GCPH Seminar Series 6 Seminar 4

Tuesday 30 March 2010

The Lighthouse, Glasgow

Impact of weather on human health – current and future issue
Wayne Elliot

Lorna Kelly, Convenor:

Good afternoon everyone. Can everybody hear? Is this working okay? Good. Okay. I'm Lorna Kelly from Greater Glasgow and Clyde Health Board and I'm very pleased to welcome you all to this, the fourth lecture in the current Glasgow Centre for Population Health Seminar Series. A couple of practicalities. We're not expecting any fire alarms this afternoon so if the alarm goes off head for the exit. I believe you should follow Andrew Lyon who's wandering around at the edge there. He'll show where you go in the event of a fire. There may be an announcement shortly before closing time asking everybody to leave the building, so please ignore that if it does happen. You're not expected to stand up and walk out.

I'm really pleased to welcome today Wayne Elliott who is the Head of the Health Programme at the MET office and the health programme's. Wayne has been doing some really interesting work over the past few years looking at the impact of the weather on health, both in terms of a short-term and immediate impact and also the much longer-term impact of climate change. Wayne's been working in the MET office for about 25 years, so has a huge amount of experience on the subject. You may also recognise him from his previous role in the MET office as Chief Press Officer when he was called upon to comment on everything from the weather at Wimbledon to the causes of floods in Cornwall.

A number of people in this room have been involved in discussions over the last few weeks about the Glasgow effect. I recognise, certainly a few faces from that and that's the effect whereby Glasgow seems to have a much higher level of mortality, a much higher death rate than you might expect given our population and the levels of deprivation and we never have a conversation about the Glasgow effect without somebody saying, "Well it's all down to our beautiful weather that we have in Glasgow". So I don't know whether Wayne will be able to solve that dilemma for us but I think it certainly shows that we all instinctively understand that there's a connection between weather and health even if we don't quite know what that is. So I'm really pleased to hand over to Wayne and hope that he can provide some informed comment on something that we all like to chat about. Thank you very much.

Wayne Elliot:

Thank you Lorna and thank you Andrew for inviting me up here. It's nice to see so many faces and I've been delving a little into your backgrounds to find out the range of the audience so I gather it's quite a wide, dispersed sector audience today. I'm going to talk through a range of issues really and I'm quite happy to wander off topic really. I've got a range of issues from looking at the weather, aspects of that, how it affects the country and the culture, and the inhabitants of this country. Out to the longer range and climate change, what we could see and what we're expecting, what we're sure of and what we're less sure of. I'm quite happy to take any questions at any point and at some point I may wander off in front of the stage here and just throw my arms around a little and ask you some questions or whatever to get you involved. Please feel free to have a two way at any point here. If you don't quite understand any point I'm trying to get over or see anything on the slides for instance that I'm not explaining correctly, please do ask.

So as you can see from my title and my introduction really, I head up the health programme in the MET office. So the MET office is the UK's national weather service. It's been going for 154 years now, so a long-established institute. One of the original meteorological offices that are around the world which were set up. The UK and Norway really led the field in establishing meteorology and many of the concepts that we have these days and that we take for granted. We're still one of the leading national weather centres, although quite small by comparison with many countries where we punch above our weight. And we're also possibly, arguably, the world's leading climate centre, centre for climate research. It started off with the opening of the Hadley Centre in 1990 when quite a significant bit of money was put into climate research by Margaret Thatcher at the time, to her credit, I say, no politically intent here intended. Being a scientist herself she did have the foresight to see the climate was changing and what the scientists were telling her had some grounds and was worth investigating and she opened Hadley Centre at the MET office. In fact in 1990, I'll just set the scene here in terms of how we've moved on in 20 years. In May 1990, on the Tuesday the first IPCC report was presented to the world in a small hotel in Windsor, down near London. So a small group of journals, about eight, and a small group of scientists led by the MET office presented this report. On the Tuesday the Director General of the MET office was asked to go and present the findings of this report to the Prime Minister and the Cabinet Officer and he went along, and it was the first time a projector had been used in the Cabinet rooms. So with a flimsy Viewforce. Do you remember those? So these new fangled and projecting onto the wall there and that was the first time, only twenty years ago, and then on the Thursday Margaret Thatcher opened the Haldey Centre at the MET office. So three great days in climate sciences history which set the scene for the following twenty years.

So we're an organisation that's based in Exton, South West of England. Only 1,700 people work there and mostly scientists in a range of other skills and disciplines. But I head up the health programme and within my team of, well the core group are 12 people with a mixture of clinical backgrounds, research backgrounds and I'm a meteorologist by training and various other skills. They tap into the broader range of research at the organisation into weather and climate research. We've got two big areas of research at the MET office which look into those two timescales. But essentially it's about physically modelling of the atmosphere and the oceans. It's about understanding through the laws of physics and mathematics what will happen in a dynamical sense and we found it translates really quite well towards the medical community looking at modelling illnesses and modelling tracking disease as it progresses.

