When Science Finds a Way

Season 2, Episode 4
Cool roofs: homes fit for a hotter world

Show notes

Episode description:

As rising temperatures challenge vulnerable regions, could ‘cool roofs’ be the affordable, sustainable solution? Alisha joins Dr. Aditi Bunker to talk about the remarkable health benefits uncovered in Burkina Faso's trial, hearing firsthand accounts of how this simple intervention significantly reduces indoor temperatures, lowers heart rates, and improves overall health.

Mentioned in this episode:

The effects of cool roofs on health, environmental, and economic outcomes in rural Africa - community-based randomised controlled trial in Burkina Faso.

Nouna Health Centre - provides capacity building for health professionals in science and data management.

Health and Demographic Surveillance System - a sampling frame for studies in the fields of clinical research, epidemiology, health economics, and health systems research in Nouna, Burkina Faso.

Transcript

(Music starts) *00:00*

ADITI CLIP – 00:06 *“For us, it's about using the best science and the methods that are available. Does having a cool roof mean that you have better health, environmental and economic outcomes? And health there for us is the key thing. Because we want to make health and people's well-being and comfort the centre point of everything”*

Alisha Wainwright 00:25
Welcome to When Science Finds a Way - a podcast about the science changing the world. I'm Alisha Wainwright. And on this series, I'm talking to the global experts who are making a difference as well as the people who have inspired and contributed to their work.

Today, we're talking about a potential way to keep cool in extreme heat. We've talked about heat stress on this show before, because it's a big challenge that affects all of us. As climate change causes temperatures to rise around the world, people are having to adapt to sweltering conditions that have serious health impacts. And many of the region's most vulnerable to extreme heat don't have access to resources and infrastructure that could mitigate the problem.

For these places, the question is, ‘In the face of rising temperatures, how do you keep cool in a way that's low cost, passive, and sustainable?’ Well, that's where today's guest comes in.

Dr. Aditi Bunker is an environmental epidemiologist and leads the Climate Change and Health Intervention Unit at the Heidelberg Institute of Global Health, at Heidelberg University. Aditi is also affiliated with the School of Population Health at the University of Auckland, New Zealand.

Aditi and her team have led research into an intervention called a cool roof. A cool roof is a simple, effective tool that can help keep a home cool in extreme heat without needing ongoing maintenance or energy use. After a two-year trial in Burkina Faso, they've expanded their research around the world.

Today, we'll hear more about the potential impact of this solution, as well as how researchers collaborated with local communities to conduct the trial.

And here, and in person, is Dr. Aditi Bunker. Thank you so much for joining us.

(Music ends)

Dr. Aditi Bunker 02:18
Hello, thank you for having me, Alisha.

Alisha Wainwright 02:20
Oh my gosh, thank you. I feel like all the stars aligned to bring you here to Los Angeles so that we can meet in person, and I am so glad. I wanted to ask about your area of research. You test interventions that help people adapt or mitigate the effects of climate change, and you study how those interventions lead to different population health outcomes.

So, what drew you to the field?

Dr. Aditi Bunker 02:43
I actually started my PhD in 2012 and this was actually based in Burkina Faso.

Alisha Wainwright 02:50
Really?

Dr. Aditi Bunker 02:51
So, yes. So, I got a million vaccinations and turned up there a few days later.

Alisha Wainwright 02:57
Your arm half-swollen.

Dr. Aditi Bunker 02:58
Yeah. With my yellow fever vaccine certificate. Um, yeah. And turned up there and then I basically haven't left.

So, I love the place. I love the people, the community there. Our Nouna Health Research Centre is integral to a lot of my work.

Alisha Wainwright 03:15
Wait, hang on. Before we jump into that, I want to be able to talk about what you're about to bring up, which is cool roofs. But we'll get to that later on.

But first, I want to get some context about the location of your study, which you've mentioned, Burkina Faso - rural Burkina Faso.

