

Accelerating Catalyzing Solutions for Climate Change's Impact on Health, Agriculture, and Gender

Grand Challenges

Background

Climate change threatens hard-earned global health and development progress and puts the health, well-being, and livelihoods of future generations in jeopardy, with a special impact on women. The 2015 Paris Agreement and the Sustainable Development Goals signaled a promise from global leaders to act - to limit global average temperature rise to within 1.5°C by 2040 and prevent the worst health and development effects of climate change. While no one is safe from these risks, the people whose health and wellbeing are being harmed first and worst by the climate crisis are also the ones who contribute least to its causes, and who are least able to protect themselves and their families against it - namely people in low-income and disadvantaged countries and communities. In low-income settings, rising heat, extreme weather events, changes in precipitation patterns, climate-related undernutrition, shifts in duration and climate-event-driven surges of malaria and other vector borne diseases such as malaria, foodborne and water-borne diseases, and increased potential for the emergence of novel diseases damage already weak primary health care systems and community structures for health. This compromises accessibility, availability, provision, and uptake of essential health services for the most vulnerable populations. Climate change can also disproportionately affect the health and financial well-being of women and girls: extreme heat increases the incidences of stillbirth, the rampant spread of vector-borne diseases worsens maternal and neonatal outcomes, and gender disparities amplified by climate change can decrease the women's share of economic agricultural gains. Those same changes in climate and weather also negatively impact all aspects of agricultural activities, a major source of income for those in low-income settings.

Catalytic research and development (R&D) as well as innovations to scale the impact of existing green technologies are essential to cut greenhouse gas emissions to net-zero and **address the unprecedented health, agricultural and environmental challenges posed by climate change**, which have an outsized impact on women. It is crucial to understand the emerging problems in health and agriculture, either directly triggered by climate change, or as a result of disruptions (e.g., operational) downstream of crises created by climate change. Consequently, there is an urgent need to invest in creative solutions to help vulnerable populations adapt and build their resilience to the existing and future climate related challenges impacting health and agriculture and build alternative livelihoods. This work will involve making those most affected, especially women, major stakeholders in discussions about how new climate resistant and adaptive innovations will be deployed, as well as giving them a deliberate choice and advantage in the creation of new economic opportunities that result from these investments.

In recent years, global leaders, philanthropies, and private investors have begun committing significant resources to climate change mitigation R&D. However, more is needed to unite partners across sectors and accelerate innovations addressing challenges at **the intersections of climate, health, gender, and agriculture**, particularly for underserved regions and groups.

The Grand Challenges family of initiatives seeks to source and seed innovations and accelerate the development of transformational solutions. To this end, Grand Challenges (GC) partners including GC

Africa (Science for Africa Foundation), GC Brazil (Ministry of Health of Brazil), GC Ethiopia (Armauer Hansen Research Institute (AHRI)), GC India (Department of Biotechnology of India), and GC Rwanda (National Council for Science and Technology), along with the Bill & Melinda Gates Foundation and the Pasteur Network, and supported by Wellcome, Foundation S-the Sanofi Collective, and the Rockefeller Foundation are launching this request for proposals (RFP) to identify and support promising innovations.

*Note that this RFP is being launched by multiple partners, across multiple geographies and topic areas with variable funding levels. **Please review the requirements for each RFP to determine your eligibility.** The individual RFPs are listed separately here: <https://gcgh.grandchallenges.org/grant-opportunities>. If you are eligible for multiple RFPs, please choose the RFP that most closely aligns with your proposed project.*

The Challenge

This Grand Challenges request for proposals seeks innovative research and pilot/feasibility projects utilizing transdisciplinary approaches to better adapt to, mitigate, or reverse the combined, deleterious effects of climate change on health, women's lives, and agriculture in the geographies of interest. These innovations include early warning and disease surveillance systems to respond to climate-event-driven surges in malaria and other vector borne diseases, as well as improved mapping of expanded vector ranges and vector-borne disease transmission. Preference will be given to innovations that are formulated locally or adapted from other contexts. We are especially interested in 1) locally led, system-level innovations that are scalable and sustainable and 2) cross-cutting solutions at the intersection of multiple scientific and engineering disciplines.

This RFP focuses on the topic areas listed below. Under each of the topic areas, we provide examples of innovations we would like to see, but innovators are also encouraged to propose their own ideas related to these topics.

