I would now like to introduce our next Speaker, Doctor Saad. Omer. Doctor Omer has conducted studies in the United States, Guatemala, Kenya, Uganda at the opia, India, Pakistan, Bangladesh, South Africa and Australia. Doctor Omer's research profile includes Epidemiology, respiratory viruses such as influenza, RSV, and more recently COVID-19. He is a director of the Yale Institute for global health and associate Dean of Global Health Research Doctor Omer.
Thank you for being here.

It’s my pleasure to present, and I will share my slides.

I’m assuming everyone can see my slides.

Correct Fatma Yes Yeah.

So it’s my pleasure to present some of our work in on this topic on the topic of COVID-19.

Broadly, I will focus on our group in both Yell Institute for Global Health and my more immediate research group.

Has been focusing on a bunch of things, but this presentation will focus on somewhat interdisciplinary, quantitative research on code 19.
But before I start, I just want to step back and talk about when there is an outbreak when there is a so-called once in a century of event. Educational institutions and research institutions should think about their role actively. We’re not Jackson Labs. We’re not scripts who have their own position in the ecosystem of discovery and deployment. We are not the CDC. We’re not a health Department. We are an educational institution and educational institutions have
to be responsive both in terms of their research and some of the other activities to emerging. Issue so one way of looking at what educational entities do is the Inter. Logically to say that the appropriate ness of our actions and our responses to public health emergencies are judge irrespective of their impact. I don’t think that’s that’s an important thing. Part of a University, so you know we should ask why someone is looking at zebrafish biology? Because it serves as well that if you
don’t ask those questions earlier on, we benefit from that kind of free thinking and. Go taking where going. Whether our curiosity takes us, but in a pandemic we have to be decidedly consequentialist. We have to say Watt, the time we are spending the things we’re doing and the research questions we’re going after. How does that contribute to our response to this? This event I would say of unimaginable proportions. It is not unimaginable. So a lot of people. Part of it talked about.
It worked on it. So I will go through a series of questions, so I'll take the so called Socratic approach to discussing what we have been doing. The first question is what was the whole country in the world shut down and the immediate question was even in March when this was started in early March in most a lot of places, or actually mid March 2nd week of March, when there was imposition of these lockdowns or social distancing measures and then bye.
Date March the question was was this?

What are these policies working?

So we did two projects around there.

The first of all we contacted the CEO of one of the apps that is out there.

It's called the mobility index.

It's called the city mapper app because it combines both the IT combines the trips taken through public transportation and private transportation and trip planning etc.

So they have.

Calibrated this mobility index of 41243 cities.
data that you’re looking at, and then we got those data. The other one was look at cell phone data that tells us with some minute detail where people are spending time and there are more advanced users of data that we’re working on. So the second part of the work, the cellphone based data, came out of collaborations with Eli furniture. I’ll pause here for a second, so the consequentialist approach. Tells us that you don’t start with a question and work backwards, but start with a question and work backwards, putting the discipline first.
and so I hope these snapshots and examples will convey that if you start with a question you don’t stay within your own research group, certainly, but also not in a single school or two schools or even an institution. Broadly speaking, you work with people who have the interest and something to offer and combine forces in producing some of these outcomes. So the first thing was actually more immediate. So this was blood by amine Malik. One of my post docs and we did a very
quick analysis and we did statistical

