely to have a low-birth-weight baby, and they are twice as likely to have an abortion. In some regions, they are 50 per cent more likely to acquire HIV, according to a [2013 report from UNAIDS](#).

To reverse these negative effects, there is need for new approaches to end GBV in our communities.

As part of this challenge, we require innovators to design models to measure impact of their new interventions.

An example of an idea in this category might be a online or mobile-based tool for reporting GBV by victims or witnesses of such.

4. INNOVATIONS IN MENTAL HEALTH

Caring for someone with mental illness, especially the youth, can be very challenging for rural communities. As a result, 75 – 85% of persons living with mental illness in Africa may not have access to mental health care.

We are seeking innovations that create awareness for mental illness as a public health problem and offer solutions for patients, caregivers, and their communities to address these issues.

An example idea for the Mental Health category might include a mobile based application that tracks and reminds patients to take their prescribed medications at appropriate times.

5. PACKAGING INNOVATIONS

Managing packaging wastes from the increasing consumption in Africa is a challenge for many communities. We are seeking sustainable innovations for packaging of single-dose units and other affordable product sizes that will reduce or eliminate wastes, while protecting the product.

An example idea for the Packaging Innovations category might include a sturdy, reusable product pod for which consumers can purchase a refill at the store when empty.

6. HEALTH WORKER SUPPORT

African frontline health workers experience high rates of stress and burnout due to the heavy burden of disease and marked health system challenges. We are seeking innovations that support the wellbeing and resilience of nurses, midwives, and community health workers at the heart of delivering care.

An example idea for the Healthy Worker Support category might include a mobile phone-based service that provides nurses with supportive and educational messages.

Another example might be an online platform where patients can access a therapist in real time whenever they feel the need to do so without a waiting period.

7. DIGITAL HEALTH TOOLS

The African continent has the world's poorest health outcomes, with HIV, TB, Mental Health, Maternal Health, and Ebola having especially large impact particularly on women. We are seeking digital tools (including apps and other mobile/web/data enabled tech) for these important health care areas that can inform, educate, communicate and connect people to treatment, support and care through their reach and information and improve health outcomes especially for women.

An example idea for the Digital Health Tools Category might include a mobile phone-based app that provides patients with accurate health care information and access services.

8. ESSENTIAL SURGICAL CARE

A significant portion of the burden of diseases in Africa can be treated with surgery. However, many health facilities in certain areas do not have the capacity to deliver even basic surgical services. We are seeking innovations that promote access to timely, safe, and skilled surgical care.

An example idea for the Essential Surgical Care category might include a low-cost reusable tool for early diagnosis and treatment of cervical cancer.

9. INNOVATION TO IMPROVE THE APPLICATION AND USE OF INFORMATION, COMMUNICATIONS AND TECHNOLOGY (ICT) TO INCREASE AND ENHANCE AGRICULTURAL PRODUCTIVITY

Agriculture has the potential to contribute to food security and sustainable livelihood, provide jobs and growth to the nation's economy. However, agriculture is meted by a high degree of neglect by the government and other stakeholders, making its relevance and adoption as a potential economic driver less recognised. Hence, agricultural productivity is drastically impacted negatively across all agro-ecological zones and clusters.

The growth of ICT in the last decade has provided many opportunities to overcome some of the challenges faced in agriculture. The application of ICT have provided agriculture stakeholders with some key tools and technologies to improve production; enhance value chain; manage postharvest losses; reduce drudgery; reduce production time interval; and improve marketing processes in agriculture and allied fields.

Some examples of innovations in this category may include:

- An idea in this category might include the use of ICT to develop an app that provides actionable information to farmers and government on weather and disaster prevention in real-time while also providing information on risk mitigation techniques.
- Developing tools and techniques for checking soil health on the spot without having to transport samples to the lab.
- Developing a farm management software that incorporates all aspects of production practices from planting to postharvest stage with the purpose to help optimise resources and reduce wastage.
- Creating tools or program to promote increased uptake of urban/vertical agriculture in urban areas.

10. INNOVATION TO IMPROVE AND INSPIRE LEARNING FROM EARLY SCHOOL AGE

When members of the public think of the way in which students learn, they typically envision a teacher providing a lecture or students independently completing worksheet assignments, or occasionally solving a problem in a group- or project-based setting. This traditional method of teaching and learning does not take advantage of the new wave of technology innovation and flipped classroom approaches that provide a wider array of spaces and activities and can offer more inclusive and accessible learning environments for all students.

Learning environment can refer to an educational approach, cultural context, or physical setting in which teaching and learning occur for all types of learners and activities. Twenty-first century learning environments are envisioned as places where the learner is engaged in self-directed and co-operative learning activities, and the physical environment is planned so that it can be routinely re-organised to mediate learning. This is lacking in our education system. This challenge is aimed at creating innovative learning environments to enhance learning and develop of students.

