

# Strengthening Health and Disease Modeling for Public Health Decision Making in Africa

## Grand Challenges

### Request for Proposals

#### BACKGROUND

Mathematical modeling is a valuable tool for informing policy-making and programmatic decision-making in the public health domain. Modeling can be applied to analyze key areas from disease burden estimation, to evaluating the potential impact of control interventions, to informing product development. Approaches to guide public health action led by local modeling units and co-created with decision-makers, bring an invaluable understanding of relevant local/regional context and questions, enabling higher impact.

Across Africa, there is a growing community of public health modelers and an increasing use of local modeling expertise to inform policy- and decision-making across a range of health areas. The Bill & Melinda Gates Foundation (BMGF) and Wellcome are committed to supporting the continued growth of this community. In June 2023, BMGF and Wellcome co-hosted a workshop bringing together over 100 modelers, policymakers, implementers, national disease control program staff, funders, and other stakeholders to discuss how to strengthen the public health modeling ecosystem in Africa.

The workshop highlighted strong consensus for several areas, including: ensuring that modeling work is focused on program/health system priority areas and/or research gaps; modeling should be co-designed and led with decision-makers; and the African public health modeling community would benefit from increased connectedness, both between modelers and decision-makers and between modeling units. Workshop attendees identified several collaborative activities that would support this connectedness, including: annual meetings of the modeling community; organized engagement and collaboration with decision-makers; coordinated training, mentorship, and research exchange opportunities; working groups and knowledge exchange; and common platforms and principles to guide method-, data- and code-sharing. The workshop's findings align well with recent work on [improving the translation of modeling results into policy impact](#).

#### THE CHALLENGE

This request for proposals (RFP) seeks proposals for innovative, high-quality modeling projects that will address specific research questions whilst:

- increasing connectedness between African modeling institutes.
- growing the African modeling ecosystem.
- accelerating the translation of modeling outputs into meaningful policy and programmatic impact.

We are looking for projects with a duration of 3-5 years that will achieve the following **objectives**:

1. Advance scientific understanding of key public health priority areas (see thematic areas below for eligible topics) and leverage modeling outputs to inform decision-making by local, regional, or continental health officials and agencies.
2. Develop, implement, and/or improve tools, processes and methods that enable the use of modeling to inform public health decision-making.
3. Strengthen connections between African modeling units, data partners (e.g., data scientists/collectors) and policy- and decision-making officials and agencies through collaborative projects. Such collaboration should lead to programmatic impact, with co-creation of the analytical questions, analysis plans, and communication of outputs.
4. Design and execute South-South collaborative activities to support knowledge exchange, cultivate partnerships between modeling units, and promote the use of modeling within health systems.
5. Use community standards for open science, including FAIR (findable, accessible, interoperable, reusable) principles where possible, thereby contributing to the development of trustworthy data science to promote collaboration within funded projects and beyond.

All proposals should articulate how they will achieve the challenge objectives above and address at least one or more of the in-scope priority areas below (either Option A or Option B). The specific questions addressed and approaches proposed should be tailored to the local/regional context and aligned with priorities of local decision-makers to ensure impact.

The funded projects will become part of a larger connected cohort aimed at further strengthening the public health modeling ecosystem in Africa.

- The project teams funded through this RFP will be expected to work together on shared areas of interest including, but not limited to, knowledge exchange and decision-maker engagement.
- The governance structure of this cross-project collaboration will be designed in Year 1 of the program by the successful project teams, together with Wellcome and BMGF.
- Proposals are required to allocate funds for staff time and travel to participate in the cross-project collaborative activities agreed upon by the governance committees.

