



Epilepsy & Climate Change

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Epilepsy Society

EpilepsyClimateChange

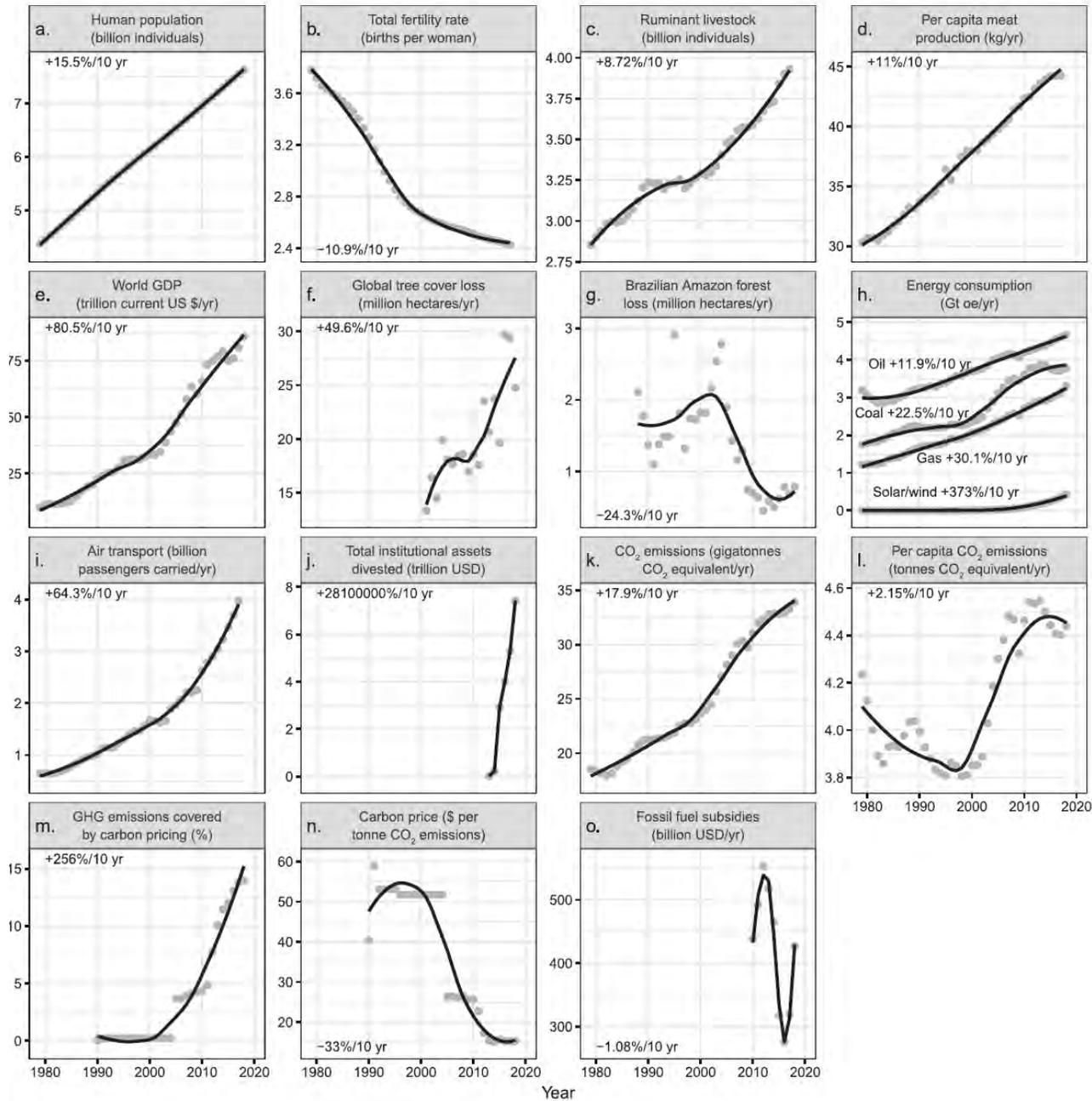
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Why think about climate change in epilepsy?

World Scientists' Warning of a Climate Emergency

Scientists have a moral obligation to clearly warn humanity of any catastrophic threat and to “tell it like it is.” On the basis of this obligation and the graphical indicators presented below, we declare, with more than 11,000 scientist signatories from around the world, clearly and unequivocally that planet Earth is facing a climate emergency.