This is graphic representation

So this is by cities and if you look

So this was on March 28th that we did

So this was on March 28th that we did

So this was on March 28th that we did

So this was on March 28th that we did

So this was on March 28th that we did

So this was on March 28th that we did
depending on the baseline compared to the baseline for a day. Even before these orders were implemented and it was almost universal across continents etc. With these data were available, however, there was an effect. Overall effect of mobility decrease after using this measure after social distancing policies were implemented. Then with this cell phone based data that I talked about, we were able to look at time spent at home in the US and we try it stress testing these data in terms of these trends which were apparent earlier on.
But just what the interesting part was, whether we looked at New York or Poker Tellow, Idaho or Arkansas, or Atlanta or Vermont, this these are the counties we had some pretty interesting trends, so they worked at first of all the change in behavior is the increase in time spent in home preceded some of these policy actions and this dark line anchors this work on the policy action and the imposition. Uh, of these lockdowns and social distancing measures.
00:06:54.220 --> 00:06:57.181 But there was also an effect and
NOTE Confidence: 0.909674286842346
00:06:57.181 --> 00:07:00.068 impact of the number of cases
NOTE Confidence: 0.909674286842346
00:07:00.068 --> 00:07:01.586 in the community,
NOTE Confidence: 0.909674286842346
00:07:01.590 --> 00:07:03.562 but there was differential
NOTE Confidence: 0.909674286842346
00:07:03.562 --> 00:07:06.027 that was the difference between
NOTE Confidence: 0.909674286842346
00:07:06.027 --> 00:07:08.047 Metropolitan areas in rural areas.
NOTE Confidence: 0.909674286842346
00:07:08.050 --> 00:07:10.594 The rural areas where going for
NOTE Confidence: 0.909674286842346
00:07:10.594 --> 00:07:12.939 the local cases and Metropolitan
NOTE Confidence: 0.909674286842346
00:07:12.939 --> 00:07:15.729 areas where tracking the added
NOTE Confidence: 0.909674286842346
00:07:15.729 --> 00:07:17.961 effect was tracking and
NOTE Confidence: 0.899560809135437
00:07:18.045 --> 00:07:21.456 there was a bit of a crowding out effect.
NOTE Confidence: 0.899560809135437
00:07:21.460 --> 00:07:24.730 That we’re tracking national cases.
NOTE Confidence: 0.899560809135437
00:07:24.730 --> 00:07:27.190 And so that’s an interesting observation.
NOTE Confidence: 0.899560809135437
00:07:27.190 --> 00:07:28.423 And that’s rational,
NOTE Confidence: 0.899560809135437
00:07:28.423 --> 00:07:30.478 and that works through.
NOTE Confidence: 0.899560809135437
00:07:30.480 --> 00:07:32.835 The phenomenon of availability heuristic
00:07:32.835 --> 00:07:36.067 in psychology that we just the probability
00:07:36.067 --> 00:07:38.874 of events by how vividly they are
00:07:38.874 --> 00:07:41.091 covered and so availability heuristic
00:07:41.091 --> 00:07:44.114 was working and it’s rational to say
00:07:44.114 --> 00:07:46.134 that Metropolitan areas were actually
00:07:46.134 --> 00:07:49.000 linked more than non Metropolitan area.
00:07:49.000 --> 00:07:52.108 So they were tracking national cases whereas.
00:07:52.110 --> 00:07:54.684 Rural areas and on Metropolitan areas
00:07:54.684 --> 00:07:57.452 were tracking local cases and that has
00:07:57.452 --> 00:08:00.298 implications on when we open up and long
00:08:00.298 --> 00:08:02.738 term strategies for social distancing.
00:08:02.740 --> 00:08:05.899 The second thing was that a lot of us
00:08:05.899 --> 00:08:08.427 working with populations and governments
00:08:08.427 --> 00:08:11.985 and policymakers outside the US as well
00:08:11.985 --> 00:08:15.420 as inside the US an the testing in the US
has gone up substantially and will go up.

This testing is load University but in low income countries.

That those limitations are even more stark, and therefore the testing capacity is a little bit more long term,

so you know you can always use a little bit of interdisciplinary work where you could look at,

you know what what is happening and what are some of the approaches.

But before I get to that, as I’ve been saying,

there’s a cottage industry of plans to open up America in the world.