Topic Areas:

1. **Health Outcomes** - including systemic and compounding impacts of climate change on health. We are seeking solutions targeting:
 - a. **Early Warning and Disease Surveillance:** We seek proposals that build resilient systems to mitigate health impact of climate change. Solutions may include accurate surveillance systems for early detection of vector-borne, waterborne, and zoonotic diseases; that predict the impact of climate-related events (heat, flood, population, vegetation, and zoonotic migration) and vectors and diseases introduced to new localities. Where possible, employment opportunities should be created for rural women. (**Geographies of interest:** sub-Saharan Africa; Brazil)
 - b. **Gender Equality, Diversity, and Inclusion:** Women are disproportionately impacted by climate-sensitive health risks. Women are themselves a vulnerable group, and they can also fall into many other vulnerable groups. As such, we seek solutions that address the increased risks related to maternal, newborn, and child health. Solutions should address gender disparities in access to food, health care, education, and economic well-being. Also of interest are solutions that address the vulnerability to forms of gender-based violence and post-traumatic stress disorders arising from climate change-driven conflict. (**Geographies of interest:** sub-Saharan Africa; Brazil)

- c. **Community Health Ecosystems:** We are looking for proposals that strengthen the resilience and adaptability of health care service delivery and supply chains to climate related changes. These solutions can include anticipatory action, adaptation of provisions, quality, and accessibility of essential services to vulnerable communities, especially women, capacity building for health care professionals and community health actors. We are also interested in solutions that help individuals and families respond locally to new ailments and challenges brought about by climate-related events. **(Geographies of interest:** sub-Saharan Africa; Brazil)
 - d. **Measurement & Evaluation (M&E):** We encourage proposals focused on development of harmonized M&E frameworks and systems for programs that better incorporate climate considerations. **(Geographies of interest:** sub-Saharan Africa; Brazil)
2. **Nutrition** – Undernutrition is a consequence of climate change — and it makes people more susceptible to its effects, particularly extreme heat exposure which poses unique risks for pregnant women, newborns, and infants under 2 years old. We are seeking solutions that address:
- a. Heat stress and nutritional status, in particular gestation weight gain, low birth weight, preterm birth, small for gestational age, early growth faltering (in children <6 months), and child wasting. **(Geographies of interest:** sub-Saharan Africa; South Asia; Brazil)
 - b. Heat stress and micronutrient status, including anemia and breastmilk quality.
 - c. Improved real-time monitoring and surveillance of wasting and the spatial relationship between climate vulnerability and undernutrition. **(Geographies of interest:** sub-Saharan Africa; South Asia; Brazil)
 - d. Integration of climate risk into social protection schemes and the inclusion of nutrition products and services as part of an essential nutrition package within social safety net programs. **(Geographies of interest:** sub-Saharan Africa; South Asia; Brazil)
 - e. Innovation in the composition of specialized nutritious foods (e.g., RUTFs to treat severe acute malnutrition), considering susceptibility of raw ingredients to climate shocks, price volatility, and decreased nutritional quality. **(Geographies of interest:** sub-Saharan Africa; South Asia; Brazil)
3. **Adaptation Strategies for Agriculture and Income Development**, with a focus on women’s agriculture livelihoods.
- a. The production of synthetic nitrogen fertilizers is energy-intensive and contributes to greenhouse gas (GHG) emissions. For every kilogram of Nitrogen (N) produced by synthetic process, 10.1Kg of CO₂ is emitted. Biofertilizers present great promise in reducing emissions associated with synthetic fertilizer production and providing nitrogen fixation needed for productive plants. The technological gap in validating this innovation lies in the lack of robust field measurements, which, when addressed by accurately measuring Biological Nitrogen Fixation (BNF), can help develop strategies to reduce GHG emissions, fertilizer runoff, and water pollution. We are looking for in-situ methods for measuring BNF at field level to help validate climate-smart biofertilizers as next generation inputs. Research topics may include novel biosensors, spectral analysis, infra-red, or any other fast and low-cost methodology for measuring nitrogen fixation and release of fixed nitrogen to plants, by free-living, associative symbiotic and non-

symbiotic microbes. Research may also comprise innovative methods for proving candidate microbes are indeed drawing nitrogen from the atmosphere for direct or indirect crop benefit, rather than mining the soil. **(Geographies of interest:** sub-Saharan Africa; South Asia; Brazil)