So it all started really round about ten years ago when a doctor came to the MET office called William Bird. He'd been looking at weather and health for some time and he basically approached us as an organisation and said, "Would you work with me?. Would you look into weather and health to a greater extent?" and so we employed him. We took him on and he's only recently left. He was my predecessor actually. And we really took this into new, a new dimension. And it's an area of research and then translation of that research into services where the UK leads the world, without a shadow of doubt. I've been traipsing the boards internationally, speaking at different conferences over the last year and it's clear that other institutions have done a lot of research into aspects of the environment on health but no one has actually translated it into information so they can actually take direct action to help themselves. I think that backs up what Lorna was saying about our interest as a nation in the weather. Frequently, you know the topic of conversation is the weather and what else we do talk about apart from the weather is our health and so the two subjects sit very nicely together.

The context of what I'm going to talk about really is a little bit about the weather. I sometimes as a weatherman forget that people do actually like to hear a little bit about the weather and why it is, how it is. So sometimes I gloss over it a little too quickly, eager to move on but I will dwell on that a little. What areas of illness/wellness that we look at. Our basic remit here is to keep people well. The health sector is complex enough as it is. The NHS is a complex animal as many of you will know. The MET office being involved as a weather organisation is a bit odd, and people often give me quizzical looks as, "Why are you here?", and unless we can help we really shouldn't be muddying the waters any, and so we really are in the game to try and assist. Our culture is about prediction, it's about prevention. We put our neck on the line, whether it be the two day range to say what it will be like on Friday or Saturday out to seasonal, monthly, decadal and out to 100 years ahead, and we don't mind doing that. That's what we're paid to do.

I'll talk about the health programme was set up. Just a slide on that for some people may find that of interest and then the future climate. So, this is not new. No way is this new. Hippocrates in 400BC actually understood that the weather and the climate played a big part in how people felt. I think in the intervening years we've kind of lost something. We've had the onset of modern medicines, pharmaceuticals playing a great role in keeping people well. The public health agenda both internationally and within the UK, and I think we kind of forgot some of the basics, and I had a very interesting chat with Andrew this morning about how some aspects of how maybe the discussion is changing around sustainability, about whether the current life we lead. Is it sustainable? Can we go on into the future? And maybe it's the time I would propose to revisit some of the old ways of thinking about ourselves and our links to the environment.

Let's talk weather. Right. Okay. We sit at a crossroads in weather terms. Note there's no doubt about that here on this bunch of islands out in the north-west of Europe. What I've tried to bring out there. The colour of the arrows dictates the temperature and the risk is pretty straightforward. The weather is coming from that direction, generally, in general terms offers a high or low risk. Straight away I think you'll pick out that generally when the wind or the weather is coming from more westerly direction it tends to not raise the level of impact on human health to a great extent and there's good reasons for that. I'll put up prevailing weather comes from the west. So I suggest, and evidence points to this, that we've become acclimatised. We've become adapted, either through our own physiology, our own make up or the way we live our lives to the way we build our houses. We live in our houses, the way we work, the way we eat, the way we move round through day and night, and I think it's largely steered by the way the wind blows, the way the weather comes at us from the west.

Let's take the high risk arrows as an example of the opposite effect. When we have heat waves in this country, when we have high temperature events, the wind's coming from the south-east pretty much all the time. So south or south-east flow very light winds, bringing warm air from the continent during the summer months and that brings a multitude of factors. Generally high temperatures which has its own impact on people, and poor air quality is also linked with wind from that direction during the summer months. So they're the principle reasons that I've put high risk next to that blue arrow. They're in the months of June, July and August typically. When we look at the east and the north-east, they're predominantly winter facets of our weather and when the wind swings round to that direction as we're seeing now with the snow starting to set in through the next 6 to 12 hours, the wind's swinging round to the north of course. Whether it brings snow or not the fact that the temperature goes down does offer a higher risk to health and you can see that in the health statistics. So, in a very straightforward way, I'm trying to characterise the British weather because I think then you see that through many of the arguments that come out in the public health debate. I won't yet offer it as an answer to the Glasgow Effect. I'll just park it for the moment.

So what does my team get involved with? Well, we've got two areas of work. On the left-hand side what we call our sort of public health services. These are kind of generic messages that go out through the media, through websites, through newspapers, through press releases and comment from various people. So, Harry Burns will stand up and say something. I might stand up and say something on the media. When we've got high temperature events, severe cold weather or, well UV not so much. I mean the UV service is something that runs in the background. It's the science behind how much UV exposure people are getting and, you know, sometimes it takes a high position within the media, sometimes not. Mostly it's a kind of background service of some interest. But the heat wave service for instance, Scotland is one of the few countries in Europe not to have a heat wave service.

[laughter]

Funny. I was here this morning talking to Harry Burns, the CMO, directly trying to influence him to get the Scottish government to have a heat wave plan for Scotland because I believe the country needs one now, let alone in 5, 10, 15 years because the impact on the health, particularly the central belt, during even the current temperature regime during the summer is there. I mean 24, 25 degrees in the day starts to affect people who have vulnerabilities, let alone 28, 29 and Scotland does get, believe it or not, 30, 31 degrees. It has in the past, it will in the future and on an ever more frequent basis so I think it's an important mark in the sand that Scotland has a heat wave plan so I'm here to try and convince the powers that be that is the case, but it is interesting to see your reaction. That's what Harry did, he laughed.