Ours was shared initially in late March,
it came out as part of a peace in JAMA where,
Extensive testing and contact tracing.
Reduced reduction of household transmission.
An additional treatment options will
be said is going to help US Open up
America safely, but now you know,
You know several program plans have since
come out for the Rockefeller plan, the.
Eh, I plan.
This one is published, I think April 4th.
So and so forth.
So there are multiple plans
that are out there.
One thing that is shared is testing and contact tracing. And so how do we optimize it in one way? And I’m sure at Kaplan was done brilliant work on this in the more sort of. Local and domestic settings will talk about that in more detail. One strategy that we figured out would be too for government, specially in low income countries, is pool testing and so this was a little bit of massive working with an economist at the awesome Center for International Development at Harvard and for Han is from magic.
00:10:00.705 --> 00:10:03.241 is an economist based out of Rice and
00:10:03.318 --> 00:10:05.684 the three of us combined forces and
00:10:05.684 --> 00:10:08.535 looked at said that there is lab based
00:10:08.535 --> 00:10:10.789 information that says that you cannot
00:10:10.789 --> 00:10:13.225 pull up to beyond a certain level,
00:10:13.230 --> 00:10:14.682 which is entirely appropriate.
00:10:14.682 --> 00:10:18.384 But can we do a bit of math to figure out
00:10:18.384 --> 00:10:21.219 who to test in low resource settings?
00:10:21.220 --> 00:10:23.754 So this is one example of that,
00:10:23.760 --> 00:10:26.058 and we found that even at.
00:10:26.060 --> 00:10:27.820 The at lower prevalence levels
00:10:27.820 --> 00:10:29.580 we can find a lot
00:10:29.653 --> 00:10:31.998 of efficiencies by pool testing.
00:10:32.000 --> 00:10:35.555 Even a full size is as low as 10,
00:10:35.560 --> 00:10:39.124 and as as soon as you increase them hire.
That would be of pretty high level of efficiency.

We also prioritize is based on some network modeling approach, which I’m not showing here in the interest of time that for low resource settings, looking at figuring out who has a high degree node.

In a network and prioritizing them actually gets you a lot of bang for your Buck, especially when the boxer shorts.

And then what do you so?

A lot of these interventions are as much about human behavior as they are about the behavior of the virus itself.

So very earlier on, we focused on
what does the US population think.

So we did a population representative survey.

Did an online survey online

servers have gotten better.

We paid a lot of attention

of representative samples.

So there. We not be.

It won’t be able to stratify them

by a lot of characteristics,

but overall it was fairly representative.

We did robustness checks and

this was done on February 8th,

2020,

so before a lot of the features

before doctor found,
she became a household name and that would be relevant in the next slide we asked a bunch of questions, but I’m showing a bunch of. Pieces of data there on February 8th, they told us when we asked them who should be in charge of America’s COVID-19 outbreak response. People said the CDC director, the director of NIH and then followed by the president and the Congress was, I think 1.5% what they were saying. They did not know the name of the direction of the NIH or the director of CDC, but where they were telling us it should be a scientist.
LED response.
The other thing we asked them, whose advice would you?
Trust the most and we found that it was that the top Dewar Healthcare Professional which is common to all sorts of other phenomenon. A lot of our study, for example vaccines, but CDC ranks fairly low in terms of vaccine information source, but CDC and NIH were right up there and we have repeated these surveys, etc. We are analyzing it for this as well, but going back to some of the other questions.
So how can we control the COVID-19 outbreak?

Sorry for the typo in confined spaces and the reason why we are thinking about that.

Is a lot of these micro level and a lot of the policy decisions as we open up our micro level decisions, companies, dorms, residential colleges in a certain 300 over University for example, and cruise ships.