An example of an innovation in this category may include idea for flipped learning classrooms that are supported by online teaching tools and adaptive, embedded technologies, offer teachers and students flexibility in structure, equipment, and access to materials, both in the natural world and virtual and augmented settings.

Another idea maybe for technology-enabled collaboration, with students working together (in groups) and/or interact with each other to enhance their learning with the help of various technologies.

11. SPARKING INTEREST IN SCIENCE, TECHNOLOGY, ENGINEERING AND MATH (STEM) IN SCHOOLS ACROSS NIGERIA

The complexities of today's world require all people to be equipped with a new set of core knowledge and skills to solve difficult problems, gather and evaluate evidence, and make sense of information they receive from varied print and, increasingly, digital media. The learning and doing of STEM helps develop these skills and prepare students for a workforce where success results not just from what one knows, but what one is able to do with that knowledge.

The process of learning and practicing the STEM disciplines can instill in students a passion for inquiry and discovery and fosters skills such as persistence, teamwork, and the application of gained knowledge to new situations (Bailey et al., 2015; Betrus, 2015). Experts contend that these are the types of growth mindsets and habits that demonstrate one's capacity for academic tenacity and lifelong learning in a rapidly changing world (Dweck, Walton, & Cohen, 2014; Sharples, 2000).

Across schools in Nigeria, there is a rising demand for quality STEM education but in the government and privately owned schools and across all level of primary and secondary education. This is even more pathetic in schools and among pupils and students in the rural areas. A strong STEM education—one that results in the skills and mindsets just described and opens the door for lifelong learning—starts as early as preschool, is culturally responsive, employs problem- and inquiry-based approaches, and engages students in hands-on activities that offer opportunities to interact with STEM professionals.

This challenge is focused on developing innovative concepts and solutions to help meet the need for increased STEM education in Nigeria and encourage the update of STEM education by kids at primary and secondary levels.

An example of an innovation in this category may be developing a child-friendly app or game that makes STEM teaching and learning unique and interesting.

12. NEW APPROACHES TO SOLVING WATER AND SANITATION PROBLEMS IN NIGERIA

THE CONTEXT:

It has been reported that “Nigeria is at the precipice of a water, sanitation and hygiene catastrophe. About 33 per cent (about 60 million; that's 1 in every 3 people) of people in Nigeria are currently living without adequate access to water; 67 per cent (over 120 million people; that's 7 in 10 people who are more likely to be ill, more often) do not have a decent toilet and 26 per cent (about 47 million people) practice open defecation”. Consequently, 59,500 children under 5 die a year due to poor water and sanitation.

Without water, decent sanitation and good hygiene, other Sustainable Development Goals, including those on gender equality, education, health, reducing inequalities and nutrition cannot be achieved.

There is urgent need to address accessibility, availability and quality of these 2 in order to continue to strive towards a better life for Nigerians. In this challenge, you will identify the key factors mitigating progress in accessing adequate quality water in a selection community and find solution to address the identified problems. The solution needs to be feasible and scalable with potential for business innovation around the solution.

THE CHALLENGE:

The goal of this challenge is to identify the prevailing problems endangering the opportunity for access to clean water and sanitation in Nigeria and develop strategies and solution to solve them. The target is to empower the communities to be responsible for their own adequate access to water and decent toilet, thereby increasing the number of people with better water and sanitation condition in the country. The focus should be on very poor rural areas in the country as it is believed that these are the most vulnerable group affected by lack of access to adequate water and clean toilets. Ideas or solutions should be scalable, innovative and with potential for improving sustainable livelihood of the people.

To be considered, proposed ideas or solutions must:

- Focus on making access to clean water and/or decent toilet facilities cheaper and easy.
- Involve working with local communities to understand the key issues and develop solutions to meet them.
- Empower local communities to solve their own problems
- Ensure availability and sustainable management of water and or sanitation for all in a community.
- Offer opportunity for financial empowerment of the community.
- Offer possibility for replication (scalability) across several communities.
- Incorporate green initiative and environmental friendliness.

A few examples of the many possible examples to be considered include:

- Simple, cheap and applicable methodology to improve water quality in rural communities.
- Construction of effective and environmental friendly toilet system.
- Strategies to reduce unavailability of water in communities.
- Community education on diseases caused by unsafe drinking water and inadequate sanitation.
- etc.