[laughter]

Okay, on the right-hand side is the more interesting, I would suggest, areas of work. More bespoke, more tailored services which are really looking at different areas of ill health and the two areas that, we have got other areas of research, but the two I just want to just bring out now, I'll go into one of them in to a decent level of detail. The first one which is our service for people with respiratory disease. So there's a disease called COPD (Chronic Obstructive Pulmonary Disease) which is emphysema and bronchitis and facets of those two conditions. It's a smoker's disease. It's very common in places like Glasgow, Birmingham, Manchester and London. High prevalence rates in those areas, and once you have it you have it. It's a pretty nasty condition. Kills you typically within ten years of being diagnosed, and the weather is a major contribution to killing those people. People are diagnosed, they're generally quite well, possibly still working but they suffer a series of what can be called 'attacks' or exacerbations and there are clear links with low temperatures in particular and I'll explain our role in trying to keep people well and to stop that decline of people with that condition.

Brighter Outlook, I'll mention just in passing. That's a service for people with SAD (Seasonal Affective Disorder). Now as a group, as a programme, I've been kind of fending off SAD for many years. Lots of press would call during gloomy summers to say, "What about people with SAD? What about people with, you know, you must be doing in that?" and we weren't. But what actually happened was the Director of Mental Health Services in a primary care trust in England came to see me a year and a half ago and said they'd questioned all their people who use mental health services in their region and asked them what they thought of the services and any other issues and number three on the list was, "Weather makes me feel worse or better depending whether its cloudy or sunny", and he came along to my office and said, "Would you look into this?". So we developed a service for people with SAD in round about six weeks actually, we turned it around. And really it's a forecast of light. The basis of which, it runs through the winter months, and this is where I think the Glasgow discussion becomes interesting because there is quite a body of evidence that suggests that the low light levels in these latitudes and particularly with the type of weather that you get in the central belt, particularly in Glasgow, which is a cloudier regime.

The depth of the cloud, the extent of the cloud, the longevity of cloud cover does affect people's health and we've been running this service as a pilot in three different regions through two winters now. It's really interesting to see. I did put some literature out at the front and some of you will have picked up some of that. That's the flyer on it. It's just to give you some information. I didn't bring enough for everyone I'm afraid but if you're particularly interested I can send any of this literature out to you if you let me have your name and address. But that's got a kind of an overview of what happened in the first year and it was really interested. What do people do? Well we arm them with a patient pack at the start f the season. So this little brochure here tells them about their condition, tells them how weather affects them and tells them what they can do to help keep themselves well. So exercise, diet, keeping their drug regime going, that sort of thing. So stays quiet, nothing happens until we see a prolonged period of cloudy weather in that particular location and then they receive an alert. So they receive an SMS or an e-mail alerting them to the fact that they can expect cloudy conditions for the next two days.

Now, ok, all well and good. You think that may or may not be clever in your mind. But what they are encouraged to do is (a) seek help from a CBT, Cognitive Behavioural Therapy, which they get a little booklet on and also use of a light box. So some of them may have used light therapy before which is proven to help but they may have come home, switched the thing on for three hours, watched TV, had a cup of tea, and then actually switched it off and put it in the cupboard and found it didn't actually make any difference. But targeted use of that box for 30 – 40 minutes before the period of gloomy weather is coming that's the sort of thing I'm trying to get across in this context. It's about a combination of interventions which you're laying out to people that they can readily use and access and think about self-managing their condition. I'll come back to Brighter Outlook if you wish, but that's all I planned to say on that.

Climate Services for Health. Well really that's about climate change and addressing the health agenda, looking at the changing climate. Thinking about cold which is fairly topical on a day like this obviously. The four worst countries coping with winter weather are the four western European countries which backs up my suggestion earlier that the direction of the wind is a predominant factor. So Portugal, Ireland, Spain and the UK are the four worst countries by some measure, and within the UK all the four countries are pretty much the same actually in terms of their mortality rate. But last winter, this is the winter before the one we're just finishing, the increase in mortality was 47% across the UK. This year we're sitting on some, again, pretty horrific mortality figures. Certainly, the Department of Health for England are really keen to try and understand why this is the case and I'm working with a couple of research institutes to try and look at that in quite a lot of detail. In that we look at the statistical relationship, the epidemiological relationship and also the behavioural relationship which is driving people to be exposed to the winter. There's a big story there but it's not easy as to how to answer the question.

