WEBVTT

1 00:00:00.000 --> 00:00:03.180 <v ->Hi, everyone, as we have long been</v>

2 00:00:03.180 --> 00:00:04.876 waiting for this time,

3 00:00:04.876 --> 00:00:09.320 Dr. Ana Vicedo-Cabrera will talk about

4 00:00:09.320 --> 00:00:13.320 the most advanced sciences in how to attribute

5 00:00:13.320 --> 00:00:15.170 the health impacts to climate change.

6 00:00:16.242 --> 00:00:19.170 Also Vicedo-Cabrera's current research

7 00:00:19.170 --> 00:00:22.180 develops along the intersection of epidemiology

8 00:00:22.180 --> 00:00:24.900 and climate sciences to understand

9 00:00:24.900 --> 00:00:26.490 how different climate factors

10 00:00:26.490 --> 00:00:28.960 and other related environmental stresses

11 00:00:28.960 --> 00:00:32.080 affect health in the context of climate change.

12 00:00:32.080 --> 00:00:36.890 So she has many, many excellent publications

13 00:00:36.890 --> 00:00:39.410 in the climate epidemiology field,

14 00:00:39.410 --> 00:00:42.860 including using the Multi-Country Multi-City Network

15 00:00:42.860 --> 00:00:45.520 data to look at the health impacts also,

16 00:00:45.520 --> 00:00:48.720 and the health impact to heat-related mortality

17 00:00:48.720 --> 00:00:50.100 including the one study

18 00:00:50.100 --> 00:00:53.900 that she will be sharing with us today.

19 00:00:53.900 --> 00:00:58.453 But before we hand it over to Dr. Ana Vicedo-Cabrera,

20 00:01:01.320 --> 00:01:05.570 I want to just mention that housekeeping rules

21 00:01:05.570 --> 00:01:07.720 that if you do have any questions,

22 00:01:07.720 --> 00:01:09.960 especially our online audience,

23 00:01:09.960 --> 00:01:13.807 please feel free to type in your question in the Chat box,

24 00:01:13.807 --> 00:01:18.510 and we will have all the questions answered at last.

25 00:01:18.510 --> 00:01:20.660 So thank you, and without further ado, Ana.

26 00:01:23.390 --> 00:01:27.897 <v ->So just give me a second, sorry.</v>

27 00:01:34.497 --> 00:01:35.928 Do you hear me?

28 00:01:35.928 --> 00:01:36.810 <v Host>Yeah, okay.</v> <v Attendee>Yes.</v>

29 00:01:36.810 --> 00:01:40.060 <v ->Yeah, perfect, so welcome, everybody,</v>

30 00:01:40.060 --> 00:01:41.920 and thank you very much

31 00:01:41.920 --> 00:01:43.607 for being here in this webinar.

32 00:01:43.607 --> 00:01:46.000 And of course, thank you for the invitation

33 00:01:46.000 --> 00:01:49.060 to contribute to this event today.

34 00:01:49.060 --> 00:01:51.930 It's a great pleasure for me being here

35 00:01:51.930 --> 00:01:54.240 to talk about a topic that in a way,

36 00:01:54.240 --> 00:01:58.470 has been a bit of my nightmare, I must say,

37 00:01:58.470 --> 00:02:01.403 or a bit of my priority during the last,

38 00:02:01.403 --> 00:02:03.830 I would say, two, three years.

39 00:02:03.830 --> 00:02:07.080 And I believe that it might be one

40 00:02:07.080 --> 00:02:11.933 of my main research fields in the coming years as well.

41 00:02:13.360 --> 00:02:17.720 So I hope that basically, at the end of my presentation,

42 00:02:17.720 --> 00:02:22.720 you might have already some insights about this topic,

43 00:02:22.890 --> 00:02:27.150 and probably you might get inspired as well

44 00:02:28.100 --> 00:02:30.640 about the specific topic of attribution.

45 00:02:30.640 --> 00:02:34.617 So as you could see from the title, we'll talk about

46 00:02:34.617 --> 00:02:37.110 "Attribution of Health Impacts to Climate Change",

47 00:02:37.110 --> 00:02:40.083 and now, you will see that mostly of my presentation

48 00:02:40.083 --> 00:02:44.190 will be focused on heat and health as an example.

49 00:02:44.190 --> 00:02:47.940 So let's start from there, from the very beginning.

50 00:02:47.940 --> 00:02:49.390 See if I can, okay?

51 00:02:49.390 --> 00:02:54.390 Yeah, so basically, heat is considered nowadays,

52 00:02:56.870 --> 00:02:59.000 an important environmental stressor.

53 00:02:59.000 --> 00:03:00.910 Very recently, it was estimated that

54 00:03:00.910 --> 00:03:05.910 around 1% of, sorry, 1% of all deaths globally

55 00:03:10.230 --> 00:03:11.420 can be attributed to heat.

56 00:03:11.420 --> 00:03:13.270 That translates around seven deaths

57 00:03:13.270 --> 00:03:17.030 per 100,000 population per year.

58 00:03:17.030 --> 00:03:19.380 And as well, it has been estimated

59 00:03:19.380 --> 00:03:21.670 that increase in morbidity, in particular,

60 00:03:21.670 --> 00:03:25.920 for cardiovascular, respiratory, and mental disorders.

61 00:03:25.920 --> 00:03:29.360 And as well, it has been identified several,

62 00:03:29.360 --> 00:03:32.090 let's say, vulnerability populations

63 00:03:34.760 --> 00:03:36.720 such as elderly, pregnant women,

64 00:03:36.720 --> 00:03:38.920 chronic patients, and children,

65 00:03:38.920 --> 00:03:42.060 and finally, it has been estimated an important burden

66 00:03:42.060 --> 00:03:43.615 in terms of economic costs,

67 00:03:43.615 --> 00:03:45.550 and also reduction in labor productivity.

68 00:03:45.550 --> 00:03:49.290 So every signal is taken together is considered

69 00:03:49.290 --> 00:03:52.300 that heat is an important element

70 00:03:52.300 --> 00:03:55.631 to be assessed in our field of climate change,

71 00:03:55.631 --> 00:03:57.970 epidemiologic impact in particular with regards,

72 00:03:57.970 --> 00:04:00.040 let's say, climate change research

73 00:04:00.040 --> 00:04:02.790 and what is gonna happen in the next decade?

74 00:04:02.790 --> 00:04:07.790 So let's say, how heat affects health?

75 00:04:10.450 --> 00:04:12.103 In a way, we can see that first,

76 00:04:13.850 --> 00:04:16.070 the mechanism by which heat likely

77 00:04:16.070 --> 00:04:18.210 impacts human health are complex

78 00:04:18.210 --> 00:04:20.083 and understanding, let's say, how the body

79 00:04:20.083 --> 00:04:24.850 reacts to heat has been the focus of decades of research

80 00:04:24.850 --> 00:04:27.980 in particular, in physiology.

81 00:04:27.980 --> 00:04:30.890 It stresses kind of the overarching term

82 00:04:30.890 --> 00:04:34.320 that is used for, let's say, to describe

83 00:04:34.320 --> 00:04:36.960 the response of human body to the exposure to heat,

84 00:04:36.960 --> 00:04:39.600 and usually happens when the body

85 00:04:39.600 --> 00:04:42.130 is overwhelmed by metabolic heat production.

86 00:04:42.130 --> 00:04:43.673 You can see here from this diagram,

87 00:04:43.673 --> 00:04:45.600 basically, our body, what it has to do

88 00:04:45.600 --> 00:04:48.350 is kind of react to the exposure to heat

89 00:04:48.350 --> 00:04:50.590 in several mechanisms to try to dissipate,

90 00:04:50.590 --> 00:04:52.450 or let's say, emit the overheating

91 00:04:52.450 --> 00:04:55.240 that we have in our body.

92 00:04:55.240 --> 00:04:57.830 And if in a way, this is not efficient,

93 00:04:57.830 --> 00:05:00.460 what we can create or let's say, can cost

94 00:05:00.460 --> 00:05:02.980 or through different mechanisms that eventually

95 00:05:02.980 --> 00:05:07.260 can damage different systems or organs in the body.

96 00:05:07.260 --> 00:05:12.160 In this nice review that was recently published,

97 00:05:12.160 --> 00:05:14.549 they summarized most of the areas,

98 00:05:14.549 --> 00:05:15.900 so the different mechanisms they have seen

99 00:05:15.900 --> 00:05:17.563 that actually, there are several,

100 00:05:18.670 --> 00:05:22.410 let's say, several organs that are directly

101 00:05:22.410 --> 00:05:25.210 affected by heat exposure through different mechanisms

102 00:05:25.210 --> 00:05:28.720 such as ischemia, heat cytotoxicity,

103 00:05:28.720 --> 00:05:31.190 inflammation, et cetera.

104 00:05:31.190 --> 00:05:33.550 This is from, let's say, physiological

105 00:05:33.550 --> 00:05:34.540 mechanism important view.

106 00:05:34.540 --> 00:05:37.620 But if we, let's say, us, epidemiologists

107 00:05:37.620 --> 00:05:39.530 working on climate change research,

108 00:05:39.530 --> 00:05:43.710 we know that we assess heat in a kind of different way.

109 00:05:43.710 --> 00:05:47.490 Basically, what we do is to have our wonderful,

110 00:05:47.490 --> 00:05:50.700 or let's say, so called exposure response functions,

111 00:05:50.700 --> 00:05:53.140 that in a way summarizes the association

112 00:05:53.140 --> 00:05:56.780 between the ambient temperature in this case,

113 00:05:56.780 --> 00:06:00.179 we do focus on heat, and specific health outcome,

114 00:06:00.179 --> 00:06:02.010 that is in this case, mortality.

115 00:06:02.010 --> 00:06:03.650 That basically, you see here

116 00:06:03.650 --> 00:06:06.800 in the y-axis is the relative risk,

117 00:06:06.800 --> 00:06:09.000 and in x-axis is the temperature.

118 00:06:09.000 --> 00:06:10.880 In this case, representing this, let's say,

119 00:06:10.880 --> 00:06:15.030 association that usually is non-linear for the City of Rome,

120 00:06:15.030 --> 00:06:19.190 and how we define heat is basically all temperatures

121 00:06:19.190 --> 00:06:21.390 above a specific threshold that we call

122 00:06:21.390 --> 00:06:23.180 temperature of minimum mortality

123 00:06:23.180 --> 00:06:25.540 that is tightly-defined from the curve

124 00:06:25.540 --> 00:06:27.550 that corresponds to the temperature

125 00:06:27.550 --> 00:06:30.190 for which the risk of dying is minimum.

126 00:06:30.190 --> 00:06:32.030 So every temperature above

127 00:06:32.030 --> 00:06:34.680 this threshold is considered heat.

128 00:06:34.680 --> 00:06:37.940 And we know that risk increases steeply

129 00:06:37.940 --> 00:06:40.410 from this point onwards, as you could see here

130 00:06:40.410 --> 00:06:42.630 in the curve, up to a maximum.

131 00:06:42.630 --> 00:06:46.210 So basically, this is how we assess heat,

132 00:06:46.210 --> 00:06:49.050 the effect of heat on health.

133 00:06:49.050 --> 00:06:52.040 But to make our life a little bit more complicated,

134 00:06:52.040 --> 00:06:54.950 we know that actually the effect of heat

135 00:06:54.950 --> 00:06:57.200 is very different across locations.

136 00:06:57.200 --> 00:07:00.880 I mean, we can assess this expression response function

137 00:07:00.880 --> 00:07:03.150 or curve from a specific population,

138 00:07:03.150 --> 00:07:06.350 but we know that we cannot extrapolate this curve

139 00:07:06.350 --> 00:07:07.990 to other locations because we know

140 00:07:07.990 --> 00:07:10.810 that vulnerability is very specific,

141 00:07:10.810 --> 00:07:13.800 very particular for a specific location.

142 00:07:13.800 --> 00:07:16.340 It's mostly because of the different combination

143 00:07:16.340 --> 00:07:18.540 of let's say, factors, so vulnerability factors

144 00:07:18.540 --> 00:07:21.690 or resiliency factors that make this population

145 00:07:21.690 --> 00:07:24.940 more or less resilient to an ambient temperature,

146 00:07:24.940 --> 00:07:26.940 in this case, for heat.

147 00:07:26.940 --> 00:07:31.290 So in a way, you could see that during the last years,

148 00:07:31.290 --> 00:07:33.650 there has been a lot of, let's say,

149 00:07:33.650 --> 00:07:37.300 developments in the field of climate change epidemiology,

150 00:07:37.300 --> 00:07:41.510 and to clarify how heat affects health.

