

# Translation of Modeled Evidence for Decision-Making

## Final Global Report

March 2023



**ACCESS**  
health international



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**RESULTS FOR  
DEVELOPMENT**

*Coordinator*

**BILL & MELINDA  
GATES foundation**

*Funder*

*How can we improve policymaker access to and use of high-quality mathematical models for decision-making? R4D, Access Health International, the Health Policy Research Group, and Nouna Health Research Center collaborate to understand critical lessons for knowledge translation.*

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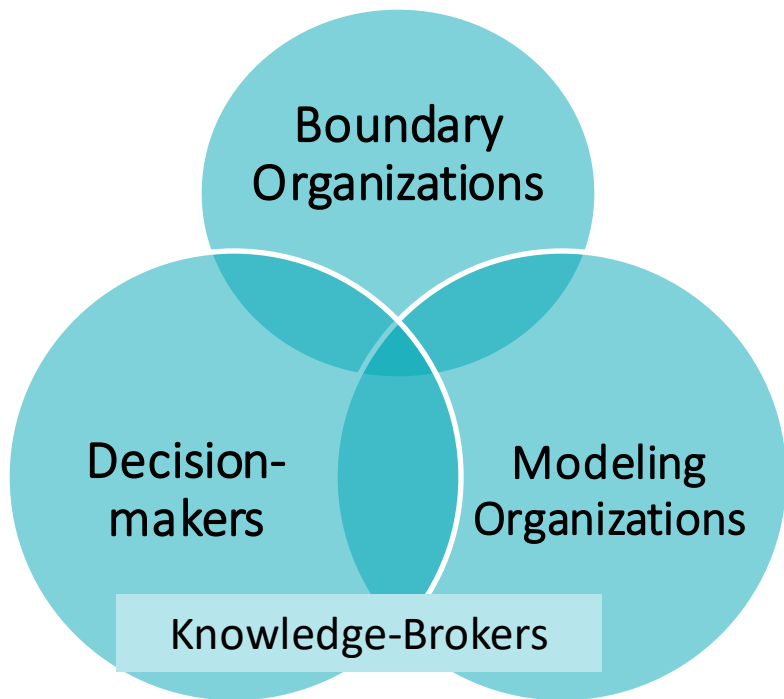
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# Executive Summary

There are many factors that influence the use of evidence in decision-making. The lack of engagement between researchers and decision-makers is a commonly cited barrier to evidence use in policy and practice. This study uses key informant interviews, a desk review, and surveys to look at the factors that facilitate and inhibit use of modeled evidence in public health decision-making across four countries. Country-based research partners conducted the study. We draw on the findings from their research to develop a set of recommendations for strengthening use of modeled evidence in decision-making, aimed at key stakeholders in the modeling-to-decision-making process. We also use insights from the research to inform a draft framework for assessing and learning from policy engagement activities in public health disease modeling.

# Key Actors in the Modeling-to-Decision-Making Process: Definitions Used in this Study

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***\*Organizations may play more than one of these roles***

**Modeling organizations:** in-country or international organizations/researchers that **produce modeled evidence**

**Boundary organizations:** **stand-alone organizations** that help to distill findings and present them in easy-to-understand formats, foster dialogue and exchange, and engage decision-makers and modelers in debating the impact of evidence on policy or practice

**Knowledge-brokers:** individuals or entities typically **embedded within research / modeling organizations** that help to distill findings and present them in easy-to-understand formats, foster dialogue and exchange, and engage decision-makers and modelers in debating the impact of evidence on policy or practice

**Knowledge translation or translation:** the process of **putting evidence into a format that is easy for decision-makers to understand and use**

**Decision-makers:** users/potential users of modeled evidence and those who **participate in making decisions** for national and-subnational health policies and strategies

# Objectives of this Research

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The inability to draw on the best available data to inform public health decision-making, including modeled evidence, can result in losses in efficiency, effectiveness, and impact that affect the end users of a health system. This study aims to understand modeling-to-policy and program efforts, specifically how to bridge the gap between the production of modeled evidence and its use in policy-/practice-level decision-making by:

- 1. Identifying factors and approaches** that facilitate/constrain exchanges between decision-makers and modelers
- 2. Assessing current practices and partnerships** in contexts/forums where use of modeled evidence in decision-making is already occurring
- 3. Offering recommendations** to inform changes in funding approaches, organizational structures and country/global policies to strengthen the use of modeled evidence into decision-making

# Research Teams & Country Reports



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[Click here to read the Burkina Faso report](#)



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[Click here to read the Nigeria report](#)

# Modeling-to-policy Ecosystem


Key actors in the modeling-to-policy ecosystem include modelers, knowledge brokers and boundary organizations, mechanisms or spaces for knowledge sharing and exchange, and funders. We observed each of these actors in the four study countries with variation in prominence and role played.





# Ecosystem: Modelers (2022)


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**Public universities and research institutions (national and international) play a lead role in developing models in the four study countries.**

 In **Burkina Faso**, modeling is conducted almost exclusively by national research and academic institutions.

 In **Nigeria**, modeling is conducted primarily by public universities and private academic institutions (local and international) as well as some parastatal research institutions and local NGOs like Pro-Health Nigeria.


 In **India**, a range of actors, including local private research and academic institutions, local and international NGOs, government think tanks, and the Health Technology Assessment agency engage in modeling.


 In **Kenya**, local universities are the most prominent modelers. But a range of other actors, including the parastatal Kenya Medical Research Institute, bilateral agencies, foreign universities, and regional initiatives, also engage in modeling activities.





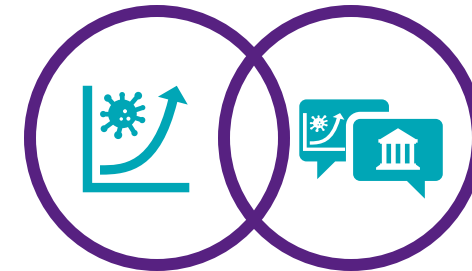
# Ecosystem: Knowledge brokers and boundary organizations (2022)

The extent to which modelers vs stand-alone organizations with boundary spanning roles engaged in knowledge brokering to influence policy or practice varied by country. In countries where we observed more modeling activities, we noted an overlap in modeling and knowledge brokering functions, with most modeling organizations playing both roles.

 In **Burkina Faso**, government agencies, civil society organizations, iNGOs, and UN agencies serve as boundary organizations – facilitating communication between modelers and decision-makers without conducting any modeling themselves. Communication between modelers who are not directly affiliated with the government and government agencies is facilitated almost exclusively by these boundary organizations.

 In **Nigeria**, the Academy of Science serves as a prominent boundary organization, as well as some local NGOs and UN/bilateral agencies. However, other local NGOs, parastatal organizations, and UN/bilateral agencies both create models and communicate the results directly to the government.

  
 In **India** and **Kenya**, all the organizations that engage in knowledge brokering between modelers and decision-makers are engaged in modeling themselves, including local and international NGOs, government think tanks, parastatal research and academic institutions, and the Health Technology Assessment agency.



# Ecosystem: Mechanisms of knowledge exchange (2022)

Across all research countries, government-led advisory groups, working groups, and task forces were routinely cited as key mechanisms for knowledge exchange between modeled evidence and policymaking. Non-government research coalitions also provide a platform for debate and knowledge dissemination, particularly in the countries we observed to have large and complex data ecosystems.



In **Burkina Faso**, government advisory groups, such as the COVID-19 thematic working group, provide a platform where modelers and decision-makers can come together to discuss modeled evidence around various diseases, most prominently COVID-19.



In **Nigeria**, disease-specific and general health or data government advisory groups provide this platform, along with the prominent and independent National Council on Health.



In **India**, independent consortia of researchers (such as the COVID-19 consortium), provide this platform, while government-led “working trainings” provide unique opportunities for modelers to come together to develop models needed by decision-makers while developing their own modeling capacities.











In **Kenya**, disease-specific government advisory groups and task forces (most prominently the COVID-19 Task Force) provide this platform, while formal partnerships between government and modeling agencies provide another avenue for communication.



# Ecosystem: Decision-makers (2022)

In the four study countries, decision-makers currently engaging with modeled outputs reported a focus on disease-specific initiatives, particularly HIV, tuberculosis, and malaria. In all the countries, modelers from all fields were called on to support COVID-19 modeling.

	HIV 	TB 	Malaria 	Dengue 	NTDs 	Rabies 	Influenza 	COVID-19 
Burkina Faso	✓	✓	✓	✓				✓
India	✓	✓	✓					✓
Kenya		✓	✓		✓	✓	✓	✓
Nigeria	✓	✓	✓					✓

\*This table presents a list of initiatives for which there were past or present modeling efforts in the study countries, as mentioned by key informants. It is not a comprehensive list of all modeling efforts in the research countries.

\* See [country reports](#) for more detail

# Ecosystem: Funders (2022)

In most of the study countries, except for India, funding for modeling is provided largely by international organizations.



In **Burkina Faso**, modeling is primarily funded by the World Health Organization, with small additional support from the government.



In **Nigeria**, funding mainly comes from international organizations (including the World Bank, the Bill & Melinda Gates Foundation, and UN agencies). The government provides some funding through the Tertiary Education Trust Fund.



In **India**, international organizations (such as the World Health Organization and the Bill & Melinda Gates Foundation) fund private or non-governmental research and academic institutions to create models. However, government agencies including the Ministry of Health and the National Center for Disease Control are the main source of funding for modeling.



In **Kenya**, bilateral agencies and international organizations (such as the Bill & Melinda Gates Foundation and the National Institute for Health Care Research, UK) fund private, academic, and government-affiliated modelers. The government funds its parastatal research institutions – though the extent to which this funding is used for modeling is unclear.



# Research Question 1: Facilitators & Inhibitors Influencing Production, Translation, and Use of Modeled Evidence

In the slides that follow, we highlight factors identified by informants across the four study countries, that facilitate the production, translation, and use of modeled evidence starting with a comprehensive summary, then turning to the most frequently cited factors. Our research indicates that barriers and enablers for evidence use are similar across different contexts, including geography and level of modeling activities.