On to COPD. Well Chronic Obstructive Pulmonary Disease is a massive killer in the UK. I've put some UK figures and some US figures there because I was over in the States doing a similar talk. It's the most common cause of admission to hospital from a pre-existing condition and the burden on the NHS is rising and so clearly with a link to the weather which is so clear there's something that we can do. So what do we do? Well, this is a temperature curve, temperature graph. The white line is the actual admissions in a unit in South-East London actually, but we've got many samples of this. This is a period in 2004 for February and the zero line is the kind of standardised admission that you would expect at that time of year in that unit. Okay? In that region, this is what actually happened, this is more like what should happen and the horizontal wide bar is a period of cold weather, low temperatures and in fact some snowfall and what you see, and this comes out time and time again, is respiratory disease tends to kick in around 10 – 12 days. Admissions due to an influence like this case, in this case a weather event, tends to happen around about 10 – 12 days later. There's other conditions, kick in here, the cardiovascular system being one of them, but the COPD link, the respiratory disease link is quite clear and it's quite established at that time.

So straightaway you can see what I'm going to suggest here is that we know this is coming. We know it's here actually because temperature is one of the easiest things to forecast. There are other things like snowfall which are harder but temperature is a pretty basic element to get right in a weather forecast these days. So if you can change behaviour around here you hopefully don't get the impact and it's essentially what we're trying to do. We're trying to take out the spike at the 10 – 12 days and that's where we can help is by removing that, because it's admissions, it's unplanned admissions which costs the NHS the most money, as some of you will be well aware I'm sure.

But we don't just look at the weather. It's not a weather forecast in itself. What we end up doing is predicting risk and this is a key aspect of what I'm here to say really. It's about communication. It always, in my experience, is. I was a meteorologist for many years trying to communicate a weather forecast to a variety of people from North Sea oil rig workers to helicopter pilots to people running out gas supplies and energy supplies and many, many others and it's always about communication. The science of weather forecasting is fit for purpose these days but you wouldn't believe it from the criticism that most people are attuned to and it's almost totally down to communication. It's about a misunderstanding and that final link of a delivery of a message to an end user. It's our problem, it's not the general public's problem at all. We need to be very sensitive, be very aware, of how we communicate to people.

So in this context this is a forecast of risk and what we do is take over aspects of the environment into the model if you like, our algorithm which is a health predictor. So we take the weather, we take the humidity as well and take circulating respirator virus, so levels of influenza-like virus which is circulating in and around the community at any one point. So we take a weekly feed of that from the health authorities and combine it with the weather data. I'll explain a little more how it works in a moment, but who do we aim this at? Well, there's the profile of people with COPD. Mostly this yellow line, the yellow box, the yellow area on the graph are people who are perhaps only recently diagnosed, perhaps only been into hospital maybe once. Fairly well people, you might say. These people, who are really quite poorly, the blue area here, are generally case managed. They are very well watched. They are on oxygen pretty much all the time. So their level of risk and exposure to risk is totally different. They don't show any difference through the year but that's not the case with people who are newly diagnosed, and so the benefit comes in trying to keep these people out of hospital because (a) they're off the radar of the GP and they're the ones which, you know, you hope to be keeping well and out of hospital.

So how does it work? Well this is the system as its set up. The MET office is in the box at the top. So we're taking in the health data and the weather date. This is the NHS Scotland in here, this white box and here's the patient down here. Now at the start of the year the patient comes onto this system, they decided they want to take it and I won't go into the ways and means how it's offered, but it involves the GP, it involves the patient and it involves us. So when see, we're monitoring the situation on a weekly basis, when we see the risk as being elevated, so we have two states. We either have normal or elevated. And when through a combination of the weather and the virus-load the risk is elevated we trigger the service, and so we activate by the push of a button at this point here. We go to the NHS, we look at the areas affected and we look for patients' telephone numbers, we look for people's contact details and then this is system here actually makes telephone calls out to these people. So it's an automated service that actually roles out and into active telephone calls to these people. At the same time it sends an e-mail to the GP to say, "We're going to call your patients" so they know it's going to happen and then in the 24 hour period. At the moment there's about 35,000 people in the UK on this service and they within a 24 hour period they all receive these alerts telling them that they're at increased risk of becoming unwell. They answer two questions. Yes or no is the answer and one is, "Are you feeling well?" The other is "Have you got enough medication for the next two weeks?" and they say 'yes' or 'no' to those two questions. The answers to those come back into the system, come back here and I'll send them to the GP the next day. So they get a follow-up e-mail to say, "You're patients have all been contacted and here's the results", and if this has GP has got say 300 COPD patients on the system. Previously they would not have known the state of those patients I suggest. In some cases, rarer cases in my experience, then there's a good handle of that COPD register but probably they're blind to the state of those but now they can see perhaps 270 of them are fine and then 30 of them have combination of either needing more medication or are feeling unwell. So it lets them be proactive with those 30 who stand out there.