13. AFFORDABLE, ACCESSIBLE AND APPEALING NEXT GENERATION OF NUTRITION

THE OPPORTUNITY:

Consumers in low- and middle-income countries purchase over \$3T worth of food and beverages through formal food markets each year. Nearly half (\$1.2T) of that total is spent by consumers in the lowest two global income quintiles. For low-income urban consumers, 75-90% of their food is purchased (as opposed to home grown), and 50-70% of the monetary value of that purchased food is processed.¹ For low-income rural consumers, about 40% of their food is purchased. However, because many of today's processed foods tend to lack nutritional density, the quality of low-income consumer diets remains an issue, despite the consumer's regular engagement with formal food markets.

Looking in detail at the products and business models that have proven viable in reaching low-income consumers, there is a clear opportunity to either improve the nutritional quality of widely-consumed foods; or encourage increased affordability, accessibility, and appeal of currently unconsumed nutritious foods. A recent cross-sectional survey that assessed consumption of commercially produced foods and beverages among infants 6-23 months of age in Dakar, Dar es Salaam, Kathmandu Valley, and Phnom Penh found that 80-90% of urban children had consumed a commercially produced packaged food within the previous week, and 23-74% within the prior day.² Moreover, the most commonly consumed packaged foods were: chips or crisps, cookies, cakes or doughnuts, and candies.

Lack of availability of affordable nutritious foods, particularly in low- and middle-income countries, is a major issue. In the U.S., the average fortified infant cereal is relatively affordable, at 3.7x the cost of our staple grain food product (bread). In India, that ratio is 11.1x and in Nigeria, 30.3x.³ Beyond the products themselves, ensuring access to nutritious foods through the distribution and retail channels that reach low-income consumers is a challenge. Lack of knowledge about nutritious food choices, or low appeal of those food products, further compounds the problem.

As a result, most low-income consumers do not consume a high-quality diet sufficient to ensure adequate intakes of vitamins, minerals and other essential nutrients. The WHO recommends that children consume at least 4 different food groups a day as a minimum, and findings from the International Food Policy Research Institute suggest that children who reach this standard of minimum dietary diversity are 22% less likely to be stunted.⁴ However, few developing countries have reached this threshold, with just 19% of children 6-23 months in countries such as India and Nigeria consuming adequately diverse diets. Moreover, the 2013 Lancet Global Burden of Disease study highlighted that many of the leading risk factors for both chronic and infectious diseases are linked to low quality diets; which in turn, undermines the health and development of low and middle-income economies.⁵ Identifying lower-cost ways to develop and deliver optimal nutrition is a global public health and development priority.

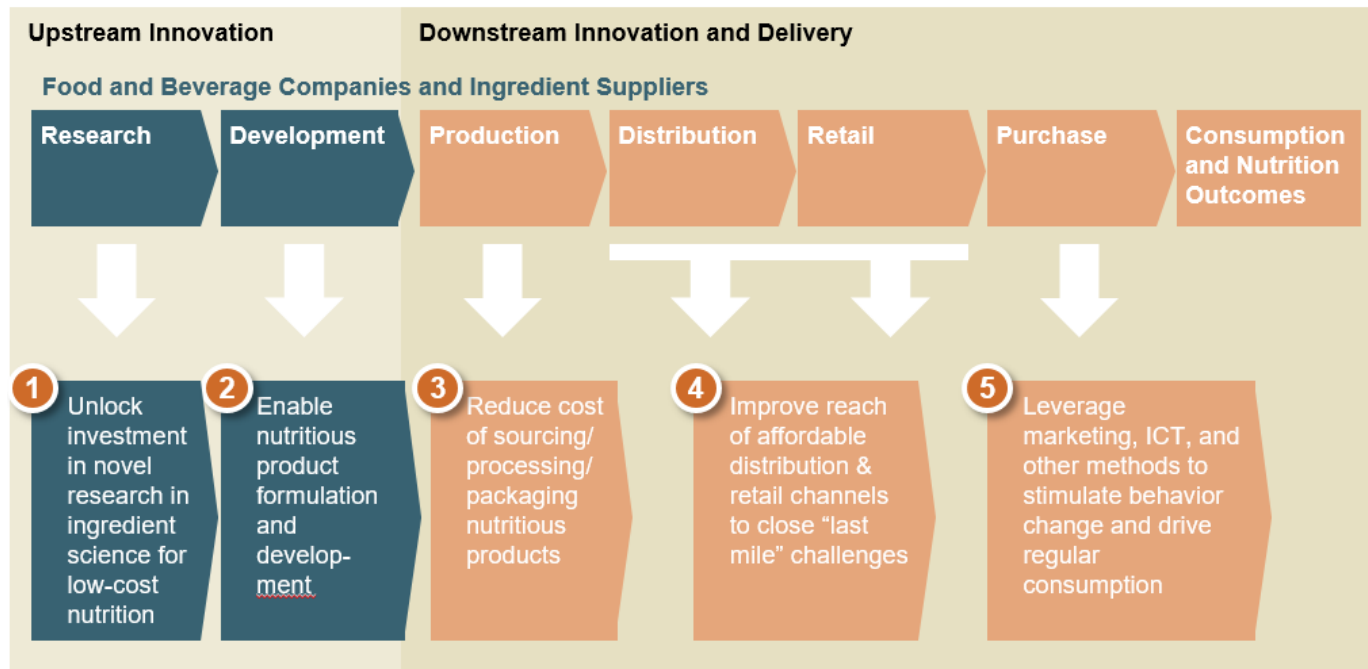
While the challenges are formidable, we believe there is significant opportunity for innovation within our market-based food systems to improve the health of nutritionally vulnerable populations.