151 00:07:41.510 --> 00:07:45.160 But if we have to define specific moments in time

152 00:07:45.160 --> 00:07:48.680 in the past but in a way constitute an important,

153 00:07:48.680 --> 00:07:52.030 let's say, kind of turning points,

154 00:07:52.030 --> 00:07:56.220 how we assess the effect of temperature on health,

155 00:07:56.220 --> 00:07:58.110 in what particular in public health

156 00:07:58.110 --> 00:08:02.200 is this event that happened in Europe in 2003

157 00:08:02.200 --> 00:08:06.360 is this massive European 2003 heat wave

158 00:08:06.360 --> 00:08:10.550 that affected very heavily Central Europe

159 00:08:10.550 --> 00:08:15.260 on the Southeast in over the Mediterranean area.

160 00:08:15.260 --> 00:08:17.740 And basically, what happened is that

161 00:08:17.740 --> 00:08:22.190 it was so massive, so unique that made

162 00:08:22.190 --> 00:08:24.540 that everybody turned their, let's say,

163 00:08:24.540 --> 00:08:28.630 focus, in particular, on public health on heat.

164 00:08:28.630 --> 00:08:32.080 Actually, a few years after that,

165 00:08:32.080 --> 00:08:36.180 there was an assessment in which they estimated

166 00:08:37.230 --> 00:08:42.230 that around 70,000 deaths could happen

167 00:08:44.360 --> 00:08:46.370 during this massive event.

168 00:08:46.370 --> 00:08:49.870 So in a way, it gave a kind of very clear idea

169 00:08:49.870 --> 00:08:52.270 about the severity of the event.

170 00:08:52.270 --> 00:08:53.957 And more importantly, what's at that time

171 00:08:53.957 --> 00:08:56.967 is really to say, "Okay, if this is happening now,

172 00:08:56.967 --> 00:08:58.540 "what would happen in the future?"

173 00:08:58.540 --> 00:09:01.080 So we know that probably due to climate change,

174 00:09:01.080 --> 00:09:03.750 these events will be much more frequent.

175 00:09:03.750 --> 00:09:06.710 So while the epidemiology is, let's say,

176 00:09:06.710 --> 00:09:09.430 as we were assessing what were the impacts

177 00:09:09.430 --> 00:09:12.830 of that event at that time, in particular,

178 00:09:12.830 --> 00:09:14.940 try to understand how we can implement,

179 00:09:14.940 --> 00:09:15.950 probably, health measures,

180 00:09:15.950 --> 00:09:20.370 how we can protect population from future events,

181 00:09:20.370 --> 00:09:24.607 climate science community, they were more thinking,

182 00:09:24.607 --> 00:09:28.457 "Okay, and what could have, in a way,

183 00:09:28.457 --> 00:09:33.370 "what was the role of climate change in this event?"

184 00:09:33.370 --> 00:09:36.820 In a way, there's this kind of very,

185 00:09:36.820 --> 00:09:38.530 not very good question,

186 00:09:38.530 --> 00:09:40.840 or let's say, an imposed question

187 00:09:40.840 --> 00:09:43.780 whether this 2003 heat wave was actually caused,

188 00:09:43.780 --> 00:09:46.570 in a very simplistic or deterministic sense,

189 00:09:46.570 --> 00:09:49.300 by a modification of external influences on climate.

190 00:09:49.300 --> 00:09:51.680 Basically, as we said it, due to the increase

191 00:09:51.680 --> 00:09:54.970 in concentration of greenhouse gases in the atmosphere.

192 00:09:54.970 --> 00:09:59.070 Because we know that almost any such weather event

193 00:09:59.070 --> 00:10:01.440 might have occurred by chance in our world

194 00:10:01.440 --> 00:10:03.565 without climate change.

195 00:10:03.565 --> 00:10:05.113 In a way, what we have to do is to think

196 00:10:05.113 --> 00:10:06.590 that in another perspective,

197 00:10:06.590 --> 00:10:09.760 or let's say, to put that question in a different way.

198 00:10:09.760 --> 00:10:13.140 Basically, it's how much did human activities

199 00:10:13.140 --> 00:10:15.590 increase the risk of occurrence

200 00:10:15.590 --> 00:10:17.480 or probability of this event?

201 00:10:17.480 --> 00:10:21.410 Or more specifically, did actually climate change

202 00:10:21.410 --> 00:10:25.400 alter the severity, frequency, or duration of the event?

203 00:10:25.400 --> 00:10:27.517 So this is exactly what attribution

204 00:10:27.517 --> 00:10:29.540 and detection studies does.

205 00:10:29.540 --> 00:10:33.050 It's a field that it has been, in a way,

206 00:10:33.050 --> 00:10:36.702 developed in the last years,

207 00:10:36.702 --> 00:10:37.823 in a way, it's more traditional

208 00:10:37.823 --> 00:10:39.810 from the climate science community,

209 00:10:39.810 --> 00:10:42.830 but not much on the epidemiological side.

210 00:10:42.830 --> 00:10:44.820 In a way, one of the first example

211 00:10:44.820 --> 00:10:49.050 was actually this study led by Peter Stott from the UK,

212 00:10:49.050 --> 00:10:51.800 in which actually they assessed

213 00:10:51.800 --> 00:10:54.440 what happened in this 2003 heat wave,

214 00:10:54.440 --> 00:10:56.443 and what they came up from this study

215 00:10:56.443 --> 00:11:00.330 is that it is very likely that human influence

216 00:11:00.330 --> 00:11:03.150 has at least doubled the risk of a heat wave,

217 00:11:03.150 --> 00:11:05.220 exceeding this threshold magnitude.

218 00:11:05.220 --> 00:11:07.180 So in a way, it's already posting,

219 00:11:07.180 --> 00:11:10.390 putting a certain name into this event,

220 00:11:10.390 --> 00:11:13.100 saying that probably climate change

221 00:11:13.100 --> 00:11:15.140 have altered the, let's say,

222 00:11:15.140 --> 00:11:17.810 probability of the occurrence of this event.

223 00:11:17.810 --> 00:11:22.490 So how this attribution and detection studies work?

224 00:11:22.490 --> 00:11:24.440 So basically, in a very simplistic way,

225 00:11:25.449 --> 00:11:29.880 what happens is that we model, let's say,

226 00:11:29.880 --> 00:11:32.120 we compare our current climate

227 00:11:32.120 --> 00:11:34.630 in presence of climate change

228 00:11:34.630 --> 00:11:39.420 that we can actually, in a way, estimate

229 00:11:39.420 --> 00:11:42.210 or let's say, mimic or get simulations

230 00:11:42.210 --> 00:11:45.360 based on these kind of climate models,

231 00:11:45.360 --> 00:11:48.610 in which they kind of try to mimic current conditions

232 00:11:48.610 --> 00:11:51.270 based on the what we know

233 00:11:51.270 --> 00:11:53.650 in terms of greenhouse gas emissions,

234 00:11:53.650 --> 00:11:58.080 and we compare it with a world without climate change.

235 00:11:58.080 --> 00:12:00.220 So basically, it's what you can see here.

236 00:12:00.220 --> 00:12:02.804 We compare it, here is in this curve

237 00:12:02.804 --> 00:12:05.300 is kind of simulated data just for you

238 00:12:05.300 --> 00:12:07.240 to illustrate this comparison

239 00:12:07.240 --> 00:12:09.840 in which we have our warming climate

240 00:12:09.840 --> 00:12:11.400 that is increasing in red

241 00:12:11.400 --> 00:12:14.480 compared to a kind of climate-free,

242 00:12:14.480 --> 00:12:16.180 climate change-free environment

243 00:12:16.180 --> 00:12:20.300 or what they called a naturalized scenario,

244 00:12:20.300 --> 00:12:24.000 or let's say, without anthropogenic forcing.

245 00:12:24.000 --> 00:12:25.180 So in a way, the difference

246 00:12:25.180 --> 00:12:28.060 between these two scenarios would give us

247 00:12:28.060 --> 00:12:33.060 what is actually the contribution of anthropogenic forcing,

248 00:12:33.540 --> 00:12:34.970 that eventually is what we want to know,

249 00:12:34.970 --> 00:12:37.120 what is the human influence in the climate

250 00:12:37.120 --> 00:12:41.680 that actually might have altered the climate

251 00:12:43.540 --> 00:12:44.677 in current period or historically,

252 00:12:44.677 --> 00:12:46.960 during the last decades.

253 00:12:46.960 --> 00:12:51.960 So as I said, it's a field that has been developing

254 00:12:52.670 --> 00:12:54.460 in the last years in particular

255 00:12:54.460 --> 00:12:55.710 for the climatological statistics

256 00:12:55.710 --> 00:12:59.250 because of course, we know what is happening now.

257 00:12:59.250 --> 00:13:02.530 I mean, we can see whether these simulations

258 00:13:02.530 --> 00:13:05.790 from these climate models really mimic

259 00:13:05.790 --> 00:13:10.050 what we are experiencing today based on observations,

260 00:13:10.050 --> 00:13:12.700 but we don't have data what would have been

261 00:13:12.700 --> 00:13:14.070 the world without climate change.

262 00:13:14.070 --> 00:13:18.060 So in a way, we have to rely on these models

263 00:13:18.060 --> 00:13:19.780 that eventually, when you reduce this,

264 00:13:19.780 --> 00:13:22.880 let's say, forcing, so these inputs in your model,

265 00:13:22.880 --> 00:13:25.790 you're actually mimicking what would have been

266 00:13:25.790 --> 00:13:28.490 the world without climate change.

267 00:13:28.490 --> 00:13:29.870 So in a way, you can see that

268 00:13:29.870 --> 00:13:30.997 there are a lot of uncertainties.

269 00:13:30.997 --> 00:13:32.830 And of course, one thing

270 00:13:32.830 --> 00:13:36.450 that I would like you to put in your,

271 00:13:36.450 --> 00:13:38.540 kind of your front, in your forefront,

272 00:13:38.540 --> 00:13:40.530 is that when we talk about attribution

273 00:13:40.530 --> 00:13:41.520 and detection studies,

274 00:13:41.520 --> 00:13:45.080 we talk about, basically, probability.

275 00:13:45.080 --> 00:13:47.480 This is a term that you will say

276 00:13:47.480 --> 00:13:50.270 that it's very pivotal in this story

277 00:13:50.270 --> 00:13:52.130 because in a way, it's not a matter of,

278 00:13:52.130 --> 00:13:54.480 okay, yes or no climate change

279 00:13:54.480 --> 00:13:56.810 have caused this event.

280 00:13:56.810 --> 00:13:58.050 It's whether climate change

281 00:13:58.050 --> 00:14:01.410 has altered the probability of this event.

282 00:14:01.410 --> 00:14:04.630 So basically, what we, let's say,

283 00:14:04.630 --> 00:14:06.840 people working or researchers working in,

284 00:14:06.840 --> 00:14:10.150 in climate science, mostly on the part

285 00:14:10.150 --> 00:14:11.670 on attribution and detection studies,

286 00:14:11.670 --> 00:14:15.340 what they do is to compare probabilities.

287 00:14:15.340 --> 00:14:17.010 As you could see here in red,

288 00:14:17.010 --> 00:14:19.140 the probability of an event happening

289 00:14:19.140 --> 00:14:21.830 above a specific temperature threshold

290 00:14:21.830 --> 00:14:24.410 compared to the same, let's say, threshold,

291 00:14:24.410 --> 00:14:25.363 what would have been the probability

292 00:14:25.363 --> 00:14:27.330 in a world without climate change

293 00:14:27.330 --> 00:14:29.403 in this counterfactual scenario.

294 00:14:31.460 --> 00:14:35.250 Let's say, in this nice review,

295 00:14:35.250 --> 00:14:39.313 this researcher, Fredi Otto from Oxford,

296 00:14:40.460 --> 00:14:43.350 she very well described in this paper,

297 00:14:43.350 --> 00:14:45.260 in this review, in which basically,

298 00:14:45.260 --> 00:14:47.380 what she said is that out of this exercise,

299 00:14:47.380 --> 00:14:50.050 we would have four different outcomes.

300 00:14:50.050 --> 00:14:52.580 First, could have been made, let's say,

301 00:14:52.580 --> 00:14:54.700 that this event could have been made more likely

302 00:14:54.700 --> 00:14:59.120 because of the anthropogenic climate change, let's say,

303 00:14:59.120 --> 00:15:03.050 or it could have been made, let's say, less likely,

304 00:15:03.050 --> 00:15:05.070 or there is no detectable influence

305 00:15:05.070 --> 00:15:06.527 from anthropogenic climate change.

