Hi everyone thanks for coming.

And this will be our last seminar of this Spring semester (indistinct)

in the house and I’m very pleased to introduce you

Dr. Jaime Madrigano. Dr. Madrigano is currently associate professor at Departments of house and engineering.

Jaime has made her research focus is environmental and social determinants of health.

Jaime uses logical method to report policy her research was informing the development of the 2017 New York City meters.

$106 million here adaptation, which I talk a lot about in my own class.

So you’ll see to see behind the core neighborhoods New York City project,

she also serves on the USEBA board of counselors and the International Society.

It sounds like they’re having a hard time hearing you.

Oh, if I’m going to wait,

can you hear us now?
25 00:01:27.900 --> 00:01:29.400 <v Mauro>That’s better, Kai thank you.</v>  
26 00:01:29.400 --> 00:01:31.748 <v ->Okay then maybe you need to stay here.</v>  
27 00:01:31.748 --> 00:01:32.907 <v ->Okay that’s okay.</v>  
28 00:01:32.907 --> 00:01:35.609 <v ->So without further ado, </v>  
29 00:01:35.609 --> 00:01:38.026 lets welcome Dr. J Madrigano.  
30 00:01:42.310 --> 00:01:44.100 <v ->Thank you so much Dr. Chen</v>  
31 00:01:44.100 --> 00:01:46.143 and it’s really great to be here.  
32 00:01:47.520 --> 00:01:49.500 I really appreciate the invitation.  
33 00:01:49.500 --> 00:01:52.310 It’s been a wonderful morning so far,  
34 00:01:52.310 --> 00:01:56.150 meeting some faculty and trainees and I really appreciate  
35 00:01:56.150 --> 00:01:59.490 having the chance to talk a little bit about my work.  
36 00:01:59.490 --> 00:02:02.670 So as Dr. Chen said, I’m Jaime Madrigano,  
37 00:02:02.670 --> 00:02:04.740 I’m currently at the Johns Hopkins Bloomberg  
38 00:02:04.740 --> 00:02:06.540 School of Public Health.  
39 00:02:06.540 --> 00:02:08.528 And there I’m in the Department of Environmental Health  
40 00:02:08.528 --> 00:02:09.600 and Engineering.  
41 00:02:09.600 --> 00:02:13.980 And I also lead the environmental challenges focused area of  
42 00:02:13.980 --> 00:02:15.280 the Bloomberg American Health Initiative,  
43 00:02:15.280 --> 00:02:20.280 which is really working to integrate our research practice  
44 00:02:20.400 --> 00:02:24.630 policy and education at the school and in kind of five  
45 00:02:24.630 --> 00:02:29.630 leading health areas that are that, that America is facing.  
46 00:02:30.330 --> 00:02:33.120 So today I’m gonna talk about my work  
47 00:02:33.120 --> 00:02:34.800 in climate change and health,  
48 00:02:34.800 --> 00:02:38.550 how some of this work has been used to inform policy
and just a couple of points broadly about how I think we can think about climate and health research being used to inform policy. Okay so please feel free online, I’m trying to stand close to the computer so that you can hear me well. But just let us know if there’s any issues that come up.