When we talk about extreme heat in a place like Burkina Faso - what exactly are we talking about? How hot does it get and what are the kinds of problems that people face?

Dr. Aditi Bunker 03:42
So, Burkina Faso is in the Sahel Desert.

Alisha Wainwright 03:44
Okay.

Dr. Aditi Bunker 03:45
And so, they experience, um, very dry kind of heat from about March until June.

Alisha Wainwright 03:51
Mm.

Dr. Aditi Bunker 03:52
And then that's followed by a very heavy downpour.

Alisha Wainwright 03:55
Right.

Alisha Wainwright 3:56
And monsoon rain.

Alisha Wainwright 03:57
Awesome.

Dr. Aditi Bunker 03:58
And that's when typically people are working in the field. And in the community where we work, there's, um - a lot of people are subsistence farmers. And so that's where it's really interesting. So, the people are in direct exposure and contact with the environment a lot there.

Alisha Wainwright 04:13
Right.

Dr. Aditi Bunker 04:13
Well, it's about 40 degrees and above 40 degrees Celsius - I think that's about 104 Fahrenheit.

Alisha Wainwright 04:20
That's hot, yeah - for consistent many days and into the nights as well. Because I have discussed on a previous episode that it's the night heat too that can be problematic as well as the day heat because no one ever gets to cool down.

Dr. Aditi Bunker 04:33
Yeah, that's right. So, there is sustained heat well into the night, and so, this kind of continuous exposure to heat can have detrimental health effects - that's right. So, yeah, it's a challenge and the housing conditions are, you know, quite basic in a lot of situations.

Alisha Wainwright 04:52

Can you run us through some of the health problems and challenges someone would face in these heat conditions?

Dr. Aditi Bunker 05:00
So, heat kind of affects our body in different ways. It places strain on the heart - your body wants to cool down - and so it's moving blood around to the periphery, therefore your heart's working harder to pump blood to the core organs.

You're feeling other sort of physical manifestations like tiredness. Even things like anxiety can arise from heat stress. There's been evidence to show that suicides and aggression and things increase with heat. Even in chronic - for chronic illnesses, there's links now with increasing diabetes, with renal health problems. And of course, there's heat stress - so things like dehydration - are all affected by heat.

Alisha Wainwright 05:46
Let's hear from Gninasse Rose. She lives in a village named Pa outside of Nouna in Burkina Faso. It's about 300 kilometres - or 186 miles - away from the capital, Ouagadougou.

Life here is very different from the big city. This is a village in rural Sub-Saharan Africa - a region that is especially vulnerable to the effects of climate change.

Gninasse spoke to us about life in their village and the impact extreme heat had on their household.

Gninasse Rose 06:16
Dyula, fading to
Voiceover
Our daily activities are based on agriculture and housework. We collect wild fruits and we also farm. We have a primary school, but no health facilities. We're five kilometres away from the health centre. Our house is a one room house, not very big, with a tin roof and a cement floor. It's made of mud brick. I live there with my husband and four children.

Extreme heat kept us awake. It's unbearable. It was unbearably hot inside during the heat, so we often slept outside. We took showers several times a day. The children cried and couldn't sleep. We couldn't stay inside with the babies, and it was impossible to put them to bed inside. We often had to use fans to ventilate the children and often you would get up in the morning with your child and they would be too hot and you would have to go to the health centre for treatment.

Alisha Wainwright 07:24
So, if you were living in a big city like Ouagadougou you could just switch on the air con or have an electric fan to cope with the heat, but that's not very realistic in a rural location, is it?

Dr. Aditi Bunker 07:38
Yeah, you're absolutely right. So, I think in the area where we work - in the Nouna Health and Demographic area - we have about 56 villages. And I think only six of those have access to electricity plus the Nouna Health Centre.

And here people live typically in kind of a one room home - so they have compounds, and within these compounds, the families kind of live together in their individual homes. And they're composed of the mud, the traditional adobe mud, with kind of four walls - typically an outside cooking area. The roofs traditionally used to also be mud brick. However, now

there's a movement towards people selecting tin roofed homes which is really interesting because…

Alisha Wainwright 08:24
Is it because it's cheaper? Or it's like less destructible?

