

GCI call on “ki data challenge for maternal and Child health”

**Biotechnology Industry Research Assistance Council  
(BIRAC)**

**(A Government of India Enterprise)**

**Request for Proposal (RFP)**

Grand Challenges India Funding Opportunity

On

**ki' Data Challenge for Maternal and Child Health**

**Jointly funded by**

**Department of Biotechnology (DBT)  
Ministry of Science and Technology  
Government of India**

**&**

**Bill & Melinda Gates Foundation (BMGF)**

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#### Data Science Approaches to Improve Maternal and Child Health in India

The ‘knowledge integration (ki) data challenge for Maternal and Child health’, is a call for proposals directed at addressing challenges that we face in improving health of mother and child in comparable geographies. This Request for Proposals (RFP) is specific to Indian researchers.

#### **PREAMBLE**

This new challenge, focused on data science approaches, is the 6<sup>th</sup> call under Grand Challenges India, a flagship program of a joint collaboration of the Department of Biotechnology, Government of India, with the Bill & Melinda Gates Foundation. This unique call diversifies the scope of data analytics which can be explored to improve the lives of mother and child and is consequent to the Bill & Melinda Gates Foundation’s Healthy Birth, Growth, and Development Knowledge Integration (HBGDki) initiative, India. HBGDki-India seeks to develop a deeper understanding of the risk factors contributing to poor maternal and child health outcomes with a focus on reducing the global burden associated with three complex and interrelated outcomes: Preterm birth, physical growth faltering and impaired neurocognitive development.

The purpose of the ki data challenge call is to have innovative data analytics solutions, results from which shall be used to inform policy decisions related to maternal and child health as well as design subsequent related challenges.

#### **THE CHALLENGE**

There remain key knowledge gaps in our understanding of how nutrition, prenatal and antenatal care, maternal support, and environmental and social factors contribute to an elevated risk of poor maternal and childhood health outcomes. Such an understanding is required to determine what interventions, including health policies, should be delivered to which group of individuals at what point in their lifecycle to ensure optimal outcomes.

#### **THE OPPORTUNITY**

Developing and validating approaches to foster maternal and child health is difficult due to the challenging interaction of biological, environmental, and social factors. Furthermore, policy recommendations for such approaches frequently lack sufficient supporting scientific evidence, while clinical trials are expensive, time-consuming, and increasingly difficult to implement. There is now a key opportunity to accelerate research in this area by analyzing existing data arising from multiple sources in India and formulating public health recommendations that are data-driven and cost-effective.

The purpose of this call for proposals is to promote new and novel approaches to analyzing existing Indian public health data and evidence in form of clinical research data, surveys and other related data sources from India to produce novel insights which can be used to improve maternal and child health in Indian context as well as around the world. Successful applicants to this call can assume that subsequent to proposal selection and with the appropriate agreements, they will not only receive funding, but will be able to access a

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large HBGDKi-aggregated Indian study datasets. (See Appendix A for more information related to the India data that will be available to selected applicants)

The utilization of the health and social data, as a key focus of this call, is intended to engage a broad spectrum of collaborators - including research and clinical scientists working with data scientists, bioinformaticians, statisticians, epidemiologists, engineers and computer programmers - to identify how innovative data analytic approaches can be used to develop improved solutions to tackle the burden of maternal and child health problems in India. (See Appendix B for more information related to website that applicants can explore to form these useful collaborations)

We also welcome applicants who have access to other relevant data sets, including publicly available data, clinical research, cohort and survey studies and other large datasets that can help address the questions below, to submit their proposals under this call. In this case, researchers who submit applications involving other data sets are responsible for securing appropriate authorization and access to the data. Applicants are encouraged to describe the steps required to access the proposed dataset in their proposals.

### **CHALLENGE IS LOOKING FOR**

We seek proposals designed to answer critical scientific questions related to maternal and child health and development outcomes, using innovative data analytics and modeling approaches applied to HBGDKi India or to other relevant data sets that applicants can access. These proposals should be based on existing primary data in India and yield actionable results with a potential to significantly impact public health policy.

### **RFP gives highest priority to proposals that:**

- 1) Support innovative collaborations between Indian clinical research scientists, healthcare experts, and data scientists/data modellers;
- 2) Answer critical scientific questions identified in this Grand Challenges India call, while building and strengthening data science capacity for India;
- 3) Take into account social, environmental and cultural determinants of outcomes and incorporates an understanding of the target community that includes barriers and constraints to delivery of interventions and to implementation of government programs;
- 4) Explain how answers will have the highest likelihood of being relevant for implementation broadly in the public health system.
- 5) Describe mechanistic models for establishing the relationship between interventions and their related outcomes.