# Key informants across the four study countries cited several factors that influence production, translation, and use of modeled evidence (2022)

	As Reported by Modelers	As Reported by Boundary Org Reps	As Reported by Decision-Makers (DM)
Individual & Interpersonal Factors	<ul style="list-style-type: none"> <li>• <b>Capacity to produce</b> policy-relevant models; expertise in academic/research institutions</li> <li>• Ability to <b>communicate models clearly and logically</b> to DMs</li> <li>• Ability to <b>work across different disciplinary</b> boundaries</li> <li>• <b>Positive attitudes</b> of decision-makers (DMs) toward models</li> <li>• <b>Experienced modelers</b> in academic/research institutions</li> <li>• Engagement of DMs in research institution advocacy efforts (<b>partnerships in advocacy</b>)</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Appreciation</b> of modeled evidence by DM</li> <li>• <b>Clear presentation</b> and communications channels</li> <li>• <b>Credibility</b> of boundary organizations</li> <li>• <b>Social networks</b> and relationships with policymakers</li> <li>• <b>Experienced modelers</b> in academic/research institutions</li> <li>• Engagement of DMs in research institution advocacy efforts (<b>partnerships in advocacy</b>)</li> <li>• <b>Lack of time</b> for knowledge exchange between modelers and DMs</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Country actors' (government, research, and academic partners) capacity to produce, use and understand</b> modeled evidence and ensure alignment with policy priorities</li> <li>• <b>Clear and logical presentation</b> of modeled evidence</li> <li>• DMs' perception of <b>credibility</b> of evidence and understanding of the <b>importance</b> of using models</li> </ul>
Organizational and Inter-Organizational Factors	<ul style="list-style-type: none"> <li>• <b>Intra- and inter-agency collaboration</b> and support</li> <li>• Strategic <b>stakeholder engagement</b> between modelers and senior DM</li> <li>• Availability of <b>funding</b></li> <li>• Institutions dedicated to <b>communicating models</b> to different DM audiences</li> <li>• <b>Interdisciplinarity and regular exchange</b> among specialists of different fields</li> <li>• <b>Research subcommittees</b> that provide technical assistance in design/conduct of health issues research</li> <li>• <b>Technical working groups and task forces</b> that advise the MoH, in particular, health programs</li> <li>• <b>Time constraints</b> for developing models under fast decision-making timelines</li> <li>• Availability of <b>modeling software</b> and computers capable of running it</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Inter-agency collaboration</b> for knowledge sharing and advocacy</li> <li>• Strategic <b>stakeholder engagement</b> between modelers and senior DMs</li> <li>• Organizational culture of <b>EBDM</b></li> <li>• <b>Contextualization of evidence and synthesis</b> by experts</li> <li>• <b>Training opportunities</b> for DMs</li> <li>• <b>Communication between modelers and DMs</b>, especially during model development</li> <li>• <b>Research subcommittees</b> that provide technical assistance in design/conduct of health issues research</li> <li>• <b>Technical working groups and task forces</b> that advise the MoH, in particular, health programs</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Intra- and inter-agency knowledge sharing</b></li> <li>• Strategic <b>stakeholder engagement</b> between modelers and senior DMs</li> <li>• Availability of champions of <b>evidence-based decision-making (EBDM)</b></li> <li>• <b>Co-production</b> of evidence and embedded researchers</li> <li>• Institutions dedicated to <b>communicating models</b> to different DM audiences</li> <li>• <b>Research institutions</b> within the MoH</li> <li>• <b>Task forces and technical committees</b> convened by the MoH with input of health sector stakeholders</li> </ul>
Environmental Factors	<ul style="list-style-type: none"> <li>• Availability of <b>funding</b> to develop models</li> <li>• <b>Lack of donor support</b> for long-term modeling capacity development</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Availability of data</b>, specifically population data</li> <li>• <b>COVID-19 pandemic (increased demand for modeled evidence and increased collaboration)</b></li> <li>• Availability of <b>funding for modeling</b></li> </ul>	<ul style="list-style-type: none"> <li>• Availability of <b>transparent data</b></li> <li>• <b>Funders'/partners' policies and influence</b></li> <li>• Global movements promoting <b>EBDM</b> in government</li> <li>• <b>Competing interests</b> within the MoH and from other stakeholders including business community</li> </ul>


# A Closer Look: Individual & Interpersonal Factors\*

*\* With a focus on the most common themes across the study countries*




# Capacity to produce useful modeled evidence

**Building modeling capacity to produce policy relevant evidence is complex and time intensive. It requires capabilities across many disciplines and needs sustained funding. Modeling capacity also depends to some extent on the availability of tools and infrastructure for modeling, including modeling software and computers powerful enough to run it.**




*“The other problem we have is sometimes the lack of software. Often there are models that you want to make, but it requires the use of particular software that you do not have.”*

- Modeler, Burkina Faso




*“If you take health services, for example, there are very few people who can really look at the data analysis, and that kind of capacity building doesn't happen...nowadays it's an age of data we need more and more people who can look at data and build models and draw conclusions and advise the policymakers. So, at several levels, we need capacity building both in generating data as well as in what I would call crunching data.”*

- Knowledge Broker, India



*“What I think is critical here is that we had developed these skills for different things. So, like, my team had developed the skills of modeling while modeling rabies – a neglected tropical disease. The team at Kilifi had been using that for another influenza virus. The team at Strathmore had developed their work around HIV. So, what happened was that there had been modeling capacity built for other things that when the pandemic came, we were able to redirect our efforts to this new thing.”*

-Modeler, Kenya



*“The first question you asked me was how many people are working on this. I only have eight people and they are working part time because there are other duties that they have. The kind of long-term funding that organizations out there enjoy, like the London School, the Imperial College, is what enables them to also constantly be able to influence policy. I think that is a major shift. If you are funded based on a small project, then we don't grow enough capacity like what you have heard now.”*

- Modeler, Kenya


# Capacity to understand and utilize modeled evidence

**Decision-makers may not always value or understand the role that modeled evidence can play in informing policymaking and planning. Boundary organization representatives report that when they work with a decision-maker who understands modeling as a concept, the decision-maker is more likely to promote and accept the usefulness of the model.**



*"More and more, the culture of excellence exists among most of the decision-makers who are there and most are public health doctors who know and understand the concepts of research, since they themselves have written public health dissertations. So they know that this evidence is important."*

-Boundary Org Rep, Burkina Faso




*"I think my experience is that decision-makers have their own considerations and many of them are not based on science or evidence, especially if you look at political people, they have considerations which are beyond evidence and evidence is something they might use to support, something that they would already like to do. But if the evidence is against what they would like to do, they generally don't accept that or they at least try to kind of tell us that probably we need to look into it more closely."*

-Modeler, India



*"So, just ensuring that we continue to capacity build to understand our data, so that when you are documenting right from the source and you are able to consume that data."*

-Decision-Maker, Kenya



*"The models are there but [the] challenge is mainly in translation. There are some evidence that came out during the [COVID] pandemic [that] I even didn't understand...If you put me on the spot to engage with policy-makers, I will not be able to do that [because] I don't even understand the models."*

-Knowledge Broker, Nigeria

# Clear and accessible communication with decision-makers throughout the modeling process

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**When modelers work closely with decision-makers to co-define research and policy questions, have a platform for regular exchange and communication, and share findings in easy-to-understand formats, the likelihood that modeled evidence will be used to inform policy and planning decisions is higher.**

*"The third thing that can facilitate this is to make these results available to them, because you see, everyone has their area of expertise. When you are a decision-maker, unless you are an academic, your reflex is not to go to libraries to search the bibliography."*

-Decision-Maker, Burkina Faso

*"So there are few advocates who are very powerful. They know how to talk, how to manage things. So if you are lucky to get a good advocate in the team along with the good models, that's like you are in the win a win situation."*

-Modeler, India

*"So, the only time that your research findings can end up with the decision-makers, you must deliberately engage the Ministry from the beginning, you set up stakeholders' meeting, you develop a policy brief, so I can tell you that it is not a walk in the park."*

-Modeler, Kenya

*"Getting [decision-makers'] trust and confidence in the first instance in the model output is often what one needs to overcome. Fortunately, interpreting the models in a very clear way that will enable them to see through empirical evidence of what is happening in the sector proves profoundly successful."*

-Knowledge Broker, Nigeria

# A Closer Look: Organizational & Inter- Organizational Factors\*

# Challenge in producing and using modeled evidence in a timely manner

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**Modeling can take a long time and can be misaligned with policy timeframes and needs, particularly in a crisis. On the other side, decision-makers report not having enough time to engage in knowledge exchange activities with researchers due to competing time demands. Long-term, sustained relationships between decision-makers and researchers would enable researchers to better understand and track emerging policy priorities and respond to decision-maker needs in a timely manner.**



*"The study was commissioned but it took too long. Actually, the conduct of HTA took I think more than a year's time, and by then the study was already the decision already was taken by the, it was Maternal Child Health Division of the Ministry."*

-Modeler, India



*"So, if...the modeled data is availed on time, then it would enable...a better response."*

-Decision-Maker, Kenya



*"So, you can do a methodology workshop where you look for ideas from them [decision-makers]. At the end of the study, you also go back to them to do dissemination workshop and get their feedback. That kind of arrangement is time consuming."*

-Modeler, Nigeria

# Strategic stakeholder engagement and involving decision-makers in the model development process

When decision-makers are consulted and engaged in developing models, it helps to build buy-in and increase the likelihood that modeled outputs will be considered in a decision process. Co-production is a way to build decision-maker trust and increase awareness and understanding of the value of using modeled outputs to inform policy and planning. It is important for modelers to build both formal and informal relationships with decision-makers and to be seen as trusted experts or partners.

*"The key success factors for COVID are the people who were involved, because they were fairly well-established national experts, which meant that people had confidence in the model and also because the modeling data was much closer to reality, because there was a first model, then the model was adjusted, so that even in terms of estimation the data was much closer. So it's really the quality of the model that was a success factor as well as the skills of the group of experts."*

-Decision-Maker, Burkina Faso

*"...In terms of engagement, having the government engaged at whatever stage but engaged in a much more not just I am talking to you and I'm telling you what to do kind of way, but in a much more ownership kind of a way always helps."*

-Knowledge Broker, India

*"Getting their trust and confidence in the first instance in the model output is often what one needs to overcome. Interpreting the models in a very clear way will enable them see through empirical evidence of what is happening in the sector or another. The approach [we used] really was to co-produce models with the actors...every Tuesday evening, the modelers were meeting with policy-makers and the programmatic people. I think that was definitely one strong strategy."*

-Decision-Maker, Nigeria

*The other one is to involve the protocol development from the beginning. Anytime you come up with a project, make sure that the Ministry people are in the protocol, they are aware what you are trying to do from the beginning...You know, to become a friend of the government teams. Volunteer to participate in the technical working groups and make sure that they know you, they can trust you, you built that rapport."*

-Modeler, Kenya

# Consistent intra- and inter-organizational data sharing and translation

Transparency and data sharing between modelers and users of modeled evidence are key in facilitating partnerships and the exchange of information. Having research institutes and knowledge brokers in the Ministry of Health with direct access to high-level decision-makers, helps to facilitate knowledge and data exchange in the Ministry. Software and databases that allow for the secure transmission of data are also critical for information sharing.



*"The fact that the Ministry has its own research centres, these are favorable factors, we meet our researchers every day, it means that we have access to their data that we can use. If we also want to seek expert advice, they are not very far away."*

-Decision-Maker, Burkina Faso



*"I think the biggest challenge has been the 'black box' issue. For groups that we work with that are open to sharing their code and reasoning behind the model structures up to the point about what assumptions they have made...that kind of transparency is great. I think the challenge has been when you have other modeling groups that are not being transparent, and they are feeding information straight to the policy makers in the absence of that transparency or critical review. Then you can end up with conflicting messages and you cannot tell when, where the problem is coming in, because it is a black box. That has been the main challenge, particularly at the start of the pandemic, before we were able to bring most of the groups together."*

-Modeler, Kenya



*"There are other organizations that collect data. WHO has offices at the state level...zonal level and...national level...they collect data too. When [our data] are not available for one reason or the other, we make use of data collected by partner agency."*

-Decision-Maker, Nigeria




*"In other cases where maybe we want to do some specific things to do with data, we partner with organizations and then we work towards some objectives. For example, if we want to create some reports, or something, we work with a partner or an organization to do that as a team. We will have, like, a working team, and you will have these meetings where we have the task, then we discuss how to do it. For example, with [a modeling organization] team, we were working on some reports on the effect of COVID on essential services and they were kind of mapping these charts, maps and trends and basically visualizations of those."*

-Decision-Maker, Kenya


# Organizational culture of evidence-based decision-making

Platforms like taskforces and committees at the federal and state department levels bring together academic/research institutions and subject experts to dialogue, debate, and apply modeled evidence in decision-making. These and other government initiatives championing evidence-based decision-making in recent years have created platforms where new kinds of evidence, like modeled evidence, can thrive.