THE CHALLENGE:

We desire to advance innovative technologies to enhance the availability and accessibility of affordable, nutritious foods for low-income consumers, working within the key constraint that these innovations must be relevant to market-based food systems in low and middle-income countries. Overall, our target population is young women, mothers, and children from 6-23 months of age. Accordingly, the proposed technologies approved must not undermine exclusive breastfeeding in the first six months of life.

WHAT WE ARE LOOKING FOR:

We also welcome technologies and translational approaches based on knowledge from ancillary fields, e.g., veterinary science, pharmaceuticals, etc. Proposals should address one of the following five innovation areas across the value chain:



Below is an illustrative sample of the many options we would consider approving. However, recognizing that creative solutions can come from many places, we are also open to proposals that take these domain areas in a different direction.

Ingredients

- Nutritious ingredient cost innovations, e.g., reducing the cost of milk powder
- Locally-sourced high protein/nutrient processed raw materials at very affordable costs
- Fortification innovations to improve the bioavailability, stability, fortification level, and/or combinability of micronutrients in fortified foods, e.g., bioactive peptides, new encapsulation technologies, gut / microbiome approaches
- Use of new technologies or novel ingredients to significantly reduce or replace sugar/salt/fat, e.g., natural additives

Food/Beverage Products

- Development of affordable, complementary feeding products (for 6-23 month olds) with improved consumer appeal in low- and middle-income countries
- Fortification of alternative food vehicles with penetration in low-income communities (i.e. tea, water, etc.)

Processing and Packaging

- New packaging solutions to protect vitamins in fortified foods within hot/humid distribution channels
- Alternate, cost-reduced forms of packaging suitable for small-quantity items such as condiments and single-serving foods

Food Fortification Monitoring/Compliance

- Cost-effective approaches to ensure compliance with micronutrient fortification standards, e.g. IT-enabled dosifiers

Distribution

- New delivery mechanisms for reaching nutritionally vulnerable groups (both urban and rural)
- Low-cost cold chain technologies for ensuring preservation of adequate nutrition

Demand

- Novel platforms for raising consumer awareness and demand for nutritious foods

We will not approve approaches that:

- Detract from immediate and exclusive breastfeeding for the first six months after birth
- Require significant user/operator behavior change, or are likely to have low consumer acceptability
- Are more targeted toward agricultural or commodity inputs than consumable food products

References:

1. World Bank Consumption Index 2010, adjusted for inflation. Lowest two quintiles corresponding to consumers making less than \$4 USD per person, per day
2. Pries AM, Huffman SL, Champeny M, Adhikary I, Benjamin M, Coly AN, et al. Consumption of commercially produced snack foods and sugar-sweetened beverages during the complementary feeding period in four African and Asian urban contexts. *Maternal Child Nutr.* 2017;13(S2)
3. World Bank International Comparison Program (United Nations Statistical Commission)
4. Headey (2017) publication forthcoming
5. Global Burden of Disease Study 2013. Forouzanfar, M.H, et al. 2015

14. INNOVATION FOR SMART AND SUSTAINABLE CITIES

UN estimates that 67% of the world's inhabitants will live in urban areas by 2050. By this time, Nigeria will be ranked at least the 5th most populous nation with over 402 million people. This will pose economic, demographic, social and environmental challenges to the society. These challenges will impact the way people move around, use water and power, produce and manage wastes, enjoy recreation, fight against crime and improve security, and so on. To improve the quality of lives of the inhabitants, there is need for developing models that enhance sustainability and make our cities smart to ensure there is balance between growth and the use of resources.

Some examples of ideas in this category might include:

- Developing an app that can help immensely in giving dynamic and intelligent solutions to ever increasing traffic problems and parking space.
- An innovative model that combines less-pollution causing travel system and helps people improve their health.

- Innovative idea to reduce waste and convert it to wealth in major cities.