U01 Site Visit Motivating Questions

1. What do you see as key **conceptual challenges** in going from theories to useful models of infection inequity? What does it mean for these models to be useful?

Assumptions, and operationalization of variables. Because as you said- race ethnicity can become a shorthand for very nuanced, and complicated problems. To be useful- the terms of the model should be explicitly stated. Emily

One conceptual challenge I see going from theories to useful models of infection inequity is adjusting models to account for the evolution in infection inequities as they are not necessarily static and can change as a result of new population demographics, health interventions, and policy responses. (Reiden)

I think having a clear sense of what public health policy or intervention "levers" the results of the model would correspond to could be difficult when the underlying causes of infection inequity are pan-pathogen and will take years/sustained effort to mitigate. How do we have results that are succinct enough and tangible enough to drive sustained action without losing the story of what drives the inequity?

Meaningful outputs I think end up being very audience-dependent, and one of my concerns is that while recommendations for structural change may be where a lot of this goes, there isn't much in the way of obvious action that we are able to take in direct response to these insights. (Jon)

I think we also have some underbaked metaphors about the relationship between social inequity or social systems and infection more generally that can create all kinds of havoc if we don't think them through a bit more. For example, spatial analysis - which is another big focus of our work - often takes relationships between proximity and exposure for granted. But sometimes those relationships are really not the most important thing, or the relationships that do matter aren't reflected in the spatial patterning of risk because they're higher level (i.e. higher-order inequities that transcend local patterns). (Jon)

Thinking about what variables actually measure versus what we are trying to measure and interpreting them appropriately. Models are useful when the variables can be intervened on - Kelly

(Krzysztof) There seems to be this idea that models can be useful for addressing equity issues even though they are detached from "user stories"--descriptions of what specific groups or individual decision makers need to use the model for and how it is going to provide them the insight or justification for actions. I think it would be helpful to put more time into discussions of "user stories" as part of model development explicitly, to make them part of model development in the same sense that understanding model efficiency or bias is seen as critical to understanding the utility of a model.

I'm not sure if it is a conceptual challenge but it seems like communication of what results mean and how they should be interpreted, in what settings they are applicable (or not), will be difficult. In order to be useful the models should help inform preparedness so that disparities are reduced in subsequent epidemics/pandemics.
(Rebecca)

2. What are the **data gaps** that need to be closed? How close-able are they? Who can close them?

Parameter tuning/estimation for hard to measure or unmeasured variables.

Going off of Jon, we're lucky to have access to very high resolution data; however, even with the high resolution data, the data is still incomplete. (Reiden)

I think demonstrating the utility of more finely resolved data is key to closing data gaps. What do we get "wrong" when these data aren't available and how can that drive bad decisions are insights. How do we should the world doesn't end when these data are available?

We have had a lot of success working closely w/the Michigan Dept. of Health and Human Services to get access to very fine-grained data, but that may be more of an exception than a rule. Plus it may be a bit of a one-off in terms of the response to the SARS-CoV-2 pandemic. Going forward, I worry about access to fine-grained data that give information on individual attributes, etc. (Jon)

Connection between spatial and categorical data. Often it seems like it isn't possible to have both at the same time. Sometimes for privacy concerns, but somehow it seems like this could be resolved at least at certain spatial scales. Possibly state-level? It can be hard to do some of these things at federal level when states own the data. (Rebecca)

(Krzysztof) Long-running collaborations on specific data sets is often missing so when I have worked with large public health data sets there's usually little understanding of a) the amount of effort required to make data usable; b) the availability of data; c) quality of individual records as a proportion of the dataset for various fields; etc… there's also usually no available mechanism for introducing corrections over the original data.

Kelly - generally difficult to get data at spatially granular levels; slightly unrelated but I have an interest in the balance of privacy and maintaining spatial patterns that I think has more tools than people generally use but is also ambiguous due to specific institution's policies.

3. What are some of the ***organizational* or *institutional* impediments** to making necessary change to the ways we operationalize infection inequity in models?

I would like to see more community engagement with infection inequity modeling and connect models with the individuals being included in the modeling. - Kelly

- I think this is an important direction things should be going in, particularly wrt defining targets for prevention and intervention in a way that is sensitive to on-the-ground needs. I also wonder how we then get this information to flow in the right direction, and how you square community-defined needs with broader public health goals and ethics. This is definitely something that is quite big in the community-based participatory research field, but not many of those folks have been in the ID modeling world. There is also something of a tradition of participatory mapping/medical geography that might have some clues. (Jon)

Starting somewhere when the data/use cases aren't perfect is an impediment. Starting to incorporate inequity into models means we're going to run into limitations but we have to convince people to start somewhere or we'll end up in the same place we started this pandemic.

Data sharing is going to be an institutional impediment because it semes like getting data consistently by more resolved vulnerable demographic groups in real-time is going to be a challenge in the short and long-term. What data sources are going to be available that can help inform these models in near real-time?

This is more of a stylistic impediment, but I think the ODE, compartmental framework - which works so well for lots of things - is kind of constraining. This is particularly true because it tends to have us focus on time-series as the most important outcome wrt dynamics, and then data that don't fit well in that mold are somewhat un-modelable. On top of that, fitting ODE-style models to more granular data can lead to something of a curse of dimensionality problem from a computational and can also sort of 'overtax' the data to the point that it is hard to know what we can learn from them. (Jon)

(Krzysztof) The concept of "data ownership" detached from any responsibility to use the data… prioritizing internal data use because someone "owns" the analysis.. Lack of institutional understanding of basic things like metadata or mechanisms for handling corrections and cross-checking data. Barriers between organizational levels that make it hard to discover actual "user stories" that might be actionable if addressed as a model.

Different owners of data. State vs. federal, government vs. industry. Mistrust or unease about having data used in ways that are not well founded. Cost of data. (Rebecca)

From both an international and national perspective, healthcare systems can be fragmented, which can make it even more difficult to close the gap to include marginalized and vulnerable populations. (Reiden)

4. Any other thoughts/considerations about how to get the **most equity bang for our modeling effort**?

One big question for Rebecca & Matt is how to frame these questions and analyses to have them be useful for making an impact on the policy side of the fence? I think there is a value in being on the outside and doing some fist-shaking but obviously the goal is to facilitate these changes as well. (Jon)

There is a large health equity initiative at CDC. I think it is in relatively early stages, but more defined agency- and division-level priorities may be on the horizon. There is also interest in communicating with modelers to see what kinds of questions are answerable. Communicating (before undertaking research) about what information would be useful in terms of policy, communication campaigns, etc. I think will be a useful avenue to ensure that results are used. E.g., I've been asked something roughly like - whether models could inform how much of a reduction in disease burden type X could be averted if there was mandatory sick leave of 5 days. I think there's a gap in communicating what is and isn't possible and on what time scale. Answering specific questions of interest may help grease the wheels in terms of data sharing and collection? (Rebecca - on behalf of myself not CDC)