Okay. So I often like to start out my lectures with this motivating slide. And I realized when I was looking at it this morning, it’s actually quite dated. So it makes me feel kind of old, but I actually think it is still very relevant and still very valid that climate change is the biggest global health threat of this century. And I strongly believe that and you know, we certainly have been facing many global health threats, but I think the thing about climate change is it really spans across all kinds of disease outcomes. So, you know, we really have been dealing with the COVID pandemic and infectious disease, but we know that climate change is changing the prevalence.
But not just that we know that climate change is impacting chronic diseases in the elderly. We’re seeing pediatric populations dealing with the brunt of climate change in ways we’ve never seen before. So I’m sure you’ve had a lot of great discussions in this seminar about all the broad range of health effects of climate change. I’m not gonna bill to cover that all today, but I’m gonna specifically talk about some of my work related to heat and health impacts of heat and environmental health disparities related to heat. So speaking of heat as an epidemiologist, I generally look at historical heat waves and occurrences of temperature fluctuations and compare those to health outcomes and see associations between those weather phenomena and adverse health consequences. But what does that mean really for climate change? Well we know that these weather phenomena, they have been changing over the last several decades. So this is data from the US Global Change Research Program and this shows that over the last six decades
we’ve seen a very consistent increase. This is data from 40 large cities within the US of kind of characteristics of the heat season. So we’ve seen that the average number of heat waves have gone from about two on average per year to about six or more per year. And the same kind of pattern with the length of the heat season. We’re seeing just a longer duration of when we might have these very extreme heat events. And so what we we know is that those patterns are continuing to get to worsen and when we can look at historical data and see the adverse health consequences associated with extreme heat events, then we can kind of project into the future about what we might continue to expect as these weather phenomenon patterns continue to change. We’re really already seeing that the health impacts, particularly mortality, which has been studied a lot that are associated with these extreme heat events, they’ve already been, impacted by climate change. And this is a referenced from the multi-country, multi-city collaborative research network. I think Dr. Chen is involved in that.
Some other faculty at Yale. And I just thought this, I don’t know if you actually were involved in this paper, but this is a really nice paper that came out a year or two ago and again, it’s not one of my studies, but I like to show this because I think it was a great paper. One of the first to really show attribution. So what was shown in this paper is they looked at, the last three decades of changes in temperature and kind of disentangled what the temperature would’ve been had we not been undergoing climate change and what the temperature really was according to the historical record. That’s the difference between those red and orange lines, you can see there. And then they were able to kind of parse out how much of the deaths that we see during these heat wave events over the last few decades in many countries around the world. You can see the map where data were pulled from, how much of those were due to that differential, to that temperature change that is associated with an
146 00:07:26.350 --> 00:07:27.810 anthropogenic climate change.
147 00:07:27.810 --> 00:07:32.810 And they showed that there were about 37% of the deaths in
148 00:07:32.850 --> 00:07:35.460 the warm season were attributable
149 00:07:35.460 --> 00:07:37.470 to that anthropogenic climate change.
150 00:07:37.470 --> 00:07:40.590 So the point I just wanted to make with this slide
151 00:07:40.590 --> 00:07:43.080 is to say that this isn’t just a future problem,
152 00:07:43.080 --> 00:07:46.890 this is a problem that is impacting us has been for decades,
153 00:07:46.890 --> 00:07:50.370 people die every year from extreme heat and this is already
154 00:07:50.370 --> 00:07:52.470 worsened because of climate change.
155 00:07:52.470 --> 00:07:56.670 And you know, without kind of mitigation and adaptation,
156 00:07:56.670 --> 00:07:58.803 we expect that to continue to worsen.
157 00:08:01.140 --> 00:08:04.100 Okay, so now that everyone may be depressed,
158 00:08:04.100 --> 00:08:06.210 what can we do about it?
159 00:08:06.210 --> 00:08:08.610 So we know that, you know,
160 00:08:08.610 --> 00:08:11.850 as I’ve shown plenty of other studies have shown heat waves
161 00:08:11.850 --> 00:08:12.683 are deadly.
162 00:08:12.683 --> 00:08:16.650 But there are some things that we can try to do to mitigate
163 00:08:16.650 --> 00:08:18.420 those health impacts.
164 00:08:18.420 --> 00:08:20.130 So there are heat warning systems.
165 00:08:20.130 --> 00:08:24.100 Many communities implement these to put into place a wide
166 00:08:24.100 --> 00:08:26.100 variety of measures.
167 00:08:26.100 --> 00:08:29.520 Now the studies that have looked at these in a rigorous way
168 00:08:29.520 --> 00:08:33.150 have really shown mixed, mixed results.
169 00:08:33.150 --> 00:08:36.270 We don’t know really if these are really effective in saving
lives during heat waves.
There’s been kind of mixed data in some locations it seems
they have been effective and others they haven’t been.
And there’s, there’s discussion around this discuss like,
why limelight did that be the case?
Well one reason is implementation after heat warnings
is very different from community to community.
What’s actually done?
But another question is,
is the temperature threshold that triggers that warning,
is it really appropriate to that local community?
Sometimes it’s based on a regional forecast.
And so in some places people have used the epidemiologic
data from that community.
So particularly in New York City they did this
where they actually changed the threshold
to trigger that warning based on epidemiologic study
and they showed that that did help
to prevent hospitalization after that change was made.
So that’s something we can do in terms of public health
research where we can try and use local contextual data to
better understand what are appropriate thresholds
to trigger warnings.
We can also think about urban form.
Where should we implement more green space or think about reflective groups to maybe lessen
that urban heat island.
But the question is where to target those?
You know, there’s only a finite amount of money usually.
And so we wanna target those in the places that could most benefit and seek to gain the most
health benefit in particular.
It might be in the parts of the city that are hottest, but that might not be where people are living.
So we really need to know where people are impacted the most.