306 00:15:06.527 --> 00:15:09.520 And the last one, with our current understanding

307 00:15:09.520 --> 00:15:11.940 and available tools, we are unable to analyze

308 00:15:11.940 --> 00:15:14.850 the role of external drivers in this event.

309 00:15:14.850 --> 00:15:16.890 So basically, as you could see,

310 00:15:16.890 --> 00:15:19.610 is to see whether climate change

311 00:15:19.610 --> 00:15:23.307 altered the probability to make this more or less likely.

312 00:15:23.307 --> 00:15:25.240 And then we have resources,

313 00:15:25.240 --> 00:15:28.730 or let's say, our models can help us to really clarify

314 00:15:28.730 --> 00:15:33.490 whether these differences in probability is meaningful.

315 00:15:33.490 --> 00:15:37.280 So to understand the world, this work of attribution,

316 00:15:37.280 --> 00:15:39.630 is we have to talk about,

317 00:15:39.630 --> 00:15:41.810 and usually, you will see this plot

318 00:15:42.880 --> 00:15:44.973 in every study in this field.

319 00:15:46.390 --> 00:15:48.810 For us, epidemiologists, it's basically

320 00:15:48.810 --> 00:15:50.530 something that we, I mean, honestly,

321 00:15:50.530 --> 00:15:53.180 when I saw it, I don't know what the hell is this,

322 00:15:53.180 --> 00:15:56.210 but at some point, I found it very, very interesting.

323 00:15:56.210 --> 00:15:58.460 So I will try to guide you through this plot.

324 00:16:00.208 --> 00:16:03.110 You could see here in the y-axis

325 00:16:03.110 --> 00:16:05.530 is the monthly temperature equivalent.

326 00:16:06.740 --> 00:16:09.960 And basically, in the x-axis,

327 00:16:09.960 --> 00:16:12.616 you have what they call return time.

328 00:16:12.616 --> 00:16:15.296 It's a measure of, let's say,

329 00:16:15.296 --> 00:16:17.360 of probability or severity of an event.

330 00:16:17.360 --> 00:16:20.200 It's basically, you put in here in this point,

331 00:16:20.200 --> 00:16:21.870 what it's saying is an event

332 00:16:21.870 --> 00:16:23.150 has a return kind of time,

333 00:16:23.150 --> 00:16:27.130 or basically, it already happens 1 in 10 years.

334 00:16:27.130 --> 00:16:31.800 If you go in here, it's an event happening 1 in 100 years.

335 00:16:31.800 --> 00:16:34.070 So in a way, you could understand

336 00:16:34.070 --> 00:16:37.967 that the far you are from the origin,

337 00:16:37.967 --> 00:16:41.490 the more extreme an event could be

338 00:16:41.490 --> 00:16:44.670 or the less likely, as you could see here

339 00:16:44.670 --> 00:16:47.010 on the other side of the axis,

340 00:16:47.010 --> 00:16:49.140 less probable an event is.

341 00:16:49.140 --> 00:16:51.080 So basically, what they do, in this case,

342 00:16:51.080 --> 00:16:54.810 it's an example of the 2010 heat wave in Russia.

343 00:16:54.810 --> 00:16:58.610 And it's basically to compare this blue line,

344 00:16:58.610 --> 00:17:03.100 that in a way, is used based on this counterfactual world

345 00:17:03.100 --> 00:17:04.500 in which you have, basically,

346 00:17:04.500 --> 00:17:06.220 this is the probability of a specific,

347 00:17:06.220 --> 00:17:08.760 let's say, event happening at different times.

348 00:17:08.760 --> 00:17:10.960 And in red, the same,

349 00:17:10.960 --> 00:17:13.280 but in our world currently, in our world,

350 00:17:13.280 --> 00:17:14.710 let's say, in our world current conditions,

351 00:17:14.710 --> 00:17:16.000 so we don't have to worry.

352 00:17:16.000 --> 00:17:19.160 So if you go in this line,

353 00:17:19.160 --> 00:17:24.160 this line is basically corresponds to this threshold

354 00:17:24.567 --> 00:17:27.050 that was, let's say, defined during this heat wave.

355 00:17:27.050 --> 00:17:28.880 But basically, this heat wave reached,

356 00:17:28.880 --> 00:17:32.097 I think, it was 24.5 degrees.

357 00:17:33.379 --> 00:17:35.590 So in a way, according to these dimensions,

358 00:17:35.590 --> 00:17:39.540 what they say is that in current times,

359 00:17:39.540 --> 00:17:44.540 this event corresponds to approximately 1-in-50-years event,

360 00:17:46.380 --> 00:17:49.770 while in a world without climate change,

361 00:17:49.770 --> 00:17:54.200 this event would have corresponded to 1 in a 100 years.

362 00:17:54.200 --> 00:17:55.640 So basically, what has happened

363 00:17:55.640 --> 00:17:59.760 is that climate change has made the event more likely,

364 00:17:59.760 --> 00:18:02.560 let's say, from an event in a hypothetical world,

365 00:18:02.560 --> 00:18:07.430 1 in 100 years has become 1 in 50 years.

366 00:18:07.430 --> 00:18:09.597 So as you could see again,

367 00:18:09.597 --> 00:18:12.120 is the EDL changes in probability,

368 00:18:12.120 --> 00:18:16.240 making a specific event or a specific temperature threshold,

369 00:18:16.240 --> 00:18:18.410 make it more probable, let's say,

370 00:18:18.410 --> 00:18:22.013 going from 1 in 100 to 1 in 50 years.

371 00:18:23.100 --> 00:18:27.500 So as you could see, it's kind of something

372 00:18:27.500 --> 00:18:31.190 that is not very, for us as epidemiologists,

373 00:18:31.190 --> 00:18:33.020 a little bit difficult because in a way,

374 00:18:33.020 --> 00:18:34.620 it's just talking about probabilities,

375 00:18:34.620 --> 00:18:37.990 but for us, translating this into health impacts,

376 00:18:37.990 --> 00:18:39.630 it requires a bit of work.

377 00:18:39.630 --> 00:18:42.327 But let's say that we're working on it.

378 00:18:42.327 --> 00:18:46.160 The idea is that this work of attribution

379 00:18:46.160 --> 00:18:49.090 has gained kind of a lot of attention

380 00:18:49.090 --> 00:18:50.890 during the last years.

381 00:18:50.890 --> 00:18:52.033 In particular, thinking about

382 00:18:52.033 --> 00:18:53.820 what happened this last summer.

383 00:18:53.820 --> 00:18:56.100 Surely, you might have heard,

384 00:18:56.100 --> 00:18:59.660 or even lived there, or suffered this event,

385 00:18:59.660 --> 00:19:03.330 this massive heat wave that happened in last summer

386 00:19:03.330 --> 00:19:05.060 in West, North in America.

387 00:19:05.060 --> 00:19:07.550 So in a way, what happened,

388 00:19:07.550 --> 00:19:11.020 we know there were few days,

389 00:19:11.020 --> 00:19:14.740 the group came with temperatures above record,

390 00:19:14.740 --> 00:19:18.340 and it was a lot of attention in media, et cetera.

391 00:19:18.340 --> 00:19:21.281 So while all this was happening,

392 00:19:21.281 --> 00:19:23.280 let's say, that there was an initiative

393 00:19:23.280 --> 00:19:27.130 from this World Weather Attribution initiative

394 00:19:27.130 --> 00:19:29.840 that it's a kind of, again,

395 00:19:29.840 --> 00:19:32.780 it's an initiative in which different researchers

396 00:19:32.780 --> 00:19:35.447 working on attribution studies put together

397 00:19:35.447 --> 00:19:39.260 and try to give answers about whether climate change

398 00:19:39.260 --> 00:19:41.290 might have had some role

399 00:19:41.290 --> 00:19:43.563 in a specific extreme weather events.

400 00:19:44.490 --> 00:19:47.630 Not saying that to provide this evidence

401 00:19:47.630 --> 00:19:49.150 a year or two years after,

402 00:19:49.150 --> 00:19:53.300 it's really to provide this evidence in the coming weeks,

403 00:19:53.300 --> 00:19:55.460 because we know that times matter.

404 00:19:55.460 --> 00:19:58.470 If we have suffered a heat wave like this,

405 00:19:58.470 --> 00:20:00.330 it would have much more impact

406 00:20:00.330 --> 00:20:04.670 if this answer comes earlier in time

407 00:20:04.670 --> 00:20:07.930 rather than wait years ahead

408 00:20:07.930 --> 00:20:10.120 that people might completely forget

409 00:20:10.120 --> 00:20:11.860 about the severity of this event.

410 00:20:11.860 --> 00:20:14.710 So the idea is that this group of researchers

411 00:20:14.710 --> 00:20:16.260 and they did this analysis,

412 00:20:16.260 --> 00:20:18.890 and basically, what they came up with this

413 00:20:18.890 --> 00:20:22.420 is that it would be virtually impossible

414 00:20:22.420 --> 00:20:24.410 without human-induced climate change.

415 00:20:24.410 --> 00:20:26.520 At this event, it's estimated to be about

416 00:20:26.520 --> 00:20:30.040 1-in-1000-year event in today's climate.

417 00:20:30.040 --> 00:20:33.020 So you can have from this sentence,

418 00:20:33.020 --> 00:20:35.180 that this event was kind of unique,

419 00:20:35.180 --> 00:20:38.540 very extreme, 1 in 1,000 year, it's a lot.

420 00:20:38.540 --> 00:20:40.280 And actually, they provided this plot.

421 00:20:40.280 --> 00:20:41.870 You will see that it's very similar

422 00:20:41.870 --> 00:20:43.320 to what I just shown.

423 00:20:43.320 --> 00:20:47.070 And actually, this event that was in here

424 00:20:47.070 --> 00:20:49.730 around 40, almost 40 degrees,

425 00:20:49.730 --> 00:20:52.790 they saw that it was actually even outside

426 00:20:52.790 --> 00:20:56.520 the probable range of events within a year,

427 00:20:56.520 --> 00:20:59.760 within let's say, in our current climate.

428 00:20:59.760 --> 00:21:01.730 So in a way, it's saying already about

429 00:21:01.730 --> 00:21:05.040 this huge severity of this event that happened.

430 00:21:05.040 --> 00:21:09.913 So this study and the savings they provide at this time,

431 00:21:09.913 --> 00:21:13.610 I said it was a couple of weeks after the event

432 00:21:13.610 --> 00:21:17.713 was very, very powerful because it's giving clear,

433 00:21:18.550 --> 00:21:22.080 let's say putting the finger into the idea

434 00:21:22.080 --> 00:21:23.500 of the role of climate change

435 00:21:23.500 --> 00:21:26.160 and the human influence in this event.

436 00:21:26.160 --> 00:21:29.090 So the message was very, very, very strong.

437 00:21:29.090 --> 00:21:30.910 At the same time, we have to bear in mind

438 00:21:30.910 --> 00:21:32.980 that surely you know that there was this,

439 00:21:34.140 --> 00:21:37.520 the new report of the IPCC,

440 00:21:37.520 --> 00:21:40.800 that part on "The Physical Science Basis"

441 00:21:40.800 --> 00:21:42.720 was already published in August.

442 00:21:42.720 --> 00:21:46.860 And the difference, let's say,

443 00:21:46.860 --> 00:21:49.340 of this report compared to previous reports,

444 00:21:49.340 --> 00:21:53.770 really to put in more weight into the influence

445 00:21:53.770 --> 00:21:56.320 of the human activities on carbon,

446 00:21:56.320 --> 00:21:58.910 let's say, extreme weather events

447 00:21:58.910 --> 00:22:02.460 happening in today's world.

448 00:22:02.460 --> 00:22:07.200 So again, you can see that the idea of attribution

449 00:22:07.200 --> 00:22:10.060 is gaining much more attention lately,

450 00:22:10.060 --> 00:22:14.250 but more importantly, because we know

451 00:22:14.250 --> 00:22:18.130 that evidence from attribution studies

452 00:22:18.130 --> 00:22:20.100 can be used in lawsuits.

