Emerging innovations at the intersection of climate and health:

Results from a global call for proposals

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BOLD IDEAS WITH BIG IMPACT ™

Executive Summary

Scientists have been sounding the alarm about climate change for decades. According to the Lancet Countdown on climate change and health, the world saw the highest global temperatures in over 100 000 years in 2023, and each continent broke heat records in 2022. [1] As temperatures continue to rise, we are seeing the damaging effects of climate change around the globe.

We know that health is the human face of climate change. Heatwaves, droughts, floods, and other climate events are putting immense pressure on cities, food systems, health systems and livelihoods. It is essential that we find new ways to address and adapt to the rising global temperatures and the stress that these changes are placing on our health systems.

With support from the Government of Canada, Grand Challenges Canada and the South African Medical Research Council (SAMRC) launched a funding call [2] on the impacts of climate change and health in October 2022. We sought promising new innovations to address some of the major health challenges in low-and middle-income countries..

The response was extraordinary. We received 772 applications from 80 countries, with 75% of applications based in Africa. The innovations spanned a variety of climate challenges, and the solutions they proposed addressed a wide variety of health impacts.

Three key findings emerged:

- The grand challenges approach has power not only in funding promising ideas but also reveals how the health effects of climate change are felt in different parts of the world, who is focused on addressing the problem and what is the landscape of ideas that exist.

- Innovators in different parts of the world are focused on solutions for different climate-related health issues. Across all the applications, it was evident that local solutions are most likely to capture the nuanced aspects of how climate change uniquely affects geographies in low- and middle-income countries. We also noted the strong presence of locally-led innovations, as the majority of applications were based in the implementation country.

- The top three health topics emerged clearly from the applications. These include communicable diseases (vector-, water-, food-borne and zoonotic diseases), nutrition security, and mental health.

This report outlines some of the key lessons from the funding call and indicates possible areas for funders and partners to consider as they conduct their own work at the intersection of climate change and health.

"Climate change is the greatest global health threat facing the world in the 21st century, but it is also the greatest opportunity to redefine the social and environmental determinants of health."

— *The Lancet Countdown on health and climate change*

Introduction

A Grand Challenges Approach

The Grand Challenges approach is rooted in the idea that innovation is key to overcoming critical barriers to our most pressing global problems. This is particularly true when it comes to the impact of climate change and health.

At Grand Challenges Canada, we believe that integrated innovations — solutions to pressing global challenges that combine business, social and scientific/technological innovation from the outset — have the greatest potential for impact and scale. We believe that by combining multiple forms of innovation, we can accelerate progress, show greater results earlier in the process, and have innovations that are more likely to scale and be sustained in the long term.

Since 2010, we have funded innovations to accelerate global health with a specific focus on low- and middle-income countries. With support from the Government of Canada and other partners, we have funded more than 1,400 unique projects in 102 countries.

We use a combination of seed and transition-to-scale funding to nurture and test promising ideas and to support those with the greatest potential to grow and be sustained in the long term. For more than a decade, we have used our Stars in Global Health program to issue funding calls on topics related to global health.

Each of these calls yields important information about the problems that innovators are trying to solve, the solutions they've created to address them, and the kinds of support that are most needed.

As an active member of the global Grand Challenges Network, we frequently draw on the expertise of our partners and feed into larger conversations about innovation, development, and global health.

Overview

Requests for proposals

The request for proposals on the impact of climate change and health was launched under Grand Challenges Canada's flagship program, Stars in Global Health. The Stars program distributes seed funding to promising innovations and provides useful insights into how a challenge manifests in local contexts as well as the landscape of solutions that are being proposed.
This type of funding call can shed light on the current state of innovation in a sector, as well as give a sense of where innovative ideas are coming from globally.

For this funding call, we issued a global request for proposals, with a focus on low- and middle-income countries and a targeted emphasis on sub-Saharan Africa. The RFP also emphasized the importance of local context and linkage with local innovations.

The RFP challenge statement explicitly sought "bold ideas that address the human health impacts of climate change in low- and middle-income countries." We asked for innovative solutions to address the "adaptation gaps and build resilience against the effects of climate change on the human health and wellbeing of underserved communities." We also requested that solutions consider the fact that older adults, women, young people, Indigenous peoples, people with disabilities, LGBTQI+ individuals, and other traditionally underserved and minority groups are most vulnerable to the health impacts of climate change in many contexts.

Each innovation was also assessed based on the ability to transform how the human health impact of climate change is addressed, and on the potential to scale following the initial proof of concept phase.