And the same thing with other types of, you know, social and financial supports.
We really wanna think about who can benefit most from these types of programs and how we can get resources to those populations and neighborhoods.
So that brings me to some of the work I wanted to talk about that I’ve done in New York City.
And this was a study that I did quite a while ago,
but it really has informed a lot of work that I've done
since then and continue to do, which I'll talk about a little bit after that.
But I wanted to set the stage with the study and this was a study on heat vulnerability in New York City.
So when I started this work, what was noon already
I was collaborating with people at Columbia University as well as the New York City Department of Health
and Mental Hygiene.
And with those collaborators at the New York City Department
of Health, they had already really looked at the burden of heat on health in New York City.
And they had found that they really started to see severe health impacts of heat so rises in mortality when the heat index,
which is a combined temperature and humidity metric,
exceeded 95 degrees Fahrenheit over a couple of days.
So a prolonged period of that high heat index.
So they kind of knew where they wanted to start thinking
about that was their threshold
where they’re seeing health impacts.
But what they didn’t know was where specifically within
New York City, which is very large and diverse city,
should they be targeting resources and what populations were most at risk.
That was where our collaboration came in and we really wanted to again,
determine individual and neighborhood characteristics that increased the likelihood of dying during a heat wave.
and then use that epidemiologic data, that health informed data to create a heat vulnerability index for New York City.
And we felt that we could really make the strongest case for policymakers to use that if we had the health data.
to back up our recommendations. So we did that with a case only study, a case only design is a kind of a nice efficient way to look at an effect modifier. So if you’ve already understand the relationship between an exposure and an outcome as I said, this relationship between heat and mortality was already pretty well characterized in this community, but you really wanna look at some of those third variables that might tighten that relationship.
You can use a case only design and really look at the
So we were able to do that with about over 200,000 deaths in New York City over a period of just over 10 years where we looked at all of the deaths that occurred in the warm season and we tried to understand what factors were increasing vulnerability. We defined heat waves as according to this definition that was already established by the New York City Department of Health times when the heat index heated 95 degrees Fahrenheit for at least two days. And then we tried to think about, okay, how do we define vulnerability? We like to think about three components of vulnerability, what’s increasing exposure? This might be something in the neighborhood that maybe makes the heat greater in one part of the city versus another. What might make a person more sensitive, maybe their age or medications that they’re on and what could give a person adaptive capacity so that they could withstand the heat. And that gets into things like maybe financial resources or other things.
The problem is of course we didn’t have all the ideal data that we wish we would in any study. So we were working with death certificates. We would have to really, we were just constrained by what we could understand from the death certificate data. So the things we were able to look at are individual factors that I’ve listed here that are readily available on the death certificate. Then what was also available on the death certificate was the person’s census tract of residence. And we could match that with other geospatial data sets to look at, you know, how much green space surrounds the person’s neighborhood, where in which they live using some satellite data to understand how temperature varied across the city and some other census data characteristics. So we looked at all of these factors and we found several factors came up as statistically significant modifiers. And so where we found that non-Hispanic black New Yorkers were much more likely to die during heatwave days.
305 00:14:57.120 --> 00:14:59.270 versus non heatwave days
306 00:14:59.270 --> 00:15:01.920 in that same warm period than any other race
307 00:15:01.920 --> 00:15:03.510 or ethnic group.
308 00:15:03.510 --> 00:15:06.420 We also found that people were more likely
to die at home
309 00:15:06.420 --> 00:15:08.523 than in hospitals or institutions.
310 00:15:08.523 --> 00:15:13.500 This could potentially be a marker of social
isolation,
311 00:15:13.500 --> 00:15:17.220 although we weren’t able to specifically mea-
sure that.
312 00:15:17.220 --> 00:15:22.220 And then we found that people that died
during heat wave
313 00:15:22.260 --> 00:15:25.380 days versus non heatwave days over this warm
period,
314 00:15:25.380 --> 00:15:29.070 relatively more of them looped in neighbor-
hoods
315 00:15:29.070 --> 00:15:31.200 that were receiving more public assistance,
316 00:15:31.200 --> 00:15:34.890 general marker of poverty and in parts of the
city
317 00:15:34.890 --> 00:15:37.290 that had less vegetation and consequently,
318 00:15:37.290 --> 00:15:38.690 higher surface temperatures.
319 00:15:40.110 --> 00:15:44.450 So we were able to look at all of those factors
that were,
320 00:15:44.450 --> 00:15:48.030 again from the epidemiologic analysis came
out as
321 00:15:48.030 --> 00:15:52.470 significant modifiers and characterized their
distribution
322 00:15:52.470 --> 00:15:53.303 across the city.
323 00:15:53.303 --> 00:15:55.920 We looked at every census tract and the preva-
ience of these
324 00:15:55.920 --> 00:16:00.400 factors and we created Z-score to combine
those factors
325 00:16:00.400 --> 00:16:02.703 into an index.
326 00:16:03.900 --> 00:16:05.730 And then we mapped the index.
And so you can see on this map the red portions indicate a higher index score. Those are the areas that we found were the most heat vulnerable where a lot of these factors tend to cluster. And if you’re familiar or not familiar with the New York City, those were in areas of upper Manhattan, the Bronx and central Brooklyn. And then of course, it’s not to say that deaths during heat waves are not occurring in other areas, but relatively there are less in other areas. So we had that combined next just to see, ’cause we did a very simple, we didn’t really do a complicated weighting scheme. We actually wanted purposely to keep it simple so that the Department of Health could continue to update this index and, you know, make it sort of an evergreen tool. So we just summed those factors to create the index, but we found that this is the relative odds. This graph on the left is the relative odds of dying during heat wave by quintile of the index. And we do see that it actually predicts pretty well with
350 00:17:13.680 --> 00:17:16.380 each increasing quintile leading to an increase in odds of dying during a heat wave.