Dr. Aditi Bunker 08:28
Well, actually, there's a couple of reasons - one is cultural, funnily enough. So, people associate tin roofs with being wealthier.

Alisha Wainwright 08:36
Okay.

Dr. Aditi Bunker 08:37
Um, and, um, yeah, kind of a high socioeconomic standard.

Alisha Wainwright 08:40
So, it's a status thing. Yeah.

Dr. Aditi Bunker 08:41
Yeah. And, another reason is, I think, mud brick roofs actually, they take quite a bit of maintenance. So, there's a traditional practice every year where people go on top of their roofs and apply a shea butter or a coating that kind of creates a waterproofing.

Alisha Wainwright 08:56
To deal with the monsoon season.

Dr. Aditi Bunker 08:59
Exactly. I think it's quite a lot of work. However, as we all know, the tin roofed homes kind of become like ovens.

Yeah. I mean, we went into the community and actually sought to understand - so that was a lot of our formative work before we started the trial - to understand how they actually perceived heat and what they thought of it - what sort of an impact. And it very much echoed the sentiments there that we just heard - that people were really affected in terms of their physical health. So, things like tiredness, feeling dizzy, getting rashes on their body, lack of sleep, to social aspects - people having difficulty maintaining family harmony and intimacy.

Alisha Wainwright 09:41
Because everyone's irritable and want to stay five feet away. Right?

Dr. Aditi Bunker 09:44
Right. And mental health.

Alisha Wainwright 09:45
Yeah, of course. And sociability is a really important part of mental health. And if everyone's feeling irritable and cranky it's kind of hard to be able to have that house harmony.

(Music starts) 09:55

Julia Gillard 09:59
Hello! I'm Julia Gillard, chair of Wellcome. Thanks for listening to our podcast, When Science Finds a Way. Wellcome supports researchers around the world to make discoveries and help solve urgent health challenges. We believe in the power of science to build a healthier future, and the need for inclusive collaborative action to ensure that everyone can benefit. To get involved, visit wellcome.org, that's Wellcome with two l's. Now, back to the story.

Alisha Wainwright 10:32
So, first things first - can you tell me what is a cool roof and how does it work?

Dr. Aditi Bunker 10:37
Yes. So, the type of cool roof that we used in Nouna, it's actually a paint with special kind of properties that make it highly reflective. And the idea is that it basically is something to cool down the indoor ambient temperature.

And it works in two ways - the main kind of way that it works is by reflecting the solar radiation from the sun. And the other way that it works is it actually reduces the heat from being absorbed inside through high thermal emissivity. So those are kind of...

Alisha Wainwright 11:11
Bounces off basically.

Dr. Aditi Bunker 11:12
That's right. So, one of the ways is that it bounces off and the other is that it stops the heat from actually being absorbed inside.

Alisha Wainwright 11:20
So, what are the advantages of a cool roof when we're talking about mitigating extreme heat for people like Gninasse? And, what are the immediate effects that someone would face living in that home?

Dr. Aditi Bunker 11:33
Yeah, well, the effect of a cool roof is immediate. So that's one of the great things, you know, we don't have to wait for a long time for there to be any sort of benefit. But it's basically something that's, it's quick to apply. We can use the local people and community to do it. It's relatively cost effective. It can also last for a long time depending on the quality of the material

Alisha Wainwright 11:56
So it's not an annual reapplication.

Dr. Aditi Bunker 11:59
No, no. Yeah, so, it's got, yeah, anywhere between a 3–10-year longevity.

Alisha Wainwright 12:04
Oh, wow.

Dr. Aditi Bunker 12:04
For our communities it's great. One of the biggest benefits I find is that it's a passive intervention.

Alisha Wainwright 12:10

Yeah.