## **SCOPE AND SCALE OF PROPOSED WORK**

Wellcome and BMGF will collaborate to achieve the overall program objectives, but successful proposals will receive awards either through Wellcome or BMGF depending on the scope and scale of the proposed work. At the application stage, you will be required to indicate if your proposal is being made to Wellcome (Option A) or BMGF (Option B). See below for the thematic areas and budgetary limits associated with each option. Lead applicants can submit only **one** application, indicating either Option A or Option B during submission. You should request a level and duration of funding that is justified by your proposed research. If a proposal

has indicated preference for Option A but is deemed by the funders to be more suitable and eligible for Option B, applicants will be given the opportunity to be considered for funding through Option B (and vice versa).

### **Option A – Wellcome-funded**

Wellcome anticipates funding proposals of up to £3,000,000 GBP for each award for a duration of 3-5 years. Proposals must demonstrate that at least 70% of the funding is going to [low-and middle-income country \(LMIC\)](#) institutions with at least 50% of the funding going to African institutions. Proposals can include institutions in high-income countries (HICs). However, no more than 30% of the project budget can go to HIC institutions.

Wellcome's focus is on vector-borne diseases which cause significant morbidity, with a high burden in Africa. This includes a range of diseases spread by vectors (or intermediate hosts), such as mosquitoes and snails. The distribution of the vectors that spread these diseases is sensitive to environmental change. For example, climate change is leading to warmer temperatures, increasing the expansion and geographic spread of mosquitoes and associated diseases to wider areas. To reduce disease burden and determine the interventions needed for control, it is critical to understand the impact of environmental changes on the vector and its ability to transmit disease. Key research questions where modeling is a valuable tool include understanding the effect of environmental change on vector distribution and how this affects disease burden, as well as understanding how current and novel control interventions can be most effectively used to control the spread of vectors and vector-borne diseases.

Proposals to Wellcome must address one or more of the thematic areas of focus below.

#### Thematic areas of focus

Proposals **must** focus on one or more of the following diseases: Chikungunya, dengue, yellow fever, zika, malaria and schistosomiasis. Proposals **must** address one or more of the following:

- **1: Environmental change:** Modeling to understand the effect of **i)** direct climate (e.g., temperature, rainfall, short/long-term climate change) and/or **ii)** indirect environmental (e.g., population movement, landscape change) factors on the spread and burden of the focus diseases (e.g., vector spread, behavior, ability to transmit disease), and implications for control.
- **2: Control interventions:** Modeling to **i)** understand optimal use of existing and novel interventions (including combinations of interventions and assessment of resistance to interventions where relevant), and **ii)** identify barriers to implementation and uptake of interventions for the focus diseases.

The specific areas addressed and approaches proposed should be tailored to the local context and include data partners (e.g., data scientists/collectors) and decision-makers as co-applicants/collaborators where relevant. We encourage proposals that span multiple areas/diseases and that include data collection where required to fill key data gaps to inform models. Proposals may include various modeling approaches, such as epidemiological,

transmission, health economic/cost-effectiveness, geospatial, climate and mechanistic modeling, as well as approaches linking climate and infectious disease modeling.

### **Option B – BMGF-funded**

BMGF anticipates funding proposals up to \$1,000,000 USD for each award for a duration of 3- 5 years. Proposals must demonstrate that at least 80% of the funding is going to African institutions. Proposals can include institutions from other regions. However, no more than 20% of the project budget can go to institutions outside of Africa.

Proposals to BMGF **must** address one or more of the thematic areas of focus below and **may** include additional topics related to understanding of the burden of disease that are aligned with local priorities. All proposals are encouraged to explore how **artificial intelligence** (in particular, large language models) can be leveraged to advance data management, modeling methods, and communication of project findings. Proposals are also encouraged to consider how their approach will increase knowledge and understanding of **gender barriers** in modeling OR display how their methodologies would alleviate a known gender gap/issue with respect to the public health theme selected.

#### Thematic areas of focus

Proposals should address one or more of the following thematic areas.