The RFP identified several areas of interest for funding, including solutions related to nutrition or water security, mental & psychological health challenges, poor air quality, heat stress, vector-, water- and food-borne disease threats, and the development of monitoring, modelling, and forecasting solutions. However, the RFP also explicitly stated that we welcomed all applications, as long as they addressed a climate-specific health risk and met the other eligibility criteria.

The request for proposals was open for a period of 12 weeks in total. Grant size limits were defined as up to CAD $150,000 per innovation, for a period of 12-18 months.

In 2022,
Grand Challenges Canada and the
South African Medical Research Council

Video: Learn more about the results of our climate change and health request for proposals

Promising innovations were assessed based on the potential to address a specific human health impact, as amplified by climate change. It should be designed for and with communities in low-and middle-income countries who are not being served by current approaches.

It should have the potential to transform how the human health impact of climate change is addressed. It should have the potential to scale after the initial proof of concept phase ends.

Based on this initial call, we gleaned that innovators in different parts of the world are focused on addressing different climate-related health issues. Local solutions are most likely to capture the nuanced aspects of how climate change uniquely affects geographies in low-and middle-income countries.

Process overview

The funding call received a total of 772 applications, of which 737 were deemed eligible for consideration. An internal screen found that 90 applications were sufficiently innovative to proceed to the peer review stage.

Peer reviews were conducted by three independent experts with scientific/technical, social and/or business expertise relevant to the climate and health space. Following the peer review process, over 40 applications were nominated for funding. [3]

Innovator spotlight: Learn how Bridge to Health Medical and Dental will use point-of-care ultrasound to detect Dengue in the Peruvian Amazon

Geography

We received applications from 80 countries. Nearly 85% of applications were submitted by locally led institutions.

Three-quarters (75%) of the applications came from Africa. Three African countries — Kenya, Nigeria, and Uganda — accounted for 38% of the total number of applications.

One third (33%) of the applicants to the funding call proposed implementation in one of the 30 countries ranked as most vulnerable to climate change among low- and middle-income countries.[3]

Twelve of the applications proposed implementation of their proposed solutions in conflict-affected settings, including refugee camps.

Figure 1. Geographic distribution, by region, of all applicants

- East Africa: 39%
- West Africa: 17%
- Southern Africa: 10%
- South Asia: 10%
- Central Africa: 8%
- North America: 6%
- Latin America & Caribbean: 3%
- East Asia & Pacific: 2%
- Europe & Central Asia: 2%
- North Africa: 2%
- Middle East: 1%
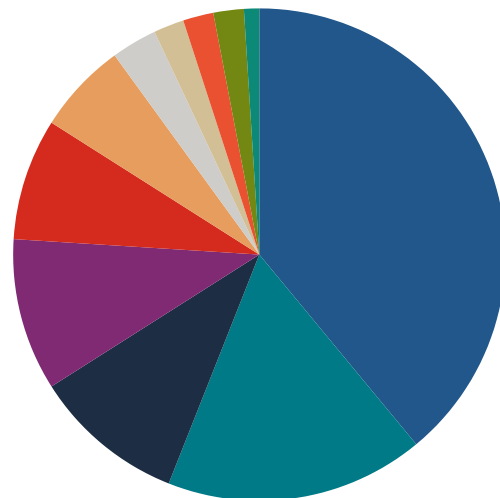
Health topics

As part of the application process, applicants self-selected health topics that aligned most closely with their innovation. (The RFP listed several possible categories, but innovators also had the option to submit proposals under areas not listed by selecting the "Other" category from a drop-down menu.)

The top two categories were communicable diseases (including vector-, water-, and food-borne and zoonotic diseases) and nutrition (including malnutrition and undernutrition). In the communicable disease category, just over a third of applications addressed vector-borne diseases, while 30% of the applications focused on water-borne diseases.

Mental health applications accounted for 14% of the applications, including those that sought to address ecoanxiety, climate resilience and post-climate-event trauma. The 'other' category accounted for 8% of applications and mainly included applications that addressed multiple health priorities.