*"More and more decision-makers at the health sector level are more and more open to the use of data for decision-making. In reality, everyone wants the effectiveness of their projects and programs. So they are looking for what has worked elsewhere, what has not worked well, also what has been found locally at the national level, so currently decision-makers are looking to know the success factors of their project."*

-Boundary Org Rep, Burkina Faso



*"Earlier they were not bothered about the evidence. But nowadays without evidence, even if they cannot take any decision, they will be questioned. And because of the nature and kind of grilling that is going through, whether it is an academic or in administrators, evidence is definitely something which they cannot ignore and they have to generate."*

-Knowledge Broker, India



*"We collect a lot of data, and our data, both the surveillance data, the process data, all the information we collect feeds into our decision-making. We are implementing our National Action Plan. So we are constantly assessing how we are performing, and part of the work we are supposed to do in the NCDC is to inform policy. It is nowhere near perfect...but we are translating a lot of things into policy."*

-Decision-Maker, Nigeria



*"I think everybody has been doing that. It is actually the cliché, the "in" thing, there is nothing you can do without the use of data."*

-Modeler, Kenya



# A Closer Look: Environmental Factors\*

*\* With a focus on the most common themes across the study countries*

# Availability of high-quality data and challenges in data structures

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**The lack of quality data and modeler access to data limits the production of models. Data are often collected by different agencies and can result in fragmented, program-specific outputs that are partial or biased and of limited value to modelers. Further, lack of communication between the modeling community and data gathering entities can lead to a misunderstanding about what is needed.**



*“One thing I understand is that you can't blame the system for not collecting useful data because people who use the data like us haven't communicated that this is what we want. There is a difference between the system, the system that is capable to collect the data, and the system that is capable to analyse it. But they haven't sat across the table and said that this is what we want.”*

-Knowledge Broker, India



*“Ah, that data, yes, that data exists, poorly labelled. There is no dictionary in some of these data sets, the answers to some of the questions, like, for example, if we are using reporting tools, the reporting tools could be saying people are answering the questions in two different ways and that also affects the...and we also have to do a lot of, ‘What do they mean by this? What do they mean by that?’ and following up. So, the data that you are working with and [it] not being great is a reality.”*

-Modeler, Kenya




*“What are you modeling? Think about it. We don't know the number of persons that are being born in this country. We don't know how many people are dying. We don't know the age distribution. So, where will the modeling data come from?”*

-Decision-Maker, Nigeria

# Sustainable funding to support development and use of models

**Sustained funding from internal government and external donor sources is needed to support researchers in generating modeled evidence in a well-established, routine, and sustainable manner; ensure intermediaries or boundary organizations are equipped with skills and tools to facilitate knowledge exchange; and promote skill and awareness building for evidence-based decision-making in government.**




*"There are times when we have to fabricate data. But if we already manage in terms of collaboration to be in contact with people who have real data, that could help us. I think this is one of our real problems and precisely it is linked to the fact that most of the models we develop are without funding. Since to have real data, you have to send people to the field to take measurements."*

-Modeler, Burkina Faso



*"And also I think funding may not be enough to do high-quality research as much."*

-Knowledge Broker, India



*"Yeah, I think the case of COVID-19 for us here, funding found us along the way. We did not start with funding from Gates Foundation, in fact Gates Foundation saw we were doing this and knew that we were an additional boost [resource]."*

-Modeler, Kenya




*"Well, practically, you know the way research is in Nigeria. It is the grant you get...that will determine whether you model or not."*

-Modeler, Nigeria


# Global movements and crises, including COVID-19

The rapidly evolving nature of COVID-19 led to widespread cooperation and use of epidemiologic modeling to inform measures to protect citizens, taken by countries across the globe. Decision-makers in ministries of health mobilized quickly to establish knowledge exchange mechanisms such as task force committees with clearly defined roles and responsibilities for stakeholders, including modelers, epidemiologists, decision-makers, and other research partners.




*"Absolutely, because it was an opportunity for us to discuss with people who are not mathematicians, we exchanged with doctors, biologists and others, people who wanted to understand what we had done...And the model was used by the ministry and ourselves, it reassured us that what we do has applications, as long as we ourselves go to the decision-makers, we go to the data real."*

-Modeler, Burkina Faso



*"There is no doubt COVID is definitely a bad thing. A whole lot of people died. But the silver lining of the cloud is that public health has been put at the forefront and the importance of investing in public health has been understood by a lot of people. So people who were not heard so much of us right now are being heard. So this is the right time to put forth and sensitize on the importance of the advantages of modeling data and things like health technical assistance and implementation."*

-Knowledge Broker, India



*"We are involved in a lot of international discussions around infection prevention and control. In the Ministry of Health, every sector is screaming, 'Data! Data! Data!' Everybody is emphasizing on the need for quality data. In WHO, NCDC, data is everybody's watchword...the fact that the world is a global village; people want to know what is happening. Anything that is happening to one country is relevant to other parts of the world."*

-Decision-Maker, Nigeria

# Research Question 2: Mechanisms that Enable Exchange Between Modelers & Decision-Makers

We observed a range of mechanisms designed to facilitate exchange between modelers and researchers in the four study countries pointing to a shared recognition of the value in bringing diverse stakeholders together to advance evidence use in decision-making through institutional structures. Except for the dedicated task forces and committees that were mobilized quickly to respond to COVID-19, these mechanisms provide a space for debating evidence in the health sector broadly, with modeled outputs featuring as one type of evidence. There is an opportunity for country actors and partners to build on the momentum of the modeling-specific activities and structures introduced during COVID-19 – strengthening what has worked well and making improvements where needed.

# Roles that facilitate translation of modeled evidence for decision-making (2022)

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Boundary Organization

# Specific mechanisms for enabling the translation of modeled evidence for decision-making (2022)

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Government Advisory Group

# Recommendations

Modeled evidence is one source of input in a public health decision process that should be situated in the broader evidence system of countries. Strengthening the use of public health disease modeling in policy and planning involves an ecosystem of actors working in alignment to improve country-level evidence systems, including funders, modelers, boundary organizations or knowledge brokers, and decision-makers. Our recommendations are tailored to these groups.



# Recommendations for Modelers

Recommendations	Why this is important
<ul style="list-style-type: none"> <li>Invest in <b>building relationships with decision-makers, both formal and informal</b> to better understand research needs and emerging policy priorities</li> </ul>	<ul style="list-style-type: none"> <li>Decision-makers are more likely to engage in discussion about research or modeled evidence with partners they trust</li> <li>Collaboration during a crisis like COVID-19 is easier when positive working relationships between decision-makers and modelers are already in place</li> </ul>
<ul style="list-style-type: none"> <li>Develop models that are <b>responsive to the priorities of decision-makers and the needs of public health organizations and communities</b>, and incorporate <b>local and regional data</b></li> </ul>	<ul style="list-style-type: none"> <li>The likelihood that decision-makers will use modeled outputs is higher when the model is relevant to decision needs</li> <li>Decision-makers place higher trust in local data</li> </ul>
<ul style="list-style-type: none"> <li>Engage decision-makers <b>early and throughout the process of developing models</b></li> </ul>	<ul style="list-style-type: none"> <li>When decision-makers are consulted and engaged in the process of developing models, they develop a better understanding and awareness of the role that modeling can play in informing decisions</li> <li>Continuous and iterative engagement can help to ensure the relevance of models</li> <li>Co-production can help to build trust in the relationship between decision-makers and modelers</li> </ul>
<ul style="list-style-type: none"> <li><b>Commit to communicating modeling assumptions and outputs in clear and easy-to-understand formats</b> for use in decision-making</li> </ul>	<ul style="list-style-type: none"> <li>Communication can help to improve the relevance of models</li> <li>Decision-makers who trust and understand modeled outputs are more likely to use them to inform policy and practice</li> </ul>

# Recommendations for Boundary Organizations and Knowledge Brokers

Recommendations	Why this is important
<ul style="list-style-type: none"><li>Invest in <b>building awareness of and buy-in for the use of modeled evidence</b></li></ul>	<ul style="list-style-type: none"><li>When decision-makers understand the value of using modeled evidence, they are more likely to draw on it to inform policy and practice</li><li>At a basic level, decision-makers should understand when and why they should use modeled evidence, how to frame a research question, and how to use the evidence in informing policy or recommendations</li></ul>
<ul style="list-style-type: none"><li>Create <b>spaces to review and debate evidence, iterate on models, discuss implications for a decision process</b></li></ul>	<ul style="list-style-type: none"><li>These spaces are an opportunity to bring different voices to the table and ensure varying perspectives are heard in efforts to make sense of the evidence</li><li>When decision-makers and researchers come together in a structured and routine way, the more likely their communication will improve – helping to increase decision-maker understanding of models and modeler awareness of decision-maker needs</li></ul>
<ul style="list-style-type: none"><li><b>Guide and support modelers in communicating research outputs in clear and easy-to-understand formats</b> such as policy briefs, PowerPoint presentations, checklists, and fact sheets</li></ul>	<ul style="list-style-type: none"><li>Decision-makers are not likely to make use of modeled evidence they do not understand</li></ul>

# Recommendations for Policy- and Decision-Makers

Recommendations	Why this is important
<ul style="list-style-type: none"> <li>Strengthen evidence systems, <b>including data accessibility and transparency</b></li> </ul>	<ul style="list-style-type: none"> <li>If the underlying data that are used to inform models are inaccurate, the evidence produced can be confusing to decision-makers and is less likely to be used</li> </ul>
<ul style="list-style-type: none"> <li><b>Improve coordination with the modeling / research community</b> through formal arrangements, technical working groups, or other structures</li> </ul>	<ul style="list-style-type: none"> <li>Governments have convening power to bring different partners together from government, civil society, research and academic institutions, as well as funders. Build on the engagement mechanisms that worked well during COVID19—improved coordination can facilitate routine sharing among different partners and improve the robustness of the evidence</li> </ul>
<ul style="list-style-type: none"> <li><b>Build a culture of evidence use</b> by incentivizing evidence use – strengthen capacity and promote a culture of learning</li> </ul>	<ul style="list-style-type: none"> <li>Decision-makers are more likely to use evidence, when they routinely engage with researchers and know how to find, appraise, and apply evidence</li> <li>A culture of learning that promotes iterative modeling activities helps to ensure decision-maker and community needs are prioritized</li> </ul>
<ul style="list-style-type: none"> <li><b>Increase funding</b> for public health disease modeling</li> </ul>	<ul style="list-style-type: none"> <li>To improve the use of modeled evidence in decision-making sustained support for strengthening the capacity of modelers, knowledge brokers, and decision-makers is critical</li> </ul>

# Recommendations for Funders

Recommendation	Why this is important
<ul style="list-style-type: none"> <li>• Take an <b>ecosystem approach to investing in modeling</b></li> </ul>	<ul style="list-style-type: none"> <li>• Different actors must be engaged to effectively move a model from the design phase, through creation, to eventual impact on policy. The evidence-to-decision-making ecosystem varies widely between countries – mapping the landscape and assessing its strengths and limitations is an important first step for an effective investment.</li> <li>• This approach is also useful for identifying existing capacity, including knowledge translation efforts – building on existing structures can help avoid duplication and ensure ownership and sustainability.</li> </ul>
<ul style="list-style-type: none"> <li>• <b>Fund policy-engagement activities flexibly</b>, not just the production of models, as part of grantmaking</li> </ul>	<ul style="list-style-type: none"> <li>• Policymaking is relational – relationships are critical to ensuring models are relevant and decision-focused. It takes time to build relationships but often this aspect of policy work is not funded which can signal that it is not valued.</li> <li>• Decision-making processes are often messy and unpredictable. Flexibility in grantmaking that also acknowledges what it takes to build relationships, would enable modelers to support critical decision windows as they arise.</li> </ul>
<ul style="list-style-type: none"> <li>• <b>Center country research priorities and strengthen country evidence infrastructures</b></li> </ul>	<ul style="list-style-type: none"> <li>• Strong data and research systems are needed to support overall use of evidence in government. Modeled evidence is one source of evidence in a decision process – when evidence systems are stronger, modeling activities are likely to be stronger as well.</li> <li>• A focus on country-level research priorities and agendas will ensure relevance and help to strengthen data systems and other needed inputs.</li> </ul>

# Limitations

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- The research teams relied on their knowledge and networks to recruit participants into the study and may have missed other key individuals in the modeling-to-decision-making ecosystem.
- Survey response rates were low\*
  - Response rates from women in particular, were low, and thus their views are under-represented in the survey
- The research teams were unable to interview several of the key informants who participated in the survey, and as such could not further explore their responses through KIIs
- We found insufficient documentation on modeling in some of the study countries

\* Burkina Faso: 74% overall survey response rate; 65% survey response rate from women versus 77% from men  
India: 59% overall survey response rate; 39% survey response rate from women versus 70% from men  
Nigeria: 53% overall survey response rate; 20% survey response rate from women versus 91% from men

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# Appendix 1: Methods

# Rapid Literature Review: Modeled Evidence and Barriers to Use

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**Modeled evidence**: This project focused on mathematical models that **simulate different potential health scenarios**, including scenarios around disease transmission, and/or the impact of different policy interventions on health outcomes.