So that's the mechanism in this case how we've used, and that's why I mentioned earlier about the communication. How this service started off was it stopped here. It didn't have this. So we used to forecast the risk and we used to send a fax actually, it was in the days of faxes, we fax to say, "We think your COPD patients are at greater risk of becoming well". What happened was that the fax curled up and fell on the floor and no action happened, of course nothing ever happened. And so all that information, that potential benefit was lost and only by bringing in this last bit do you actually get benefit to the patient and the patients (we were quite nervous about introducing it), the patients absolutely love it. Some don't but most absolutely and many look forward to the telephone call believe it or not because a lot of the many thousands of… we questionnaire a lot of patients for the first few years. Most said the biggest issue for them was lack of contact, contact with other people and… you know, my first comment about the way we live our lives these days that's the biggest single factor which comes through in the feedback. They just want contact, and they see it as somebody's watching out for them. Doesn't seem to matter it's an automated call. Not what we expected at all.

So what do people about it? Well, in this case well it's about simple measures. These are clinically recognised measures that they can take. The most obvious one that they can do is to report their symptoms early. As soon as they start to feel perhaps a little loss of appetite, or unwell if they bother to look after themselves and report their symptoms they stand a much better chance of staying out of hospital.

I'll probably breeze past this quite quickly in terms of how my programme is set up but basically we're split into three different areas – pure research, applied translational research and then business activity, really getting the service out there. So in summary in terms of weather and health the key issues really are understanding the relationships between the weather and certain health impacts, understanding the group of people who are at risk within the population and then trying to elicit behavioural change through effective communication. I mean this is not rocket science in essence really. People know what to do. GPs know that people are at risk. People know that cold weather generally makes them worse but it's built on the premise of something called 'Nudge Theory' that it's okay, everyone's getting on with their lives. But they need a little trigger, a little nudge at the right time to instigate an action and if they're seeing Heather on telly talk about colder weather coming in a few days and then they get a call as well they know the risk applies to them. The overwhelming evidence from people, older people primarily, who when they're told that the weather is coming, bad weather is coming and they need to take care, they think "I'm okay. It's Joan down the road who's at risk. She's always falling over in the slippy conditions or she's got that bad cough or whatever". Predominantly people think it's just older people, but don't think the risk applies to them. They offload the understanding onto others. They've got the problem not me.

So this is really an attempt at trying to make it clear that, "No it's you. It is actually you that's got the condition and we're trying to keep you well and help you self-manage your condition better". So, have you any questions, any points on weather and health and particularly respiratory disease? Yes sir?

Q: Have you found the issue of driving rain and wind together, particularly the western side, has the worst driving rain?

WAYNE ELLIOT: It does. Yeah. Wind clearly does make people feel worse with this particular condition. That's frequently reported. Very hard to measure and very hard to warn of. People going out to the shops, maybe sheltered in one street, they turn around the corner, they get a full blast down the street around the corner. So actually trying to have useful comment to that individual or significant numbers of individuals in that context has proved a real challenge. Originally we did have it in there and we took it out because it was complicating the issue because you tend to get your lowest temperatures when the wind is very slack, when you get still air and you tend to get the greatest wind chill effect when you get, obviously, the wind blowing, when you've got a decent degree of cold. So it's a strange combination of wind and temperature. We've kept it simple at this stage. Yes?

Q: Presumably the ability to keep your house warm and insulated is also very important to people with respiratory disease? I noticed that kind of featured in the risks. Can you comment on that?

Wayne Elliot: Yes one of the key things. This is the patient pack for people taking that service for respiratory disease and at the back there's a little magnetic card which people put on their fridge, there's a reminder of what to do but there's two thermometers, these bend over and you can just put them out. One you put in your lounge and one in your bedroom, and you keep your bedroom at 18 degrees and your lounge at 21 Celsius, not above the fire or the radiator where we frequently find them unfortunately [laughter], but again people get quite excited and animated about just a simple feature like that. Tell them what will help them look after themselves and tell them the measure of which they're looking for. 21 Celsius in their living room. Now this opens up the whole fuel poverty issue, which I strongly suspect you're touching on. We don't get involved as an organisation, it's not really our job. We work quite closely with what was Help the Aged and is now Age UK as an older person's charity to work, they work with government and we communicate with them quite well and they support this quite strongly but we tend to not get involved in this as it's political. We are civil servants as the MET office and we shouldn't get involved in that kind of issue. Sorry I ducked that one completely. Yes sir?

Q: I just wondered if there's a difference in uptake rates between different social groups for this kind of intervention?

Wayne Elliot: Well we deliver this in eight different languages so English and Welsh and then six other languages. The uptake of those is interesting. Many health boards and PCTs say you can't operate in our area without offering in Punjabi and Bengali and Urdu but the uptake from those groups has been limited. We, in terms of the translation of the call of the pack, what's happening in those households is the younger, the cultural aspects are coming out that the young members of the family are taking the call and translating it for their older, maybe their parents who have got the condition and almost caring for them in that context. So in the kind of, the race aspect of it, it's predominantly English speaking people who have taken the service but there is the facility for others to and its a limited uptake at the moment. In terms of socio-economic issues it's very mixed. I mean we've got really wealthy areas where you can definitely see its more the middle class type thing but then we've got some really gritty urban areas where people are trying to use this to reduce inequalities because it's a fairly straightforward intervention and you don't have to, you know, self-management is anybody's responsibility really and right. It's all a matter of right. What was interesting is was the responses to the call. You see big differences in the different areas in taking the call right the way through to the end and answering the two questions. The most, by far and away, year after year, the biggest area in terms of response rate is Moray in Scotland. And we're not sure why but we think this actually reflects the culture of people living in the Moray area within Scotland. Very different to somebody in a city, particularly in London, Birmingham and the north of England where the rate is down at around sort of 60%, 65%. Moray stands at 90% plus. So 92% it was last year of people who actually picked the phone up, they were in, they answered the call and through to successful completion because the GP can see how many calls were successfully completed and how many weren't. They were probably snowed in.

