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9th International Conference on Urban Climate

TUKUP7: Warning plans & Decision support tools

Assessing the health impact of the Urban Heat Island of Birmingham, UK

Paul Fisher, Research Fellow,
Fellow of the Faculty of Public Health

24th July 2015

PhD

Examining the association between temperature and health in Birmingham and Baltimore: implications for public health and health inequalities.

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Overview

- History
- Mortality
- Ambulance
- Syndromic Surveillance
- Future steps

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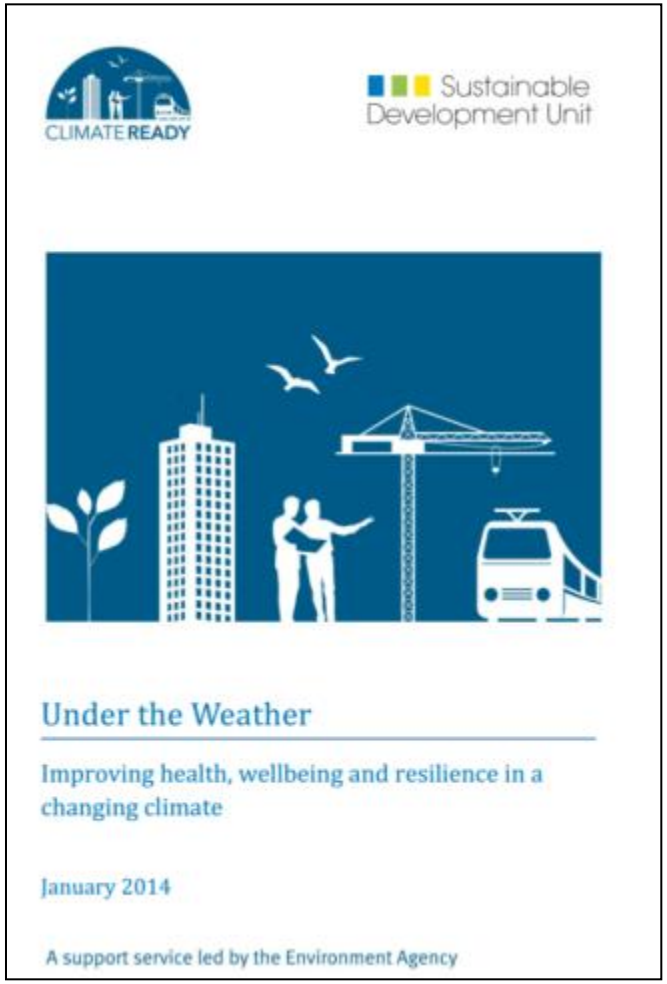
The Significant Seven

Climate change health impact
1. **Increased heat related illness and death** – increased mortality from respiratory and cardiovascular diseases. [3]
2. **Flood related illness and displacement** – as well as injury and infection, the effect of flooding on mental health is well documented, and a considerable part of the overall health burden. [4]
3. **Increase in food, water and vector borne diseases** – an increase in incidences of infections may be seen due to higher temperatures, drought, flooding, changes in habitat and rainfall patterns. [5]
4. **Health impacts relating to air quality and aeroallergens**– high temperatures are linked to poor air quality with high levels of ozone which are formed more rapidly in strong sunlight; fine particles (PM_{10}, $PM_{2.5}$) that damage health may also become more prevalent in the future. Climate change may result in earlier seasonal appearance of respiratory symptoms and longer duration of exposure to aeroallergens (e.g. pollen). [6]
5. **Skin cancer and sunburn** – excessive exposure to UV may have consequences ranging from premature aging of the skin to skin cancer. Malignant melanoma incidence rates in the UK have more than quadrupled over the last thirty years[7]
6. **Pressure on health care providers to keep services running in the face of extreme weather** – extreme events such as droughts, wildfires and storms may impact on service delivery as they become more common in the future. [8] [9] This includes ability to deliver services in the community.
7. **Increase in health inequalities** – between different population groups. For example increase fuel and food prices, reduced access to heating, cooling, health services, education and food security.[10]



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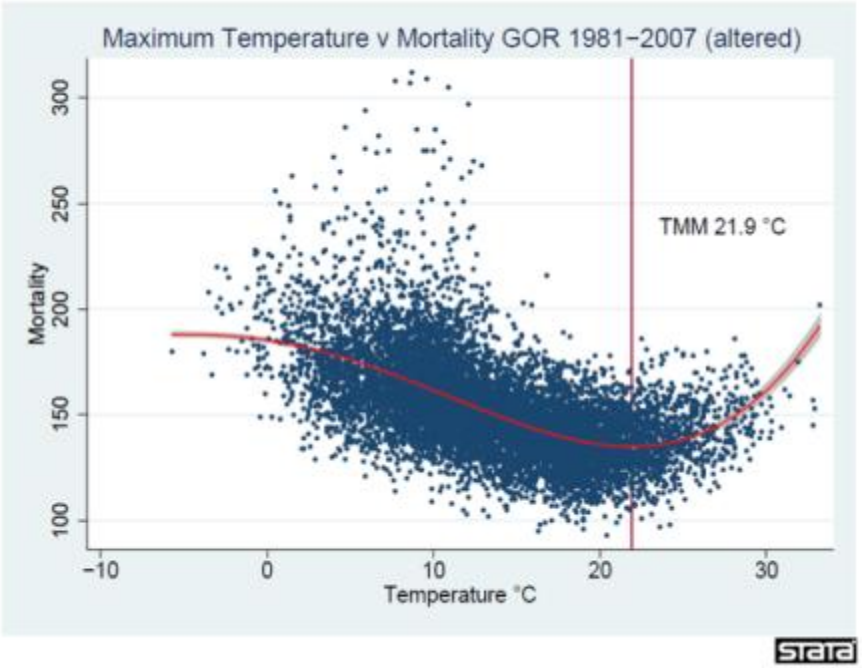
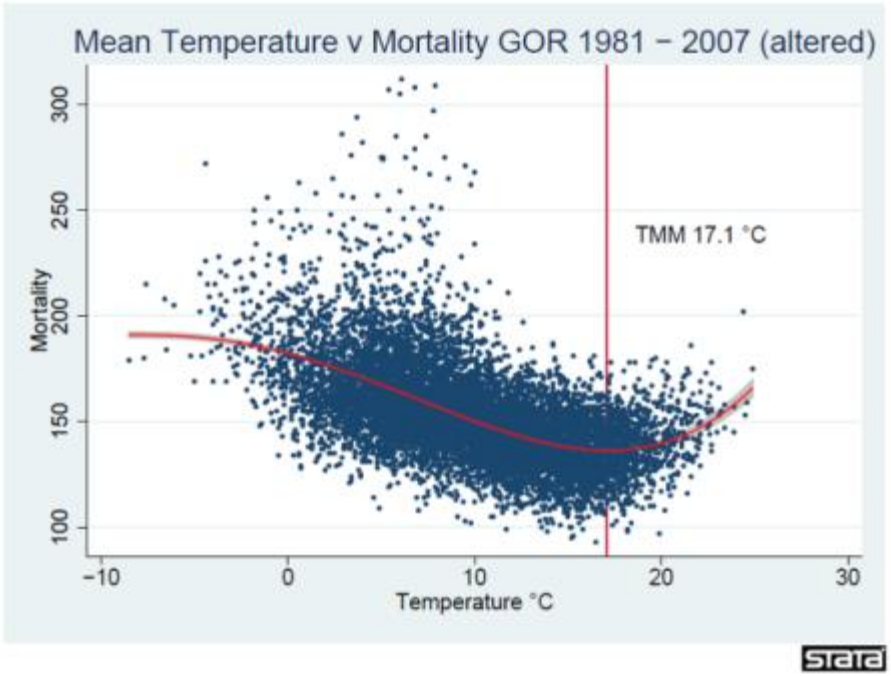
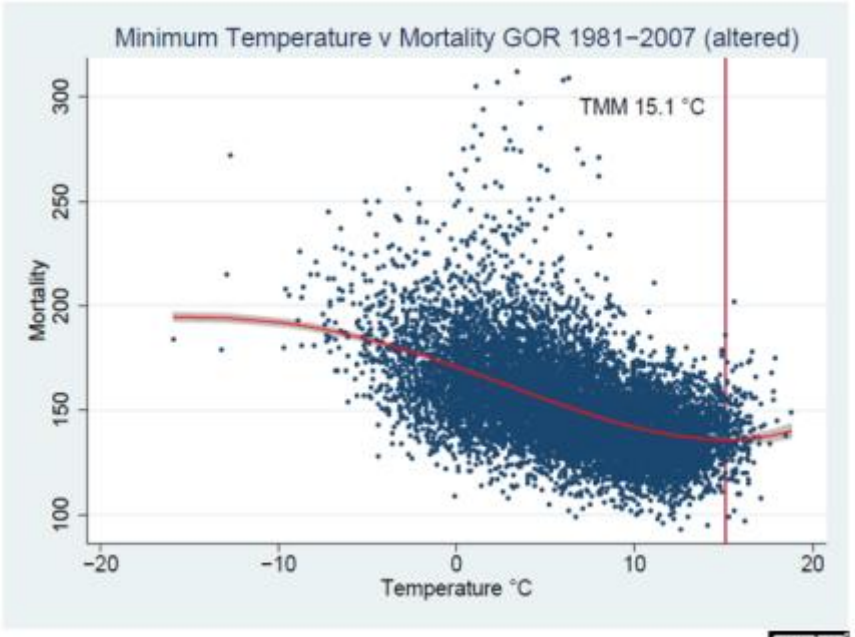
Research gaps, De Sario et al, (2013)*