- Modeled evidence can be a **valuable tool** for helping decision-makers choose between **complex trade-offs**.
- The inability to draw on the best available data to inform public health decision-making, including modeled evidence, can result in losses in **efficiency, effectiveness, and impact**.

However, decision-makers do not always use modeled evidence for reasons including:

- **Lack of policy-relevant models**
- **Perception** that models are **too complex to understand** or based on too many assumptions
- **Lack of communication** about modeling needs, findings, and assumptions between decision-makers and modelers



# Activity Timeline

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Workstream	Sept 2021	Oct 2021	Nov 2021	Dec 2021	Jan 2022	Feb 2022	Mar 2022	Apr 2022	May 2022	June 2022
Landscaping Research										
Survey Research										
Working Group Meetings										
Interview Research										
Synthesis										

# Methodology

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Country	Survey Respondents	Survey Response Rate	Key Informant Interviewees
Burkina Faso	54	74.0% (54/73)	25
India	55	59.1% (55/93)	25
Kenya*	-	-	9
Nigeria	38	52.8% (38/72)	24
<b>Total</b>	<b>147</b>	<b>61.8% (147/238)</b>	<b>83</b>

The research teams applied a mixed-methods approach including a desk review, surveys, and in-depth key informant interviews with over 200 decision-makers, modelers and brokers of modeled evidence across their country's modeling-to-decision-making ecosystem.

*\*The smaller scope of work in Kenya was added closer to the end of the research plan to provide additional experience in another country, and thus no surveys were conducted and fewer KIIs were conducted by the research team.*

# Working Group

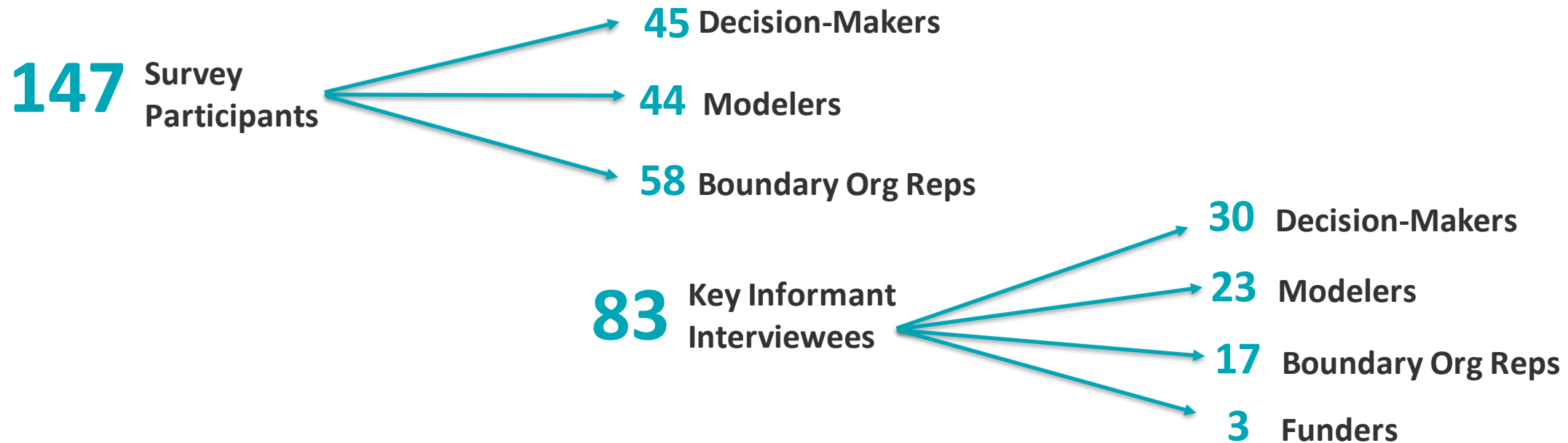
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The project Working Group represents stakeholder groups in the four research countries. Members were selected by the country research teams and all play key roles in the modeling-to-decision-making ecosystem in their country. Members:

- **Root the research** in country contexts and priorities
- **Provide a platform** for country actors to learn from the experiences of other members
- **Share feedback** with donors and other global partners about good practices for enhancing access to and use of high-quality modeled evidence for country-level decision-making

# Survey and KII Processes

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- Survey and KII participants (some overlap) were identified through stakeholder mapping and snowball sampling
- Semi-structured interviews were conducted virtually over Zoom or phone
- A pre-defined codebook was used across all interviews
- Interviews were coded and analyzed in NVivo and QDA Miner Lite

# Participants

Participant	Decision-Maker				Modeler				Boundary Org Rep			
	BF	India	Kenya	Nigeria	BF	India	Kenya	Nigeria	BF	India	Kenya	*Nigeria
Survey	15	13	-	17	20	10	-	14	19	32	-	7
KII	7	7	5	11	7	6	4	6	11	12		4
Gender	Female				Male				Other			
	BF	India	Kenya	Nigeria	BF	India	Kenya	Nigeria	BF	India	Kenya	Nigeria
Survey	11	13	-	8	43	42	-	30	0	0	-	0
KII	6	5	3	4	19	20	6	20	0	0	0	0
Level	Local/Regional				National				International			
	BF	India	Kenya	Nigeria	BF	India	Kenya	Nigeria	BF	India	Kenya	Nigeria
Survey	4	16	-	10	34	29	-	27	16	10	-	1
KII	4	14	0	3	15	7	6	18	6	4	3	3

\* The Nigeria team also interviewed 3 informants from funding organizations

# Research Questions

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The goal of this study is to develop a shared understanding of what it means to be an effective boundary organization – the **traits and functions that facilitate research-to-policy collaboration and exchange in public health.**

- 1. Understand a range of factors** at various levels (from the individual level to the ecosystem level) that **facilitate or inhibit exchange between decision-makers and modelers.**
- 2. Evaluate partnership structures that support evidence translation** including but not limited to knowledge brokers and boundary organizations in target countries to deeply understand the challenges they face, what they are doing well, how they are learning, and where they need support.
- 3. Offer recommendations to inform changes** to funding approaches, organizational structures, and practices including evaluative thinking and learning, and country or global policies that may better enable decisions to be informed by the best evidence possible.

# Appendix 2: Summary Country-Specific Findings (see [country reports](#) for further detail)

# Key Findings in Burkina Faso



## HIGHLIGHTS

### Context

- Nascent use of models to inform public health decisions in Burkina:
  - Limited capacity to produce models and communicate results in accessible formats
  - On decision-maker side, there is limited capacity to make sense of and apply modeled evidence to decision-making
- Growing recognition in government of the value of using modeled evidence and commitment to strengthening use, following collaborative partnerships and successful use of models during COVID-19

### Evidence-to-policy mechanisms

- Knowledge Management and Transfer Unit (UGTC) in the Ministry of Health (MoH)
- Government advisory groups such as Estimate HIV and the COVID-19 thematic group
- Government agencies such as the Performance Management and Results Unit (UGPR) and the Directorate of Monitoring, Evaluation and Capitalization (DSEC) that have a mandate to collect data and produce evidence for sharing with decision-makers
- Advocacy organizations like RAME (Réseau d'Accès aux Médicaments Essentiels) and AGIR (Action Gouvernance Intégration et Renforcement)

For more details see Burkina Faso country report, [here](#).

## Summary

The use of modeled evidence to inform public health decision-making in Burkina Faso is nascent. However, during COVID-19, models were used to inform management and treatment protocols, with the Ministry of Health establishing a formalized COVID-19 thematic working group to bring together research experts, modelers, and decision-makers, including representatives from the Ministry of Education and the Institut des Sciences des Sociétés (INSS). The working group was chaired by partners (many of them professors) from academic institutions.

Other working groups that facilitate the use of modeled evidence include the HIV Estimate working group. Members of the working group comprise nearly all of the stakeholders involved in HIV care in Burkina Faso, including the family health directorate, the sectoral program to combat HIV, and the national HIV council that serves as the lead for the group. Other members include UNAIDS and UNICEF. On the research side, key government partners include Institut National de la Statistique et de la Démographie (INSD), INSS, and Institut de Recherche en Sciences de la Santé (IRSS). The Estimate HIV group meets annually. According to one informant, the working group presents results and proposals for taking action, often in the form of reports and scientific publications, to a functional committee in the MoH that includes technical experts and financial partners.

In addition, the Ministry of Health, through the recently established Institut National de Santé Publique (INSP), has its own research center that works to ensure timely responses to public health problems. During COVID-19, INSP played a key role in bringing together researchers and decision-makers to guide the government's response and coordinate information sharing. While several other national research institutes and universities produce scientific evidence to inform public health decision-making, they have limited experience and expertise in mathematical modeling. The Performance Management and Results Unit (UGPR) and the Directorate of Monitoring, Evaluation and Capitalization (DSEC), located with the Direction Générale des Etudes et des Statistiques Sectorielles (DGESS), also support evidence production. The DGESS is responsible for coordinating all aspects of health data planning and management and cooperation with technical and financial partners as well as health financing aspects and monitoring of projects and programs. Finally, several of the decision-makers interviewed for the study indicated a preference for local data as a source of inputs in models, stating that researchers who are most proximate to the problem and country context are best positioned to produce relevant results.

In 2017, the MoH established the Knowledge Management and Transfer Unit (l'Unité de gestion et de transfert des connaissances, UGTC) to support the translation of evidence to inform policy and programmatic decision-making. Informants describe the Unit as having limited success for reasons that include a feeling among decision-makers that researchers are in direct competition for power, limited resources, and a reluctance to support new knowledge translation approaches.

Advocacy organizations like RAME (Réseau d'Accès aux Médicaments Essentiels) and AGIR (Action Gouvernance Intégration et Renforcement) call attention to salient policy issues, conduct research and create fora for decision-makers to engage with researchers and civil society, although with limited use of modeling. They engage decision-makers through deliberative/seminar workshops, feedback workshops, and by distilling results into easy-to-understand policy briefs for decision-making.

The West African Health Organization (WAHO) supports capacity development through regional training workshops and webinars to improve pandemic surveillance and management. There is little funding for modeling activities from the government, with most of the funding coming from WHO.