[laughter]

Q: One more question. You mention 21 degrees and 19 degrees. Is that general health optimum health temperatures for general health or is that particularly for people that aren't well?

Wayne Elliot: It's particularly with people with respiratory disease. We do patient days quite often and I did one recently and in my hometown. A queue of people formed to talk to you after and many of them on oxygen and one older lady. A very serene, elegant, older lady said she had always had, a lot of them keep their windows open at night in their bedrooms, particularly, and it isn't the right thing to do. I'm speaking as a meteorologist here but this is acquired knowledge from GPs. They should not have their windows open at night. It's definitely a detrimental thing to do when you have COPD. She'd shut her window when taking this service as it recommends in here and her condition had changed overnight. Completely changed its characteristics. She'd been much better off after that and it's different for different people. A lot of people with COPD are frightened becoming out of breath. They associate becoming out of breath with having an attack, an exacerbation whereas if anybody in the room walked quickly round the block you'd be out of breath or ran up the stairs from the ground floor, you'd be out of breath and you'd accept that as being normal behaviour. It's about kind of normalising within the right context that aspect of being alive and that's what we've been able to do, working in conjunction with the NHS. I mean this is not us taking a health lead at all. Don't misinterpret me here at all. This is us taking a back seat, supporting the health practitioners. Does that answer your question?

Q: Sort of.

Wayne Elliot: Sort of. It does run into respiratory disease. I don't know beyond that so I wouldn't like to comment for other areas of ill health. But it definitely is for this. Yes sir?

Q: I was astonished that firstly that the brighter, dryer, sunnier east coast of Scotland was highest in terms of health and weather and the dull, damp west coast with statistics to mach that description was lowest. Can you say more about that?

Wayne Elliot: Yes. Those arrows don't reflect its healthier or more at risk on the east side. It's showing that when the weather comes from that direction the general risk to the population of the UK is elevated, is higher risk. So, no, that's definitely misinterpretation of the map. It's showing you when the wind's in the east or the north-east during the winter it generally brings colder weather pretty much to a T. Colder weather has an obvious detrimental impact on the health of the population. It's not about east and west. You're absolutely right in what you say, the West is wetter, damper, cloudier, the dry pretty much all the way down the east coast of the UK is sunnier and drier, and is therefore more healthy for that respect. A lot of people retire to the east coast. Certainly down in England on that east coast to get away from the cloud and the damp. Good reason for that.

Okay so looking at the longer range. Just a few slides on the longer term. A lot of unfortunate public disquiet about the science, the climate science. It's a real shame that a few people, few stray mouths, few mis-worded actions, obviously wrong, clearly wrong, admitted by the individuals have served to undermine some of the extensive science and the long-ranging science, quality science which has gone on. So I'll park that for the moment but happy to talk about that if anybody's particularly interested. How do we know the climate's changed? The climate's always changed of course. Climate change is a natural phenomenon to a great degree and there are clear reasons, natural reasons, why that's the case. The two key ones are long term changes in the orbit of the Earth that does change, it wobbles and variations in sun output, so solar output changes and it's rhythmic. It has a cycle. And they do alter the climate, and that is well understood, has been understood for many years and is modelled within the climate models.

Volcanic activity is another major issue. And one that isn't forecast able of course when the big ones blow and then affect he climate for 2, 3, 4 maybe longer years, then they happen. There's no stopping them. There's no forecasting them. They do cool the climate of the planet but it is temporary. It only lasts for typically two or three years. When Pinatubo erupted, one of the dustiest volcanoes, the cloudiest volcanoes to erupt in many years. Its trace, the evidence of it was clearly there in the global temperature records for 2 – 3 years and then the temperature recovered almost completely from that. And then there's anthropogenic factors, so humankind's activity.

What gives us the basis. I'm going to simplify this to this extent. There's two reasons why we're confident we've got it right. One is at the MET office uniquely we use the same atmospheric models to model the weather and forecast the weather as we do the longer-term climate. Now, the weather forecast is pretty near spot on, on most occasions, bearing in mind my communication comment earlier. But generally it has the atmosphere pretty much spot on. It takes us about an hour and twenty minutes four times a day to run a five day forecast for the whole planet. So what are we now? We're twenty past four GMT. The whole world in meteorological terms works on GMT still. So we're busy gathering information from around the world at the moment down at the MET Office and at six o'clock, 1800, we will run the atmospheric model again which goes out for another five days and that takes about an hour and a half and we do that four times a day, day in day out and it gives us great confidence that the dynamics, the physics and mathematics within the model are broadly correct.