453 00:22:20.100 --> 00:22:22.920 Basically, has been used for a specific,

454 00:22:22.920 --> 00:22:27.150 let's say, companies, individuals, et cetera,

455 00:22:27.150 --> 00:22:30.750 to kind of give some complaints,

456 00:22:30.750 --> 00:22:33.710 or let's say, to ask for some compensations

457 00:22:33.710 --> 00:22:36.970 of a specific losses to, let's say, governments

458 00:22:36.970 --> 00:22:39.620 or companies emitting greenhouse gases.

459 00:22:39.620 --> 00:22:43.010 So the idea is that during the last years,

460 00:22:43.010 --> 00:22:45.960 it has been a tremendous increase in,

461 00:22:45.960 --> 00:22:48.100 let's say, different lawsuits

462 00:22:48.100 --> 00:22:50.910 that have been implemented against climate change

463 00:22:50.910 --> 00:22:54.171 using evidence from attribution and detection studies.

464 00:22:54.171 --> 00:22:55.640 In this plot, you can see that it actually

465 00:22:55.640 --> 00:22:58.650 was mostly during the second half

466 00:22:58.650 --> 00:23:02.460 of the previous decade that actually went super up.

467 00:23:02.460 --> 00:23:04.270 And most of these, let's say,

468 00:23:04.270 --> 00:23:08.210 these initiatives happened in the US.

469 00:23:08.210 --> 00:23:11.580 Most importantly, it's like, okay,

470 00:23:11.580 --> 00:23:13.070 we know that there's this tool,

471 00:23:13.070 --> 00:23:17.530 but we need scientific, robust scientific evidence

472 00:23:17.530 --> 00:23:20.600 that could help us to gain or let's say,

473 00:23:20.600 --> 00:23:22.940 to win these different, let's say,

474 00:23:22.940 --> 00:23:25.120 initiatives in the courts.

475 00:23:25.120 --> 00:23:26.713 At the same time, we know that,

476 00:23:27.890 --> 00:23:30.720 let's say, that the idea of these initiatives

477 00:23:30.720 --> 00:23:32.950 is that beyond individual litigant,

478 00:23:32.950 --> 00:23:35.730 but it is seek to advance climate policies,

479 00:23:35.730 --> 00:23:38.590 drive behavioral shifts by key actors,

480 00:23:38.590 --> 00:23:40.750 and or create awareness,

481 00:23:40.750 --> 00:23:42.810 and encourage public debate.

482 00:23:42.810 --> 00:23:44.960 So it goes beyond the idea of compensation.

483 00:23:44.960 --> 00:23:48.070 It's really to gain more weight,

484 00:23:48.070 --> 00:23:50.010 or let's say, to put more emphasis

485 00:23:50.010 --> 00:23:52.870 on the role of climate change on the different,

486 00:23:52.870 --> 00:23:54.240 let's say, events, extreme weather events

487 00:23:54.240 --> 00:23:55.633 that are happening.

488 00:23:56.742 --> 00:23:58.960 At the same time, it's something

489 00:23:58.960 --> 00:24:02.890 that has been in a way highlighted.

490 00:24:02.890 --> 00:24:06.763 That's why that nowadays, it's not an easy task.

491 00:24:07.860 --> 00:24:10.410 There are variants such as accessing to justice,

492 00:24:10.410 --> 00:24:14.740 and difficulties in dealing with scientific evidence,

493 00:24:14.740 --> 00:24:19.490 and the conservatism of many courts

494 00:24:19.490 --> 00:24:22.460 that eventually confronted the different policy issues.

495 00:24:22.460 --> 00:24:25.110 So in a way, the idea is that

496 00:24:25.110 --> 00:24:27.450 there's a lot of now, research,

497 00:24:27.450 --> 00:24:31.160 going on, putting together climate science

498 00:24:31.160 --> 00:24:35.250 and low, try to gain or let's say,

499 00:24:35.250 --> 00:24:37.180 to create some synergies that eventually

500 00:24:37.180 --> 00:24:41.080 would help advance this field on climate litigation.

501 00:24:41.080 --> 00:24:42.530 And one important, let's say,

502 00:24:42.530 --> 00:24:45.450 call that I take from a recent publication

503 00:24:45.450 --> 00:24:49.940 of a colleague of mine, of Rupert Stuart-Smith,

504 00:24:49.940 --> 00:24:52.300 they say that greater appreciation

505 00:24:52.300 --> 00:24:53.900 and exploitation of current methodologies

506 00:24:53.900 --> 00:24:58.250 in attribution science could address obstacles to causation

507 00:24:58.250 --> 00:25:00.804 and improve the prospects of litigation.

508 00:25:00.804 --> 00:25:02.097 So in a way, it's really saying,

509 00:25:02.097 --> 00:25:04.907 ”Okay, we know that we can do something.

510 00:25:04.907 --> 00:25:07.957 ”Law can be a very good path for doing that,

511 00:25:07.957 --> 00:25:11.037 ”but probably, science is we need to, in a way,

512 00:25:11.037 --> 00:25:12.330 ”advance knowledge in this field

513 00:25:12.330 --> 00:25:14.987 ”and try to provide better, let's say,

514 00:25:14.987 --> 00:25:17.477 ”scientific evidence that could help, let's say,

515 00:25:17.477 --> 00:25:20.950 ”winning on these different initiatives in courts.”

516 00:25:20.950 --> 00:25:23.230 So let's say that so far,

517 00:25:23.230 --> 00:25:28.230 we have been working more on the part on climate events,

518 00:25:29.050 --> 00:25:30.883 more on the weather events,

519 00:25:30.883 --> 00:25:33.043 whether one weather event can be attributed,

520 00:25:33.043 --> 00:25:34.420 attributed or let's say,

521 00:25:34.420 --> 00:25:36.790 how was the role of climate change.

522 00:25:36.790 --> 00:25:39.370 But what about health impacts?

523 00:25:39.370 --> 00:25:41.810 Okay, we know that one event

524 00:25:41.810 --> 00:25:44.870 might have been more frequent or more, let's say,

525 00:25:44.870 --> 00:25:47.200 the probability has increased because of climate change,

526 00:25:47.200 --> 00:25:48.660 but at some point, we would like to know

527 00:25:48.660 --> 00:25:51.710 what this translates into health impacts.

528 00:25:51.710 --> 00:25:54.167 So, as I said, the idea is how much

529 00:25:54.167 --> 00:25:57.110 of the observed health burden during an extreme event

530 00:25:57.110 --> 00:25:59.590 can be attributed to human activities?

531 00:25:59.590 --> 00:26:04.260 Or more broadly, how much of the historical

532 00:26:04.260 --> 00:26:07.270 health burden of a climate-sensitive outcome

533 00:26:07.270 --> 00:26:09.290 can be attributed to climate change?

534 00:26:09.290 --> 00:26:11.353 So it's not an easy task.

535 00:26:11.353 --> 00:26:13.730 I mean, we know that in there,

536 00:26:13.730 --> 00:26:18.543 there might be some kind of different, let's say,

537 00:26:20.040 --> 00:26:22.420 developments in terms of methods, et cetera.

538 00:26:22.420 --> 00:26:24.350 And actually, one example, for example,

539 00:26:24.350 --> 00:26:28.240 you know that I found this article in The New York Times

540 00:26:28.240 --> 00:26:31.090 that was basically, they showed some calculations

541 00:26:31.090 --> 00:26:34.283 based on a recent report of the CDC,

542 00:26:35.370 --> 00:26:37.150 based on that, let's say, what has happened

543 00:26:37.150 --> 00:26:41.890 in these massive heat waves in the Northwest in the US.

544 00:26:41.890 --> 00:26:45.868 And actually, they just did a very simple estimation

545 00:26:45.868 --> 00:26:49.130 on the let's say, estimated the number of deaths

546 00:26:49.130 --> 00:26:50.760 that were kind of excess,

547 00:26:50.760 --> 00:26:53.050 or let's say, more than normal

548 00:26:53.050 --> 00:26:56.150 during that period of time, during the heat wave.

549 00:26:56.150 --> 00:26:57.403 Attributing that, let's say,

550 00:26:57.403 --> 00:26:59.390 that during this heat wave,

551 00:26:59.390 --> 00:27:03.360 more than 600 people died because that in a way,

552 00:27:03.360 --> 00:27:07.870 one could attribute to this heat wave.

553 00:27:07.870 --> 00:27:10.280 But the other question is how much actually

554 00:27:10.280 --> 00:27:13.600 of this burden can be attributed to human activities?

555 00:27:13.600 --> 00:27:15.760 Again, talking about the probabilities,

556 00:27:15.760 --> 00:27:19.070 not to say yes or no, is to how much of this burden

557 00:27:19.070 --> 00:27:23.050 can be kind of attributed to these events.

558 00:27:23.050 --> 00:27:27.660 So one of the first exercise that has been done

559 00:27:27.660 --> 00:27:29.427 in terms of attribution of health impacts

560 00:27:29.427 --> 00:27:32.920 was this study done by Dann Mitchell

561 00:27:32.920 --> 00:27:35.500 in which they assessed what was the impact

562 00:27:35.500 --> 00:27:39.360 of the 2003 heat wave in London and in Paris.

563 00:27:39.360 --> 00:27:40.350 And actually, what they found

564 00:27:40.350 --> 00:27:41.577 is that anthropogenic climate change

565 00:27:41.577 --> 00:27:44.350 increased the risk of heat-related mortality

566 00:27:44.350 --> 00:27:49.110 in Central Paris by 70%, and by 20% in London.

567 00:27:49.110 --> 00:27:51.330 So eventually, what is really in here

568 00:27:51.330 --> 00:27:54.620 is saying that how much human

569 00:27:54.620 --> 00:27:56.530 or anthropogenic climate change

570 00:27:56.530 --> 00:28:00.123 has either the severity of this event

571 00:28:00.123 --> 00:28:02.600 in terms of how much to really put the value,

572 00:28:02.600 --> 00:28:06.050 a number on this contribution in terms of health impacts.

573 00:28:06.050 --> 00:28:08.817 So in a way, you will see that

574 00:28:08.817 --> 00:28:09.990 it's clearly a different message

575 00:28:09.990 --> 00:28:11.580 compared to what I said before.

576 00:28:11.580 --> 00:28:14.540 It's not about the excess debt during that period,

577 00:28:14.540 --> 00:28:15.960 it's really to say how much,

578 00:28:15.960 --> 00:28:17.420 how many beds can be attributed

579 00:28:17.420 --> 00:28:20.510 to anthropogenic climate change.

580 00:28:20.510 --> 00:28:22.157 So let's say that traditionally,

581 00:28:22.157 --> 00:28:25.000 the way how we have assessed this

582 00:28:25.000 --> 00:28:26.987 is more into the future.

583 00:28:26.987 --> 00:28:30.940 Say compare in what has been there,

584 00:28:30.940 --> 00:28:33.960 the health burden attributed to heat in current times

585 00:28:33.960 --> 00:28:36.550 compared to what will be in the future

586 00:28:36.550 --> 00:28:38.190 using climate change scenarios,

587 00:28:38.190 --> 00:28:40.660 assuming that the difference between today

588 00:28:40.660 --> 00:28:42.160 and the future can be attributed

589 00:28:42.160 --> 00:28:44.120 to anthropogenic climate change.

590 00:28:44.120 --> 00:28:46.550 But you will see that from this idea

591 00:28:46.550 --> 00:28:49.090 of attribution studies is not about future,

592 00:28:49.090 --> 00:28:51.230 it's about present, okay?

593 00:28:51.230 --> 00:28:53.000 This is something that you should be reminded,

594 00:28:53.000 --> 00:28:55.350 is really to use historical events

595 00:28:55.350 --> 00:28:57.580 and try to see what has to be the footprint

596 00:28:57.580 --> 00:29:00.960 of human activities in historical events.

597 00:29:00.960 --> 00:29:03.600 So when we talk about the tradition, as I said,

598 00:29:03.600 --> 00:29:05.933 one could focus on, let's say,

599 00:29:07.077 --> 00:29:09.040 on a specific event to say,

600 00:29:09.040 --> 00:29:10.460 what they call event attribution

601 00:29:10.460 --> 00:29:12.300 for individual extreme weather events

602 00:29:12.300 --> 00:29:14.650 as this example of Dann Mitchell,

603 00:29:14.650 --> 00:29:18.680 but another example is more on the trend attribution.

604 00:29:18.680 --> 00:29:20.890 Basically, for long-term changes

605 00:29:20.890 --> 00:29:23.079 in the mean of climatological statistics.

606 00:29:23.079 --> 00:29:24.900 So not really to assess specific events,

607 00:29:24.900 --> 00:29:28.777 it's to see how much the observed trend

608 00:29:28.777 --> 00:29:32.470 can be attributed to human activities.