- Effect on specific diseases/morbidity outcomes
- Effect on children and young age groups
- Effect on low socio economic subgroups
- To identify vulnerability factors
- Interaction of temperature on specific pollutants
- Toxicological and pathogenetic mechanisms

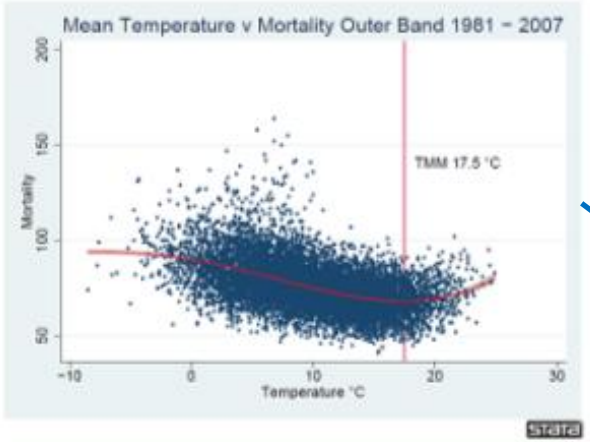
*De Sario M, Katsouyanni K, Michelozzi P. Climate change, extreme weather events, air pollution and respiratory health in Europe. Eur Respir J. 2013 Sep;42(3):826-43

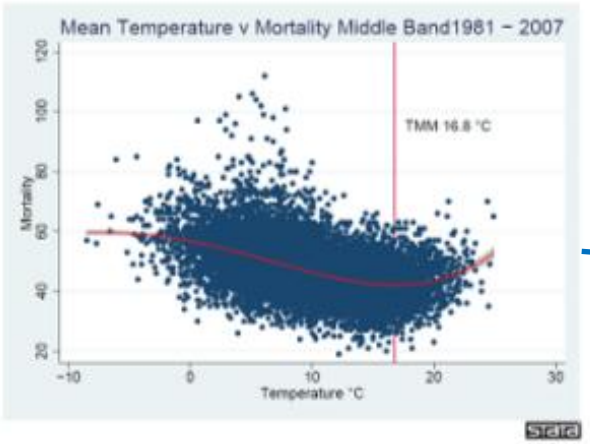

Maximum Temperature v Mortality GOR 1981−2007 (altered)
TMM 21.9 °C
Mortality
100
150
200
250
300
−10
0
10
20
30
Temperature °C

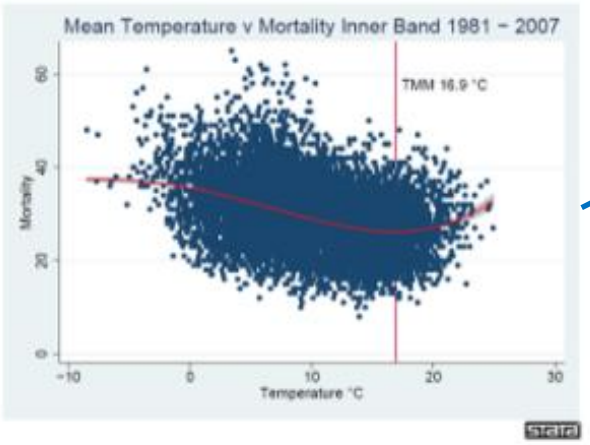

Mean Temperature v Mortality GOR 1981 − 2007 (altered)
TMM 17.1 °C
Mortality
100
150
200
250
300
−10
0
10
20
30
Temperature °C

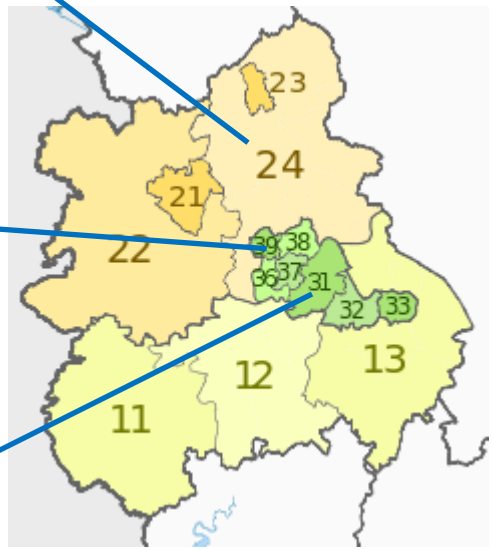

Minimum Temperature v Mortality GOR 1981−2007 (altered)
TMM 15.1 °C
Mortality
100
150
200
250
300
−20
−10
0
10
20
Temperature °C

Location	Minimum Mortality Temperature (T_{MM})	Reference
Netherlands	**15.5**	Huynen *et al*, 2001
UK	**15.6 – 18.6**	Donaldson *et al*, 2001
North Finland	**18.0**	Eurowinter, 2007
London, UK	**18.0**	Pattenden *et al*, 2003
Sofia, Bulgaria	**18.0**	Pattenden *et al*, 2003
Budapest, Hungary	**19.6**	Hajat *et al*, 2006
Paris, France	**20.6 – 23.6**	Laaidi *et al*, 2006
Barcelona, Spain	**21.0**	Saez *et al*, 2000
Boston, America	**22.0**	Gosling *et al*, 2007
Valencia, Spain	**22.0 – 22.5**	Ballester *et al*, 1997
North Carolina, America	**22.3 – 25.3**	Donaldson *et al*, 2003
Athens, Greece	**22.7 – 25.7**	Keatinge *et al*, 2000
Milan, Italy	**23.4**	Hajat *et al*, 2006
Sydney, Australia	**26.0**	Gosling *et al*, 2007
Taiwan	**26.0 – 29.0**	Pan *et al*, 1995









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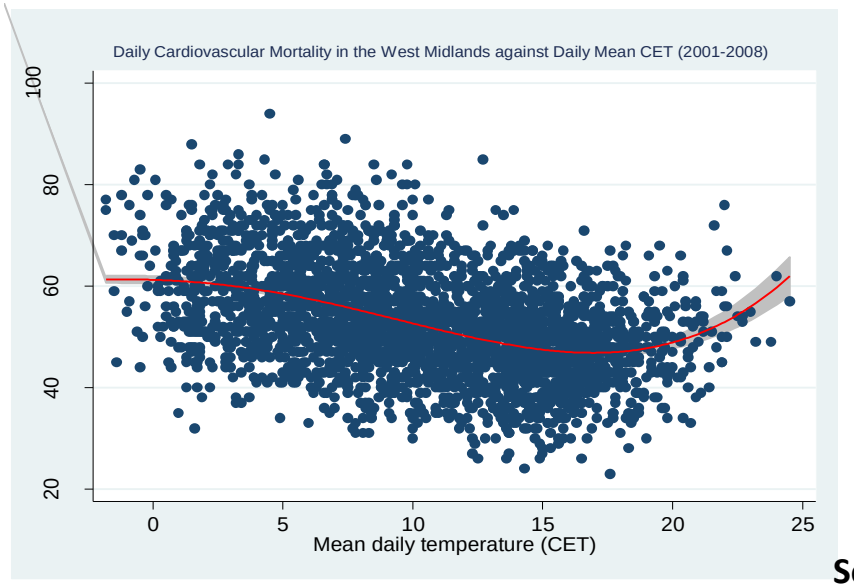
Cardiovascular Disease