352 00:17:19.350 --> 00:17:22.140 So this was a very useful tool for the city health department and I’ll talk a little bit about how this index was eventually used by the city,

356 00:17:29.220 --> 00:17:31.650 but of course I do wanna mention some limitations of this work and how it kinda got us thinking about other aspects of things to look into.

360 00:17:45.090 --> 00:17:48.540 and so many of these things are highly correlated.

362 00:18:00.925 --> 00:18:04.323 this study design is limited in that way.

366 00:18:00.925 --> 00:18:15.960 But if you are interested in that, we didn’t have in information on individual socioeconomic position or measures. We used the a neighborhood measure,

370 00:18:12.870 --> 00:18:15.960 but of course both of those really play an important role in the ability to adapt to heat.

372 00:18:18.207 --> 00:18:19.623 And we did not have that.
And of course like most big epidemiologic studies, we used outdoor temperatures of proxy for personal exposure. This can be a poor proxy in a lot of cases, particularly when you’re talking about having air conditioning or not having air conditioning. And so, you know, when we think about the sort of relative differences day to day, we still think it’s useful but it’s worth mentioning that is a limitation of this study. And you know, correspondingly, no information on the indoor residential environment. Again, pretty pretty par for the course for a large epidemiologic study, but left a lot of open questions for us. The one thing we decided to do after that work was complete was to try to understand some of those open questions a little bit more.

And what we did is we conducted a follow-up telephone survey. So I’m not gonna get into all the details of this study, but I’ll just say that we ended up doing telephone interviews.
It was a landline plus cell phones sample and we did about over 700 interviews conducted in English and Spanish of New Yorkers.

I think there were about 15 questions kind of ranging from some information about characteristics of people's homes, whether or not they had air conditioning, whether they used it from some demographic information and also some questions on what they did during heat waves. If they hand staple at home, what were their options, how did they protect themselves? So you can always pull up the study if you really wanna know a lot more about it.

But I'll just highlight a couple of the key findings which were that we found that over a quarter of New Yorkers did not have access to functioning air conditioning or used it less than half the time when they noted that it was very, very hot outside. So that's really telling us that, you know, in general we think kinda air conditioning coverage or penetrance is pretty high, but there are a lot of people in vulnerable communities who do either don't have access or are not running it.
And a lot of times, you know, that may be due to financial constraints for electricity bills.

We also found that non-Hispanic black respondents, which was again a priority population since we found they were dying much more during heat waves than other groups in New York were less likely to own air conditioning even when adjusting for household income. Now our household income measures are still somewhat prude, but I think what this points to is that there are other potentially systemic factors that really need to be accounted for. When we sort of do these epidemiologist studies, a lot of the things we’re measuring there are things that go way beyond that. So this may be related to certain types of housing conditions that can’t support air conditioning use or other things that might just not, not be solely due to the current household’s income. And we need to think about those, you know, potentially systemic and structural factors that have played a role in putting populations at a higher increased risk.
for all kinds of climate events.
And then lastly,
we found that participants stay at home even when they can’t keep cool.
So when we asked the question about what do you do
when you can’t keep cool at home during very hot weather,
I think it was either the top response or maybe it was the second response was just stay home.
And this is, I don’t know,
and you know,

What do people think?
I think it’s counterintuitive because we would think people it’s too hot and go out to public library or (indistinct).
Yeah, I mean I think that’s what a lot of us think.
when we’re thinking about potential solutions, right?
We suggest operating cooling centers and you know,