609 00:29:32.470 --> 00:29:34.800 So basically, using this approach,

610 00:29:34.800 --> 00:29:36.690 not really to focus on extreme events,

611 00:29:36.690 --> 00:29:40.390 but on the trend during a period of time

612 00:29:40.390 --> 00:29:45.390 is we did this analysis that it was, I mean,

613 00:29:45.510 --> 00:29:47.870 I had the pleasure to lead together with my colleagues

614 00:29:47.870 --> 00:29:49.420 of the Multi-Country Multi-City

615 00:29:49.420 --> 00:29:50.700 Collaborative Research Network

616 00:29:50.700 --> 00:29:52.530 was recently published is here.

617 00:29:52.530 --> 00:29:54.410 And this is the reason why I'm talking today

618 00:29:54.410 --> 00:29:57.280 about this topic, because thanks to this opportunity,

619 00:29:57.280 --> 00:30:02.060 I had really the option to dig a bit into this topic.

620 00:30:02.060 --> 00:30:05.480 So in a kind of general terms,

621 00:30:05.480 --> 00:30:09.750 this study like the general framework

622 00:30:09.750 --> 00:30:14.750 was about combining data and methods in epidemiology

623 00:30:15.410 --> 00:30:20.170 with modeling, let's say, climate projections,

624 00:30:20.170 --> 00:30:24.880 climate, let's say, simulations of the past years,

625 00:30:24.880 --> 00:30:27.610 we were able to estimate how much

626 00:30:27.610 --> 00:30:30.870 of the observed heat-related mortality

627 00:30:30.870 --> 00:30:34.580 can be attributed to human-induced climate change.

628 00:30:34.580 --> 00:30:37.500 So I will go step by step.

629 00:30:37.500 --> 00:30:39.770 First, as I said, we used data from the

630 00:30:39.770 --> 00:30:42.300 Multi-Country Multi-City Collaborative Research Network

631 00:30:42.300 --> 00:30:47.300 in 732 locations in 43 countries in the world.

632 00:30:47.950 --> 00:30:49.780 Here, you can see the different location

633 00:30:49.780 --> 00:30:51.330 of the different places.

634 00:30:51.330 --> 00:30:53.900 And the idea is that we combine,

635 00:30:53.900 --> 00:30:55.690 let's say, we took all this data

636 00:30:55.690 --> 00:30:58.243 on observed temperature and mortality,

637 00:30:59.106 --> 00:31:02.720 and we derived this, the vulnerability function

638 00:31:02.720 --> 00:31:05.780 or the exposure response functions of each city.

639 00:31:05.780 --> 00:31:08.520 You've seen the state of the art methods

640 00:31:08.520 --> 00:31:09.790 in climate change epidemiology

641 00:31:09.790 --> 00:31:12.930 is basically to a stage and serious analysis

642 00:31:12.930 --> 00:31:14.860 with distributed lag non-linear models

643 00:31:14.860 --> 00:31:17.080 and multivariate multilevel meta-regression.

644 00:31:17.080 --> 00:31:18.720 Yeah, it sounds super fancy,

645 00:31:18.720 --> 00:31:21.840 but in a ways, it's not as complicated,

646 00:31:21.840 --> 00:31:24.130 and you'll have all the information

647 00:31:24.130 --> 00:31:25.780 on the methods in the paper.

648 00:31:25.780 --> 00:31:27.300 I invite you to have a look,

649 00:31:27.300 --> 00:31:29.230 review if you would like to learn more

650 00:31:29.230 --> 00:31:31.090 about the methodological part.

651 00:31:31.090 --> 00:31:32.610 So basically, what we did, as I said,

652 00:31:32.610 --> 00:31:36.798 is to estimate the vulnerability of each city,

653 00:31:36.798 --> 00:31:41.210 which in a way, was already kind of an advancement

654 00:31:41.210 --> 00:31:42.840 compared to previous assessments.

655 00:31:42.840 --> 00:31:45.280 Because again, here, the idea is that we clearly

656 00:31:45.280 --> 00:31:49.590 or we aim to assess the specific vulnerability

657 00:31:49.590 --> 00:31:52.520 of each population to have a better estimation

658 00:31:52.520 --> 00:31:55.500 of heat-related mortality in each location.

659 00:31:55.500 --> 00:31:58.760 And you see here that it was clearly heterogeneous.

660 00:31:58.760 --> 00:32:01.873 We saw as we found in previous assessment,

661 00:32:01.873 --> 00:32:04.890 that actually, most of higher risks

662 00:32:04.890 --> 00:32:08.670 are usually found in Europe, in the Mediterranean area,

663 00:32:08.670 --> 00:32:11.630 and other locations in Asia.

664 00:32:11.630 --> 00:32:15.530 So as I said, we combined these exposure response curves

665 00:32:15.530 --> 00:32:18.210 with moderate climate data

666 00:32:18.210 --> 00:32:20.930 that we got from our colleagues from there,

667 00:32:20.930 --> 00:32:22.240 the DAMIP Project, this is

668 00:32:22.240 --> 00:32:24.473 the Detection Attribution Model Intercomparison Project

669 00:32:24.473 --> 00:32:28.500 that is based on the last CMIP6 simulations.

670 00:32:28.500 --> 00:32:33.500 And idea is that for each location in this assessment,

671 00:32:33.770 --> 00:32:38.770 we derive a series, let's say, of moderate pairs

672 00:32:39.310 --> 00:32:43.250 of moderate climate on daily temperature

673 00:32:43.250 --> 00:32:45.260 under current conditions

674 00:32:45.260 --> 00:32:48.291 and under our without climate change,

675 00:32:48.291 --> 00:32:50.334 that is our counterfactual scenario.

676 00:32:50.334 --> 00:32:54.380 Here, you have a kind of illustration of the trends.

677 00:32:54.380 --> 00:32:59.380 Basically, in red, you have the observed trend

678 00:32:59.630 --> 00:33:01.170 with a warming trend.

679 00:33:01.170 --> 00:33:04.070 That it mimics current conditions with climate change

680 00:33:04.070 --> 00:33:06.590 while the orange one mimics somewhere

681 00:33:06.590 --> 00:33:09.300 without climate change in the absence of warming.

682 00:33:09.300 --> 00:33:12.130 So basically, we focused in this period here

683 00:33:12.130 --> 00:33:17.130 between 19, yeah, 1990, oh, 1990, oops,

684 00:33:18.760 --> 00:33:23.640 I forgot, 1991 to 2006, 2018.

685 00:33:23.640 --> 00:33:24.990 Actually, sorry about the numbers,

686 00:33:24.990 --> 00:33:26.230 I'm very bad with that.

687 00:33:26.230 --> 00:33:28.280 And basically, what we did is as I said,

688 00:33:28.280 --> 00:33:33.170 for each location, we obtained these pairs,

689 00:33:33.170 --> 00:33:36.400 and we translated these observed,

690 00:33:36.400 --> 00:33:39.290 or let's say, simulated temperature

691 00:33:39.290 --> 00:33:42.920 into hypothetical excess mortality

692 00:33:42.920 --> 00:33:45.240 under these two scenarios.

693 00:33:45.240 --> 00:33:49.260 And this is basically what you can see here

694 00:33:49.260 --> 00:33:52.190 in this panel A.

695 00:33:52.190 --> 00:33:56.283 In solid, you have the anthropogenic,

696 00:33:58.140 --> 00:34:00.660 let's say, the heat-related mortality

697 00:34:00.660 --> 00:34:02.530 under current condition, let's say,

698 00:34:02.530 --> 00:34:04.880 in presence of anthropogenic climate change,

699 00:34:04.880 --> 00:34:07.910 while in light here, these bars,

700 00:34:07.910 --> 00:34:11.370 you have what would have been heat the excess,

701 00:34:11.370 --> 00:34:13.570 or let's say the heat-related mortality

702 00:34:13.570 --> 00:34:15.850 in a world without climate change.

703 00:34:15.850 --> 00:34:17.587 So basically, we estimated on this

704 00:34:17.587 --> 00:34:20.960 for each of the 700 something locations,

705 00:34:20.960 --> 00:34:23.030 and we aggregated by country,

706 00:34:23.030 --> 00:34:24.320 and this is what you see here.

707 00:34:24.320 --> 00:34:27.360 And eventually, we estimated the difference

708 00:34:27.360 --> 00:34:30.700 in terms of excess mortality between these two scenarios.

709 00:34:30.700 --> 00:34:33.230 That is basically what you find here.

710 00:34:33.230 --> 00:34:35.110 So what we saw overall

711 00:34:35.110 --> 00:34:40.110 is that 0.98% of excess mortality,

712 00:34:41.490 --> 00:34:43.198 heat-related excess mortality

713 00:34:43.198 --> 00:34:44.520 in the counterfactual scenario,

714 00:34:44.520 --> 00:34:47.440 and of course, more excess mortality

715 00:34:47.440 --> 00:34:48.750 in the factor is null,

716 00:34:48.750 --> 00:34:51.091 that is with anthropogenic climate change

717 00:34:51.091 --> 00:34:54.103 that is currently slipping to 1.56%.

718 00:34:55.660 --> 00:34:57.510 So the difference between the two

719 00:34:57.510 --> 00:35:01.010 that is basically, this number here is 0.58%.

720 00:35:02.531 --> 00:35:05.610 It represents the all-cause mortality

721 00:35:05.610 --> 00:35:08.190 that can be attributed to heat induced

722 00:35:08.190 --> 00:35:10.775 by anthropogenic climate change.

723 00:35:10.775 --> 00:35:13.473 So the idea is that in a final step,

724 00:35:13.473 --> 00:35:17.360 what we did is to kind of rescale this difference

725 00:35:17.360 --> 00:35:21.370 over the observed, or let's say, the impact

726 00:35:21.370 --> 00:35:24.610 or the excess mortality in anthropogenic climate change.

727 00:35:24.610 --> 00:35:29.610 In a way to estimate what is the proportion of this,

728 00:35:30.290 --> 00:35:32.740 the excess mortality happening today,

729 00:35:32.740 --> 00:35:37.050 that can be attributed to human-induced climate change.

730 00:35:37.050 --> 00:35:40.650 So it's basically, what we try to illustrate here,

731 00:35:40.650 --> 00:35:45.650 and we found that overall, 37% of heat-related deaths

732 00:35:46.120 --> 00:35:49.160 can be attributed to human-induced climate change

733 00:35:49.160 --> 00:35:52.457 in this assignment, these locations that we included.

734 00:35:52.457 --> 00:35:54.240 And in a later step, what we did

735 00:35:54.240 --> 00:35:56.510 is to kind of extrapolate this

736 00:35:56.510 --> 00:36:00.130 and compute what would be the mortality rate

737 00:36:00.130 --> 00:36:03.650 attributed to heat-related or let's say,

738 00:36:03.650 --> 00:36:05.570 heat-induced climate change.

739 00:36:05.570 --> 00:36:08.623 So in here, what we observed that on average,

740 00:36:08.623 --> 00:36:13.623 2.2 deaths per 100,000 population per year

741 00:36:13.890 --> 00:36:18.490 can be attributed to heat induced in human influences,

742 00:36:18.490 --> 00:36:20.710 and let's say, of climate change.

743 00:36:20.710 --> 00:36:22.590 So as you could see in this assessment,

744 00:36:22.590 --> 00:36:26.800 it had very powerful message.

745 00:36:26.800 --> 00:36:31.460 It's really we provide evidence on the clear

746 00:36:31.460 --> 00:36:33.810 to tell the impacts of climate change

747 00:36:33.810 --> 00:36:37.770 over health burden that we observed today.

748 00:36:37.770 --> 00:36:39.460 And you can see that, of course,

749 00:36:39.460 --> 00:36:41.810 this evidence can be very, very useful

750 00:36:41.810 --> 00:36:44.770 for let's say, to support policy-making processes.

751 00:36:44.770 --> 00:36:45.950 And more importantly, I think,

752 00:36:45.950 --> 00:36:49.340 it was about the key message about the relevance

753 00:36:49.340 --> 00:36:51.950 of these findings in terms of to put

754 00:36:51.950 --> 00:36:55.040 a little bit more attention to what is happening,

755 00:36:55.040 --> 00:36:57.460 saying that climate change is not something

756 00:36:57.460 --> 00:36:58.720 that will happen in the future,

757 00:36:58.720 --> 00:37:02.370 it's already happening today.