So the first thing we started attacking with a postdoc amine and Sam Jenness who is a close collaborator based at Emory. Collaborating on some of the other
00:13:36.428 --> 00:13:39.018 stuff we said look the best model.
00:13:39.020 --> 00:13:42.170 The best source of data we have right now is
00:13:42.245 --> 00:13:44.177 from Diamond Princess Anne.
00:13:44.180 --> 00:13:47.231 If we could because there was a lot of
00:13:47.231 --> 00:13:49.231 reporting over reporting because there's
00:13:49.231 --> 00:13:52.669 a lot of other cases were not that high.
00:13:52.670 --> 00:13:54.878 We know a lot of details,
00:13:54.880 --> 00:13:57.463 so we sort of through with with
00:13:57.463 --> 00:13:58.948 another graduate students, etc.
00:13:58.948 --> 00:14:00.082 Katy Villa brand.
00:14:00.082 --> 00:14:03.141 We really did God really detailed data and
00:14:03.141 --> 00:14:06.005 we figured out that there were two networks.
00:14:06.010 --> 00:14:09.293 Uh, that were a small world networks
00:14:09.293 --> 00:14:11.900 that were existing side by side,
00:14:11.900 --> 00:14:15.977 the staff and the passengers and we said OK,
but they are interacting so
they have their own dynamics,
their own degree of mixing etc and
they are interacting with each other.
And again from the beginning.
The idea was that we work it out for
Diamond Princess and then that serves as
a template for other confined populations.
So these are initial results.
So we did we doing model,
and these are work in progress.
That network, log downtime etc is.
The earlier use stop the interaction
between the two networks,

the better control that you

have on the outbreak.

The other thing is,

you know we are in a situation

where going forward we’re going

to have a lot of decisions we made

based on the idea that we have to

symptomatic San asymptomatic.

So how can we innovate in the

context of imperfect data?

So there are two lines of

NOTE Confidence: 0.887116014957428
inquiry that we started.

They are existing surveillance systems too.

All to our surprise that CDC frankly wasn’t

When is influenza like in Leicester

A negative I’ll I there has been

A change in healthcare behavior

in terms of seeking care for

respiratory illness,

which is can be accounted for

and we depend through that.

And the other thing is sewage.

Essentially sludge based surveillance,

and for that again work.
Starting with the problem and working backwards. So this sort of these ideas came out with.

Discussions with at Kaplan and then subsequently we reached out to Jordan patio what it came out of was that a lot of us were observing that very early around. There was evidence that at least viral name was being excreted in feces. Then the question was if it’s being excreted in the feces, is it detectable in sewage or sludge, etc? Because there other attractive
part interactive part was.

That the world does this kind of surveillance, including and low income countries for polio.

So there is this muscle memory and the ability to do this in this kind of a situation.

So the first thing is that these data for flu influenza.

So we created standardized these scores and we found that this can be a leading indicator even adjusting for imperfections and testing and sort of honing in places.
where we had some confidence. Uh. Can be a leading indicator for monitoring.

Kobe 19 deaths and incidents. These are the data this should come out in a bio archive fairly quickly, and what we found a few things in from the sewage and such data. And then there was a.

I would be remiss if I don’t recognize the, uh, the dedication of not just Jordan Pescia from the school of engineering, but the medical students who collected specimens on a daily basis, and they’re pretty trying circumstances. Obviously each is approved,
etc from sewage medical students
and graduate students as well
as native grew by in his lab.
Being a collaborator,
the AG station folks being apart of it,
this is a true collaborative project
That the we can identify this RNA
the size of the outbreak,
from sewage sludge that tracks well
with the size of the with the.
The trends in the outbreak and
can serve as a leading indicator
for cases by 5 to 7 days.
There is other preliminary work
that says that you can quantify
the size of the outbreak,
but I am a little bit more sceptical of that part right now because we need to calibrate that a little bit more. But as those indicators, so this has resulted already in the city, contacted us and Jordan will be providing weekly information to the city of New Haven. But also I've been working with the World Bank to expand this. Uh, and piloted in at least two countries. Countries in large Metropolitan areas, as well as smaller areas. So then what is the acceptance of vaccines, We're talking about vaccines, but vaccines if not taken,
are pointless, and so we looked at that and we predicted that there is a lot of variability and we had sort of a predictive model based on demographics. So we calibrated this and said, can we create a risk map based on directly asked questions? But calibrating it again based on demographics to identify higher risk areas and that’s. What some of this work? This is fairly recent, like a couple of days old, and this will be coming out fairly soon. The other thing is we don’t want
to be in a situation in vaccine distribution where governor's are fighting over vaccine like they did on some occasions on PE.