A class of diseases involving the heart and/or blood vessels

Epidemiology:

Detected most in adults >65 years

Can be exacerbated by high and low temperatures



Current trend:

- **Increased mortality during winter and hot summer weather**
- **Minimum mortality between 15-18°C**

Source: WMPHO and BADC (British Atmospheric Data Centre)

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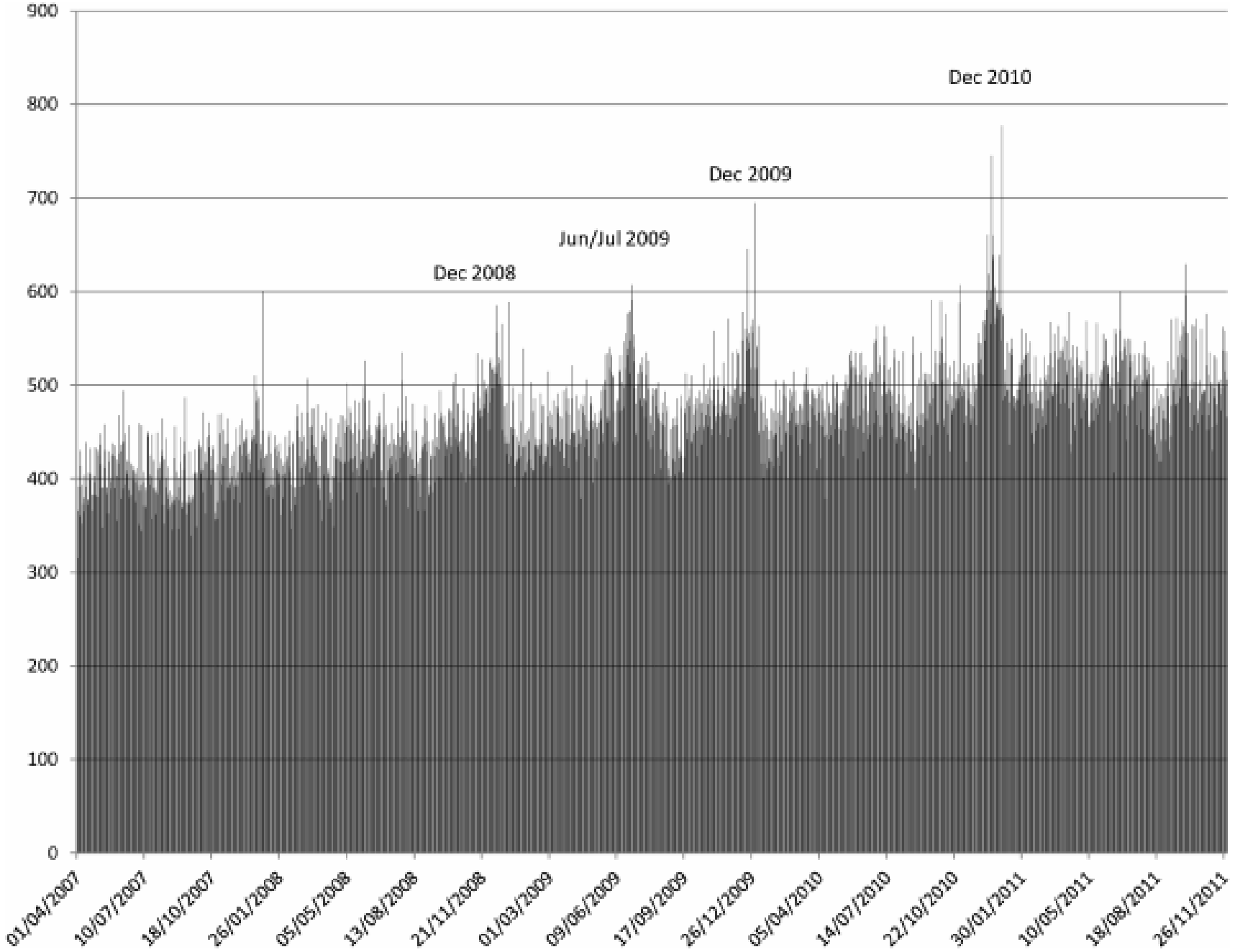
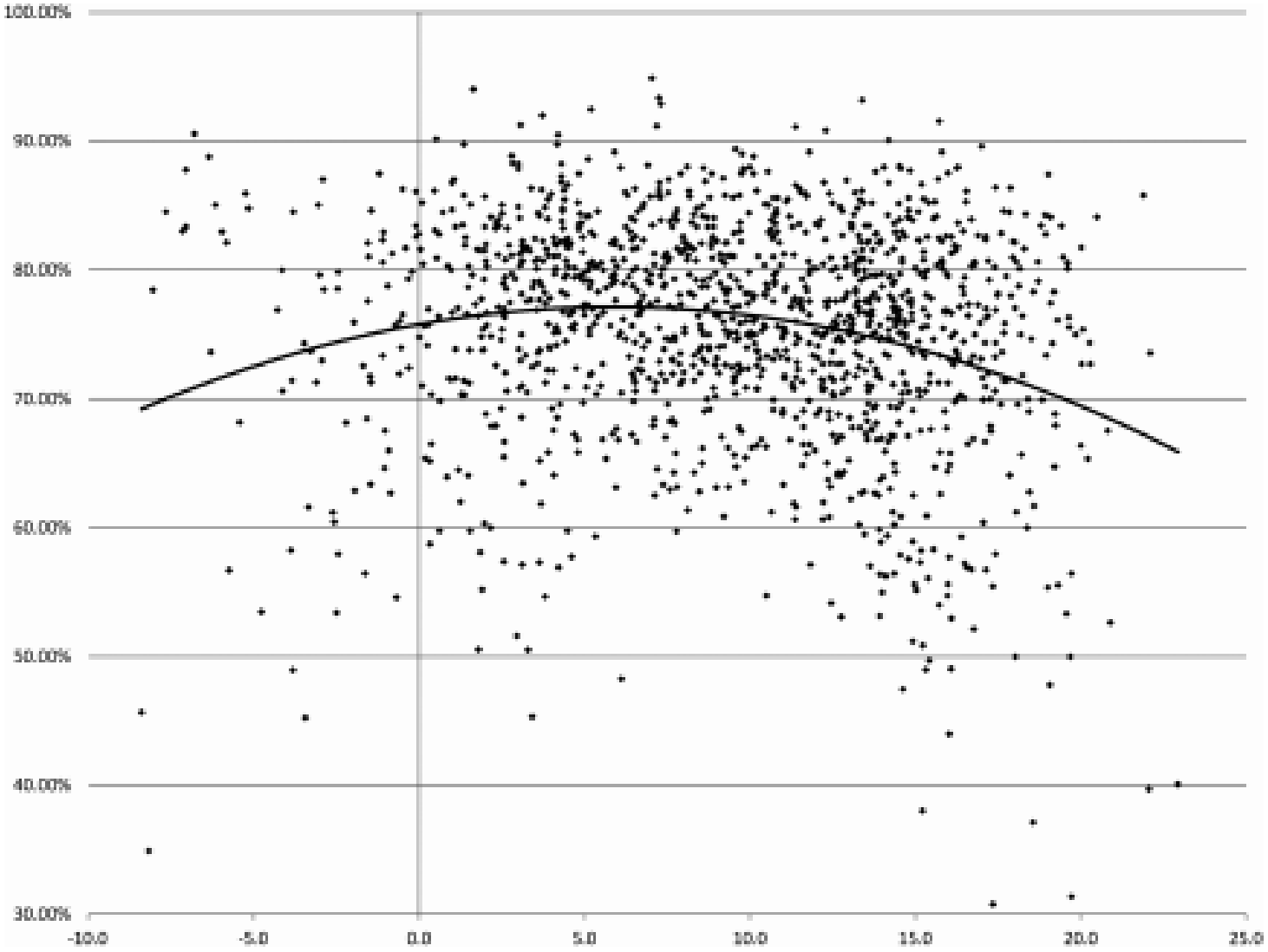


Figure 1 Total daily 999 ambulance calls 1 April 2007–30 November 2011.