758 00:37:02.370 --> 00:37:03.760 We can talk about the projections,

759 00:37:03.760 --> 00:37:05.690 but we cannot focus on your projections

760 00:37:05.690 --> 00:37:07.420 in terms of impacts of climate change

761 00:37:07.420 --> 00:37:11.250 is really that already we are suffering.

762 00:37:11.250 --> 00:37:14.137 So it's really to say, "Okay, we need to do,

763 00:37:14.137 --> 00:37:17.557 "or put more emphasis in terms of implementing

764 00:37:17.557 --> 00:37:20.137 "a strong mitigation policies to abate

765 00:37:20.137 --> 00:37:21.927 "this warming in the future,

766 00:37:21.927 --> 00:37:26.927 "but more importantly, to implement adaptation strategies

767 00:37:27.197 --> 00:37:31.057 "that would help us to reduce our vulnerability,

768 00:37:31.057 --> 00:37:33.340 "in this case, for heat."

769 00:37:33.340 --> 00:37:36.520 But of course, we had to acknowledge several limitations,

770 00:37:36.520 --> 00:37:39.360 and understood that, although it was one of the biggest,

771 00:37:39.360 --> 00:37:40.660 let's say, assessment on this field

772 00:37:40.660 --> 00:37:43.530 in terms of attribution of health impacts,

773 00:37:43.530 --> 00:37:44.620 we know that for example,

774 00:37:44.620 --> 00:37:47.850 it was cannot be considered a worldwide study

775 00:37:47.850 --> 00:37:50.741 because we focused our assessment on the locations

776 00:37:50.741 --> 00:37:52.737 that were already included in the MCC,

777 00:37:52.737 --> 00:37:55.290 and we know that there are important regions

778 00:37:55.290 --> 00:37:57.220 in the world that were not covered.

779 00:37:57.220 --> 00:37:58.560 This is an important limitation

780 00:37:58.560 --> 00:38:00.910 that we have in our study environment directly

781 00:38:00.910 --> 00:38:03.620 because we are very much aware

782 00:38:03.620 --> 00:38:05.570 that vulnerability is very heterogenous

783 00:38:07.080 --> 00:38:09.130 and changes from one location to the other.

784 00:38:09.130 --> 00:38:11.933 So at some point, we can extrapolate risk

785 00:38:11.933 --> 00:38:13.690 that we observed in Europe

786 00:38:13.690 --> 00:38:16.760 into places like Africa or Asia.

787 00:38:16.760 --> 00:38:19.040 So at some point, we need better data

788 00:38:19.040 --> 00:38:21.590 that would help us to better identify

789 00:38:21.590 --> 00:38:24.560 or let's say, assess what is the vulnerability

790 00:38:24.560 --> 00:38:26.030 of these locations that currently,

791 00:38:26.030 --> 00:38:28.260 are unobserved or unexplored.

792 00:38:28.260 --> 00:38:29.890 On the other side as well,

793 00:38:29.890 --> 00:38:31.350 something that we have to bear in mind,

794 00:38:31.350 --> 00:38:34.260 we have to do a simplification in terms of risk.

795 00:38:34.260 --> 00:38:37.810 We assume that, in a way,

796 00:38:37.810 --> 00:38:39.750 we did a cultural adaptation in the sense

797 00:38:39.750 --> 00:38:43.600 that we assumed a kind of average risk

798 00:38:43.600 --> 00:38:46.870 across the 20 years, 30 years that we assessed.

799 00:38:46.870 --> 00:38:50.280 And the idea is that okay, it's likely,

800 00:38:50.280 --> 00:38:52.680 and we know that as you could see here in this plot

801 00:38:52.680 --> 00:38:54.990 that actually, there might have been

802 00:38:56.780 --> 00:39:01.140 a partial adaptation of the population to heat.

803 00:39:01.140 --> 00:39:02.890 Though at some point, we don't know

804 00:39:03.919 --> 00:39:04.990 which impact this could have had

805 00:39:04.990 --> 00:39:07.670 because probably, the idea is that probably,

806 00:39:07.670 --> 00:39:09.770 at the end of the period, the risk

807 00:39:09.770 --> 00:39:12.050 might have been lower compared with the beginning.

808 00:39:12.050 --> 00:39:13.720 So eventually, as you could see,

809 00:39:13.720 --> 00:39:16.500 we had to do a kind of group simplification

810 00:39:16.500 --> 00:39:19.060 and something as well that we have to bear in mind

811 00:39:19.060 --> 00:39:22.430 is that the risks that we applied to both scenarios

812 00:39:22.430 --> 00:39:23.740 is the observed risk.

813 00:39:23.740 --> 00:39:25.953 That is the one that we estimated

814 00:39:25.953 --> 00:39:28.470 in our world with climate change.

815 00:39:28.470 --> 00:39:30.820 So we don't know what would have been the risk

816 00:39:30.820 --> 00:39:32.580 without climate change.

817 00:39:32.580 --> 00:39:34.810 So again, it's very difficult,

818 00:39:34.810 --> 00:39:37.220 and I expected in the future,

819 00:39:37.220 --> 00:39:39.530 it's something that we will implement in them,

820 00:39:39.530 --> 00:39:42.520 in this field or in climate change epidemiology.

821 00:39:42.520 --> 00:39:45.740 And finally, the lack of epidemiological causal basis.

822 00:39:45.740 --> 00:39:47.660 This is important because this assessment

823 00:39:47.660 --> 00:39:51.050 is purely based on an ecological design

824 00:39:51.050 --> 00:39:53.270 that as most of the climate change

825 00:39:53.270 --> 00:39:55.510 and epidemiological studies.

826 00:39:55.510 --> 00:39:58.490 So at some point, if we want to talk about the attribution,

827 00:39:58.490 --> 00:40:01.280 we have to improve our way,

828 00:40:01.280 --> 00:40:05.600 how we can assess causal links in this field.

829 00:40:05.600 --> 00:40:09.710 So just as a kind of final wrap-up on this subject,

830 00:40:09.710 --> 00:40:11.190 and as I said, I really want you

831 00:40:11.190 --> 00:40:14.170 to make it fun about this kind of a study,

832 00:40:14.170 --> 00:40:17.940 is first, because as we know,

833 00:40:17.940 --> 00:40:21.810 it can be a powerful tool for climate change policy,

834 00:40:21.810 --> 00:40:24.670 and as well, it can help understanding the mechanism

835 00:40:24.670 --> 00:40:27.590 by which climate change effects have.

836 00:40:27.590 --> 00:40:29.330 Can support in finding projections

837 00:40:29.330 --> 00:40:32.030 of future health effects of climate change,

838 00:40:32.030 --> 00:40:34.620 and as well, improve adaptation to climate change impacts

839 00:40:34.620 --> 00:40:36.330 and disaster recovery.

840 00:40:36.330 --> 00:40:38.630 As well, it can increase motivation

841 00:40:38.630 --> 00:40:40.500 for climate mitigation, as I said,

842 00:40:40.500 --> 00:40:42.457 just learning about what is happening today

843 00:40:42.457 --> 00:40:44.520 and the urgency to really do that.

844 00:40:45.590 --> 00:40:47.680 And also, demonstrate causal links

845 00:40:47.680 --> 00:40:49.057 between greenhouse gas emissions

846 00:40:49.057 --> 00:40:50.550 and climate change impacts

847 00:40:50.550 --> 00:40:52.240 that serve as a basis of evidence

848 00:40:52.240 --> 00:40:54.480 underpinning climate-related losses,

849 00:40:54.480 --> 00:40:56.280 as I said, previously.

850 00:40:56.280 --> 00:40:59.160 And finally, what I believe is also very, very attractive.

851 00:40:59.160 --> 00:41:02.637 It's an excellent platform for interdisciplinary research,

852 00:41:02.637 --> 00:41:05.440 really to put together experts from different fields,

853 00:41:05.440 --> 00:41:09.151 from climate science, working more on the modeling side,

854 00:41:09.151 --> 00:41:10.780 climate epidemiologists, working

855 00:41:10.780 --> 00:41:12.787 on the ascertain the health impacts.

856 00:41:12.787 --> 00:41:16.390 And at the later stage, other experts in other fields

857 00:41:16.390 --> 00:41:18.260 like the economy, law, et cetera,

858 00:41:18.260 --> 00:41:20.440 can take part on these investigations.

859 00:41:20.440 --> 00:41:22.260 So definitely, it's an excellent platform

860 00:41:22.260 --> 00:41:25.530 for latching our kind of research area,

861 00:41:25.530 --> 00:41:28.860 grab information, address knowledge from other fields

862 00:41:28.860 --> 00:41:31.200 and reach our risk portfolio,

863 00:41:31.200 --> 00:41:34.550 which I think is also very relevant for young researchers.

864 00:41:34.550 --> 00:41:36.983 And just as our final point,

865 00:41:38.567 --> 00:41:41.364 something that I think it has to do, bear in mind,

866 00:41:41.364 --> 00:41:44.900 and as I said for me, this research field

867 00:41:44.900 --> 00:41:48.020 can be considered kind of very powerful research line

868 00:41:48.020 --> 00:41:50.270 in the future in climate change epidemiology.

869 00:41:52.130 --> 00:41:53.770 Let's say, climate attribution

870 00:41:53.770 --> 00:41:55.760 is something that has been developed

871 00:41:55.760 --> 00:41:58.340 for years in climate science sphere,

872 00:41:58.340 --> 00:42:00.450 but not much in epidemiology.

873 00:42:00.450 --> 00:42:05.450 And if we really want to advance in climate litigation,

874 00:42:06.000 --> 00:42:09.270 really advance on the fight against climate change,

875 00:42:09.270 --> 00:42:11.760 we have to put a value on what is happening

876 00:42:11.760 --> 00:42:13.170 in terms of extreme events,

877 00:42:13.170 --> 00:42:17.227 in terms of X is that burden, economic cost, et cetera.

878 00:42:17.227 --> 00:42:20.720 And all this can help people change your mind,

879 00:42:20.720 --> 00:42:24.040 and as well, help, advancing or let's say,

880 00:42:24.040 --> 00:42:27.490 winning different initiatives in courts, et cetera.

881 00:42:27.490 --> 00:42:29.930 So as important elements that I believe

882 00:42:29.930 --> 00:42:31.470 we should focus in the future,

883 00:42:31.470 --> 00:42:35.460 is first assess causality, use advanced methods

884 00:42:35.460 --> 00:42:36.570 in environmental epidemiology

885 00:42:36.570 --> 00:42:39.330 that help us to clarify causal links.

886 00:42:39.330 --> 00:42:42.720 Second point, to provide innovative frameworks

887 00:42:42.720 --> 00:42:45.680 that probably, I mean, you think about

888 00:42:45.680 --> 00:42:48.350 as the world attribution initiative,

889 00:42:48.350 --> 00:42:52.050 they provided this evidence on the role of climate change.

890 00:42:52.050 --> 00:42:54.930 If we can couple this with health impacts,

891 00:42:54.930 --> 00:42:57.620 that could be even much more powerful.

892 00:42:57.620 --> 00:42:59.330 And finally, we have to think

893 00:42:59.330 --> 00:43:02.090 about how we can address this research question

894 00:43:02.090 --> 00:43:03.640 in a more broader perspective

895 00:43:03.640 --> 00:43:05.600 and provide probably, global estimates

896 00:43:05.600 --> 00:43:08.100 that are closer to the, let's say,

897 00:43:08.100 --> 00:43:10.870 the real, what is happening today.

898 00:43:10.870 --> 00:43:12.670 So yeah, that's all.

899 00:43:12.670 --> 00:43:14.667 Thank you very much for your attention,

900 00:43:14.667 --> 00:43:18.588 and I'm happy to take questions, thank you.

901 00:43:18.588 --> 00:43:19.448 <v ->Thank you, Ana.</v>

902 00:43:19.448 --> 00:43:20.570 Thank you for the wonderful presentation.

903 00:43:20.570 --> 00:43:23.500 I think you gave a superb view

904 00:43:23.500 --> 00:43:26.740 like an introduction from kind of science, how to tackle

905 00:43:26.740 --> 00:43:28.667 and attribute extreme weather events,

906 00:43:28.667 --> 00:43:31.680 and these type of extreme events attribution

907 00:43:31.680 --> 00:43:33.860 to the trend attribution,

908 00:43:33.860 --> 00:43:36.217 and to the landmark study that you have,

909 00:43:36.217 --> 00:43:38.320 the MCC quality you've been working on.

910 00:43:38.320 --> 00:43:39.940 So thank you very much.