# Key Players Named in Interviews and Desk Review: Burkina Faso



Key Players	Modeling Orgs	Boundary Orgs	Decision-Makers
<p><b>Key Players</b></p> <p><b>Local</b></p> <p><u>Parastatal Bodies</u></p> <ul style="list-style-type: none"> <li>• Institut des Sciences des Sociétés (INSS)</li> <li>• Institut National de la Statistique et de la Démographie (INSD)</li> <li>• Centre National de Recherche et de Formation sur le Paludisme (CNRFP)</li> <li>• Institut de Recherche en Sciences de la Santé (IRSS)- one of four specialized research institutes within Centre Nationale de la Recherche Scientifique et Technologique (CNRFP)</li> <li>• Centre Muraz</li> <li>• Centre de Recherche en Santé de Nouna</li> <li>• Centre des Opérations de Réponse aux Urgences Sanitaires (CORUS)</li> </ul> <p><u>Universities</u></p> <ul style="list-style-type: none"> <li>• Université de Ouagadougou</li> <li>• Université Norbert Zongo</li> <li>• Université Nazi Boni</li> <li>• Université Joseph Ki-Zerbo</li> </ul> <p><b>Regional</b></p> <ul style="list-style-type: none"> <li>• West African Health Organization (WAHO)</li> <li>• WHO Afro</li> </ul> <p><b>International</b></p> <p><u>Universities</u></p> <ul style="list-style-type: none"> <li>• London School of Hygiene and Tropical Medicine</li> <li>• University of Basel (Switzerland)</li> <li>• Johns Hopkins University / Jhpiego</li> </ul> <p><u>Non-Governmental Orgs</u></p> <ul style="list-style-type: none"> <li>• Avenir Health</li> <li>• Institute for Disease Modeling</li> </ul>	<p><b>Types of Modeling</b></p> <p>A range statistical (e.g., Bayesian) and epidemiological models are used.</p> <p><b>Data Sources</b></p> <p>UNAIDS, UN Population Division, DHIS, WHO, UNDP, Ministry of Health / Department of Statistics</p> <p><b>Sector/Disease Areas</b></p> <p>Modeling publications within health seem to be focused on Ebola, malaria and COVID-19, though modeling is commissioned/used for HIV and TB as well.</p> <p><b>Int'l Collaborations</b></p> <p>Local universities coordinate and collaborate with universities in HIC, primarily in the US, UK, France, Switzerland, and Belgium.</p> <p><b>Capacity</b></p> <p>While there has been focus on developing capacity for public health generally, there does not appear to be a robust pipeline for developing modeling expertise in country. WAHO supports capacity development through regional training workshops and webinars to improve pandemic surveillance and management. This includes direct support to decision-makers to guide them through a synthesis of modeled evidence. Experts have noted the lack of capacity for modeling generally, and for using the strategic priorities of policy decision-makers to inform/tailor the research process.</p>	<p><b>Key Players</b></p> <p><b>Local</b></p> <p><u>Knowledge Translation Mechanisms</u></p> <ul style="list-style-type: none"> <li>• HIV Estimate Working Group</li> </ul> <p><u>Governmental and Parastatal</u></p> <ul style="list-style-type: none"> <li>• General Directorate of Health Information and Statistics (DGISS)</li> <li>• Knowledge Management and Transfer Unit, Ministry of Health</li> <li>• Institut National de Santé Publique (INSP)</li> </ul> <p><u>Non-governmental</u></p> <ul style="list-style-type: none"> <li>• Réseau d'Accès aux Médicaments Essentiels (RAME)</li> <li>• Action Gouvernance Intégration et Renforcement (AGIR)</li> </ul> <p><b>International</b></p> <ul style="list-style-type: none"> <li>• West African Health Organization (WAHO)</li> <li>• Evidence-Informed Policy Network (EVIPNet) – network established by WHO</li> <li>• African Population and Health Research Center (APHRC) West Africa – regional office in Senegal</li> <li>• Supporting the Use of Research Evidence (SURE)</li> <li>• UNICEF</li> <li>• UNAIDS</li> </ul> <p><u>Non-governmental organizations</u></p> <ul style="list-style-type: none"> <li>• Health Policy Plus (focus seems to be on family planning and on COVID-19 in Burkina)</li> <li>• Avenir Health (focus seems to be on family planning in Burkina)</li> <li>• MEASURE Evaluation</li> <li>• IntraHealth</li> </ul>	<p><b>Modeling Focus and Capacity</b></p> <p>Very limited, primarily driven by COVID-19 pandemic.</p> <p><b>Sector/Disease Areas</b></p> <p>Health, especially infectious diseases including COVID-19, HIV/AIDS, and TB + One Health approach to zoonotic disease surveillance. Additionally, modeling is used for environmental and population/migration research.</p> <p><b>Reach of Engagement</b></p> <p>Primarily focused at the national policy level and regionally in the case of WAHO and its partners.</p> <p><b>Int'l Involvement</b></p> <p>International involvement beyond ECOWAS seems limited, as coordination is primarily through West Africa regional efforts (i.e., through WAHO) for coordinated epidemic response.</p>
<p><b>Regional Engagement</b></p> <p>Regionally, WAHO has developed epidemiological models to help improve the response to COVID19 in the region. This information has helped WAHO management to tailor its support to the needs of countries through collaboration with national coordination in stitutes. Additionally, WAHO is developing communities of practice to support knowledge/evidence exchange for improved decisionmaking (Sombié et al.). While WAHO is headquartered in Burkina Faso, much of the regional engagement occurs through ECOWAS member states such as Senegal and Nigeria.</p> <p>The recent launch of APHRC West Africa in Dakar will further support regional capacity strengthening and policy engagement incountries across the West Africa region (APHRC).</p> <p>The World Bank has been another major player in cross-border collaboration in the West Africa region, as the Ebola outbreak spawned the development of the Regional Disease Surveillance Systems Enhancement (REDISSE) Program in 2016 to support a coordinated approach to epidemic preparedness and response.</p>			

# Key Findings in India



## HIGHLIGHTS

### Context

- Robust modeling ecosystem and use of modeled evidence at the federal level by the Ministry of Health and Family Welfare and at the sub-national or state level by Departments of Health.
- Key producers and users of modeled evidence include:
  - The federal Department of Health Research (DHR) whose mandate includes promoting and coordinating basic, applied, and clinical research
  - The Indian Council of Medical Research (ICMR), funded by the government through the Department of Health Research, Ministry of Health, and Family Welfare. ICMR has a network of national and regional Institutes across India, with well-developed modeling capacity.
  - The Department of Science and Technology in the Ministry of Science and Technology and parastatals like the Regional Resource Centers for Health Technology Assessments (HTAs) and Jawaharlal Nehru Center for Advanced Scientific Research that commission models and use outputs to inform decision-making
  - Academic and research institutions like the Indian Institutes of Technology (IITs), Indian Institutes of Management (IIMs), Public Health Foundation of India (PHFI), and its affiliate institutes, Administrative Staff College of India (ASCI), are also core actors in the modeling ecosystem
- Several factors constrain the use of modeled evidence including the perception in government that research timelines do not align with decision-maker needs, competing priorities and political interests that de-prioritize use of modeled evidence, and gaps in the communication between the producers and users of modeled evidence

### Evidence-to-policy mechanisms

- Health Technology Assessment India Secretariat (HTAI), put in place by the Department of Health Research (DHR) to facilitate the uptake of HTA (Health Technology Assessment) in partnership with regional resources centers and technical partners
- National Taskforce (NFT) for COVID-19
- State Taskforce for COVID-19

For more details see India country report, [here](#).

## Summary

India has robust capacity in developing models to inform public health decision-making at the federal and state levels – both epidemiological modeling for infectious and non-communicable diseases and economic modeling for health systems research. Modeled evidence is used to inform decision-making in TB, HIV, Malaria, COVID-19, non-communicable diseases, among other areas as well as economic/cost-effectiveness modeling for Health Technology Assessments

Many of the country's academic institutions have mathematics departments that support and are helping to build a pipeline of disease modelers.

At the federal level, within the Ministry of Health and Family Welfare, the Department of Health Research is a key producer and user of modeled evidence. Within the Department of Health Research, in turn, the Indian Council of Medical Research (ICMR), and its vast network of national and regional institutes develop epidemiological models to inform decision-making in infectious and non-communicable diseases. The Department of Science and Technology in the Ministry of Science and Technology and parastatals like the Regional Resource Centers for Health Technology Assessments (HTAs) and Jawaharlal Nehru Center for Advanced Scientific Research are also key partners in commissioning models, analyzing, translating, and using data outputs to inform decision-making.

At the State level, the Indian Institutes of Technology (IITs), Indian Institutes of Management (IIMs), academic institutions like Public Health Foundation of India (PHFI) and its affiliate institutes, and Administrative Staff College of India (ASCI), also commission and develop models for use in decision-making.

The Health Technology Assessment India (HTAI) Secretariat led by the Department of Health, brings decision-makers together with academic and research partners to facilitate HTA, with modeling used as a tool to inform policy questions. HTAI's support at the federal level, networks at the regional and state level, and the space it provides for decision-makers and researchers to work jointly to understand policy challenges have helped to establish it as a mechanism for collaborative evidence production, translation, and use. Many of the organizations and initiatives undertaking modeling generally also support knowledge translation activities.

The National Task Force for COVID-19 launched by the Ministry of Health and Family Welfare in March 2020 was a rapidly established mechanism for bringing together public health and epidemiology experts from within and outside of government to inform the national response to the pandemic. The Taskforce used modeled evidence to better understand the pandemic trajectory, and health system surge capacity, among other areas, and inform the government's management response. Notably, state-level task forces also used models for pandemic management, with the State of Kerala working in partnership with Cambridge Judge Business School as one example.

Government efforts to strengthen capacity include, "working trainings" that brings together researchers to develop modeling capacity through the collaborative development of a model, often in partnership with international organizations like the Cochrane and Campbell Collaboration training and Center for Global Development International Decision Support Initiative (iDSI). This helps to develop capacity, encourages transparency and collaboration, promotes government leadership in modeling

Funding for modeling activities is mostly provided through government institutions and research grants by ICMR, the National Centre for Disease Control (NCDC), the Ministry of Health, and State Departments of Health. External funding for modeling comes from the World Health Organization (WHO), the World Bank, and the Bill & Melinda Gates Foundation, and several international NGOs (Non-governmental organizations) including the International Decision Support Initiative, and Jhpiego and mainly supports academic and research institutions like PHFI. ACCESS Health International and other boundary/knowledge broker organizations.

# Key Players Named in Interviews and Desk Review: India



## Modeling Orgs

### Key Players

#### Local

##### Non-governmental organizations

- Public Health Foundation of India (PHFI) + its network of public health institutes across the country + its four centers of excellence
  - Affiliate Administrative Staff College of India (ASCI)
- ACCESS Health International

##### Government organizations

- Ministry of Health and Family Welfare
  - Department of Health Research / Indian Council of Medical Research (ICMR) – National Institute of Malaria research; National Aids Control Program
  - National Institute of Epidemiology (Chennai, Tamil Nadu)
- Department of Science and Technology (DST), Ministry of Science and Technology

##### Parastatals

- Jawaharlal Nehru Centre for Advanced Scientific Research

##### Academic

- Indian Institutes of Technology
- Indian Institutes of Management
- Wide range of universities, e.g., University of Kolkata, Madras Institute of Technology, University of Delhi

#### International

##### Non-governmental organizations

- Stop TB Partnership
- The Center for Disease Dynamics, Economics, and Policy
- The George Institute for Global Health (IHME collaborator)
- Burnet Institute (earlier multi-modeling work with TB-MAC consortium at LSTHM)

##### Academic partners

- U of Michigan School of Public Health
- Oxford University
- Imperial College

### Types of Modeling

A wide range of dynamic, statistical, and epidemiological models

### Data Sources

HMIS, Ministry of Health and Family Welfare

### Sector/Disease Areas

COVID-19, TB, HIV/AIDS, malaria, non-communicable diseases, cost-effectiveness

### Capacity

Capacity appears to be high; many academic institutions have mathematics department that support disease modeling

## Boundary Orgs

### Key Players

#### Local

##### Non-governmental organizations

- Public Health Foundation of India; PHFI also convenes the Keystone initiative (a network of health systems actors and researchers)

##### Parastatals

- Jawaharlal Nehru Centre for Advanced Scientific Research
- Regional Resource Centers for Health Technology Assessments (HTAs)
- Health Technology Assessment India

##### Government advisory groups

- Indian SARS-CoV-2 Genome Sequencing Consortia (INSACOG)
- National Task Force for COVID-19
- State task forces for COVID-19

#### International

- Stop TB Partnership
- The Center for Disease Dynamics, Economics, and Policy
- Access Health International
- Cochrane (capacity development)
- Campbell (capacity development)
- Center for Global Development International Decision Support Initiative (iDSI)

### Modeling Focus and Capacity

The Public Health Foundation of India seems to be biggest player, but it does not have a specific modeling focus

### Reach of Engagement

Mainly national level, but growing capacity at state level currently limited by subnational data availability.