So what we did was I worked with one of my keyboard mantis, who happens to be at the is a geography Republican geographer at UNC. Although matter and we looked at the what are the risk groups that we know? What are some of the other population characters characteristics we know and we came up with this map for. Distributing in placing vaccines and we have 5 version of it.
Based on the policy goals.

So if you have mortality reduction is your policy goals,

this is very your situation,

distribution centers etc and distribution based on the underlying and if you have it for transmission and so and so forth.

The other thing is how do people mix during during an outside? Pandemics has been a question, so I’ve had a narrow one and a CDC grant so we repurposed it and so there are three 4 size the first original one with through STD CDC grant is workplace, the second is home,
particularly low income countries,
and then we have a supplement which is likely to get funded for health care
workers that we’re tracking them using RF ID technology, and the idea is.
Uh, do, and with consent this has been there and we have an anthropologist in the team who has done the heavy lifting on acceptability and all sorts of stuff.
That is that people are guessing now about the acceptability of other kinds of contact tracing and these are the Maps that we will be creating.
This is from a previous study of Contacts.
between different kinds of people,

not just 8 bass mixing.

How can be facilitated vaccine development?

There's all sorts of studies that are going on leveraging our health worker cohort that several people came together and establish to evaluate cordless of protection and severity. Advanced phase getting ready for advanced phase clinical trials and focusing on vaccine access. The last thing is that University of a unique responsibility to make sure lessons learned during this pandemic are remembered for centuries. So the first thing is public scholarship.
This was. This is an op Ed.

I wrote in the New York Times that came out right after the when the count was, I think one or two in the US and the title was is America ready for another outbreak? And the answer was no, but you can do a few things and I warned about not consequences of scientists not taking the lead. No false assurances, and it was very clear that if you give false assurances, there’s a trust diversion it trust compliance will be low. And then scientific and public
misinformation.

Was the thread that a lot of us saw coming.

And as you know, in the public discourse,

I think what the day before yesterday.

There’s another op Ed,

that that was published,

and I wrote highlighting.

Look what is going to happen

day after tomorrow.

This is not the last big outbreak

on unfortunately not even the

last pandemic that will happen

in this country in this world.

And so the idea is to focus on

CDC reform based on lessons now.
And and and because CDC remains our best defense against Japan damage, but as an educational institution, it’s our responsibility to make sure that we pass on this knowledge to our students and minties. So being Brown restart to a few of us to say that, can we create options for students elective, so we paired with myself, Doctor Sheila she noise from adults, Student volunteers came together worked on the higher terms of in ID and three students.
the blooms taxonomy so that their education is not compromised in the middle of a pandemic and we were very encouraged in our initial evaluation approximately 86% says that the course achieved its stated aims and similar 87% of students said that it would recommend this course through the classmates because we obviously measured and then you know the efficacy. But the best way to pay back to this privilege of being part this privilege is to pay it.

forward and and I’ve had the privilege and a lot of us have had the privilege
to invest in the next generation of interdisciplinary scientist. So they range from left to right of faculty member who’s about to join my existing entities about to join Yale as an associate professor in Zaidi to medical students, post graduate students, and all of them, and so these are the ones only the select ones that have directly contributed to the work I have shown. And that’s the most incredibly gratifying part of a lot of this work, so I’ll.
In a seminar that you know found that on it was surprising, unfortunately highlighted on the years full of Medicine website, the root page and and I'll repeat it, universities have a privileged position in civilization. We're guardians of knowledge for future generations. We are what we are learning now through science, through experience. Through policy we will pass on to our students are manatees and future scientists, so I'll end with the expression. No pressure, no pressure. My academic friends.
This is a responsibility.

Thank you very much.