But this is an example of the kind of thing we do. The black line is actually for the actual northern hemisphere. It's not for the whole globe, it's pretty much the same. It's the actual observed temperature through these years from 1850 up to the year 2000 and beyond and if we only include a matter of four seconds, that's these two aspects here. The green line is what the models produce so if we pretend we're in 1850 and run the model forward the green line is what we get. The spread is because of the uncertainty. Okay? I'll come on to uncertainty later but the spread is because of the uncertainty and you can see there's a spread but later on the black line clearly goes outside of the green area and that ain't good. That's not what you want to see because your models aren't working right in that case. If you bring in human activity that's what you get. So the anthropogenic forcings, that's the greenhouse gases, primarily CO2 but also methane and others. Water vapour has an effect as well. Then you see far better correlation with the observed temperature. That's the sort of thing which gives us great confidence that we've got it right and the atmospheric models of the longer range are broadly correct.

This is a northern hemisphere again. Temperature trend for back to the year 1000. In the recent past when thermometers were available, accurate and available, then we've seen an approximate, it's about 0.78 now. It's getting up towards 0.8 degrees temperature rise. Okay? That's what we've seen in this latter bit. What are we expecting? Well these are the IPCC scenarios. These are the lower and the upper range, depending on how much CO2 we eventually end up actually emitting and it's somewhere in the middle of that blue, probably the way things are going. This is off the record. We're going for round about 2 – 3 degrees at the moment with our current behaviour and our current emissions. The EU avoiding dangerous climate change limit, have to avoid, what global temperature rise to limit in terms of being confident that we would not see any disastrous consequences. It's two degrees. We're pretty much past that now in terms of what we've emitted even over the last 2 – 3 years. So we're probably edging up towards the centre part of that but an interesting facet of the CO2 actual emissions that we're measuring. The emissions are above the top end of the IPCC scenarios. So at the moment we're here. At the moment the CO2, this is temperature, but the CO2 emissions are above what this, you know, the highest temperature here. So that's not encouraging really in terms of global CO2 output.

Okay so we get two degree temperature rise globally. That is not the story, that is definitely not where our concerns should lie and I've got a summary slide coming up which kind of brings it out. The big concern is extremes and extremes really are about temperature and rainfall because if you move. These are normal distributions so two of the temperature. So this is our current climate let's say, this one on the left. So this is mean temperature sitting in the middle and these are allies so these are cold events and this is a warm event here and I'll draw a line there. If you move the whole distribution to the right by two degrees. If we keep the trigger point of what we call hot weather in the same place you can see the area under the ground you now characterise as hot weather and therefore extreme weather and potentially damaging to health becomes far greater so you increase your chances of getting an extreme event substantially than your mean temperature and that's the essence of the concern because the extremes will come in far, far quicker. Interestingly what will happen is, we've seen it this last two years, people will become less able to cope at the bottom end as well so when do get cold evens which you clearly will. People think because it's snowed that global warming is off the agenda. That is absolutely not the case of course. You will continue to get cold events and hot events and when you get these people will become less able to deal with them.

One graph to really finish this little bit off really to bring out that. This is the summer of 2003. This is the reason that I was with Harry Burns this morning because this killed an estimated 35,000 – 50,000 people in Europe this heat wave in 2003. The black line again is he observed temperature that we've seen in Europe and the red line are the simulated, sort of the model of predictions. Interestingly this year that we saw in 2003 was a complete outline, everything rushed by, happened so quickly. You can see quite quickly it's starting to happen more and more frequently and by 2040 it's a one in two year event. So every other year you would expect that kind of summer to be happening and that's only thirty years away and then by 2060s, 2070 it's a cool event. We'll be looking at that summer and saying, "Wow that was a cold one. Got away with it that year didn't we?", and that's a really interesting to way to think about. I've got a three and five year-old, two daughters, and within their lifetime they'll be experiencing summers which are cool but killing 35,000- 50,000 people. Now clearly society will have adapted by then. We won't, as humans, but our buildings and our infrastructure must change or else we won't cope. But I think that brings in again the extremes and the return periods of these kind of events quite graphically I think.

This may be a little bit too much especially at 5.30 on a Tuesday but what I'm trying to show here is that we used to talk about uncertainty in this game and now we don't, we talk about probability. So what is most probable. We used to, this is UK climate impact programme 2002. When this was, this is a leading bit of work that the UK is well ahead of everyone else in doing. This looks at the impact of climate and we look at the single model and we used to be able to look at the model what that model said and think, "Okay that's the best measure in years of what the climate will be at". In the IPCC recent result we looked at many models and reported on those but it still didn't give you a very accurate, very mathematical way of looking at it. What we do in this UK plan programme over nine, which was probably last year when the MET office did the science behind is look at all the different models and actually look at the range of the probability of that happening and how that actually looks is like this. What we used to get is a single projection. This is summertime rainfall. So this was showing some southern England, looks like around 50 – 70, say 60% reduction in summer rainfall. Western Isles, west coast of Scotland, something like a 0 change, maybe a small dip. And you thought, Okay. I don't really trust that plan very much. Looks a bit rubbish anyway". What we're able to do now is actually the pixels are far smaller so there's great confidence there and we had a central estimate, 50%, so that distribution, if you look at the central bit.