911 00:43:39.940 --> 00:43:42.507 And I think there will be a lot

912 00:43:42.507 --> 00:43:44.710 of questions from our audience.

913 00:43:44.710 --> 00:43:48.030 So while our online audience is typing

914 00:43:48.030 --> 00:43:50.690 your questions in the Chat box,

915 00:43:50.690 --> 00:43:54.850 we do have already collect some questions from our students.

916 00:43:54.850 --> 00:43:57.550 So there are several types of questions

917 00:43:58.648 --> 00:44:01.100 that students are particularly interested in.

918 00:44:01.100 --> 00:44:03.290 For example, the first type,

919 00:44:03.290 --> 00:44:06.170 I think for some of the students still wondering,

920 00:44:06.170 --> 00:44:08.712 you have given this great example

921 00:44:08.712 --> 00:44:11.640 of attributing heat-related mortality.

922 00:44:11.640 --> 00:44:14.150 So they're wondering if this type of technique

923 00:44:14.150 --> 00:44:17.030 can be used to attribute other extreme weather events,

924 00:44:17.030 --> 00:44:18.773 like hurricanes or wildfires?

925 00:44:20.560 --> 00:44:23.440 <v ->Yeah, exactly, I mean, as I said,</v>

926 00:44:23.440 --> 00:44:24.917 in this assessment, in this presentation,

927 00:44:24.917 --> 00:44:27.180 I focused on heat on health,

928 00:44:27.180 --> 00:44:28.450 because in a way, I mean, of course,

929 00:44:28.450 --> 00:44:30.541 it's a bit biased because it has been

930 00:44:30.541 --> 00:44:33.590 my research field for already several years,

931 00:44:33.590 --> 00:44:38.210 but we know that within attribution science,

932 00:44:38.210 --> 00:44:39.720 it's not only about heat waves.

933 00:44:39.720 --> 00:44:44.170 Actually, there's also a very new report

934 00:44:44.170 --> 00:44:49.160 published by this Global Weather Attribution initiative

935 00:44:49.160 --> 00:44:53.650 on the floods happening in Central Europe even this summer.

936 00:44:53.650 --> 00:44:56.370 Again, put in, estimated that actually

937 00:44:56.370 --> 00:44:58.560 the role of climate change was very substantial

938 00:44:58.560 --> 00:45:01.350 in let's say, in increasing the probability of this event.

939 00:45:01.350 --> 00:45:05.010 So definitely, this kind of framework

940 00:45:05.010 --> 00:45:07.860 can be extended to other extreme weather events.

941 00:45:07.860 --> 00:45:12.210 Of course, with some caveats and some limitations,

942 00:45:12.210 --> 00:45:16.630 but I believe that if we try to, let's say,

943 00:45:16.630 --> 00:45:21.000 it would be easy to adapt this framework

944 00:45:21.000 --> 00:45:22.410 to other extreme weather events

945 00:45:22.410 --> 00:45:26.520 if data, of course, is available.

946 00:45:26.520 --> 00:45:27.353 <v ->Thank you, Ana.</v>

947 00:45:27.353 --> 00:45:30.063 I think we have a typo from our online audience.

948 00:45:30.900 --> 00:45:32.350 Exactly, the same question

949 00:45:33.800 --> 00:45:35.650 some of the students are also asking.

950 00:45:36.490 --> 00:45:38.577 But Mona is asking,

951 00:45:38.577 --> 00:45:42.367 "Why is the A and B data missing environments

952 00:45:42.367 --> 00:45:44.010 "from most of Africa?"

953 00:45:44.010 --> 00:45:47.108 And also, it's kind of related to the question

954 00:45:47.108 --> 00:45:49.870 student's asking in the Multi-Country Multi-City

955 00:45:49.870 --> 00:45:54.054 is that they only have South Africa,

956 00:45:54.054 --> 00:45:56.410 doesn't have much of Africa.

957 00:45:56.410 --> 00:45:59.280 And also, one of my students is asking,

958 00:45:59.280 --> 00:46:03.020 why there's no data from the South Pacific,

959 00:46:03.020 --> 00:46:06.822 where she have experienced doing this one

960 00:46:06.822 --> 00:46:07.655 and like fuzzy.

961 00:46:07.655 --> 00:46:11.003 So why there's no such coverage?

962 00:46:12.370 --> 00:46:14.560 <v ->Well, maybe I can give you a little bit of story</v>

963 00:46:14.560 --> 00:46:17.290 about how the MCC started.

964 00:46:17.290 --> 00:46:21.330 And basically, it was, I think in 2014

965 00:46:21.330 --> 00:46:24.170 during a conference, with a group of researchers

966 00:46:24.170 --> 00:46:27.930 working on climate change epidemiology,

967 00:46:27.930 --> 00:46:30.820 mostly on the temperature-related health impacts.

968 00:46:30.820 --> 00:46:34.210 They had an informal meeting,

969 00:46:34.210 --> 00:46:35.850 and they were discussing the possibility

970 00:46:35.850 --> 00:46:38.900 of probably putting together some data from their countries.

971 00:46:38.900 --> 00:46:42.060 For example, one have data on temperature mortality

972 00:46:42.060 --> 00:46:45.380 in the UK, other have in Japan,

973 00:46:45.380 --> 00:46:47.070 the other one had in Spain.

974 00:46:47.070 --> 00:46:49.650 So eventually, they realized that,

975 00:46:50.847 --> 00:46:53.617 "Okay, maybe we can start putting all this data together

976 00:46:53.617 --> 00:46:55.797 "instead of assessing our impacts

977 00:46:55.797 --> 00:46:58.517 "or let's say, our estimates in our country,

978 00:46:58.517 --> 00:47:01.047 "it would be nice to compare different locations

979 00:47:01.047 --> 00:47:01.880 "at the same time."

980 00:47:01.880 --> 00:47:04.573 Because as I said, the idea of,

981 00:47:06.460 --> 00:47:10.477 the peculiarity in a way of temperature-related

982 00:47:10.477 --> 00:47:12.910 health impacts is that this,

983 00:47:12.910 --> 00:47:15.830 the effect is very dependent on the location.

984 00:47:15.830 --> 00:47:19.360 So it's nice to compare these estimates across locations

985 00:47:19.360 --> 00:47:20.971 to understand vulnerabilities

986 00:47:20.971 --> 00:47:22.370 and potential vulnerability factors.

987 00:47:22.370 --> 00:47:25.693 So as I said, it started kind of informal way,

988 00:47:25.693 --> 00:47:30.693 and they started opening the door to other collaborators

989 00:47:31.670 --> 00:47:33.100 and colleagues to work in,

990 00:47:33.100 --> 00:47:35.130 and eventually, it grew, grew, grew,

991 00:47:35.130 --> 00:47:38.400 grew until nowadays that we are around, I think,

992 00:47:38.400 --> 00:47:43.010 70 researchers from 43 countries

993 00:47:43.010 --> 00:47:44.820 with all these bunch of locations

994 00:47:44.820 --> 00:47:46.260 with different data sets.

995 00:47:46.260 --> 00:47:48.290 And also, not only focusing

996 00:47:48.290 --> 00:47:51.440 on the idea of temperature mortality,

997 00:47:51.440 --> 00:47:54.540 but also, air pollution, on projections,

998 00:47:54.540 --> 00:47:57.730 on I mean, in a way, it's a project

999 00:47:57.730 --> 00:48:02.730 that greatly grow in an exponential way.

1000 00:48:03.640 --> 00:48:07.710 But the idea how this, then the beauty of this project,

1001 00:48:07.710 --> 00:48:11.100 how it's developed and how it started

1002 00:48:11.100 --> 00:48:13.340 is that it works in a very informal way

1003 00:48:13.340 --> 00:48:16.196 in the sense that the idea how you contribute,

1004 00:48:16.196 --> 00:48:20.190 you take part of this consortium by providing data

1005 00:48:20.190 --> 00:48:22.370 on a specific country that is missing

1006 00:48:22.370 --> 00:48:27.120 because you had it because of your research or whatever.

1007 00:48:27.120 --> 00:48:29.290 And it's surprising that it is not directly funded.

1008 00:48:29.290 --> 00:48:30.590 I mean, it works, let's say,

1009 00:48:30.590 --> 00:48:33.570 off each funds of each partner.

1010 00:48:33.570 --> 00:48:36.640 The reason why there are some places in the world

1011 00:48:36.640 --> 00:48:40.400 that is not, let's say, covered within this spread

1012 00:48:40.400 --> 00:48:42.720 is basically, because so far,

1013 00:48:42.720 --> 00:48:46.000 we didn't manage to get data from these locations.

1014 00:48:46.000 --> 00:48:48.810 And I mean, it's a problem of course,

1015 00:48:48.810 --> 00:48:51.240 of places like in Africa,

1016 00:48:51.240 --> 00:48:53.950 where good quality on mortality,

1017 00:48:53.950 --> 00:48:57.770 daily mortality in specific locations in Africa

1018 00:48:57.770 --> 00:48:59.430 is very difficult to find.

1019 00:48:59.430 --> 00:49:00.450 Especially because at some point,

1020 00:49:00.450 --> 00:49:03.020 whether you need this data is somehow

1021 00:49:03.020 --> 00:49:07.220 comparable in terms of quality and temporal scale.

1022 00:49:07.220 --> 00:49:08.420 And especially, this idea

1023 00:49:08.420 --> 00:49:11.650 that it should be daily mortality, et cetera,

1024 00:49:11.650 --> 00:49:14.120 because the part on them, whether we know

1025 00:49:14.120 --> 00:49:16.480 that is relatively easy to get it

1026 00:49:16.480 --> 00:49:19.620 from the analysis data, et cetera,

1027 00:49:19.620 --> 00:49:23.490 but the main limiting factor here is the mortality data.

1028 00:49:23.490 --> 00:49:24.980 And that's why in a way,

1029 00:49:24.980 --> 00:49:28.710 we didn't manage too far to kind of get this information

1030 00:49:28.710 --> 00:49:33.710 here in terms of observed mortality in this assessment.

1031 00:49:34.384 --> 00:49:37.070 However, very recently,

1032 00:49:37.070 --> 00:49:38.580 as I mentioned in my first slide,

1033 00:49:38.580 --> 00:49:41.610 we performed a global assessment

1034 00:49:41.610 --> 00:49:43.820 in which basically, based on information

1035 00:49:43.820 --> 00:49:48.070 of the observed locations, our colleagues in Monash,

1036 00:49:48.070 --> 00:49:49.630 they managed to extrapolate

1037 00:49:49.630 --> 00:49:51.880 the risk in an observed location

1038 00:49:51.880 --> 00:49:55.070 and eventually, provide kind of comprehensive

1039 00:49:55.070 --> 00:49:58.360 assessment on the team,

1040 00:49:58.360 --> 00:50:02.220 non-optimal temperature-related mortality across the globe.

1041 00:50:02.220 --> 00:50:05.103 I invite you to have a look in,

1042 00:50:06.340 --> 00:50:10.143 I think, it was recently published in (indistinct).

1043 00:50:10.143 --> 00:50:12.041 <v ->Thanks, Ana, I think,</v>

1044 00:50:12.041 --> 00:50:13.140 if you collect it with the history

1045 00:50:13.140 --> 00:50:14.800 and also development for MCC,

1046 00:50:14.800 --> 00:50:15.840 why it's not covered?

1047 00:50:15.840 --> 00:50:17.770 And what's the most recent

1048 00:50:17.770 --> 00:50:21.160 that MCC predict in the temperature mortality

1049 00:50:21.160 --> 00:50:24.980 association in places where you don't have mortality data.

1050 00:50:24.980 --> 00:50:26.980 There are always a lot of questions,

1051 00:50:26.980 --> 00:50:30.350 but I do have one kind of question

1052 00:50:30.350 --> 00:50:32.290 related to your answer.

1053 00:50:32.290 --> 00:50:36.280 This one student is kind of were astonished about

1054 00:50:36.280 --> 00:50:38.340 since the heat-related mortality risk

1055 00:50:38.340 --> 00:50:42.290 varies across places that you have shown me on slides.

1056 00:50:42.290 --> 00:50:47.290 So the question is why do places have,

1057 00:50:47.650 --> 00:50:49.610 even we have similar latitude,

1058 00:50:49.610 --> 00:50:52.680 maybe even with the same organization level,

1059 00:50:52.680 --> 00:50:56.323 why do we have different heat-related mortality risk?

1060 00:50:58.310 --> 00:51:00.380 <v ->Well, it's a very good question,</v>

1061 00:51:00.380 --> 00:51:02.560 and I must say, difficult to answer

1062 00:51:02.560 --> 00:51:05.173 in a very clear way.