Percentage of daily Category A responses within 8 min versus mean daily temperature.



Irish Medical Times

Temperature drop delaying responses

March 7, 2013 by admin Leave a Comment

Photo by Shout / Rex Features

Every one-degree fall in outside air temperature during the winter corresponds to a drop in ambulance response time of more than 1 per cent, reveals research published online in the *Emergency Medicine Journal*.

Increased demand and treacherous road conditions during the winter months combine to stretch ambulance services in England, which have a target of reaching 75 per cent of immediately life-threatening (category A) calls within eight minutes, said the authors.

Studies on the impact of extreme weather conditions on health have tended to focus on associated illness and death, but there has been relatively little research on the impact of weather on NHS infrastructure in the UK, they said.

Related Tags

Hospital Medicine >

Extreme Weather Impacts Ambulance Calls

Mar 04, 2013 |

MONDAY, March 4 (HealthDay News) -- Extreme weather, either hot or cold, significantly affects the number of ambulance call-outs and response times, according to a study published online Feb. 27 in the *Emergency Medicine Journal*.

To examine the impact of cold weather on

EMERGENCY MEDICINE 02.28.2013

Extreme Weather Hampers EMT Response

by Charles Bankhead
Staff Writer, MedPage Today

+ SAVE

Falling temperatures appear to have a significantly adverse effect on the response time of emergency medical services -- in some instances almost doubling response time.

Action Points

Why you shouldn't get sick in a cold snap - it can take ambulances twice as long to respond

- **Study looked at how long it took ambulances to arrive at emergencies in Birmingham between 2007 and 2011**

this is the most ridiculous study ever. Anyone who has ever driven an emergency service vehicle (which i did for 30 years) have always used the mantra "drive to arrive" and that means adapting your driving to suit the road conditions to make sure you actually arrive safely even though it is done at the maximum speed possible in those conditions even if that arrival is delayed slightly. Just how many emergency vehicles were involved in accidents during the cold weather ?

Click to rate 8 0

Thanks for the tip, DM, I'll bear that in mind when I am planning my next bout of illness.

Click to rate 8 0

Why you shouldn't get sick in a cold snap - it can take ambulances twice as long to respond

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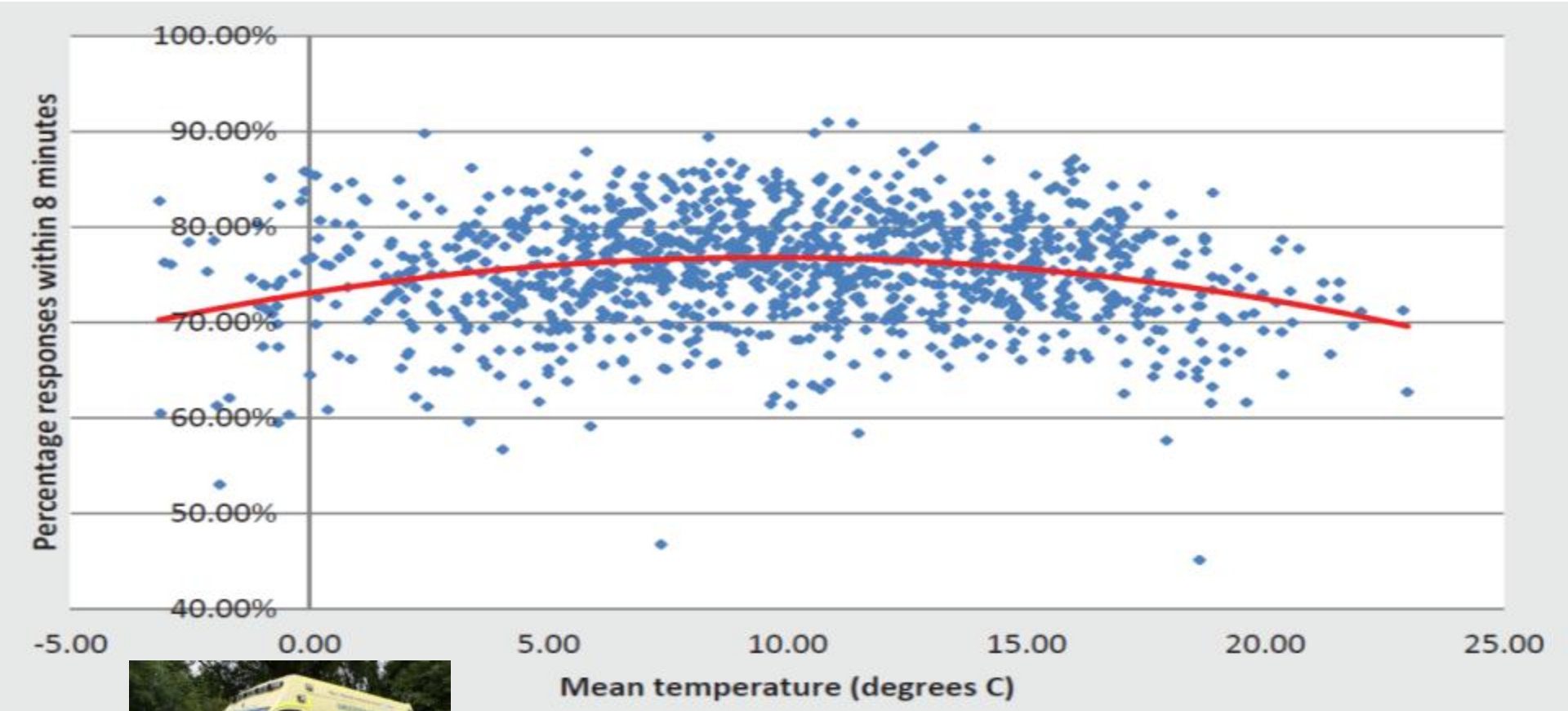
Action Points

Category A Performance, Annual 2009-2014



↓ 1.24%

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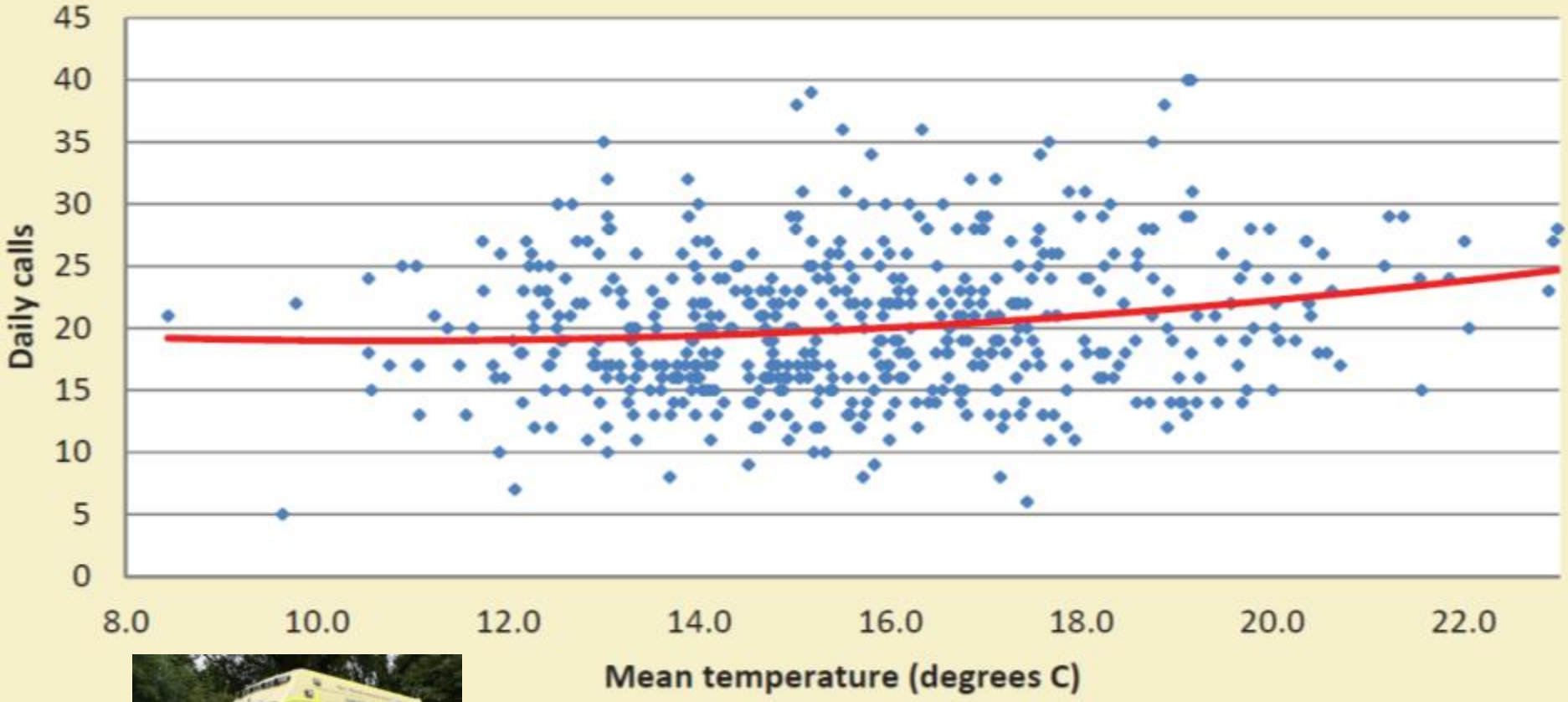
Traumatic Injuries Summer 2009-2014