So here we think the south-west of England will go for something like a 60% reduction in summer rainfall. You can see that, if you're looking at what could happen, it's very unlikely to be less than this. So this is most of the UK seeing a 40 – 60% reduction but it's very unlikely to be less than that I've not explained this particularly well but hopefully those that are mathematical will better understand. It's not likely to be more than this, round about 10% increase. What this is trying to show you is that an increase in summer rainfall is possible mathematically within the models and what we're trying to show you is the whole range of certainty. Balance of probability show that were down here somewhere, but there is a chance, there is an outlying and the models are picking this up that we could see a zero change or even a small increase because what this way shows you is that. This kind of trumps the sceptics really because they often lean on this sort of thing. They'll trash this model and say, "This model goes for a 10% increase. It's rubbish. You can't believe it." The consensus is there. It's multi-model. It presented in a proper, realistic way. That's what we're trying to show. It's a greater transparency within the sites really is the game here.

A complex slide really but this is trying to show you that, depending what your role is within your job and depending whether you're interested in climate change and whether you think have a part to play in it, there's different ways you can look at it. The longer range is the years range and the people who are designing building and structure, local planning, those kind of tasks clearly need to take into account a different set of uncertainties or probabilities than the shorter range. If you're an Operations Manager within an organisation you thought maybe sort of looking at this variant. What I'm showing you here is science is attempting to link all these timescales together. You have to take into account the degree of uncertainty exists because we do become less certain the longer range we go out but there is information out there for you.

Key events that will affect the UK in terms of health, cold, heat and flooding pretty much cover it. They are the big issues in terms of the UK but they are definitely, definitely compounded by other events and we see this time and time again. When you get some poor quality events or some economic issues brings out the fuel poverty there. So if you get cold in deprived areas then you see a multiplier coming in there which makes the issue worse. Just looking at the NHS, working with them over the last few years. There are three defined areas where you can put an organisation like the NHS, is very typical here. So you look at staff which required to operate the system, you look at the infrastructure which they are operating in and with and you look at the demand upon the services. You can look at the timescales, for instance, you can break it down into three keys and define those key areas to a greater degree by looking at your particular area. So what do we need to do? Adapt and plan is the key thing. Mitigation is part of the sustainability agenda. By mitigation that means we can do things which stop it happening. I hope I've made it clear. I don't mean to be evangelical about it but we are pretty much committed to a 2 degree temperature rise globally from what we've done already and perhaps a bit more as well and we need to adapt to those kind of issues which are going to already roll out in the next 10, 20 perhaps 30 years but it's about planning, good quality information, understanding the timescale issue which I discussed and helping us to communicate the science better. We've been lambasted by a range of people, namely social scientists, who quite rightly have said you've singularly failed in getting your message across over the last twenty years. People don't really understand anything off into the 2080s. They don't understand something which is happening in Africa; they care but they can't understand it and relate their lives to it and we have to think about the way we communicate our climate science to make it relevant.

So in summary the climate's warming and it will continue to do so; means and extremes being particularly affected. Adaption and prediction systems and information for people who have to make these decisions is key. So I'll leave that slide as my last one. I just want to show you one issue because of my last point there, the role of public opinion. There are great similarities between the climate change agenda and the smoking agenda that happened within the 1950s and 1960s and this commercial advert from then actually shows you how things can change.

Hopefully you'll be able to hear this in a moment. Shouldn't have happened should it? Just bear with me. Technical glitch folks sorry about this. Worth waiting for. It's an advert for smoking that came out in the 60's, 50's, with doctors actually promoting smoking. I've lost my memory stick. I may not be able to show you this. And really only when the doctors became part of the solution and started to convince that they needed to change their behaviour did you see a change of attitudes within smoking and it's quite remarkable to see the change. I've lost it. I have. I've actually lost it. [laughs] It's here somewhere. Anyway I will finish there. While we're winding down if I manage to find it I show you it. I hope you found that interesting. I'm happy to take any questions

Let me show you this short clip and I'm sure it will send you off in good spirits.

[1950's advert of doctors advocating Camel cigarettes shown] That's it. [Clapping]

Lorna Kelly:

We've very quickly come to six o'clock it seems. Just a couple of things to say. One is to highlight this flyer which is for the next event on 20 April. David Gustave talking about the code of the street and how we should reinterpret morality. The second is to say that through that door on your way out there are some refreshment and a chance to continue some of these conversations and the last thing for me to day is to thank Wayne very, very much for a really interesting talk. He said very early on that one of the challenges about all of this is communication. I think the balance that you had in your talk of some very really and immediate issues about health impact and what's happening now really helped to bring to life some of the longer-term, more abstract issues around climate change, so I found that a really powerful balance.

Thank you very much again.