Dr. Aditi Bunker 12:10
You know, that's what we need. Like, we need something that lasts for a long time, something that's passive, so that it doesn't require the human element in the interaction, which can modify the effects. And of course it doesn't require energy use. It's got waterproofing properties, so that's a co-benefit. And it can also kind of minimise the sound that comes into the building.

Alisha Wainwright 12:31
Oh, right, of course, because if you have a tin roof that's quite clacky, with the rain - so that kind of softens, softens the sound on top. That makes sense.

Dr. Aditi Bunker 12:39
But actually, one of the great things about the cool roof is that it reduces your energy demand and your active energy use.

That's why actually in a lot of high-rise structures around the world they actually have a cool roof on top.

Alisha Wainwright 12:50
Oh, wow. I didn't even know that.

Dr. Aditi Bunker 12:51
Yeah, let's go on a roof tour.

Alisha Wainwright 12:56
So, this, um, I guess technology you call it, is being serviced in these rural areas, but it's also being used globally in urban settings as well.

Dr. Aditi Bunker 13:05
Yeah, of course it is, yes. My first sighting of cool roofs was over the kind of buildings in Cambridge in the US, in Boston. Yeah.

Alisha Wainwright 13:14
Yeah. So it would make sense for like a, certified green building - or something like that - to try and passively mitigate some of the heat to cool their buildings.

Dr. Aditi Bunker 13:24
That’s right.

Alisha Wainwright 13:25
That makes a lot of sense.

What was your plan for studying the impact of these cool roofs? I know it was a randomised control trial. So, what exactly was your intervention and what were you trying to find out?

Dr. Aditi Bunker 13:35
Our intervention was to apply the cool roof and we took a sample of 600 households. And the beauty of using the randomisation is that we're avoiding, you know, selection bias. And

so, then we can really say that this is a causal study - we're able to say that it's the cool roof that's actually causing the observed effects that we see.

Alisha Wainwright 13:58
Right. This kind of randomised control trial is normally done for medical interventions, right? So, was it significant that you were taking this approach to study a new roof installation?

Dr. Aditi Bunker 14:08
Yeah, um, well, for us, it's about using the best science and the methods that are available. Then using it for the purpose that we need - which is right now - to test solutions to combat the effects, or at least to adapt to the effects of climate change. And in a way, if you can combat it too and mitigate, you know, your emissions, that's great, which is what a cool roof hopefully will allow us to look at.

Does having a cool roof mean that you have better health, environmental, and economic outcomes? And health there for us is the key thing, because we want to make health and people's well-being and comfort the centre point of everything. It's a powerful way to drive a message of how something works or not.

Alisha Wainwright 14:49
So tell me more about how you partnered with the local community and organisations.

Dr. Aditi Bunker 14:55
Our research institute at Heidelberg's had a long-standing partnership with Dr. Ali Sie and the Nouna Health Research Center. They cater for about 110,000 inhabitants around Nouna.

The people that are in all the villages where we do the study - there's a health centre that is responsible for providing care for the people there.

And at the same time, since 1992, Ali and the team have set up the Health and Demographic Surveillance System. And basically, what that does is it captures important demographic and health information about the population - the births, the deaths, marriages, um, people leaving, the community, in and out migration. It also looks at the actual causes of death, because without that, we don't actually know what the health status is and what the trends are, right? Data speaks.

And so, it's because we've had that data and that infrastructure that we're able to go in and do some really cool studies in an area like that. And they've also collected weather data.

Alisha Wainwright 15:59
Oh, that's helpful. Yeah.

Dr. Aditi Bunker 16:00
Yes, through local weather stations. So, um, this kind of infrastructure and their partnership with the community and prior studies and trials has really helped us and given us a platform to do our own work in.

Alisha Wainwright 16:13
Let's hear from Dr. Guillaume Compoare, who was a field coordinator in the study. He spoke to us about how local communities were involved in conducting the research.