8.3%



↑ 3.9%

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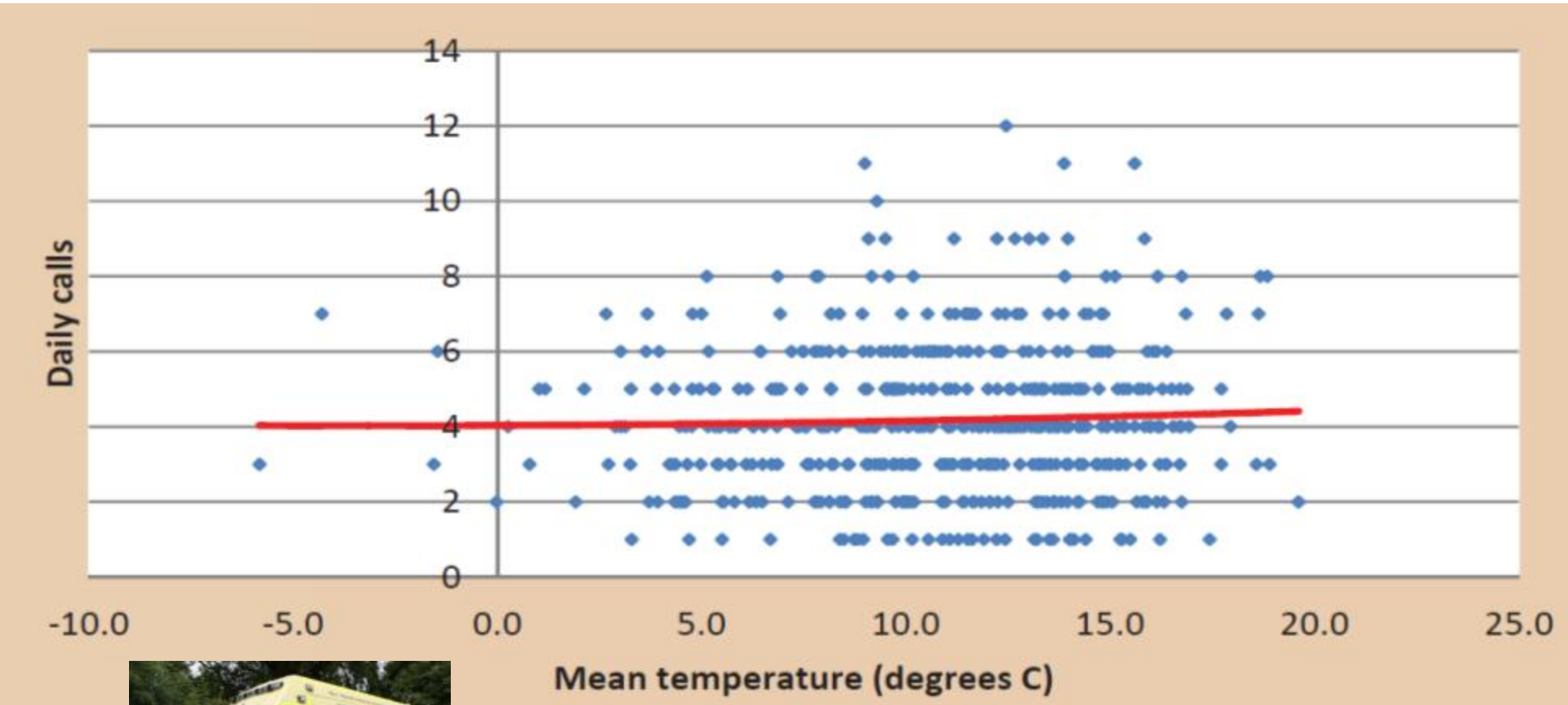
Allergies/Rash/Stings Autumn 2009-2014

2.4%



↑ 8.1%

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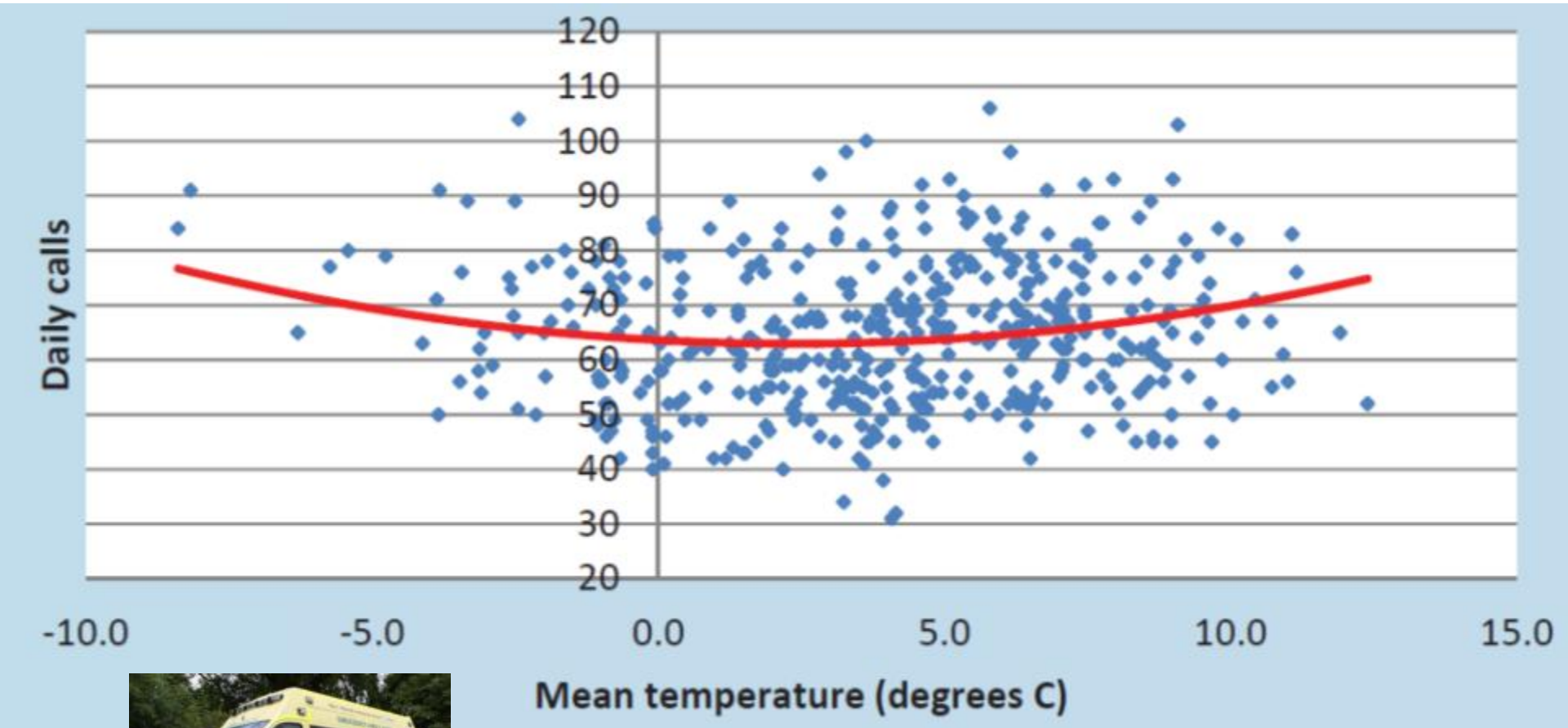
Breathing Problems Winter 2009-2014