### **Examples of what we are looking for include analytical approaches that:**

- Apply innovative analyses or machine learning techniques to identify patterns in data from “natural experiments” (e.g., seasonal variation, vegetarian diet);
- Stratify risk of adverse pregnancy outcomes, including preterm birth and low birth weight;

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- Incorporate weight gain during pregnancy as a variable, including helping to determine the relative contributions to neonatal health outcomes of diet quantity versus quality;
- Determine the relative contributions to infant health outcomes of diet quantity versus quality (e.g., protein quantity versus quality);
- Target underexplored subsets of data (e.g., positive health outcomes in individuals despite a high number of risk factors);
- Convert correlations to causal hypotheses (e.g., health outcomes correlated to sex differences, maternal education, birth spacing, age of first pregnancy, establishing causal impact of air pollution on fetal growth);
- Identify new ways to aggregate risk factors and vulnerable populations, including innovative data integration strategies and visualization tools;
- Incorporate the roles of women – as perceived locally – from adolescence to motherhood;
- Evaluate programs for pre-pregnancy intervention for women and the effect if doing so on prenatal and fetal mortality;
- Determine the best care for low-birth-weight babies;
- Determine the window of opportunity to foster catch-up growth for preterm and low-birth-weight babies, and the most effective interventions for doing so;
- Identify critical periods for intervention during pregnancy and early childhood;
- Stratify risk of stunting and wasting from birth through two years of age;
- Combine data focused on improving child survival with data focused on improving early neurodevelopment;
- Answer specific questions related to childhood developmental disorders such as answering at what age in childhood developmental or cognitive disorders become irreversible if appropriate interventions are not instituted.
- Test hypotheses regarding the divergence in the rates of wasting and stunting over the last decade.

### **Examples of what we are NOT looking for:**

- Proposals submitted by applicants from outside of India;
- Proposals for new studies to generate new data;
- Proposals that do not focus on health outcomes in India;
- Proposals to develop new primary data collection tools;
- Proposed analyses applicable to only a small fraction of the population (e.g., because of a focus on a specific disease or condition with limited incidence) and without the potential for leading to widely-used solutions relevant beyond a single context;
- Approaches that do not meaningfully involve data from adolescent girls, mothers, or infants;
- Applications proposing data science algorithm development without clear relevance to answering the types of questions described in this call for proposals;
- Ideas without a clearly articulated and testable hypothesis together with metrics of success;

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- Ideas for which the described indicator of success cannot be demonstrated or significantly advanced within the scope of this award (USD \$100,000 for 18 months);
- Proposals that do not describe the innovation’s potential effects on health policy making
- Analyses that are only slight improvements over existing approaches (e.g., replication of an approach in a new geography in the absence of added innovation).

### Appendix A

A wide range of data types is required to develop data-driven solutions for guiding cost-effective health policy and programs. These data are typically captured through various independent clinical research trials, health delivery programs and various surveys but are stored across different departments, organizations or at various levels of the health system. Child health and development programs need to bring these data together – and frequently in a harmonized and integrated form – to ensure research and analysis is fully informed by the best available data. These data include already existing primary data in India from varied sources such as those from one or both of the following data repositories:

- **India-HBGDki data repository, created for this GCI.** This repository brings together and harmonizes many types of study data in India, and can be used to develop algorithms and answer critical questions. To explore this repository please click on the following link: [india.studyexplorer.io](http://india.studyexplorer.io).
- **Other data sources that applicants may propose:** This includes existing data repositories, including population-level surveys and cross-sectional and longitudinal cohort studies, program-level data on disease burden from government agencies, surveillance system data on disease burden, administrative records of health-service encounters, disease registries, and other relevant India studies. These studies include published literature as well as unpublished studies that can be identified and accessed by collaborating with healthcare experts and other stakeholders in India. Applicants are encouraged to describe the steps required to access the proposed dataset in their proposals.

### Appendix B

#### GC-India Maternal, Newborn & Child Health (MNCH) Data Challenge Community:

The HBGDki team has established a website to share additional information that may be helpful to applicants as they prepare their proposals. The following link provides access to the website: [GC-India Maternal, Newborn & Child Health \(MNCH\) Data Challenge Community website.](#)

This site can be explored by applicants to learn more about available data sources and to form useful collaborations with people from a variety of areas of expertise - including research and clinical scientists working with data scientists, bioinformaticians, statisticians, epidemiologists, engineers and computer programmers.

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This space contains information about a primer on MNCH for data scientists, a primer on data science for research scientists, a description of the data sets available in the India-HBGDKi data repository and a discussion forum where interested applicants can associate to form innovative teams to apply for this call.

The HBGDKi team will be adding additional information including sample datasets for download and experimentation, so please check the site regularly to look for additional information.

**\*Please Note:** The applicants are directed to abide by the details laid down in the call ‘RFP’ and the ‘Rules and Guidelines’ documents and these will be the final decision providers in case of any conflict.