## Decision-Makers

### Key Players

#### Government organizations

- Ministry of Health and Family Welfare
  - Department of Health Research
  - Indian Council of Medical Research (ICMR)
  - National Institute of Malaria research
  - National Aids Control Program
- Department of Science and Technology (DST), Ministry of Science and Technology

### Funders

#### Local

- Ministry of Health
- State Departments of Health
- National Centers for Disease Control
- Indian Council of Medical Research (ICMR)

#### International

- WHO
- World Bank
- Jhpiego
- FCDO
- Wellcome Trust
- BMGF
- USAID
- UK Medical Research Council
- Center for Global Development International Decision Support Initiative (iDSI)

# Key Findings in Kenya



## HIGHLIGHTS

### Context

- History of collaboration between research and academic partners who develop models and the Ministry of Health (MoH)
- Several knowledge exchange mechanisms embedded in MoH to facilitate exchange between research partners and decision-makers
- Limited capacity and awareness of the value of using modeled evidence among decision-makers
- Lack of quality data constrains use and performance of models
- Funding for modeling mainly comes from external partners; while the Kenyan government funds the Kenya Medical Research Institute (KEMRI), the extent to which resources are used for modeling is unclear
- Limited funding for research partners to develop models and strengthen capacity in any sustained or ongoing way

### Evidence-to-policy mechanisms

- Embedded structures in the MoH
  - Specialized committees such as task forces, technical working groups, committees of experts, and research subcommittees
  - Formal, ad hoc partnerships between the MoH and external research partners, that are established to address a specific issue

For more details see Kenya country report, [here](#).

## Summary

Many of the policy decisions taken by the Government of Kenya to inform prevention, control, and management of COVID-19 cases, including whether to impose lockdowns and curfews and ban international travel, were informed by modeling studies. The heightened use of modeling during COVID-19 helped to increase the acceptance of modeling as a key tool for decision-making, more generally. “Parachute modelers”, typically from international consultancies, who approached different arms of government with their services during the pandemic, only served to create confusion and fragment decision-making processes.

Prior to the spread of COVID-19, research and academic partners developed models to address specific health issues, such as the eradication of rabies. They worked jointly with the MoH to support policy formation and health regulation and established close working relationships by aligning their research agenda with the Ministry’s annual work plan, even pursuing joint applications for research grants. In other instances, the MoH invited collaboration from research partners to address a specific evidence need.

The MoH uses formalized, embedded mechanisms to bring research and decision-making partners together to co-create research questions and review findings. Examples include specialized committees such as task forces, technical working groups, committees of experts, and research subcommittees. These structures give researchers access to the highest levels of decision-making at both the political and technical levels of the government where decision-making authority and power reside, helping to increase the likelihood that evidence is used in decision-making. Several factors contribute to the success of these mechanisms, including the Ministry of Health’s leadership, oversight, and consensus building approach that helps to ensure policies are not driven by sectarian interests.

In the context of recent COVID-19 modeling activities, a culture of transparency and data sharing between modelers and users of modeled evidence has helped to facilitate partnerships and the exchange of information. When modelers share their codes along with the reasoning and assumptions behind the models, it builds trust and increases the likelihood that decision-makers will use the evidence that is produced to make informed decisions.

On the other hand, the complexity of models, the time needed to develop them, the limited capacity of decision-makers to understand and apply modeled evidence, and the many time demands on decision-makers have challenged the MoH’s engagement mechanisms.

Many of the research partners who participate in the MoH’s formal engagement mechanisms conduct knowledge translation activities to ensure the evidence they produce is relevant, timely, and appropriate for decision-making, including co-production of research questions and the production of plain language briefs. Examples of these organizations include the Center for Environmental Modeling and Application (CEMA), KEMRI, KEMRI-Wellcome Trust, Amref Health Africa, and the Clinton Health Access Initiative (CHAI).

The main funders of modeling activities in Kenya include the Bill & Melinda Gates Foundation, National Institute for Health Research (NIHR), Norwegian Fund, Foreign, Commonwealth and Development Office (FCDO), Global Fund, Government of the Netherlands, United States Agency for International Development (USAID), and the European Union. The Kenyan government funds KEMRI and the country’s public universities but does not offer funding for modeling to private sector organizations or private universities. However, the extent to which funding for KEMRI and public universities supports modeling is unclear.

# Key Players Named in Interviews and Desk Review: Kenya



Key Players	Modeling Orgs	Boundary Orgs	Decision-Makers
<p><b>Local</b></p> <p><u>Non-Governmental Orgs</u></p> <ul style="list-style-type: none"> <li>African Population and Health Research Centre (APHRC)</li> <li>AMREF</li> <li>Center for Epidemiological Modeling and Analysis (CEMA)</li> <li>Kenyan Mathematical Society</li> <li>Kenyan Statistical Society</li> <li>Qhala</li> </ul> <p><u>Parastatal Bodies</u></p> <ul style="list-style-type: none"> <li>Kenyan Medical Research Institute (KEMRI)</li> <li>Kenyan Ministry of Health</li> <li>National Emergency Response Committee on COVID-19</li> <li>Working Groups of COVID-19 Task Force</li> </ul> <p><u>Universities</u></p> <ul style="list-style-type: none"> <li>Dedan Kimathi University</li> <li>Kenyatta University, Nairobi</li> <li>Moi University Nairobi</li> <li>Jomo Kenyatta University of Agriculture and Technology, Nairobi</li> <li>University of Nairobi</li> <li>Strathmore University, Nairobi</li> <li>Technical University of Mombassa</li> </ul> <p><b>International</b></p> <p><u>Universities</u></p> <ul style="list-style-type: none"> <li>Oxford University</li> <li>University of Liverpool</li> <li>Nagasaki Universities</li> <li>Long list of International Collaborating Universities and Networks</li> </ul> <p><u>Other</u></p> <ul style="list-style-type: none"> <li>Japan International Cooperation Agency (JICA)</li> <li>US Centers for Disease Control and Prevention (US-CDC) Nairobi</li> <li>World Bank</li> <li>WHO</li> <li>Wellcome Trust</li> </ul>	<p><b>Types of Modeling</b></p> <p>Epidemiological (Transmission dynamics—SEIR—, deterministic and stochastic; Agent-based models); Modeling of indirect impact; Economic modeling</p> <p><b>Data Sources</b></p> <p>IHME, DHIS2, UNAIDs, Population-based surveys- NDHS. Access to primary data is challenging</p> <p><b>Sector/Disease Areas</b></p> <p>Within health, they focus on COVID-19, HIV/AIDS, TB, and malaria, rabies, and other infectious diseases</p> <p><b>Int'l Collaborations</b></p> <p>WHO, UNAIDs, UNICEF, USAID, US-CDC, US-DoD; UK-FCDO; JICA, KOICA; Danish International Development Agency (DANIDA)</p> <p><b>Capacity</b></p> <p>KEMRI is the leading organization that is leading efforts to generate modeling evidence in Kenya in collaboration with researchers from universities. It has long-standing collaboration with the Oxford University and Wellcome Trust; a UK charity .</p>	<p><b>Key Players</b></p> <p><b>Local</b></p> <p><u>Non-governmental organizations</u></p> <ul style="list-style-type: none"> <li>African Population and Health Research Centre (APHRC)</li> <li>AMREF Health Africa</li> <li>Center for Epidemiological Modeling and Analysis</li> </ul> <p><u>Parastatal bodies</u></p> <ul style="list-style-type: none"> <li>Kenyan Medical Research Institute (KEMRI)</li> </ul> <p><u>Government advisory groups</u></p> <ul style="list-style-type: none"> <li>COVID-19 Task Force</li> </ul> <p><u>Universities</u></p> <ul style="list-style-type: none"> <li>Kenyatta University</li> <li>Moi University</li> <li>AMREF Universities</li> </ul> <p><b>International</b></p> <ul style="list-style-type: none"> <li>UNAIDs</li> <li>UNICEF</li> <li>WHO</li> <li>US-CDC</li> <li>USAID</li> <li>Clinton Health Access Initiative (CHAI)</li> </ul>	<p><b>Modeling Focus and Capacity</b></p> <p>KEMRI and Jomo Kenyatta University of Agriculture &amp; Technology run an MSc/PhD in 'Infectious Diseases and Tropical Medicine' which has graduated over 400 epidemiologists; the SEIR model is a basic model taught in public health programs. Two key projects that are important are:</p> <ul style="list-style-type: none"> <li>KEMRI-Wellcome Trust Research Programme</li> <li>Capacity Building Network in Biostatistics for Public Health Innovation in Kenya</li> </ul> <p><b>Sector/Disease Areas</b></p> <p>Health, especially infectious diseases including COVID-19, HIV/AIDS, and TB.</p> <p><b>Reach of Engagement</b></p> <p>Appear to focus on national or regional (Eastern Africa) policy engagement.</p> <p><b>Int'l Involvement</b></p> <p>There is strong collaboration with international partners and universities in Europe and North America and Japan. KEMRI hosts an annual scientific and health conference</p>
	<p><b>Connections to Other Ecosystems</b></p> <ul style="list-style-type: none"> <li>East African Integrated Disease Surveillance Network (EADSNNet)</li> <li>East, Central and Southern African (ECSA) Health Community</li> <li>Regional Network on Equity in Health in East and Southern Africa (EQUINET)</li> <li>WHO Africa Regional Office</li> </ul>		<p><b>Key Players</b></p> <ul style="list-style-type: none"> <li>Kenya National Bureau of Statistics</li> <li>Kenya Ministry of Health</li> <li>Kenya Ministry of Education</li> <li>Office of the President of Kenya</li> <li>County Governments</li> <li>KEMRI</li> </ul> <p><u>Key Departments of MOH</u></p> <p><b>Preventive &amp; Promotive Health</b></p> <ul style="list-style-type: none"> <li>Division of Strategic Public Health Programs</li> <li>Division of Disease Surveillance &amp; Epidemiology</li> <li>Division of National Public Health Laboratories</li> </ul> <p><b>Planning and Health Financing</b></p> <ul style="list-style-type: none"> <li>Division of M&amp;E and Health Research Development and Informatics</li> </ul> <p><b>Curative and Rehabilitation Services</b></p> <ul style="list-style-type: none"> <li>Division of Health Emergencies and Disaster Management</li> </ul> <p><b>Funders</b></p> <p><b>Local</b></p> <ul style="list-style-type: none"> <li>Government of Kenya (funds KEMRI and public Universities only)</li> </ul> <p><b>International</b></p> <ul style="list-style-type: none"> <li>the Bill &amp; Melinda Gates Foundation</li> <li>European Union</li> <li>Global Fund</li> <li>Government of the Netherlands</li> <li>Norwegian Fund</li> <li>UK Foreign Commonwealth Development Office</li> <li>UK National Institute for Health and Care Research</li> <li>USAID</li> <li>US Department of Defense</li> <li>Wellcome Trust</li> </ul>



# Key Findings in Nigeria



## HIGHLIGHTS

### Context

- Developing use of modeled evidence in Nigeria
  - Epidemiological and economic modeling activities featured prominently in the government's response to COVID-19, with the Nigeria Center for Disease Control (NCDC) relying extensively on mathematical models to understand the trajectory of the pandemic
- Several factors limit more expansive use of models:
  - Lack of capacity to understand modeled evidence due to limited engagement with models on the decision-maker side
  - Limited capacity for developing models, including resources and professional opportunities to engage with researchers to ensure policy relevance
  - Limited knowledge brokering or translation capacity in research organizations to facilitate decision-maker access to quality, timely, policy-relevant, and easy-to-understand modeling outputs

### Evidence-to-policy mechanisms

- Academic/scientific alliances, such as the Nigerian Academy of Science
- Research consortia, such as Nigeria COVID-19 Research Coalition
- Technical working groups and advisory committees, such as National Health Research Committee and the Antimicrobial Resistance Committee
- Civil society coalitions, such as the Health Sector Reform Coalition (HSRC)
- Alliance of development partners, such as the Development Partners Group for Health

For more details see Nigeria country report, [here](#).