But I think if you also think about it,
you can also see the perspective that it could be intuitive as well
because do you really wanna leave your home where you tend to be comfortable and just go sit somewhere with strangers?
So it’s, you know,
I think it’s something to keep in mind in terms of
the solutions that we’re implementing because we need to think about how can we... I think cooling centers are an important measure, but also how can we keep people cool at home? And in particular, I think we thought a lot about this during the Coronavirus pandemic and New York City was one of the places that actually was able to get enough resources together to provide air conditioning at home and subsidize that for individuals because it was dangerous to go home and... Yeah?
That’s actually, that’s a good question. So I don’t, I mean I’m sure there are, I mean maybe not in like public libraries, which are often used, but I think, I’ve heard sort of anecdotally that there are also concerns in some communities about sort of going to government sponsored places because of fears around other things, immigration status or other other things. So yeah, I think there’s kind of like a lot of broad implications that need to be kept in mind in terms of putting this protective measure in a public space.
497 00:24:18.330 --> 00:24:19.410 Good question.
498 00:24:19.410 --> 00:24:20.243 Yeah?
499 00:24:21.214 --> 00:24:23.631 (indistinct)
500 00:24:28.500 --> 00:24:29.730 No it wasn’t.
501 00:24:29.730 --> 00:24:33.810 So it was just a representative telephone sur-
vey
502 00:24:33.810 --> 00:24:36.330 of New York City, so.
503 00:24:36.330 --> 00:24:38.400 Oh, sorry, yeah,
504 00:24:38.400 --> 00:24:40.950 yeah it was a random digit telephone survey.
505 00:24:40.950 --> 00:24:43.050 So yeah, so I don’t know if everyone heard
that,
506 00:24:43.050 --> 00:24:44.677 but the question was,
507 00:24:44.677 --> 00:24:49.023 ”Did this telephone survey sort of target a
group residents
508 00:24:50.010 --> 00:24:54.000 living in an HVI area and that wasn’t some-
thing
509 00:24:54.000 --> 00:24:54.930 we were able to do,
510 00:24:54.930 --> 00:24:58.023 it was a random digit dial of all New Yorkers.
511 00:25:01.290 --> 00:25:04.470 So, you know, so we potentially answered
512 00:25:04.470 --> 00:25:06.180 some of our questions but probably
513 00:25:06.180 --> 00:25:08.220 just ended up having more questions
514 00:25:08.220 --> 00:25:11.370 and I guess maybe that’s good for us as re-
searchers
515 00:25:11.370 --> 00:25:12.780 ’cause we have more things to look at.
516 00:25:12.780 --> 00:25:14.130 But, you know,
517 00:25:14.130 --> 00:25:18.330 I think it’s helpful to sometimes think about
different ways
518 00:25:18.330 --> 00:25:22.170 of study quantitative methods, survey meth-
ods,
519 00:25:22.170 --> 00:25:24.600 qualitative methods to tackle different,
520 00:25:24.600 --> 00:25:27.243 different pieces of this complex problem.
521 00:25:28.560 --> 00:25:30.930 So I wanna talk a little bit about some of the
impact that
this work had before I move on in the discussion.

So, you know, we were able...

I think the findings from the epidemiologic study supported by this telephone survey and because we’re working very collaboratively with the New York City Department of Health,

were able to be used right away,

which was a really nice, and this is... So a couple of years after the study was published,

the New York City mayor implemented a cool neighborhoods NYC program.

And this is, you know, what Kai was mentioning in the intro,

this was a very, a lot of resources devoted to thinking about curbing the effects of extreme heat in New York City.

And throughout the plan and through, you know,

this is some language from the press release, you can see that the heat vulnerability index has mentioned quite a lot.

And so I think, you know,

what was really nice is this study had a very like, practical implication is that policymakers could take the results, look at a map pretty easily, and use this to target resources in this plan.
So this part of the press release is talking about where they were doing some street tree plantings and cool roofs implementation, and you can see pretty clearly that they talk about the South Bronx, Northern Manhattan and central Brooklyn. Those were those red areas on the map and they specifically mentioned how the heat vulnerability index, those areas are ranked high according to the city’s heat vulnerability index and that’s why the resources are being targeted to those areas.