9.2%



↑ 2.1%

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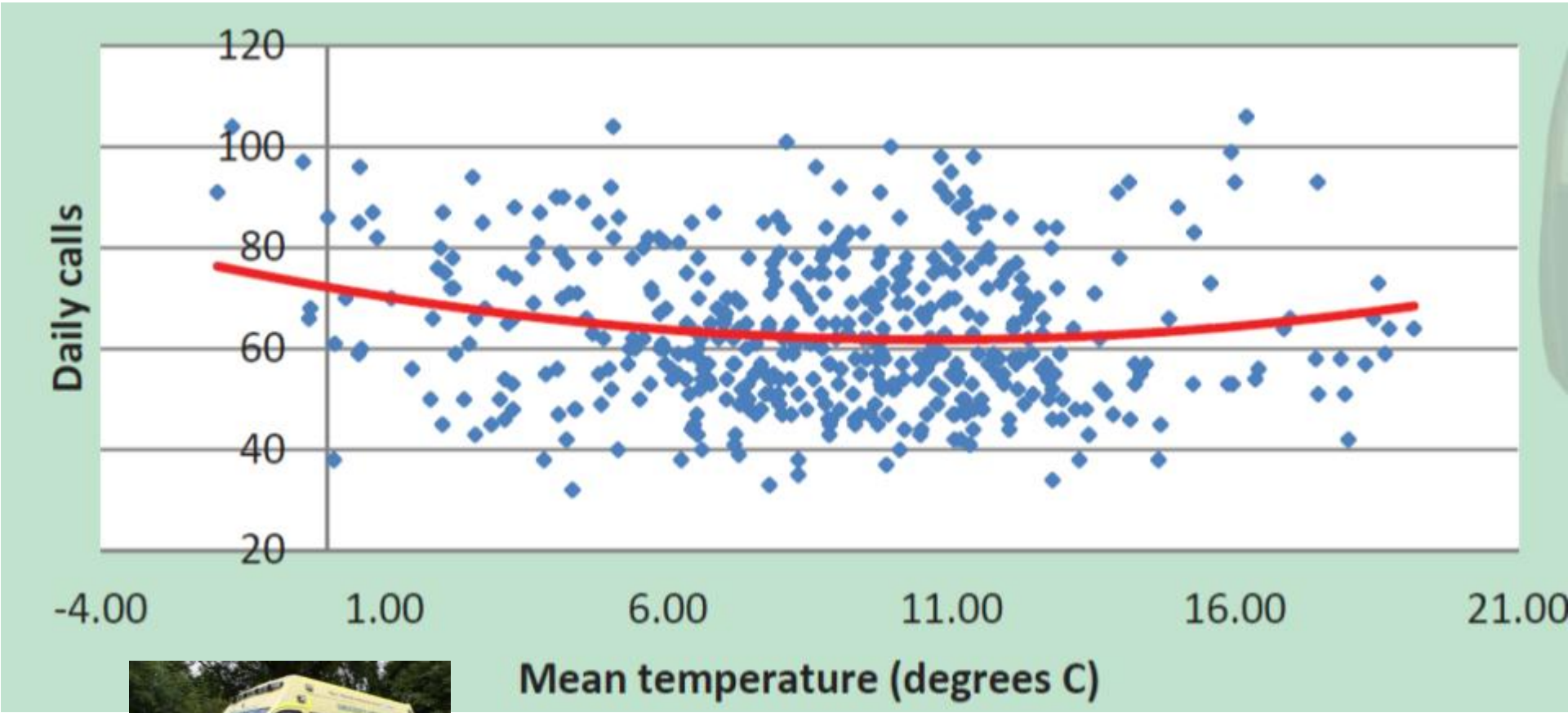
Sick Person
Spring 2009-2014

4.5%



↑ 2.4%

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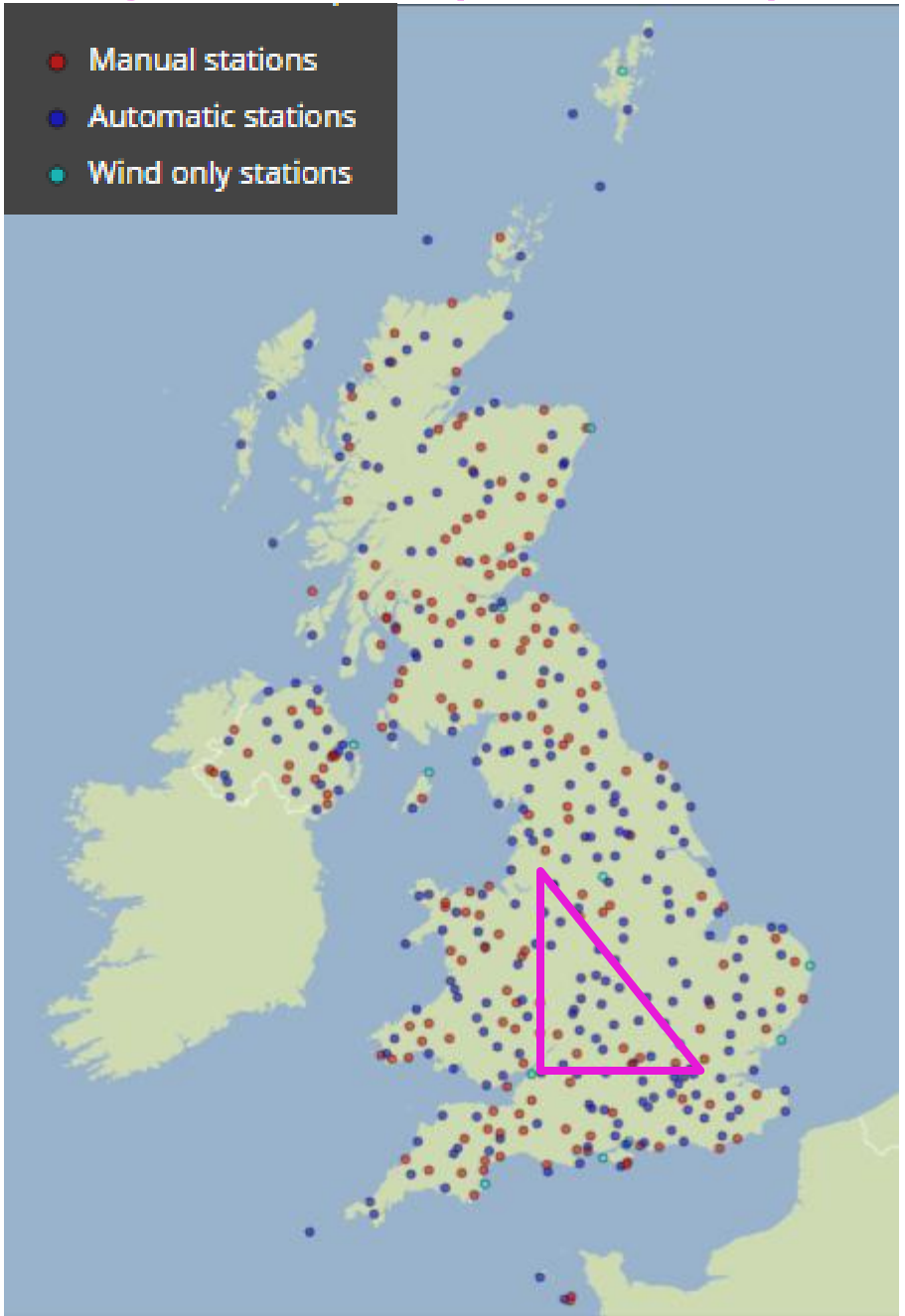
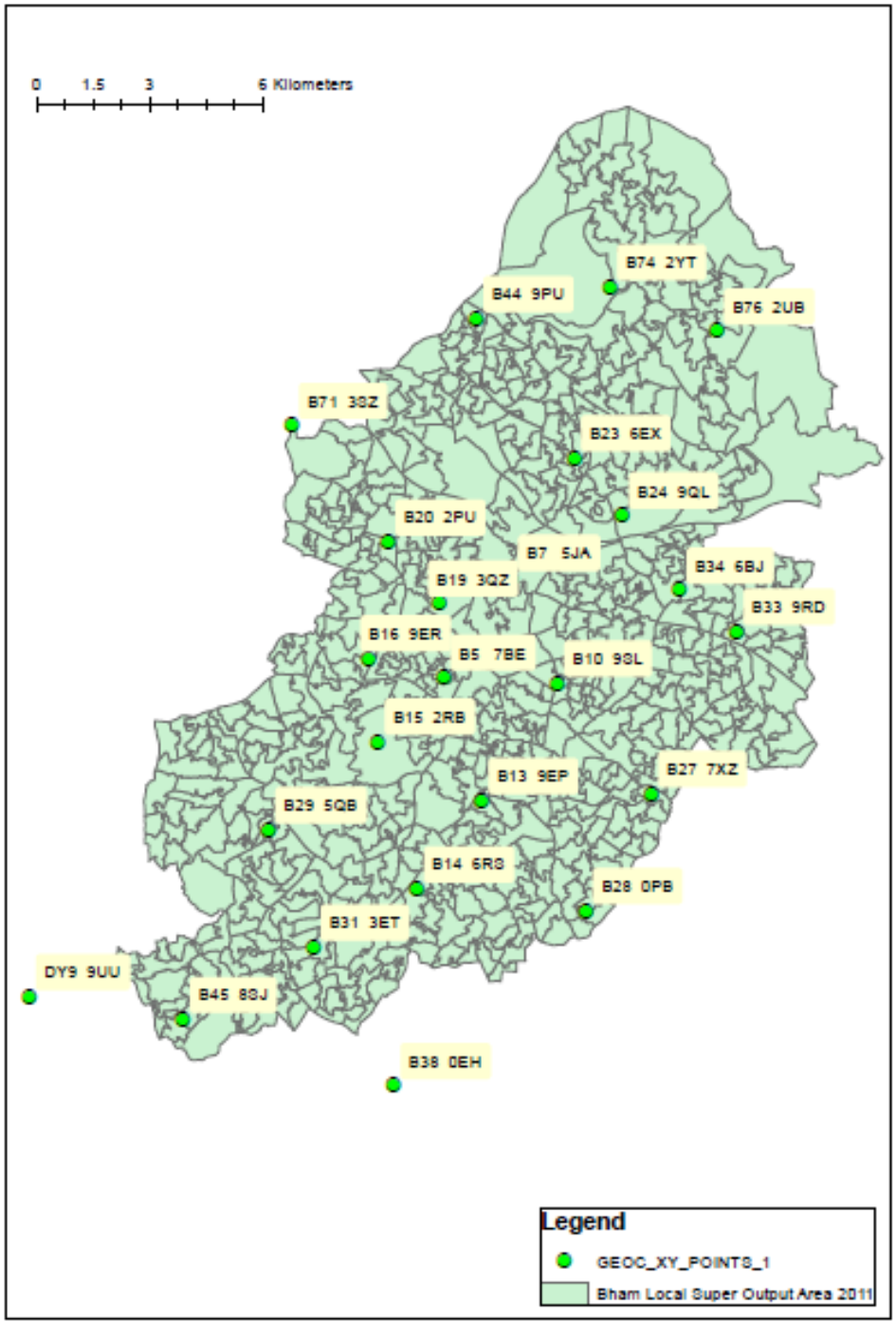
=Central England Temperature (CET)