## Summary

The use of modeled evidence to inform public health decision-making is developing in Nigeria. COVID-19 and the co-production of models through various partnership platforms like the Nigeria COVID-19 Research Coalition (NCRC) has helped to elevate mathematical modeling as a tool for policy decision-making.

NCRC was a government-led research coalition and scientific advisory group comprising partners from leading health institutions and academia – Nigeria Centre for Disease Control (NCDC), National Institute for Medical Research (NIMR), NUC (National Universities Commission), Tertiary Education Trust Fund (TETFUND), universities, and the private sector. Its role was to synthesize research evidence on COVID-19, interpret the evidence and make evidence-based recommendations to decision-makers, including the Presidential Steering Committee, Federal Ministry of Health (FMOH), NCDC and development agencies. The Coalition took a co-production approach to jointly addressing policy questions, draw on peer reviewed evidence, and relied on technical working groups to advance work on thematic priorities.

Several other mechanisms facilitate the use of evidence in decision-making, although not all specifically support the translation of modeled evidence. They include the National Academy of Sciences (NAS), which hosts convenings and consensus building dialogues to facilitate exchange between scientists and decision-makers. Notable NAS initiatives include the Forum on Evidence-Based Health Policymaking in Nigeria (2006-2011) and the Policy Review Evidence for effective working of the Nigeria health system – PREVIEW project (2011-2012). Although the Academy does not develop models, many of its members engage in modeling through other institutions and it has the technical expertise to engage in capacity strengthening activities to improve decision-maker ability to understand and use modeled evidence and communication capabilities of other knowledge brokers.

The Antimicrobial Resistance Committee (AMR), an advisory committee coordinated by NCDC is a multi-stakeholder and multi-sector committee with representation from government agencies such as the Ministry of Agriculture, Ministry of Environment, and National Agency for Control of HIV/AIDS (NACA) and international agencies such as the World Health Organization (WHO). The Committee's mandate is to review and make decisions to improve the data infrastructure for antimicrobial resistance, and to develop guidelines for infection prevention and control (IPC), and to provide a platform for learning and exchange on AMR and IPC. It is funded by the Fleming Fund, a UK (United Kingdom) aid program that uses modeled data to estimate country level AMR burden data.

Another mechanism, the Health Sector Reform Coalition (HSRC) is a powerful coalition of over 50 CSOs (Civil Society Organizations), development partners and international agencies that advocate for health reforms. It targets legislators at the national and state levels and policy-makers in ministries, departments and agencies, and facilitates retreats and workshops aimed at strengthening the capacity of legislators and policy-makers in evidence-based decision-making. The Coalition hosts policy dialogues to facilitate knowledge exchange between policy-makers and scientists and periodically produces policy papers/briefs which are disseminated to decision-makers to sustain knowledge sharing.

Another example, the Development Partners Group for Health (DPG-Health), provides a space for coordinated review of information to address emerging health needs, bringing together UN agencies, bilateral agencies, donor and civil society organizations. Members of DPG-Health, provide technical advice on health priorities through national technical committees such as the Presidential Steering Committee on COVID-19 and the National Technical Working Group on Health Financing.

The traits that make these mechanisms effective platforms for facilitating evidence to policy include relationships and access to senior-level decision-makers, ability to attract funding from external and internal sources, and deep technical expertise in strengthening the capacity of decision-makers to understand and use modeled evidence. Further, NCRC had wide representation from health organization and research partners and a mandate to synthesize evidence related to COVID-19 and use co-production to ensure policy questions align with decision-maker priorities.

Funding for modeling activities comes primarily from external sources, including the World Bank, the Bill & Melinda Gates Foundation, Foreign, Commonwealth and Development Office, UNFPA, and WHO. The government provides some funding for modeling through the Tertiary Education Trust Fund. There is no systematic approach to building modeling capacity in Nigeria, although the Nigeria Field Epidemiology Training Program which is managed and coordinated by NCDC will be establishing a training program to increase the number of Ph.D. level-trained mathematical modelers with malaria expertise based in Nigeria and localize modeling expertise to support the National Malaria Elimination Program, with funding from the Bill & Melinda Gates Foundation. Additionally, the African Field Epidemiology Network training program offers training in disease surveillance and outbreak investigation, data management, monitoring and evaluation of health programs, scientific writing, and communication to health workers.

# Key Players Named in Interviews and Desk Review: Nigeria



Modeling Orgs		Boundary Orgs		Decision-Makers
<h2>Key Players</h2> <p><b>Local</b>  <u>Non-Governmental Orgs</u></p> <ul style="list-style-type: none"> <li>Resolve to Save Lives (RTSL) Nigeria</li> <li>Pro-Health Nigeria</li> </ul> <p><u>Parastatal Bodies</u></p> <ul style="list-style-type: none"> <li>Federal Ministry of Health (FMOH)</li> <li>National Primary Health Care Development Agency (NPHCDA)</li> <li>National Agency for the Control of AIDS</li> <li>National Institute for Pharmaceutical Research &amp; Development (NIPRD)</li> <li>Nigeria Center for Disease Control (NCDC)</li> <li>Nigerian Institute of Medical Research (NIMR)</li> </ul> <p><u>Universities</u></p> <ul style="list-style-type: none"> <li>Ahmadu Bello University (ABU)</li> <li>University of Ibadan (UI)</li> <li>Covenant University Ota</li> <li>Federal University of Technology Akure</li> <li>Federal University Oye Ekiti (FUOYE)</li> <li>University of Abuja</li> <li>Nasarawa University Keffi</li> <li>National Universities Commission</li> </ul> <p><b>International</b>  <u>Universities</u></p> <ul style="list-style-type: none"> <li>University College London (UCL)</li> <li>Imperial College London (ICL)</li> </ul> <p><u>Other</u></p> <ul style="list-style-type: none"> <li>US Centers for Disease Control and Prevention (US-CDC)</li> <li>World Bank</li> <li>McKinsey (potentially a boundary org)</li> <li>Boston Consulting Group (potentially a boundary org)</li> </ul>	<h2>Types of Modeling</h2> <p>Epidemiological (Transmission dynamics—SEIR--, deterministic and stochastic; Agent-based models); Modeling of indirect impact; Economic modeling</p> <h2>Data Sources</h2> <p>IHME, DHIS2, UNAIDs, World Bank LSMS, NDHS, National Surveys for HIV/AIDS, Malaria</p> <h2>Sector/Disease Areas</h2> <p>Within health, they focus on COVID-19, HIV/AIDS, TB, and malaria.</p> <h2>Int'l Collaborations</h2> <p>WHO, UNAIDS, UNICEF, USAID, US-CDC, US-DoD; UK-FCDO; Japan International Cooperation Agency; The European Delegation; Global Affairs Canada</p> <h2>Capacity</h2> <p>Nigerian Field Epidemiology Training Programme (NFETP) -- collaboration between Federal Ministry of Health (FMOH), Federal Ministry of Agriculture and Rural Development (FMARD), Ahmadu Bello University (ABU), and University of Ibadan (UI)</p> <p>African Field Epidemiology Network</p>	<h2>Key Players</h2> <p><b>Local</b>  <u>Non-governmental organizations</u></p> <ul style="list-style-type: none"> <li>Nigerian Academy of Science</li> <li>Health Strategy &amp; delivery Foundation (HSDF)</li> <li>Solina Group</li> <li>Sydani Initiative for Int'l Development</li> <li>Health Systems Consult</li> <li>Avenir Health</li> <li>Hanovia Health</li> <li>EpiAfric/Nigeria Health Watch</li> </ul> <p><u>Government advisory groups</u></p> <ul style="list-style-type: none"> <li>National Council on Health (NCH)</li> <li>National Health Research Committee</li> <li>Antimicrobial Resistance Committee</li> <li>Health Sector Reform Coalition</li> <li>Development Partners Group for Health</li> <li>Presidential Task Force on COVID-19 (PTF)</li> <li>National COVID-19 Research Coalition (NCRC)</li> <li>Health Data Consultative Committee (HDCC)</li> <li>Geo-Referenced Infrastructure and Demographic Data for Development (GRID3)</li> </ul> <p><b>International</b></p> <ul style="list-style-type: none"> <li>UNAIDS</li> <li>UNICEF</li> <li>WHO</li> <li>US-CDC</li> <li>USAID</li> </ul>	<h2>Modeling Focus and Capacity</h2> <ul style="list-style-type: none"> <li>Currently there is no systematic approach to building modeling capacity, as this is not institutionalized although there are individual modelers/researchers based in different universities (esp mathematics, statistics, and epidemiology faculty) who do some modeling</li> <li>The African Field Epidemiology Network (AFENET) training program in Nigeria teach students basic epidemiologic modeling using the SIR Model</li> <li>Building a CoP for modeling can help</li> </ul> <h2>Sector/Disease Areas</h2> <p>Health, especially infectious diseases including COVID-19, HIV/AIDS, and TB.</p> <h2>Reach of Engagement</h2> <p>Appear to focus on national or regional (Africa) policy engagement.</p> <h2>Int'l Involvement</h2> <p>Int'l organizations such as CDC and USAID may be present during critical meetings, but the work is mostly led by local players.</p>	<h2>Key Players</h2> <p>National Council on Health          Presidential Steering Committee on COVID-19          National Technical Working Group on Health Financing          Federal Ministry of Health</p> <ul style="list-style-type: none"> <li>National Primary Health Care Development Agency (NPHCDA)</li> <li>National Agency for the Control of AIDS (NACA)</li> <li>National AIDS Control &amp; STI Control Program, Ministry of Health (NASCP)</li> <li>Nigerian Institute for Medical Research (NIMR)</li> <li>Nigerian Centre for Disease Control (NCDC)</li> </ul> <p>Ministry of Agriculture          Ministry of Environment</p> <p>Department of Health Planning, Research and Statistics (DHPRS)</p> <ul style="list-style-type: none"> <li>Coordinates the collection and archiving of all health-related data in the health sector and serves as the Secretariat of the Health Data Consultative Council and manages the Multi-Source Data Analytics and Triangulation (MSDAT) platform for curating and reporting on key health indicators</li> </ul> <p>Department of Public Health</p> <ul style="list-style-type: none"> <li>National AIDS and STIs Control Programme</li> <li>National Malaria Elimination Programme</li> <li>National TB and Leprosy Control Programme</li> <li>National NCDs Control Programme</li> <li>National NTDs Control Programme</li> </ul>
<h2>Region</h2> <p>West Africa</p>	<h2>Connections to Other Ecosystems</h2> <p>African Centre for Disease Control (ACDC); West African Centre for Disease Control (WACDC); West African Health Organization (WAHO); AUC-WHO Meeting of African Ministers of Health</p>	<h2>Funders</h2> <p>National: Tertiary Education Fund (TETFUND)          International: Fleming Fund, World Bank, BMGF, UNFPA, WHO, Foreign Commonwealth Development Office</p>		
<h2>Language(s)</h2> <p>English</p>				

# Appendix 3: Draft Monitoring Indicators for Modeling-Related Grants



# Draft Monitoring Indicators for Modeling-Related Grants

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To support the practical use and application of recommendations from the Translating Modeled Evidence for Decision-Making research, Results for Development compiled a draft list of monitoring indicators to help funders and implementers assess the progress and success of investments in modeling activities. The following slides provide suggested qualitative and quantitative indicative indicators for modeling projects that could be used by implementers for self-assessment and/or for funder results monitoring efforts throughout the life of a modeling grant.