The city also implemented a pilot program called, "Be a Buddy". And this program was also piloted in some of those high HVI neighborhoods. And in this program, this is specifically trying to get at those people who won’t leave their home. This was a program to encourage neighbors to check in on others during extreme heat events. The city chooses to use the heat vulnerability index. So in 2020 during the Coronavirus pandemic, when again, we couldn’t bring people to public spaces, there were some other initiatives,
the cool streets initiative, and this was, you know,
where they were opening fire hydrants and spray caps
trying to create some mitigating effects of extreme heat in
the outdoor environment.
And again, the city used the HVI
large measures should be collected.
So a couple of takeaways from this collective work
in terms of the findings, again,
I wanna highlight that our study, like many, many other studies in the US
has showed that black New Yorkers were much more at risk
during heat wave events than other race ethnic groups.
We see that pretty consistently in studies of heat
and in studies of a lot of environmental stressors.
But, you know, our research team tried
to delve into that a little bit,
but we really felt like there were a lot of unmeasured
factors and this really points to kind of the potential for
systemic discrimination that has been, you know,
that may be at play here
in a lot of this work.
And I’m gonna talk about some continuation
of this work next. And I think that’s an important thing to highlight. We also really feel that there’s a lot more to learn about housing in the indoor environment. And I think this is probably one of the major areas of potential future research for people interested in heat, is really getting a better understanding and characterization of where people spend the majority of their time and the indoor environment and the kind of the range of health impacts that might be mitigated within that indoor environment. And in terms of process, we’re really critical to work with stakeholders from the beginning so that this research could inform policy. And that was really one of the things I was very fortunate to work directly with the New York City Department of Health because they were able to help define the question and help make research able to be used. And so in future work I continue or current in future work, I continue to try to work with policymakers, with grassroots organizers to try to incorporate their ideas early on.
And I think that’s something that’s always useful if you can find those connections to make your research relevant. And then also just the utility of maps. It seems very simple, but I think the fact that we had a nice easy to understand map really helped our vulnerability index, again, to be used. It could tell a story right away to, you know, somebody that doesn’t know a thing about epidemiology, but if it’s very easy to it to look at a pretty map and kind of understand it. So I think, you know, that again is kind of continue on in that thread a little bit. So I wanna talk a little bit about some work I’ve been doing a little last couple of years, a little last couple of years, that flowed outta that New York City work to some extent and also just reflected a lot of other current thinking at the time. And this is some work that I was doing before I moved over to Johns Hopkins. About a year ago I was at a public policy research institute called RAND. And so this is where I started there with some collaborators.
myself and the other lead investigator Ben Preston.

And I’m continuing to work with my RAND collaborators on some of this stuff.

And so this was kind of thinking about, you know,

we see environmental health studies of environmental health and racial disparities over and over kinda pointing to the same factors.

And in some ways it’s very unsatisfying to talk about things like certain race or ethnic groups as being more vulnerable because this isn’t an inherent, this isn’t an inherent characteristic that makes someone more more vulnerable.

There’s a lot of systemic factors that have gone into this.

So what we wanted to do was kind of delve into a little bit more of that systemic and structural factors that have led to the environmental health disparities that we see today.

And so I will just briefly,

let’s see, should I,

so I don’t, so just for some, some added context and background, and I think, you know, in the last few years the literature’s kinda exploded in this area.
So I probably don’t need to give this background, but I’ll briefly say that one of the measures we started looking at as well as many other researchers have been looking at is these historical maps called redlining. And this was a practice that happened in the US in the 1930s that kind of basically codified discriminatory lending. And this is a map of Baltimore where you could see that areas in the center of the city were what we call redlined. And those were areas that were marked as being pretty risky for mortgage investment, whereas other of the surrounding areas that were deemed not as risky. So mortgage lending could, you know, more freely happened now. The thought is that, you know, where this occurred, this sort of created both segregation and economic inequity that has lasted for generations. You know, creating real wealth gaps in communities because of these
discriminatory practices that happened about a hundred years ago, right? Because people could not get mortgages, they couldn’t accumulate wealth over time, they couldn’t pass it on intergenerationally. And I think the key thing to think about there is some historical archives. We can see the language that was used to make some of these determinations. Now it wasn’t a hundred percent always based on race, or whether the residents were foreign born or not, but in many, many cases it was very explicit in terms of how they made these characterizations. So I think, you know, it’s a pretty clear example of a discriminatory practice that was pretty embedded throughout the US. Now there’s been also, I do wanna mention discussion in the literature as sort of whether this is, or was it this redlining practice and these maps or was it other types of discrimination and segregation that was happening before that? And this was sort of a result of that? I think for our purposes is, you know, a lot of epidemiologists and geographers have become interested in this.
We know there were lots of discriminatory practices happening at that time. So I don't think we need to necessarily know that this was the be all and end all, but I think we can use this as a very good measure of the things that were happening. And so that’s how many people have been using it. And that’s how we used it in study where we really again wanted to think about how to change the dialogue, one that focuses explicitly on race and racial disparities to one that focuses on practices and policies and racism. At the time when we started this study, there was a little bit of work being done in this area. As I said, it really has exploded over the last few years, but there was a really nice paper by Jeremy Hoffman and colleagues that looked at heat islands across the US and how the spatial distribution of heat really varied within cities and mapped those pouring to these redlining maps and showed very high correlations between areas that were previously redlined and those being the areas that still retain the most heat. We kind of knew that this was the case,
not just with heat, right?

There’s so many environmental aspects that we see

in these sort of, that play a role in these environmental health disparities.

So goal of this project is really to kinda bring a lot more

data into the picture, look at a broad range of environmental hazards

and see if we could make that data available for people to use it and kind of look at

these associations more closely.

Other goal of this topic was to think about solutions

and what communities are currently doing to kind of mitigate

these long-term systemic problems.

So we did that by taking data from multiple sources.

So we took some of that temperature data,

but we also took data on air quality,

hazardous waste sites,

a lot of EPA data,

the redlining maps that were digitized by the University of Richmond.