Music, fading to
Guillaume Compoare 16:29
We go to the village, and we meet, uh, in each village, the key chief elder. So, with the chief of the village, we meet them, to have permission to speak with the people in each village.

And we explain the objective of the study. We explain the goal of the study, so we go throughout all the villages to explain to them what we want to do before starting the study.

To set up my team, uh, we used, uh, local personnel. If we want a study to run well, you have to choose people and to be connected with participant.

Because local personnel, they know well the villages. They speak the local languages because we have many languages. So, we selected our team locally to be sure they will be accepted in the village.

For the cool roof application, our objective is we try to see if you can find, locally, the person and we use a local paint. And we train them, to guide them, to show them how to mix the cool roof, how to do the cool roof. And we involve also the participant - to do the cool roof, we involve also the participant. First, they help to repair the roof, before we come. The mud-brick roof, if we didn't repair it, it is difficult to paint the roof.

Also, the tin roof, they help to repair the edge before we are coming. If they didn't do it, it will be difficult for us. The benefit for working closely with participants is they will be involved. They will be happy to answer your questions. Because they are happy to give a contribution to this. It's like you are in a family.

Because we have sometimes, sensitive information, if the participant is not close to you, they will not give you a good answer. So, it's a good thing to be close to participants, to have what you want, to have the information you want. At the end, you can reach your goal.

Music, fading to
Alisha Wainwright 19:18
It sounds like your team put a lot of thought and effort into engaging communities as part of the study.

When you come into a country as an outsider to conduct research, how important is it to make sure that research is locally owned like this is?

Dr. Aditi Bunker 19:35
What we want is for this to pretty much be driven from the ground up, right? So, we actually start off by doing a lot of formative work in the field. We do tons of community engagement.

We go out and find out how heat is affecting people. We go and find out - do focus group discussions and get them to talk to each other. So, yeah, that's pretty much how we started off. We met the community leaders, we met citizens, we took demonstration samples of cool roofs and showed it to them, got them to touch it, smell it, feel it, you know, like, to say, well, what do you think of this? Will this be acceptable in your community? Is it culturally okay? Is white an okay colour?

Alisha Wainwright 20:12

Right. All these little nuanced things that you wouldn't know unless you engage with the community.

I also love how he said that when participants feel like they know the person asking them questions, they're more likely to give accurate answers because they're talking to a local - someone who they feel understands them. And that's so important when you're getting self-reported data.

Dr. Aditi Bunker 20:31
The more we can empower the community and get them involved and, of course, seek the permission from the elders in the community and do things in a culturally sensitive way, yeah, I think the better off we'll be.

Alisha Wainwright 20:43
Let's hear again from Gninasse Rose.

She was one of the participants in the trial, and she told us about her experience taking part in it as well as the impact it made on her life.

Gninasse Rose 20:56
Dyula, fading to
Voiceover
We had monthly visits when someone came to take our blood pressure and body temperature from our ears. They took our urine for observation and also took our blood. There's also a device that hangs from the roof of the house inside, which measures temperature. We didn't have any concerns because we know that installing the cooling roof will be beneficial to us.

The benefits are there. It's cool in our houses. The temperature has gone down. Our bodies don't heat up as much. Malaria and frequent headaches have decreased. Before the cool roof was installed, I couldn't even sleep in the house. So, I spent every night out in the heat. But now that the roof has been painted, I can sleep in it without any problem.

We rarely shower now, and we sleep inside. We can be inside all the time, day and night. I hope everyone in the village will get one of these cool roofs, because it will be better for everyone.

Alisha Wainwright 22:09
As a researcher, how does it feel hearing something like that?

Dr. Aditi Bunker 22:13
When we do these trials, we hope to, or when we bring a certain intervention into a community, we hope to create a small change to improve people's lives. Like, that's what it's all about, right? And this isn't an air conditioner, it's not. But, the fact that we're seeing these types of responses and that the community feels this way, I'm really happy to hear it.