Figure 2. Climate-sensitive health risks addressed among all applications.
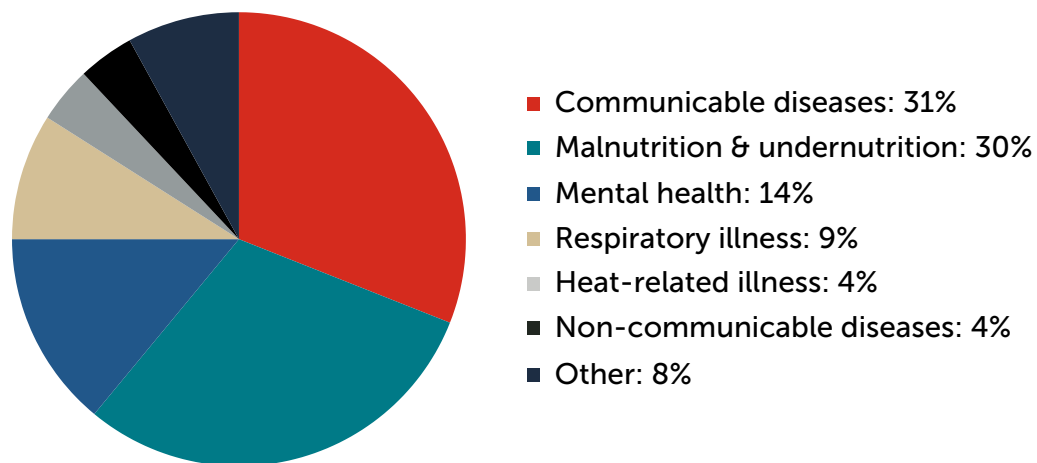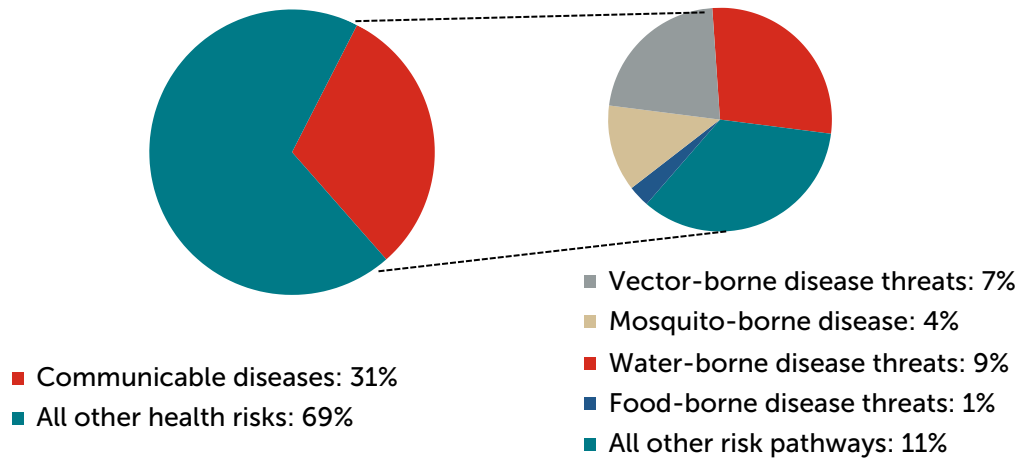
- Communicable diseases: 31%
- Malnutrition & undernutrition: 30%
- Mental health: 14%
- Respiratory illness: 9%
- Heat-related illness: 4%
- Non-communicable diseases: 4%
- Other: 8%

Figure 3. Further breakdown of risk pathways addressed among all applications addressing communicable disease

- Communicable diseases: 31%
- All other health risks: 69%

- Vector-borne disease threats: 7%
- Mosquito-borne disease: 4%
- Water-borne disease threats: 9%
- Food-borne disease threats: 1%
- All other risk pathways: 11%

Climate-related risk pathways to health

As part of the application process, innovators identified the specific climate-related risk pathways that they were trying to address. The RFP listed several possible categories, but innovators also had the option to submit proposals under areas not listed.

More than a quarter (28%) of all innovations were aimed at improving nutrition security. According to the 2023 report of the The Lancet Countdown on Climate Change and Health, the higher frequency of heatwaves and droughts in 2021 was associated with 127 million more people experiencing moderate or severe food insecurity compared with 1981–2010.[4]

Another quarter of applications were devoted to addressing vector-, water- and food-borne disease threats. The Lancet Countdown report indicates that the "changing global climate is becoming increasingly suitable for

the transmission of many life-threatening infectious diseases, making control efforts more and more challenging and costly."

The risk of vector-borne disease threats has experienced a significant increase with the changing climate patterns. From 1951-60 to 2013-22, the climate suitability for the transmission increased by 28.6% for Aedes aegypti (Yellow fever mosquito) and by 27.7% by Ae albopictus (Asian Tiger mosquito).

The remaining applications focused primarily on addressing water security, air quality, damage to infrastructure and health services, migration, and displacement and heat stress. The 'other' category included innovations related to early warning systems, data collection and research, and a variety of other interventions.