1063 00:51:11.317 --> 00:51:14.350 In a way, we know that vulnerability to heat

1064 00:51:14.350 --> 00:51:16.270 or let's say, non-optimal temperature

1065 00:51:16.270 --> 00:51:21.270 depends on a complex network of different factors

1066 00:51:21.560 --> 00:51:23.600 that are highly interconnected.

1067 00:51:23.600 --> 00:51:25.640 It's not like we know so far

1068 00:51:25.640 --> 00:51:30.640 that what makes one city more vulnerable to the other

1069 00:51:31.180 --> 00:51:33.470 is not because of one unique factor.

1070 00:51:33.470 --> 00:51:36.700 It's because of combination of different factors

1071 00:51:36.700 --> 00:51:39.570 that actually are very much dependent between each other.

1072 00:51:39.570 --> 00:51:42.200 Thinking that, for example, we published,

1073 00:51:42.200 --> 00:51:46.030 I think, it was in 2018, a study was led

1074 00:51:46.030 --> 00:51:47.853 by our colleague, Francesco Sera,

1075 00:51:48.740 --> 00:51:53.600 in which we tried to assess specifically this,

1076 00:51:53.600 --> 00:51:57.600 to try to understand what were the contextual factors

1077 00:51:57.600 --> 00:52:00.830 defined at city level that can give us some hints

1078 00:52:00.830 --> 00:52:04.004 about which locations are more vulnerable

1079 00:52:04.004 --> 00:52:05.970 in terms of higher excess mortality

1080 00:52:05.970 --> 00:52:08.340 due to heat compared to others.

1081 00:52:08.340 --> 00:52:10.360 And eventually, what we saw in this assessment

1082 00:52:10.360 --> 00:52:12.870 is that it's not only one factor,

1083 00:52:12.870 --> 00:52:15.210 it was a combination of probably cities

1084 00:52:15.210 --> 00:52:17.330 that are more urbanized,

1085 00:52:17.330 --> 00:52:20.470 but also more unequal are those

1086 00:52:20.470 --> 00:52:23.650 with a higher heat-related burden

1087 00:52:23.650 --> 00:52:26.830 compared to others with a lower level in this case.

1088 00:52:26.830 --> 00:52:29.860 Well, for cold, the story was much more complicated

1089 00:52:29.860 --> 00:52:31.790 with no clear patterns around.

1090 00:52:31.790 --> 00:52:35.970 But again, the idea how all, let's say,

1091 00:52:35.970 --> 00:52:37.900 the main factors driving this difference

1092 00:52:37.900 --> 00:52:39.960 is nowadays, have very important

1093 00:52:39.960 --> 00:52:43.700 or very crucial point that we are trying to disentangle,

1094 00:52:43.700 --> 00:52:46.960 especially because we know that if we understand

1095 00:52:46.960 --> 00:52:48.440 what are the mechanism, let's say,

1096 00:52:48.440 --> 00:52:52.250 the reasons why one city is more resilient

1097 00:52:52.250 --> 00:52:55.540 compared to other, this can help us

1098 00:52:55.540 --> 00:52:58.680 to understand which mechanism in terms of adaptation

1099 00:52:58.680 --> 00:53:01.420 we can apply to other places to try to protect

1100 00:53:01.420 --> 00:53:03.840 to reduce our vulnerabilities in the future.

1101 00:53:03.840 --> 00:53:07.860 So hopefully, if you ask me this question in a few years,

1102 00:53:07.860 --> 00:53:11.700 I hope I will answer this question,

1103 00:53:11.700 --> 00:53:14.820 but I think right now, it's very difficult to say.

1104 00:53:14.820 --> 00:53:17.753 <v ->Yeah, yeah, I think it's excellent answer now.</v>

1105 00:53:17.753 --> 00:53:20.110 So it's kind of related to one,

1106 00:53:20.110 --> 00:53:22.290 our online audience questions

1107 00:53:22.290 --> 00:53:25.124 regarding the difference in the heat-related mortality,

1108 00:53:25.124 --> 00:53:27.817 whether it is rural or regional kind of communities.

1109 00:53:27.817 --> 00:53:29.560 I think it's more related

1110 00:53:29.560 --> 00:53:31.923 to Francesco Sera's paper you mentioned.

1111 00:53:33.840 --> 00:53:34.980 <v ->Yeah, in a way, I mean,</v>

1112 00:53:34.980 --> 00:53:36.500 it's still that in this assessment,

1113 00:53:36.500 --> 00:53:39.210 and I must say that in the MCC,

1114 00:53:39.210 --> 00:53:42.520 most of the locations that we have are cities.

1115 00:53:42.520 --> 00:53:45.910 So in a way, the risks that we obtained

1116 00:53:45.910 --> 00:53:49.160 are mostly represented for urban locations.

1117 00:53:49.160 --> 00:53:51.920 This is one of our limitations in this assessment.

1118 00:53:51.920 --> 00:53:53.440 And probably, if you don't,

1119 00:53:53.440 --> 00:53:57.700 you need to go a kind of national level assessment

1120 00:53:57.700 --> 00:54:02.010 in which you can better disentangle the different,

1121 00:54:02.010 --> 00:54:06.350 let's say, patterns in terms of vulnerability to heat

1122 00:54:06.350 --> 00:54:09.350 and cold in a rural versus urban.

1123 00:54:09.350 --> 00:54:12.453 And as I said, it's also it's a story that needs to,

1124 00:54:13.320 --> 00:54:15.670 we need to address in the next years.

1125 00:54:15.670 --> 00:54:17.340 And I know there are initiatives in terms

1126 00:54:17.340 --> 00:54:21.720 of nationwide assessments try to see patterns

1127 00:54:21.720 --> 00:54:25.080 between urban and rural locations, et cetera.

1128 00:54:27.010 --> 00:54:29.490 <v ->Yeah, I think kind of the final</v>

1129 00:54:29.490 --> 00:54:33.460 group of questions students and also online audience

1130 00:54:33.460 --> 00:54:35.870 is interested is adaptation.

1131 00:54:35.870 --> 00:54:40.610 So I mean, the adaptation matters

1132 00:54:40.610 --> 00:54:42.833 students are kind of wondering,

1133 00:54:44.280 --> 00:54:46.740 how must immediate needs to deal

1134 00:54:46.740 --> 00:54:49.600 with increasing temperature can be balanced

1135 00:54:49.600 --> 00:54:53.980 against the long-term goals of emission reduction?

1136 00:54:53.980 --> 00:54:58.120 Basically, asking using adaptation methods

1137 00:54:59.160 --> 00:55:03.980 to talk to the long-term global warming paths.

1138 00:55:03.980 --> 00:55:06.790 And also, if there are some studies like this,

1139 00:55:06.790 --> 00:55:11.010 are there any practical suggestions

1140 00:55:11.010 --> 00:55:13.850 on how local communities can do

1141 00:55:13.850 --> 00:55:15.300 about the adaptation methods?

1142 00:55:16.730 --> 00:55:19.910 <v ->Yeah, and I must say it was one of the key messages</v>

1143 00:55:19.910 --> 00:55:22.860 of this assessment that yeah, I presented today,

1144 00:55:22.860 --> 00:55:24.010 in this attribution study,

1145 00:55:24.010 --> 00:55:28.120 because of course, we give a little bit,

1146 00:55:28.120 --> 00:55:30.110 it gives them the message about the urgency

1147 00:55:30.110 --> 00:55:35.110 in terms of abating or let's say,

1148 00:55:35.150 --> 00:55:37.730 reducing the warming in the future.

1149 00:55:37.730 --> 00:55:40.050 But more importantly, what it is saying

1150 00:55:40.050 --> 00:55:43.662 is that we really need to reduce our vulnerability

1151 00:55:43.662 --> 00:55:45.680 because the idea is that with mitigation,

1152 00:55:45.680 --> 00:55:47.710 we know that these benefits will come

1153 00:55:47.710 --> 00:55:50.550 in the next decades while with adaptation,

1154 00:55:50.550 --> 00:55:52.600 these benefits can come earlier.

1155 00:55:52.600 --> 00:55:54.670 And probably, this can be even more efficient

1156 00:55:54.670 --> 00:55:57.140 compared to just waiting for, let's say,

1157 00:55:57.140 --> 00:56:00.630 the mitigation strategies to have some impacts.

1158 00:56:00.630 --> 00:56:01.843 And it's true that we have to think

1159 00:56:01.843 --> 00:56:05.560 about even in the best of the scenarios today,

1160 00:56:05.560 --> 00:56:08.100 in which we set emissions to zero,

1161 00:56:08.100 --> 00:56:11.180 we will be any way exposed to warmer climate

1162 00:56:11.180 --> 00:56:12.550 in the next decades.

1163 00:56:12.550 --> 00:56:14.440 So it's about, really again,

1164 00:56:14.440 --> 00:56:16.500 to put emphasis into the idea of adaptation

1165 00:56:16.500 --> 00:56:19.730 that it might be the key on this story.

1166 00:56:19.730 --> 00:56:24.170 And with regards on how we can counteract

1167 00:56:24.170 --> 00:56:27.560 future warming in terms of how much

1168 00:56:27.560 --> 00:56:29.640 we can decrease our vulnerability

1169 00:56:29.640 --> 00:56:31.440 to counteract this warming.

1170 00:56:31.440 --> 00:56:34.190 I know that there have been some initiatives

1171 00:56:34.190 --> 00:56:36.650 of some studies published in the past.

1172 00:56:36.650 --> 00:56:41.010 For example, there's a study by our colleagues in Romania

1173 00:56:41.010 --> 00:56:44.540 that they simulate what this kind of how much

1174 00:56:44.540 --> 00:56:47.227 we would need to reduce our vulnerability

1175 00:56:47.227 --> 00:56:51.450 in the future to reduce or let's say,

1176 00:56:51.450 --> 00:56:55.610 to keep our heat-related deaths in the future constant

1177 00:56:55.610 --> 00:56:58.000 despite the global warming.

1178 00:56:58.000 --> 00:57:00.259 So in a way, this is a very nice exercise.

1179 00:57:00.259 --> 00:57:02.190 That is certainly something that as well, I'm leading,

1180 00:57:02.190 --> 00:57:05.010 an initiative within the MCC to try to address this.

1181 00:57:05.010 --> 00:57:08.240 Because as well, this can help us about them,

1182 00:57:08.240 --> 00:57:12.690 how much we need to adapt to really do something,

1183 00:57:12.690 --> 00:57:14.747 to have some impacts in terms of reduction

1184 00:57:14.747 --> 00:57:17.170 of heat-related mortality.

1185 00:57:17.170 --> 00:57:21.420 Because imagine that if warming continues,

1186 00:57:21.420 --> 00:57:25.210 and let's say, the pace at which we adapt

1187 00:57:25.210 --> 00:57:28.940 is not quick enough, let's say,

1188 00:57:28.940 --> 00:57:30.780 to kind of counteract this warming,

1189 00:57:30.780 --> 00:57:33.570 we eventually will have the same heat-related deaths

1190 00:57:33.570 --> 00:57:34.610 today but in the future,

1191 00:57:34.610 --> 00:57:35.970 which of course, it would be fine.

1192 00:57:35.970 --> 00:57:38.960 But ideally, what we would like is that

1193 00:57:38.960 --> 00:57:40.550 the heat-related deaths happening today

1194 00:57:40.550 --> 00:57:42.250 won't happen in the future anyway.

1195 00:57:44.846 --> 00:57:45.679 <v ->Thank you, Ana.</v>

1196 00:57:45.679 --> 00:57:49.197 I think, I saw Tobias posts a comment,

1197 00:57:49.197 --> 00:57:50.900 "A really fantastic talk."

1198 00:57:50.900 --> 00:57:55.900 So I think is there are any final questions?

1199 00:57:58.460 --> 00:58:00.540 If there's no final question,

1200 00:58:00.540 --> 00:58:02.550 thank you, Ana, very much for this

1201 00:58:02.550 --> 00:58:04.170 really, really amazing talk.

1202 00:58:04.170 --> 00:58:05.860 And I think both the students

1203 00:58:05.860 --> 00:58:07.520 and I'm sure, our online audience

1204 00:58:07.520 --> 00:58:09.820 learned a lot from you, but thank you so much.

1205 00:58:10.730 --> 00:58:11.913 <v ->Thank you, thanks a lot</v>

1206 00:58:11.913 --> 00:58:13.513 for the invitation, my pleasure.