- **HIV and TB\*** : Understanding transmission modeling (including advancing understanding of sexual networks in HIV models and role of subclinical TB in TB models), support for portfolio optimization exercises (against impact and cost-effectiveness outcomes) at sub-national levels in support of NSPs, and incorporation of social and structural barriers in models. Consideration will also be given to exploration of multi-pathogen or multi-systems questions such as integration of HIV with STIs, family planning, or non-communicable diseases.
- **Neglected tropical diseases** (human African trypanosomiasis, visceral leishmaniasis, Guinea worm, lymphatic filariasis, onchocerciasis, schistosomiasis, soil-transmitted helminth, trachoma), addressing questions of how to target interventions, evaluate new and potential interventions, and assess risk of resurgence once an intervention is stopped.
- **Malaria and climate:** Exploring the intersection between climate change and malaria vector ecology and/or malaria epidemiology; this may also include modeling the expected impact of climate change on malaria intervention efficacy.
- **Malaria control interventions:** Understanding the optimal sub-national deployment of existing malaria control interventions, defining the ideal characteristics and deployment of novel products and product classes, assessing the cost-effectiveness of existing interventions in the content of a national strategic plan.

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\* Updated 9/22/2023 – previous language: “**HIV**, including exploration of multi-pathogen or multi-systems questions such as integration of HIV with sexually transmitted diseases, family planning, or non-communicable diseases.”

- **Enteric and diarrheal diseases** (diarrheal disease and etiologies, typhoid and other invasive Salmonellosis, and Hepatitis A and/or E): Understanding of disease transmission, local/regional/global burden of disease, pathogen burden forecasting, public health and economic impact of vaccination, integration of vaccination with other prevention/control strategies, or vaccine targeting for optimal impact.
- **Primary health care (PHC) service delivery and management:** Advancing modeling approaches to optimize health structures and inputs (financing, infrastructure, supplies, workforce, information systems) for improved service delivery that meets population health needs and leads to improved PHC system outcomes and impacts. Leverage available data to drive modeling approaches that support national, subnational, and/or facility decision-making to optimize available health inputs for equitable, high-quality PHC service readiness and delivery. This theme may be either a primary focus or conducted as a component of another thematic area, such as routine immunization, HIV, or malaria PHC services.
- **Maternal and newborn health:** Quantifying the epidemiology of conditions and intergenerational risk factors linking maternal and fetal/newborn health, assessing the potential impact of existing and emerging interventions, and exploring interactions within and across the health system at critical points of care (e.g., antenatal care, in-facility delivery, newborn intensive care units).
- **Nutrition:** Use of modeling to support decision-makers to set priorities for the most cost-effective means of improving micronutrient status. For example, estimating the contribution of vitamins and minerals from fortified foods (staples and condiments) towards improved nutrient intake.
- **Immunization program planning and policy:** Scope can include the full expanded program on immunization (EPI), however strongest consideration will be given to those focused on measles, HPV, and/or zero-dose communities (those fully unreached by routine immunization).
- **The impact of climate and environmental change** on population movement and impact on transmission/burden of diseases, such as HIV, TB, malaria, and enteric and diarrheal diseases, and planning of primary health care and immunization services.

The specific questions addressed, and approaches proposed, should be tailored to the local context and aligned with the interests of local decision-makers to ensure translation to local public health impact. Priority will be given to applications from high burden countries. We encourage proposals that span multiple thematic areas. Proposals may include various modeling approaches, such as epidemiological, transmission, health economic/cost-effectiveness, geospatial, climate and mechanistic modeling.

#### **SUCCESSFUL PROPOSALS TO EITHER OPTION A OR B WILL:**

- Address one or more of the thematic areas of focus described above.
- Include a well-articulated plan for collaboration with local and/or regional public-health decision- and/or policy-makers throughout the project. We encourage the inclusion of these individuals as co-investigators or collaborators on the proposal. Collaboration

should be key to advancing the project's goals and creating impact that would be difficult to achieve without decision-/policy-maker participation.