Issues

- Exposure assessment
- Routinely available data
- Aggregate data
- Limited confounders





HiTemp project

HiTemp

High Density Measurements within the Urban Environment

24 monitoring stations across Birmingham linked to their nearest Lower Super Output Area (LSOA) of which there are 639

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Amber — Heatwave action

Triggered when the Met Office confirms threshold temperatures for one of more regions have been **reached** for one day and the following night, and the forecast for the next day has a greater than 90% confidence level that the day threshold temperature will be met. This stage requires social and healthcare services to target specific actions at high-risk groups.

Advice: Stay out of the sun. Keep your home as cool as possible – shading windows and shutting them during the day may help. Open them when it is cooler at night. Keep drinking fluids. If there's anybody you know, for example an older person living on their own, who might be at special risk, make sure they know what to do.

Advice on how to reduce the risk either for yourself or somebody you know can be obtained from NHS Choices at **www.nhs.uk/summerhealth**, NHS 111 or from your local chemist.

Threshold temperatures

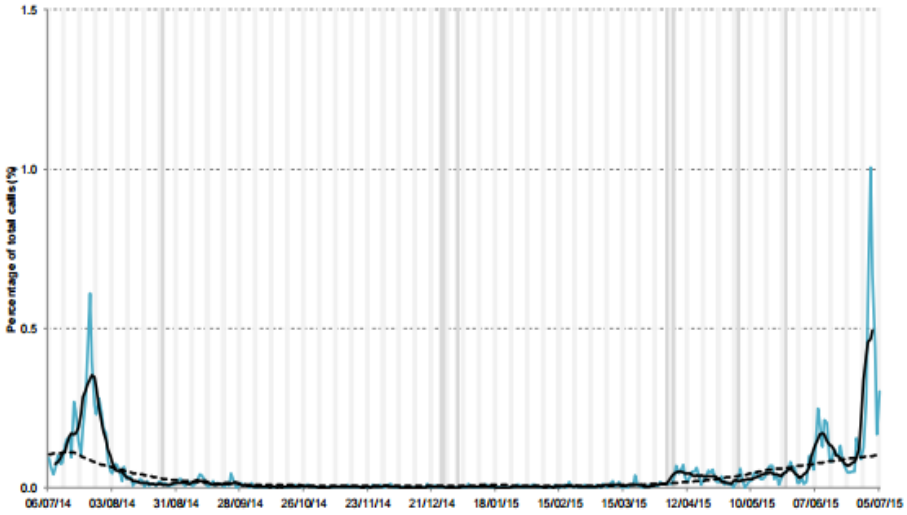
Region	Day max (°C)	Night min (°C)
North East England	28	15
North West England	30	15
Yorkshire and the Humber	29	15
West Midlands	30	15
East Midlands	30	15
East of England	30	15
Southeast England	31	16
London	32	18
Southwest England	30	15

These temperatures could have significant effect on health if reached on at least two consecutive days and the intervening night.

PHE Syndromic Surveillance data

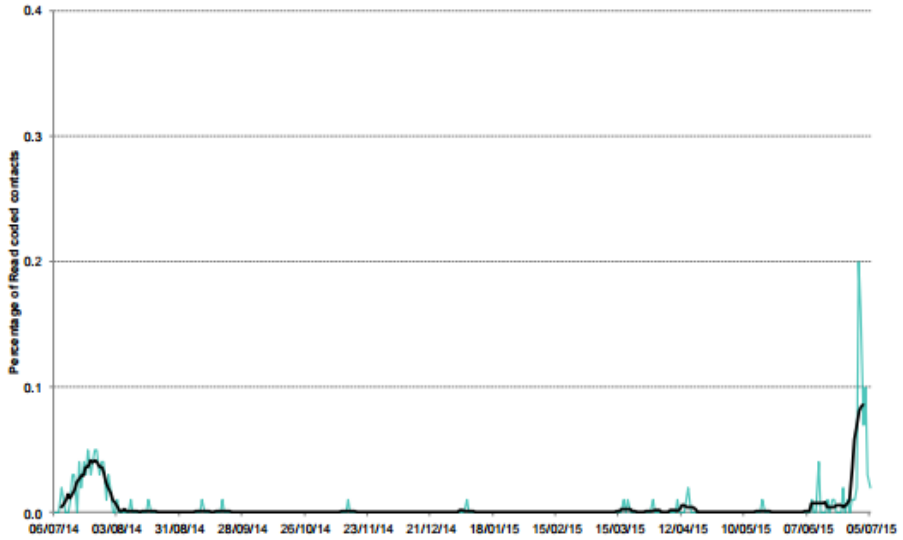
10: Heat stroke

Daily heat stroke calls as a percentage of total calls. Baselines are constructed from historical data since 2010, including data from NHS 111 and NHS Direct.