We wouldn’t have been able to do this project without that,

as well as some land cover data.

We took all of that data for our quantitative piece.

The other thing we did was we worked and partnered
with a grassroots organization called Groundwork USA.

Groundwork USA is a network of trusts, environmental justice organizations across the country working specifically on kind of mitigating these issues of environmental inequities and communities. And we interviewed the groundwork trusts and we interviewed the policymakers that they’re working with to find out what are they doing now, how are they trying to rectify this issue, what are the barriers they faced?

So in terms of this study, well the first thing we did was put a publicly available tool together. And I have a link here at the bottom of the slide. The tool is finally published just about a year ago. And I also wanna highlight that someone who has way better coding skills than I do is a doctoral student, a doctoral student at the party rating school, Carlos Calvo Hernandez. So he really was instrumental in building this tool. But we have data on about 200 communities in the US and we have two dropdown menus for this tool where you can pick the community
and you can pick the environmental hazard and then you can see maps comparing those historical redlining maps and as well as the distribution of all of these environmental metrics and how they exist today.

And you’ll see quite consistent patterns across a range of cities and across a range of environmental metrics.

And in general, just to show you some descriptive results from that work, we consistently see this is from data across all of the communities.

So things like diesel particulate matter are carcinogen much higher in previously redline areas than in other parts of cities.

Counts of hazardous waste sites higher, again, in those formerly redline areas.

When we talk specifically about climate related stressors, others have shown this.

But we did look at tree canopy cover.

I again see that consistent pattern where areas that were previously redlined have much less tree canopy than other parts of the community.

We looked at gridded climate data, so we were able to look at average minimum temperatures over a summer season, mean temperature,
We know that minimum temperature can be important in terms of health because that’s the time when the body can cool down in the evening and we consistently see higher minimum temperatures in those previously red line areas.

And another metric that I’m really excited about, a paper that was published not too long ago, by Remedia Et al., They put together a estimate of air conditioning prevalence by census tract in many major cities in the US. And so this is, we’re working on this now to get the paper ready for publication, but I looked at the air conditioning prevalence by these redlining measures and we can still see while air conditioning prevalence doesn’t vary a lot, we can still see, and it’s statistically significant in our regression modeling of it, that there is a lower prevalence of air conditioning in those previously redlined areas. Now, in terms of what we learned from the interviews with Groundwork USA, there is a lot,
and I’m not gonna go through all of those results. We published a paper last year on those interviews and a lot of the policy solutions people are working on, so if this is something you’re interested in, I encourage you to take a look at that. The response that we heard from the trust over and over again was something that I found really interesting was that they themselves and their constituency had a lot of concerns about greening solutions and quotes from interviews, and I’ll let you read them yourself, but generally these were basically within the context of people being concerned about displacement or what some people are calling green gentrification. So there are a lot of concerns about like, are you putting trees in here for me or for the person who’s gonna buy up my land and displace me? And so this is something that Groundwork has taken really seriously. And one of the things that they told us that they’re doing to address this issue is to really think holistically about solutions.
they’re simultaneously advocating for housing protections.

And I think, you know,

with these types of issues,

we really need to think very holistically,

even as researchers when we’re recommending solutions about

the potential unintended consequences.

So with that work we see of across a variety of hazards,

we see pretty consistent spatial patterns

that this systemic discriminatory practice,

whether it’s redlining or other things that will hopefully

start to measure better soon,

as potential drivers for some of the environmental

inequities we see today,

even with some regional variation,

we still see that those relationships hold up

and it’s really important to think about implementing

interventions that may avoid unintended consequences.

So thinking about holistic solutions are really,

again, an important piece

of how we’re gonna move forward with this and progress.

So, you know,

this work has really gotten me thinking a lot

about how to better consider structural racism

within climate and health studies.