This list was created based on the results of a qualitative study conducted with modelers, knowledge translators, boundary organizations, and decision-makers on strategies and challenges for improving the use of modeled evidence for decision-making in four countries (Kenya, India, Burkina Faso, and Nigeria) in 2021. Given the limited set of countries and stakeholders engaged in that study and its inherent limitations, this list of indicators should be considered a work in progress. We suggest that the Foundation and its partners test and iterate upon these indicators over time.

Not all the suggested indicators may be applicable to every grant. Rather, these lists should be viewed as a menu of indicator options.

# Indicative indicators for grants that aim to strengthen use of modeled evidence – Part 1: Modeling indicators (1 of 2)

Theme	Indicator	Indicator Type	Reporting Frequency
<b>Ensure Utility of Models for Decision-Making</b>	Established a MoU or a agreed on formal Terms of Reference with relevant decision-making organization outlining the scope of the project and the decision-maker's role in the model-development process, including timelines and opportunities to provide inputs to research questions, methods, assumptions, and analysis of findings.	Binary (y/n)	Once, first quarter
	Engagement plan in place to ensure model responds to salient policy questions. <ul style="list-style-type: none"> <li>Includes plan to ensure research/policy question is defined with key stakeholders at the outset.</li> <li>Plan considers awareness raising activities to ensure full engagement and inclusion of stakeholders.</li> <li>Includes plan to ensure stakeholders continue to engage in validating and iteratively shaping models.</li> <li>Plan and modeling approach aligns with decision-maker timelines.</li> </ul>	Binary (y/n), nested	Once, first quarter
	Plan in place to document assumptions and limitations of the model.	Binary (y/n)	Once, first quarter
	Describe the quality controls in place to ensure rigor of modeled outputs.	Qualitative	Quarterly
	Plan in place to ensure data sources are clear and transparently documented. <ul style="list-style-type: none"> <li>Plan includes documentation of key sources of data, identification of data gaps, and use of local, context-specific data as a starting point.</li> </ul>	Binary (y/n), nested	Once, first quarter
	Describe one way in which the input of a decision-maker resulted in a change to your research questions (include which decision-makers were involved, what input they made, how they provided the input, and how you changed the research question as a result).	Qualitative	Once, first half
	Describe one way in which the input of a decision-maker resulted in a change to your methodology or assumptions (include which decision-makers were involved, what input they made, how they provided the input, and how you changed the methodology or assumptions as a result).	Qualitative	Once, first half
	Describe one way in which the input of a decision-maker resulted in a change to your analysis of findings (include which decision-makers were involved, what input they made, how they provided the input, and how you changed the analysis as a result).	Qualitative	Once, end of project
	The model uses at least some data from the country or region it seeks to inform (may specify which data should be local).	Binary (y/n)	Once, end of project
	Publication of the model includes a description of any limitations resulting from poor quality or availability of country or regional data.	Binary (y/n)	Once, end of project
	Brief or presentation provided to the government outlining any challenges related to accessibility, quality, or formatting of country data encountered during the model development process and recommendations for improvement.	Binary (y/n)	Once, end of project
	Orientation workshop or training provided to decision-makers to enhance their understanding of modeling and their engagement in the modeling process.	Binary (y/n)	Once, first half
Describe at least one government policy or strategy that was impacted by this model. Include which findings from the model were relevant and which components of the policy or strategy were influenced by the model.	Qualitative	Once, post-project	

# Indicative indicators for grants that aim to strengthen use of modeled evidence – Part 1: Modeling indicators (2 of 2)

Theme	Indicator	Indicator Type	Reporting Frequency
<b>Communicate</b>	All journal articles are submitted to Open Access Journals.	Binary (y/n)	Once, end of project
	Model, assumptions, and data references published in publicly-accessible database or website at the country level (maybe a webpage on the modeling organization's website if no other database exists).	Binary (y/n)	Once, end of project
	At least one trained communications staff member, with a degree or certification in communications or a related field, employed on the project with at least 25% LOE.	Binary (y/n)	Quarterly
	Communications plan developed, outlining key communications activities and engagement indicators, and shared with relevant decision-makers.	Binary (y/n)	Once, first quarter
	Percent of communications budget spent to date.	Quantitative	Quarterly
	Brief summarizing model findings and recommendations in language accessible to non-researchers developed and shared with decision-makers.	Binary (y/n)	Once, end of project
<b>Organizational Considerations</b>	"Pause and reflect" session held with decision-makers to discuss the modeling process and how to further strengthen communications, processes, and collaboration between the modeling organization and the decision-makers for future projects.	Binary (y/n)	Once, end of project
	Brief developed and shared with the funder outlining challenges, successes, and lessons learned from the modeling process, with a list of changes to the process that will be made for future grants.	Binary (y/n)	Once, end of project

# Indicative indicators for grants that aim to strengthen use of modeled evidence – Part 2: Boundary organization indicators (1 of 2)

Theme	Type of Grant	Indicator	Indicator Type	Reporting Frequency
<b>Build Awareness of Models and Modeling</b>	Non-modeling specific	Number of knowledge products published that include modeled evidence.	Quantitative	Quarterly
	Non-modeling specific	List any models that have been shared with decision-makers as part of technical assistance or advocacy efforts.	Qualitative	Quarterly
	Support to a specific modeling effort	Number of decision-makers engaged in model development or dissemination efforts supported by the boundary organization (meetings, workshops, webinars, etc.)	Quantitative	Quarterly
	Support to a specific modeling effort	Number of dissemination or collaboration events (meetings, webinars, workshops, etc.) held during the model development process.	Quantitative	Once, first half of project
	Support to a specific modeling effort	Number of dissemination events (meetings, webinars, workshops, etc.) held to disseminate or discuss model results.	Quantitative	Once, end of project
<b>Create Spaces for Exchange</b>	Support to a specific modeling effort or general modeling	Number of modelers or other stakeholders participating in modeling capacity building activity [specify workshop, working training, or competition].	Quantitative	Quarterly
	Support to a specific modeling effort or general modeling	Number of modeling capacity building activities [specify workshop, working training, or competition] that engaged researchers from X DISCIPLINE [specify].	Quantitative	Quarterly
	Support to a specific modeling effort or general modeling	List any models developed at least in part through a modeling capacity building activity [specify workshop, working training, or competition].	Qualitative	Quarterly
	Non-modeling specific	Number of modeling studies uploaded to research results database.	Quantitative	Quarterly

# Indicative indicators for grants that aim to strengthen use of modeled evidence – Part 2: Boundary organization indicators (2 of 2)

Theme	Type of Grant	Indicator	Indicator Type	Reporting Frequency
<b>Create Spaces for Exchange (continued)</b>	Non-modeling specific	Number of unique views of modeling studies uploaded to research results database.	Quantitative	Quarterly
	Non-modeling specific	Number of evidence sharing activities [specify working group meetings, task force meetings, community of practice posts, or collaborative meetings] that include discussion of modeled evidence.	Quantitative	Quarterly
	Support to specific modeling effort or general modeling	Describe the level of government ownership or leadership in one model capacity building or modeled evidence sharing activity (describe the activity, the role of the government in the activity, and the support that your organization provided).	Qualitative	Quarterly
<b>Build Communication Capacity</b>	Support to a specific modeling effort	Number of communications products (knowledge products written in language accessible to non-researchers) developed in support of modeling organization.	Quantitative	Quarterly
	Support to a specific modeling effort or general modeling	Number of modelers participating in communications trainings.	Quantitative	Quarterly

# Pre-Grant Checklist for Funders Designing Modeling-Related Grants

✓	Item	If not complete, we suggest...
	Conduct a rapid landscaping of donors, decision-makers, partners, and knowledge brokers/boundary organizations relevant to the policy question.	Add this as a first deliverable for the grant to ensure that all necessary stakeholders are included in the research question and model development process.
	Consortia of partners to be included on grant have combined capacity to: <ul style="list-style-type: none"> <li>• Contribute to the model from the perspective of all relevant disciplines or engage other researchers from missing disciplines.</li> <li>• Access necessary, context-specific data.</li> <li>• Develop complex, rigorous models.</li> <li>• Regularly access all relevant decision-makers for the policy question.</li> <li>• Develop clear knowledge products accessible to a non-researcher audience.</li> <li>• Facilitate regular dissemination and communications activities targeting a broad range of stakeholders.</li> <li>• Securely store data and research materials long-term.</li> </ul>	Return to the landscaping to determine which other organizations could be engaged to meet these capacities.
	Decision-makers in-country have been consulted on the policy question to be addressed and agree that it is relevant to their work.	Have this conversation before finalizing the grant to ensure that the research is relevant to policy-makers and they are engaged in the process from the beginning.
	Grant includes dedicated budget, staff, and deliverables for communications and engagement of decision-makers.	Ask the grantees to include these in their budgets and workplans.
	Grant includes process and outcome indicators for monitoring decision-maker engagement and policy impact.	See suggestions on slides 59-62.
	(In non-existent, nascent, or developing ecosystems) Grant includes provisions to develop modeling capacity in the country and preserve learning from the modeling process.	Consider adding activities such as workshops, trainings, modeling competitions, communities of practice, building linkages to regional Centers of Excellence, sponsoring PhD/masters/certificate programs, mentorships, “pause and reflect” sessions, or evaluative learning plans to encourage capacity development, with a focus on sustainability.

# Pre-Grant Checklist for Funders Designing Modeling-Related Grants

✓	Item	If not complete, we suggest...
	Grant includes time, budget, and plans for linking to relevant knowledge-sharing mechanisms in country, such as task forces, advisory groups, and research collaboratives.	Ask grantees to develop a plan for engaging these groups as an early deliverable.
	If other partners are expected to contribute models on this topic (such as during a major health crisis like COVID-19), a mechanism is in place to coordinate this external input and ensure guidance provided to the government is clear and transparent.	Consider supporting the government to organize a coordination committee for modeling inputs on this topic. In nascent ecosystems, the government is likely to need some assistance facilitating these meetings.
	(In developing, optimizing, for flourishing ecosystems) Grant includes a preference for local or contextually-relevant data.	Lack of local data may cause decision-makers to question the relevancy of the model. Consider what local or contextually-relevant data is available to use for the model and take time to help decision-makers understand the potential the relevance of the model and its applicability to their context.
	(In developing, optimizing, for flourishing ecosystems) Grant includes a plan for identifying challenges using local or contextually-relevant data to be addressed through future government action.	Consider adding this as a deliverable, particularly if decision-makers have expressed a strong preference for local data.
	Mechanisms are in place to ensure sustainable, open access to model results and notes on methodology, data sources, and assumptions.	Consider which other decision-makers or partners may need to be engaged for the long-term storage of findings.

# Thank you!

If you have any questions or comments, please contact the R4D research team lead Leah Ewald at [lewald@r4d.org](mailto:lewald@r4d.org).