Figure 4. Climate-related risk pathways addressed among all applications

- Nutrition security: 28%
- Vector-borne disease threats: 12%
- Water-borne disease threats: 10%
- Water security: 10%
- Air quality: 9%
- Damage to infrastructure & health services: 8%
- Migration & Displacement: 7%
- Heat stress: 5%
- Food-borne disease threats: 3%
- Other: 8%
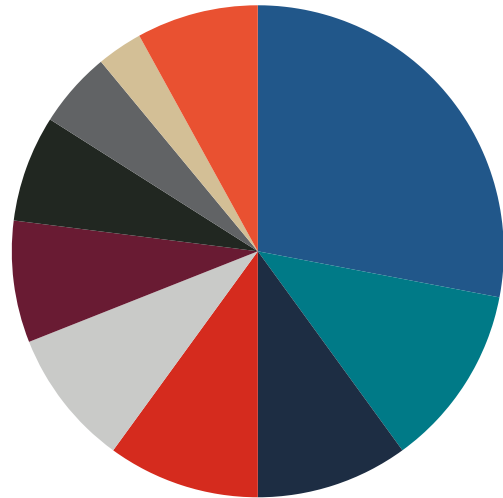
Country- and region-specific observations

When we received more than five applications for a given country, we were able to draw observations about the kinds of climate challenges being addressed:

- The highest number of mental health proposals came from East and Southern Africa.
- Most heat stress applications came from West and Southern Africa.
- Water-borne disease threats were addressed in a greater number of applications from Central Africa.

- Applications from Bangladesh focused on risks related to extreme weather events, including flooding and cyclones, as well as water-related risks, such as water-borne disease threats and water security.
- Applications from Cameroon prioritized food insecurity and disease threats.
- Applications from Ghana had a strong focus on health system strengthening.
- Applications from Kenya had a significant focus on agriculture.
- Applications from India prioritized research and digital applications.

Sources of innovation

Innovative solutions came from a variety of sources, including non-profit institutions, academic or research institutions, for-profit companies, and social enterprises.

Roughly half of the innovative ideas submitted as part of the request for proposals were led by non-profit organizations, with an equal split between academic / research institutions and for-profit/social enterprises in the remaining half.

Observations

- For-profit entities submitted the greatest proportion of applications related to respiratory illness and among the 'other' health topics. For-profit entities were also more likely to propose solutions related to non-communicable disease.

- Non-profit organizations were overrepresented in the areas of malnutrition and mental health. They were also more likely to propose solutions related to nutrition and communicable diseases.

- Academic institutions were slightly more likely than other categories of innovator to have their solution be deemed innovative'. This was particularly true for solutions proposed for areas such as heat stress, mental health, and respiratory illness.

OLUFEMI ADEWOLE
OBAFEMI AWOLOWO UNIVERSITY, NIGERIA

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Innovator spotlight: Learn how Obafemi Awolowo University plans to use plants to reduce indoor air pollution in Nigeria

Conclusions

The request for proposals on the impact of climate change and health attracted a wide number of diverse applicants from around the globe. Based on this call for funding, we have learned that:

- The top three health topics emerged clearly from the applications. These include communicable diseases (vector-, water-, food-borne and zoonotic diseases), nutrition security, and mental health.

- The kinds of climate risks being addressed varied by region, and by country. Local solutions are most likely to capture the nuanced aspects of how climate change affects low- and middle-income countries.

- There was a strong response rate to the request for proposals from across Africa, with a majority of the applications from institutions based in the implementing country (i.e., local leadership).

- Funders and other stakeholders should look to solutions that are developed by those closest to where they are meant to have impact.

The grand challenges approach not only has power to fund promising ideas but also to show how the health effects of climate change are being felt in different parts of the world, who is focused on addressing the problem and the landscape of ideas that exist.

References

[1] Marina Romanello, PhD, et al. The 2023 report of the Lancet Countdown on health and climate change: the imperative for a health-centred response in a world facing irreversible harms. Published: November 14, 2023. DOI: https://doi.org/10.1016/S0140-6736(23)01859-7
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[2] Grand Challenges Canada. Round 12 Stars in Global Health Request for Proposals. October 26, 2022. https://www.grandchallenges.ca/wp-content/uploads/2015/11/Stars-R12-RFP_FINAL-ENG-revDec15-1.pdf

[3] Notre Dame Global Adaptation Initiative (ND-GAIN). ND-GAIN Index Country Rankings. https://gain.nd.edu/our-work/country-index/

[4] Marina Romanello, PhD, et al. The 2023 report of the Lancet Countdown on health and climate change: the imperative for a health-centred response in a world facing irreversible harms. Published: November 14, 2023 DOI: https://doi.org/10.1016/S0140-6736(23)01859-7.

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