- b. Climate and weather information are fundamental for agricultural decision making and become even more essential amid changes in temperature and rainfall patterns. Women are typically underrepresented as users of climate decision support, due to cultural norms or technological gaps, and even more underrepresented as innovators and providers of climate services. We are looking for innovation solutions for scaling access to climate decision support provided by women- and youth-run, micro, small, and medium enterprises (MSMEs). This may include women- and youth-run small and medium enterprises (SMEs) integrating climate information services or a climate service provider innovating ways to partner with women- and youth-run SMEs. **(Geography of interest:** sub-Saharan Africa)
 - c. Women face multiple systemic disadvantages that reduce their capacity to adapt to climate change. We seek proposals on three topics related to women's resilience: (1) Climate-smart labor-saving technologies for rural women that are affordable and accessible with potential for scale, (2) Identifying opportunities for rural women's organizations to influence national climate adaptation plans, and (3) Gender transformative climate-smart innovations for livelihood diversification on and off farm in food systems. Cross-cutting topics of interest include access to capital, upskilling, digital tools, social norms, expanding market access, and support for young women and adolescent girls. **(Geographies of interest:** sub-Saharan Africa; South Asia)
4. **Knowledge Management and Data Integration of Climate and Health Databases** - Many vector-borne diseases may increase in localities that were not prepared for them before the advent of climate-change. We seek solutions that integrate data from climate scientists, disease modelers, and government health officials to help address the rise of specific diseases. Potential areas of interest include, but are not limited to:
- a. Facilitating community participation in/crowd-sourcing data collection to track climate change impact at local level (e.g., changes in weather patterns or detection of invasive vector species) **(Geographies of interest:** sub-Saharan Africa; Brazil)
 - b. Integrating commercially available databases and local data into early warning systems that can drive decision making, working to ensure sex-disaggregated data when relevant. **(Geographies of interest:** sub-Saharan Africa; Brazil)
 - c. Researching the relationship between climate change and the spread of vector-borne diseases (e.g., changes to vector populations or disease transmission dynamics) to develop early warning systems to prevent outbreaks. **(Geographies of interest:** sub-Saharan Africa; Brazil)
5. **Effective Response and Resilient Supply Chains for Crisis Management** – Maintaining routine health delivery or non-routine campaigns such as humanitarian aid and vaccination efforts will be an increasingly multifaceted problem as the need for rapid, directed humanitarian aid increases in the face of extreme climate events, examples include changing landscapes for roads

and bridges; Internally Displaced People (IDPs) and armed conflicts; and disrupted daily routines for affected populations. We are seeking to implement agile, resilient supply chains that allow for the re-deployment of interventions based on need, e.g., malaria insecticide-treated nets, preventive chemotherapies, etc. against vector-borne diseases. (**Geography of interest:** sub-Saharan Africa)

Funding Level, Period of Performance, and Geography of Interest

The funding level is up to USD \$200,000.00, for each grant. The period of performance is up to two years. The geography of interest is outlined within the topic/sub-topic areas listed above. This means that the effort needs to be led by investigators in the specified geographies above. Global collaborators may be included, but at least 80% of the funding must go to an organization within the specified geographies. Application budgets should be commensurate with the scope of work proposed.

We are looking for proposals that:

- Demonstrate that projects are led by (Low- and Middle-Income Countries (LMIC)ⁱ investigators, local stakeholders, or community-led organizations. Global partners may be included, but proposals must demonstrate at least 80% of the funding is going to an investigator in an LMIC institution within the geography of interest. Teams comprising multiple LMIC institutions will be given preference over applicants from single institutions. We also encourage multi-country collaborations.
- Come from women-led organizations or involve projects led by women and focused on reaching women.
- Articulate how the project will lead to near-term impact and how the impact will be sustained over the lifetime of the project and beyond.
- Articulate the scalability of the solution beyond a small local region or population. Strong consideration will be given to approaches that can scale to multiple geographic areas, demographic groups, etc.
- Demonstrate engagement with local and/or regional communities, decision-makers, and adopters.
- Promote inter-sectoral co-ordination and collaboration.

We will not fund proposals that:

- Do not support communities and countries to adapt and be resilient to the effects of climate change on agriculture, health and gender in the geography of interest.
- Do not demonstrate that the majority of the work proposed will be undertaken by investigators and/or local stakeholders living in the geography of interest.
- Do not plan for or demonstrate a pathway to sustainable impact and scalability.
- Are not linked to or have no plan to engage relevant key stakeholders and decision makers from the affected communities.

ⁱ See [World Bank - Low- & Middle-Income Countries](#) for definitions.