And I wanted to...
This work is very much in progress. I wanted to just go highlight my doctoral student, current doctoral student, Shifali Matthews, because she’s been really digging into thinking about, she’s using the case study of hurricanes. And she’s started off that work by doing a literature review to look at, well, how have we in the past considered vulnerability? And I know this graph isn’t in the best shape at this point, it’s very preliminary, but what I can tell you is the bar all the way on the left is a bar of demographic. So that’s by far and a way how we generally look at vulnerability things like age, race, and ethnic groups, social economics, gender. The second to the, you know, maybe the one, two, three, four, fifth bar over is structural factors. And I think we found maybe four or five studies that looked.
upstream policy factors. So you can really see the literature has not explored that as much and Shifali’s been thinking about this you, is working on recommendations for this paper. So I wanna close out with just a mention of really briefly two studies. I know that when Dr. Chen first invited me here, I was hoping that I would talk about one of these and I was hoping that too, but we’ve had some big delays in these studies, but, you know, maybe if I’m able to come back in a year or two, maybe I can put on some findings on some of this new work. But we have two studies that are really kicking off right now. One is very much focused on heat within the city of New Orleans. And a lot of this is building off of the New York City work. And really, again, thinking about what is the right threshold that we start to see hospitalizations. We’re working with Louisiana Department of Health to look at more hospitalization data. What are the neighborhood factors?
We know that there’s a high proportion of the population in New Orleans that is living in poverty. And so it’s a particularly heat vulnerable area. And we have three things that we’re doing study first, again, sort of characterizing that burden, looking at vulnerability, very similar to the work I showed in New York City. So we’re hoping to create a heat vulnerability index then. Then which is one of the most exciting parts of the study. And we’ll be in the field this summer and hopefully we’ll get participants and get good data, but we’re partnering with a group called I See Change who has a digital application where they allow participants to just report on climate change and the findings, sightings in their own neighborhoods. So we’re gonna work with I See change to get participants enrolled in our study to answer questionnaires through their app that kind of report on day-to-day subtle changes, changes in mood, changes in sleep patterns, and kinda subjective health measures.
that will correlate with day-to-day changes in temperature and even within day changes in temperature. So I’m really hoping that that data collection goes well this summer. The other study that is kicking off now is building off of the work I talked about related to redlining and green space and we’re adding on a health component to that work and really thinking about how neighborhood factors can play a role in cognitive function. But there’s been little attention on the relationship between green space and cognitive function to date. We do see huge racial disparities, and so maybe again these systemic factors that have led to very different environments where people have green space around them may play some role in these health disparities. And you know, this question around green gentrification, does that modify the relationship? Does that make green space have benefits for some groups of people while it’s detrimental to other groups of people? So in this study we’re gonna be looking at, we’ve already kind of looked at, as I mentioned, the relationship between historical redlining
and green space. We’re adding on measures of cognitive function in a nationally representative study. We’re gonna be examining that, looking at this maybe as a potential mediation pathway and I’m looking at gentrification as a modifying variable as well as potentially the role of social support in cognitive function. So, you know, I hope we’ll have some preliminary results in that also maybe within the next year. So hopefully just sort of in wrapping up, I think, I hope you can see that there are many ways I think that climate health research can inform policy from, you know, characterizing the burden, understanding triggers and thresholds, thinking about drivers of vulnerability and how to target resources and also thinking about solutions. I didn’t get to talk at all but I’m very interested in the effectiveness of solutions. I think that’s a huge area for us to be working on. Love to think about that with anyone who’s interested in thinking about that more. But as I did show, you know,
I think solutions really we need to think about all the potential unintended consequences too, and that’s a key role. So with that, I’d like thank you for your attention. If you are interested in any more information, I have my website here. Probably be posting some postdoc opportunities there soon. just in case anyone’s interested in that. But yeah, and really thank you all very much.

The question from the audience was... The person here mentioned that they’ve heard of the Be A Buddy program in New York City and they were wondering if it was actually effective. And so the answer is I don’t have the answer to that. I’ve actually asked the collaborators if they’ve ever been able to evaluate that program...
and I think they wanted to, but I think they had some resource constraints around actually doing an evaluation. So I'm not sure they were ever able to evaluate it. And in transparency, I actually don’t know if it’s continued at this point. Yeah. When you run into (indistinct) Yeah, being on so, well I think I’m actually, I’m not sure. Let me repeat what you’re saying and I’m not sure if I’m totally understanding the question, but I think question was, when you start to hear things about potential unintended consequences, so for example, someone responding that they’re not sure the greening is really meant for them or is it meant for the person that’s going to potentially displace them? What are some workarounds about not being able to quantify that risk? Is that right? So I think, yeah, there’s a couple of answers to that question. So one is I think it actually does point to the value of kind of mixed methods research
because and I kind of grew up trained as a quantitative researcher and it was only more recently that I’ve been exposed to interviewer qualitative studies. And I think there is a real value to kind of interdisciplinary collaborations because we might not have good quantitative data on that. Yeah, there are studies that are looking at green gentrification, we’re gonna look at it in the study I just mentioned, but it may be happening in some places, it may not be happening in other places. There may be a lot of things that are triggering gentrification. So it’s hard to tease that out. But I think we can just put some value on the words that that person is speaking. Those are the person’s like feelings, right? That’s how... And so whether objectively by one of the 10 ways we can define gentrification, it’s happening, that person may still be dealing with mental stress and anxiety related to those feelings. So I think that’s an important piece. So sort of thinking about how that, that might relate
to mental distress and also thinking about
the value of qualitative research.

So I think because of time, thank you again for.

(indistinct) for our online audiences,

thanks for staying with us. Thank you.

We got to end this masters seminar series
and only all the best for the families, okay?