Alisha Wainwright 22:33
So, you know, you mentioned the caveat - it's not an AC. So, if we're talking about, you know - 40 Celsius, 104 Fahrenheit - what would the average temperature reduction be on a hot day like that inside?

Dr. Aditi Bunker 22:49

Indoors during the day, we're observing about a 1.2 degrees Celsius reduction in temperature, on average, across all homes.

There's more of a cooling effect in tin homes - about 1.7 degrees Celsius. And so that's still quite significant because I think the human body is sensitive to temperature.

Alisha Wainwright 23:12
Yes of course.

Dr. Aditi Bunker 23:09
And so yeah, I'm really like, I'm thrilled to hear that, you know, a small degree of change like that is making an effect in people's day to day well-being and comfort.

And that's the beauty of population trials and studies, is that, when you have an intervention that's creating a small effect, but across a large population, you actually see like a shift.

Alisha Wainwright 23:31
Yes. Yes. So, getting into the nuts and bolts of your research. What were the different things that you were measuring? And - because it wasn't just physical health markers, right?

Dr. Aditi Bunker 23:42
Yeah, that's right. So, I mean, there's multiple ways that the organ systems and someone's body reacts to heat exposure. So, one of those is the way that our heart and the cardiovascular system reacts.

Alisha Wainwright 23:58
Okay. So like an increased heart rate if you're hot?

Dr. Aditi Bunker 24:01
Yeah. So what happens is your body tries to cool - when you're - cool down, right? When you're hot. And so, you've got the blood flow being redirected from your core organs to the periphery - and to the outside - to kind of have this radiative cooling effect. And so, your heart then has to pump the blood harder and faster.

Alisha Wainwright 24:23
Right. To cool the body.

Dr. Aditi Bunker 24:24
To get the blood to the core organs.

Alisha Wainwright 24:27
Right.

Dr. Aditi Bunker 24:28
Because you've got the blood going to the surface.

Alisha Wainwright 24:30
To the surface. Right. Okay.

Dr. Aditi Bunker 24:32

And so there's that type of strain. And then you've got other things - like a lot of sweating going on - and so you lose electrolytes and fluid. And so that also means that your heart has to work harder.

And typically with heat there's a range of different responses that kind of, all contribute to placing different, you know, placing more strain on the heart. So that's one of the organ systems. And that was actually our primary outcome that we sought to look for a relationship with, you know, indoor cooling and how does it affect the heart rate. And then we also looked at a whole range of secondary outcomes.

Alisha Wainwright 25:05
Okay.

Dr. Aditi Bunker 25:10
So objective measures like we were talking about, like blood pressure, markers of heat stress - so dehydration. We collected people's urine sample. We looked at also capturing a whole lot of subjective outcomes, like the softer things. So, you know, we wanted to actually understand someone's, well, sense of well-being and comfort. So, we asked them a series of questions and captured their heat stress. It's like an index.

Alisha Wainwright 25:31
Yeah, yeah.

Dr. Aditi Bunker 25:32
Um, and then.

Alisha Wainwright 25:33
But a self reported one.

Dr. Aditi Bunker 25:34
That's right. And so then we're able to triangulate the results with the heat stress marker, for example, dehydration. And then with what they actually say with their level of heat stress. And we can, you know, corroborate the results. So that's a nice way of, you know, when you capture these objective and subjective outcomes together, it’s a great way of being able to give an overall picture of what happens to somebody. And then we of course looked at things like sleep, productivity, mental health – so depression. We looked at intimate partner violence.

Alisha Wainwright 26:09
So, who collected all of this data? How, how did you get your information?

Dr. Aditi Bunker 26:14
Our data was collected by the field teams – so these are our trained staff that go from home to home - and they've come up with very innovative ways to collect the data. So, for example, when we had the floods, they literally had to make makeshift boats, and actually like, you know, travel from village...

Alisha Wainwright 26:34
That's incredible.