- Articulate how the project will lead to impact over the term of the project and how those benefits will be sustained past the lifetime of the project. Sustainability plans should consider institutional, operational, and financial structures needed to ensure sustainability of the project and its constituent components.
- Clearly describe the datasets required to achieve the project's objectives, including whether they **i)** are already available and permission has been granted to use them for the project, **ii)** will be made available to the researchers during the project, and the expected timelines for this release, or **iii)** will be collected during the project, and the expected timelines for collection (where there are data gaps that need to be filled to inform models, inclusion of data collection within proposals will be considered if well justified). Where relevant, we encourage data partners (e.g., data scientists/collectors) to be collaborators or co-applicants on proposals.
- Demonstrate a commitment to open science including sharing data and modeling tools where possible and building re-usable assets that will have wider benefit.
- Promote a diverse, inclusive, and supportive research environment.

## ELIGIBILITY

The lead applicant and their institutions must be based in Africa. We particularly encourage applications from women-led organizations or projects led by women.

- Proposals must follow the above guidance for Option A and Option B on budget allocation for African institutions versus other regions.
- This RFP is open to researchers at any career stage. Applications led by early- and mid-career investigators are encouraged.
- Applicants must have the experience needed to drive and lead a research program addressing the thematic area(s) of interest.
- Researchers may participate as co-applicants or collaborators on multiple proposals but may submit only one application as a lead applicant to this funding call. If researchers are co-applicants or collaborators on multiple proposals, they must be able to demonstrate that they can dedicate enough time and resources to all projects if all the projects they are involved in are funded.
- Additionally, for projects funded through Wellcome only:
  - Lead applicants must have a permanent, open-ended, or long-term rolling contract for the duration of the award.
  - Lead applicants and co-applicants must be able to contribute at least 20% of their time to this project.
  - Lead applicants must be based at an eligible administering organization that can sign up to our [grant conditions](#) and [grant funding policies](#).
  - There is a limit on the number of active Wellcome awards an individual can hold at one time (based on career stage). Please refer to [guidance](#) on this.

- Proposals are limited to 8 co-applicants. There is no limit to the number of collaborators an application can have but the added value must be clear. There is no minimum time commitment for collaborators.
- Co-applicants must have a guarantee of space from their host institution for the duration of their commitment to the award, but do not need to have a permanent, open-ended, or long-term rolling contract at their administering institution.
- Co-applicants cannot be based in mainland China.
- Applicants cannot apply if intending to carry out activities that involve the transfer of grant funds into mainland China.
- For information on what costs can be included in proposals funded by Wellcome, please refer to [what we offer](#).

**We will not consider funding for proposals that:**

- Do not directly address the core objectives and at least one of the thematic areas of focus outlined by each funding organization.
- Are not led by Lead Applicants (and their institutions) based in Africa.
- Have not engaged local and/or regional decision-/policy-makers or do not include a plan to do so.
- Do not demonstrate a pathway to decision-making that results in sustainable impact on public health.
- Do not demonstrate a clear commitment to open science and making their findings, processes, and/or tools accessible and reusable, where possible.
- Are focused primarily on educational or training programs.
- Are submitted by teams not committed to collaboration with other projects funded through this RFP.
- Are focused on conducting primary data collection alone – projects must include a substantive modeling component.
- Aim to conduct clinical trials or randomized control trials.
- Cannot be accomplished within a 5-year project duration.

*This Grand Challenge is between the BMGF and Wellcome, but each funder will make independent funding decisions. Applicants successful at the preliminary stage will be invited to submit a full application via BMGF or Wellcome as applicable. If a proposal is submitted for one funder but is deemed more appropriate for the other funder, the other funder may invite the applicant to submit a proposal to them. Note: Success at the preliminary stage does not guarantee that the full application will be successful in receiving funding.*

*Applicants should familiarize themselves with the supporting documents for this Grand Challenge, including the rules and guidelines and application instructions, as well as the relevant terms and conditions for each funder at the following links:*

*Wellcome: [specific information, grant conditions and grant funding policies](#).*

*BMGF: [sample terms & conditions and RFP terms and conditions](#)*