11: Heatstroke and sunstroke.

Shown as a percentage of the total contacts with a Read code and as a 7 day average*.



GP

OOHs

NHS

111

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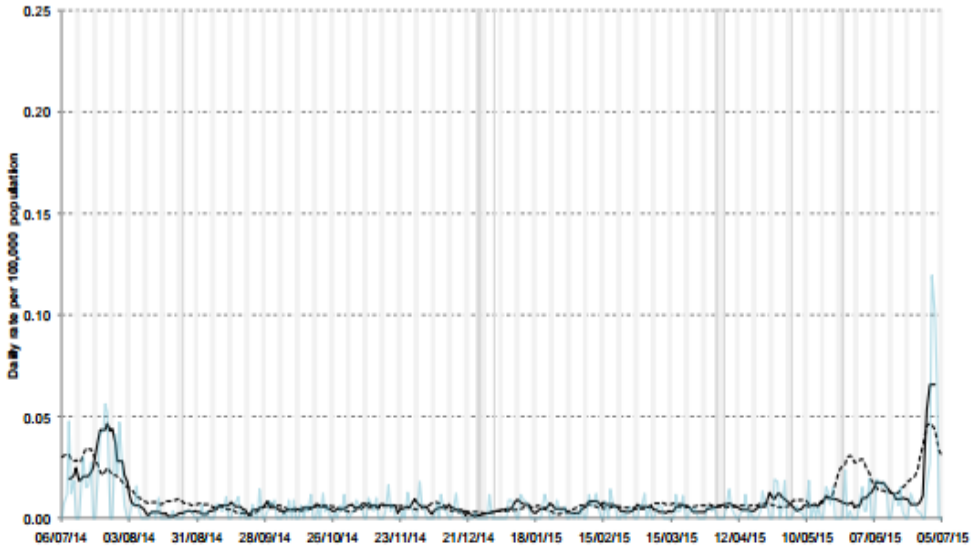
23: Heat/sunstroke

Daily incidence rate (and 7-day moving average*) per 100,000 population (all England, all ages).

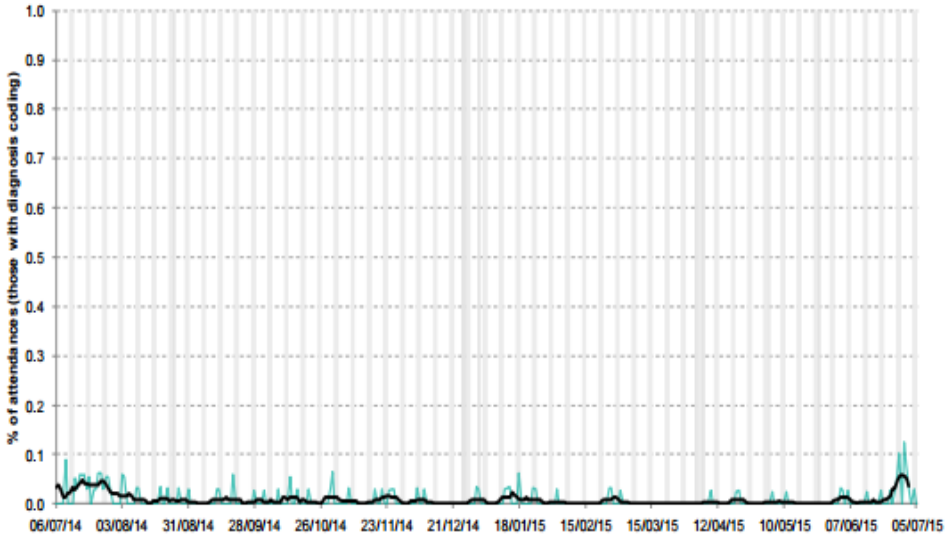


GP

22: Heat / Sunstroke

Daily percentrage of all attendances recorded as Heat / sunstroke attendances across the EDSSS network.

Includes 20/35 EDs.



ED

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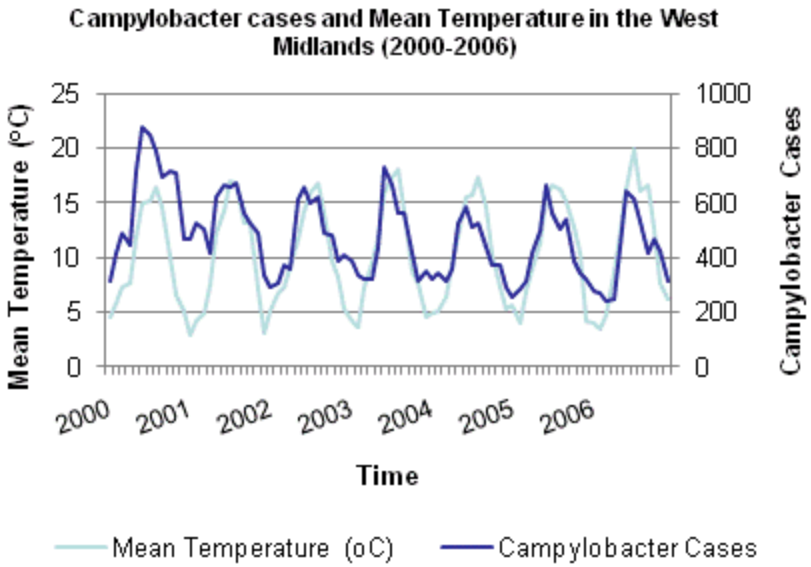
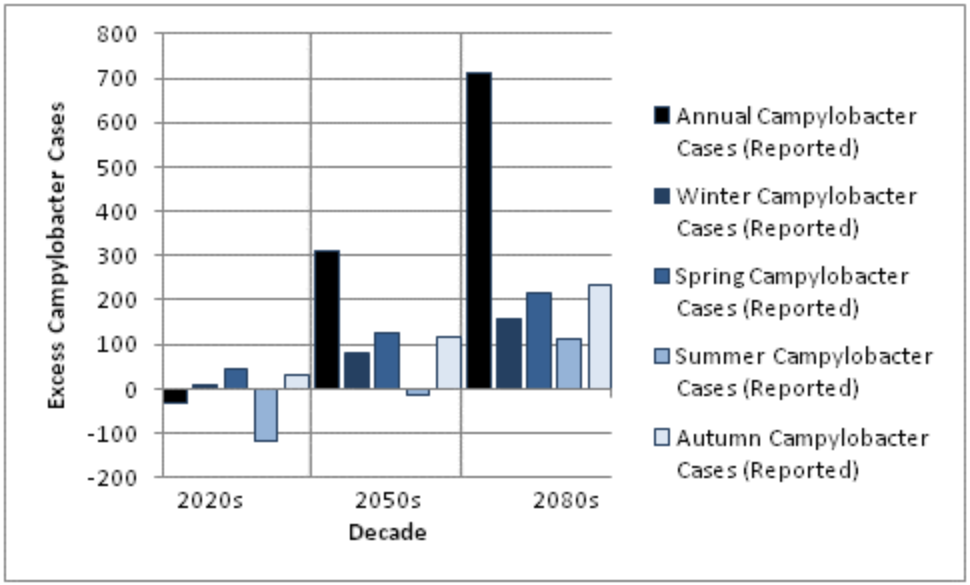
Campylobacter and Temperature





There might be an additional 179,000 cases of food poisoning in the UK by the year 2050 as a result of climate change

	Excess Campylobacter cases per year in 2080s (High Emissions Scenario)
Annual	**Increase of up to 1277 reported cases**

REU (Regional Epidemiological Unit)

UKMO (UK Met Office)

Thanks to:

- Prof. John Thornes
- WMAS
- Birmingham City Council
- Public Health England
- Dr. Lee Chapman (PhD supervisor)
- Dr. Neil Tomas (PhD supervisor)

Reference:

Thornes JE, Fisher PA, Rayment-Bishop T, et al. (2014) Ambulance call-outs and response times in Birmingham and the impact of extreme weather and climate change. Emerg Med J 2014;31:220–228

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Merci pour votre attention
?
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