Dr. Aditi Bunker 26:34

Yes. And they had to sleep there many nights when they couldn't actually get out because it was raining so much. So, there's a whole infrastructure and set up and huge effort from the team on the ground in collecting all of these important data that we've managed to capture.

Alisha Wainwright 26:52
And the team is made up primarily of locals?

Dr. Aditi Bunker 26:55
Yes, of course. So we have Guillaume Compoare - we've got Ali Sie, the director, Guillaume, who is our designated lead coordinating all the field teamwork. We have a data management team there in Nouna who kind of analyse the data as it comes in and do quick QC - quality checks - and things.

And then we've got at least 10-15 staff that go from home to home throughout the two years that have been doing, yeah, a lot of the legwork and the groundwork.

Alisha Wainwright 27:25
I just want to say anyone who is like, 'This is challenging, I don't know if we can do this,' - I will refer them to you because that's impressive. Oh my gosh. So, I know the results are currently being peer reviewed, but can you give us a broad insight into all the kinds of results that you saw, because you did take a lot of data, so.

Dr. Aditi Bunker 27:48
Yeah, so like I said, the primary outcome that we were interested in was heart rate. And here we're seeing a significant reduction in the number of beats per minute in the population by about between one and two beats per minute.

However, the very interesting thing for us is that this is actually a super healthy population of people with very low disease prevalence and other issues.

So, if they have a very healthy, you know range of heart rate - say around 60 to 65 - if you're reducing that by two beats per minute, it's actually creating quite a large impact on the…

Alisha Wainwright 28:24
Yeah, yeah, of course

Dr. Aditi Bunker 28:26
And remember that our heart works throughout our lives.

Alisha Wainwright 28:28
Constantly, yeah.

Dr. Aditi Bunker 28:29
So, if you're reducing that small burden on your heart, it's actually creating a large difference and that's the same story with a lot of these public health things that we talk about.

You reduce your salt intake by a little bit and individually you'll reduce your blood pressure by a little bit. But across the population you're creating like a huge shift. So, you know, we're reducing the indoor temperature by a bit and subsequently the heart rate by a bit, but across the population you're creating a large change and that's the beauty of population health.

Alisha Wainwright 28:56

Wow, and so in addition to heart rate, uh, what else did you discover?

Dr. Aditi Bunker 29:01
Yeah, so we saw a reduction, jointly also, with blood pressure - there's a trend of reducing blood pressure. We saw that the inner ear temperature was significantly reduced.

Alisha Wainwright 29:11
Wow.

Dr. Aditi Bunker 29:12
We saw that people's, um, we took, we measured people's blood glucose. And that actually - there was a significant reduction there too - especially in males. And sorry, just coming back to heart rate again - we saw that there was more of an effect in elderly and people with tin homes. We saw that, yeah - we saw that there was a reduced kind of depression score in people with cool roof homes. And so you're having the benefits.

You know, like, a human body isn't something that works in isolation - the organs all play into each other - and the systems. And so, it's a really nice story overall that we're seeing these general reductions in almost all the outcomes, really.

Intimate partner violence was an interesting one. So we, yeah, we found that there was a 10 percent prevalence in physical intimate partner violence in the population - which didn't include verbal violence or anything like that - which is quite high if we have a sample of 1,200 participants, you know?

Alisha Wainwright 30:13
Yeah.

Dr. Aditi Bunker 30:14
And so, yeah, giving them a cool roof significantly reduced the IPV - intimate partner violence - in the community.

Alisha Wainwright 30:20
Wow. Wow, that's incredible. And I really appreciate your explaining how all of these small incremental things - if you're impacting hundreds of people in a community - you are creating a larger shift that is much more noticeable than maybe something to an individual person. I think that's really interesting.

Now, your team is in the process of expanding the cool roof trials to other locations, tell me more about where you'll be working.

Dr. Aditi Bunker 30:57
We're now going to be extending this cold roof trial from Nouna to four climate hotspots around the world.

Alisha Wainwright 31:04
Wow, wow.

