

[COVID Information Commons \(CIC\) Research Lightning Talk](#)

[Transcript of a Presentation by Dan O'Brien \(Northeastern University\), April 14, 2021](#)



[Title: \*RAPID: Infection Transmission of COVID19 in Urban Neighborhoods\*](#)

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*Slide 1*

Getting started: so, Inequitable Consequences of Uneven Vaccination Intentions. I'm presenting this work on behalf of myself but also my colleagues Qi Wang and Alina Ristea from Northeastern University also affiliated with the Boston Area Research Initiative which is a center that worked there and Russell Schutt and the progress from UMass Boston Center for Survey Research.

*Slide 2*

So jumping in here, right, this doesn't need too much preamble being that all the talks are about COVID, but this is the Boston globe headline from March 11th last year: shutdown, right? Everything shuts down right the world shuts down and like everyone else on this panel, the question that struck me after a few days was how does an academic center help? Right, what do we do to contribute in this moment? And especially because I myself, unlike some of the others, I'm not a public health researcher, I'm not an expert in disease transmission and so then what do we do?

*Slide 3*

Right so what we decided very quickly was we needed to be a data support system in a pandemic. We needed to bring together as much information as possible to understand the social and individual dynamics that were shaping and being shaped by the pandemic. And so this included a neighborhood survey on COVID experiences, social distancing, and risk exposure and understand how these varied by

neighborhood. This was funded by an NSF RAPID grant. Case records I'm sharing with the Boston Public Health Commission related to the survey, but giving us access to the case records themselves. We access mobility flows from cell phones much like Dr. Gao's work using things like safe graph and cubic data to approximate networks of exposure and activity patterns. And we built on an existing NSF grant to build what's called the Boston Data Portal which we extended to a COVID in Boston Database for Research and Teaching and we gathered basically every administrative and internet gathered data set we possibly could over the course of a four month period including 311 calls, 911 calls, building permits, tax assessments, craigslist postings, Airbnb postings, Yelp reviews and some others. And that's actually publicly available that's been published and people can access that at will and please do.

#### *Slide 4*

So what did we do with that then, right? We want to have impact and so we've written some academic papers as well that are in the pipeline or under review but we really went whole hog on public reports to try to have impact locally so we published eight of these for inequities in navigating a pandemic, one on fear and ambivalence towards the virus, another one on economic impact, another one on how lifestyle ideology context influencing people's social distancing behaviors and attitudes, another on vaccination planning and hesitancy, one on physical and mental health impacts across communities, one that I'm going to speak about today: the inequitable consequences of vaccination intentions, and last one a little bit different from others, the responsibility of the large landlord addressing the impending eviction tsunami people have been talking about once the CDC moratorium goes there. So, we want to have public impact and so all of these are out, there they're all published, they're all up on our website, the center's website and also in preprints, but today I just want to kind of wrap up by showing one example of something we did that really brought together all of these data sets on the inequitable consequences of vaccination intentions.

#### *Slide 5*

And so the whole premise here was vaccination is the light at the end of the tunnel right? It's what we're going through right now and we hope it ends the pandemic or slows it down enough that we can return to some form of normal, but lots of Americans are hesitant about getting vaccinated. And this, especially in January and now as well too, especially concentrating communities of color. Those communities that were most impacted by the pandemic also are the ones most hesitant about getting vaccinated. And then the question was can we quantify the consequences and I put this picture in here because it's just so illustrative. About six to eight weeks ago, Boston opened a new vaccination center in the heart of Roxbury, which is kind of the cultural and historical hub of the black community in Boston and this was the line on opening day. Very few people showed up and as you can notice half of them were white and came from other neighborhoods because they heard there were appointments. So how do we quantify this?

### *Slide 6*

We ran a simulation model, a pretty traditional susceptible infection recovered model, probably very similar to what Dr Gao was working with, but we added in mobility-based transmission and then we incorporated a vaccination rollout that we assumed would take three months and we defined communities as zip codes in Boston plus 104 municipalities in the region. And then in order to make this happen we used multiple data sources. We used historical infection cases to estimate transmission recovery rates. We use historical mobility data to estimate cross-community transmission, and then we took our survey and we looked at people's responses about vaccination intentions and we split those by race and we had responses that were yes, no, and maybe and what we did in the model was we allowed people who said maybe to be persuaded to yes based on how many people in their neighborhood had been vaccinated at that time. So, then what do we learn?

### *Slide 7*

So, the first discovery was bottlenecks and vaccination. We've been seeing that on and off the last few months, right? All communities had a bottleneck everywhere. Further vaccination at that point depends on persuasion. You can see this in the graph where there's this kink right here around 45, around 50 days or so for most communities but if you notice right this dotted line here is for communities of color and they hit the kink more around 40 days, right, about 15 days before predominantly white communities. So, it arrives earlier and this has a double whammy effect where not only do you hit it earlier and therefore make less progress you have less persuasion because you have fewer people vaccinated at that point, according to the assumptions of the model and so you fall further behind in those communities.

### *Slide 8*

Second was consequences for infections, right? Infections remain higher and persist longer in communities of color so the gold lines here are under a circumstance with no vaccination as you can see it's just sort of off to the races and again the dotted line is communities of color quite a bit higher but the blue green line is with vaccination, you see, you know, eventually vaccination really does have impact but that dotted line is still above the other lines and considerably so for quite a while and takes longer to reach the asymptote at the bottom. And if we look at the cumulative impact of this right we get basically a layer cake, right, your green lines here are communities of color and they are seeing way more total infection over the course of the simulation than your purple lines which are communities that are predominantly white.

### *Slide 9*

And last herd immunity, right, so we estimated herd immunity as reaching a point where there is fewer than one infection in the community and what we see is stark disparities in the attainment of herd immunity but the average difference of 45 days between predominantly white communities at the top and high Black-Latinx communities at the bottom, and depending on how you play with the assumptions

in the model which I can talk more about offline, it only gets worse right and even the best case scenario only narrows this by about 10 percent, and so you're seeing a real challenge in getting to an equitable outcome.

*Slide 10*

So, in conclusion vaccination will lead to herd immunity for everyone but there will be inequities in getting there and we're seeing that play out right now. Bottleneck in vaccination is critical for all communities and this is a logistical challenge but also a messaging challenge - how do we get out ahead of the bottleneck? And the last one is a need for well-crafted compassionate messaging and it turns out that the biggest hurdle was not the maybes, it's the nos. It's the percentage of people who are saying absolutely not, because they can't be persuaded according to the model and I love this picture and I end on it because this is a prominent black minister in Boston, and in January he sat down and he got his vaccination publicly videotaped so he could show to his community that this was safe and that this was something that needed to happen and I think the attitude we have to take towards this is not, you know, blaming the communities that are having difficulty determining whether this is something they feel safe with, but really reaching out to them and the challenges they're facing in order to bring everyone to the, you know, herd immunity in the end as it were. So thank you and happy to answer any questions offline.