Dr. Aditi Bunker 31:06
So, we've kind of selected, strategically, the spots - one in each continent.

Alisha Wainwright 31:11
Okay.

Dr. Aditi Bunker 31:12
So, in Latin America, we'll be working in Hermosillo in Mexico. And in Africa, we'll be going to urban, Burkina Faso, Ouagadougou.

Alisha Wainwright 31:22
Okay, cool

Dr. Aditi Bunker 31:23
We're working in the Pacific Islands in Nui Island. And so – and - just to finish up, and the last site for Asia is in India - in Ahmedabad - where there's been devastating impacts of heat.

Alisha Wainwright 31:36
Yes.

Dr. Aditi Bunker 31:36
And my colleagues have just told me that it's been about 50 degrees Celsius there - this week.

Alisha Wainwright 31:40
Oh my goodness. Wow. The benefits there, I'm sure, will be drastic.

Dr. Aditi Bunker 31:45
Yeah. So we're working in informal settlements - slum households there. That's kind of one of the aspects of extending our work, from what we're currently doing. And then we've also received funding from the German Science Foundation to now develop a package of interventions in Nouna.

And here we're considering local vernacular architecture and, you know, so things like local materials, what's available for us to take and to, kind of, enhance the cooling effect. So, can we use the cool roof in combination with other passive cooling interventions? Maybe better shading, maybe an indoor ceiling to break the heat transfer inside.

Alisha Wainwright 32:27
Right, right.

Dr. Aditi Bunker 32:28
And then also perhaps improved ventilation, and passive airflow inside the house. So, we're exploring all of these different options now through design and simulation work. And then we'll be working with local community to co-develop the solutions to, and to evelop a full package.

As you said in your intro, we're all experiencing heat and we'll be experiencing it more in the future.

Alisha Wainwright 32:52
Yep.

Dr. Aditi Bunker 32:53

So, I only see that there's going to be more need for passive cooling solutions. And I think that, you know, our moment is, kind of, now, to step up, and to take this challenge on and to just address it. So, we've shown that we can, you know, partner with industry - and in a responsible way - and bring the solutions to the people most in need. You know, that's what we need to do.

Yeah, I think that science has to be the driving force here, you know. We have to show that there are benefits and that the technologies that we want to take really do offer benefits - and that can be for reducing temperature. They can be for whatever purpose, but they have to be - it has to be scientifically driven and through data, you know, seeing that these passive technologies are becoming more widely available.

So, I think spreading the message can kind of help to say to people this is something that you can do to actually reduce your own energy use and to drive down your costs.

Alisha Wainwright 33:57
Well, Dr. Aditi Bunker, thank you so much for joining me again in Los Angeles - in person. It's so nice to have you here and to share your results.

Dr. Aditi Bunker 34:09
Thank you.

(Music starts)

Alisha Wainwright 34:13
Thanks for listening to this episode of When Science Finds a Way. Our thanks to Dr. Aditi Bunker, Guillaume Compoare, and the rest of the Cool Roofs team. And thanks also to Gninasse Rose for sharing her experience with us.

It is stunning to see how much difference a small change like a cool roof can make. It goes to show you don't need expensive or labour intensive technology to mitigate the effects of climate change. And it works on roofs anywhere in the world.

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It's also where you can find the episodes about climate and health from season one of the podcast. Or just scroll back through the series on your podcast app, and you'll find it there too. If you've been enjoying When Science Finds a Way, be sure to rate and review us in your podcast app. You can also tell us what you think on social media. Just tag @wellcometrust - with two L's - to join the conversation.

Next time, we'll be talking about the challenges and opportunities of involving pregnant women and people in vaccine trials.

Flor Munoz 35:47

The question that people should be asking is, why not include pregnant women? And it needs to be justified now why we are excluding pregnant women from a potentially very beneficial vaccine, or medication for that matter, or an intervention.

Alisha Wainwright 36:04
When Science Finds a Way is a Chalk and Blade production for Wellcome.

(Music ends)