Climate Change: happening now



People with epilepsy and their carers



Courtesy of Dravet Syndrome UK

Happening now, with consequences now – anecdotal data

Many people, many processes: multiplicative, complicated effects

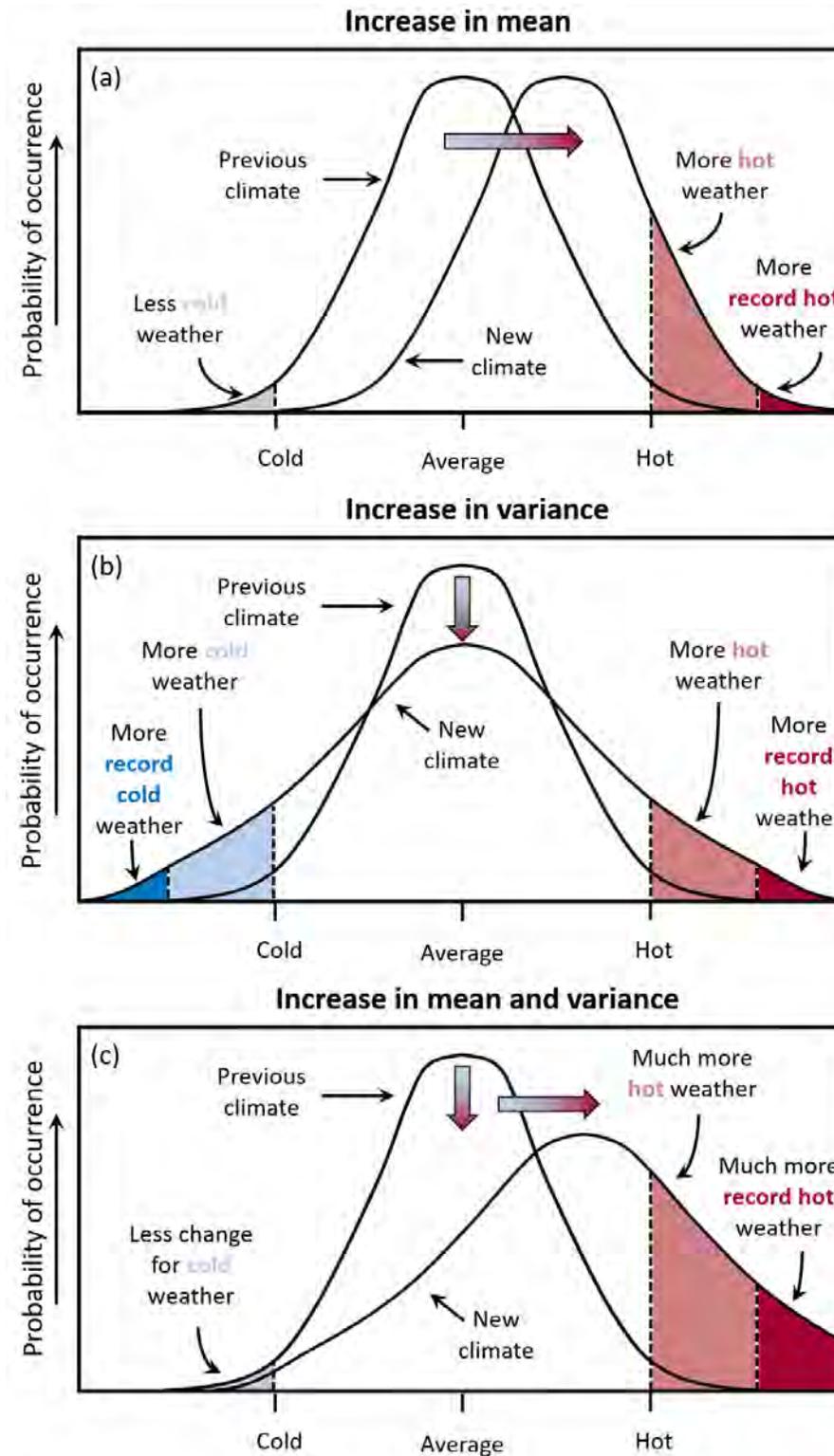
Those with less resilience likely to be affected first and more

Even in wealthy countries, health systems can collapse

Global challenges happen, and should be met with global action

Dramatic responses are possible, even with a very acute challenge

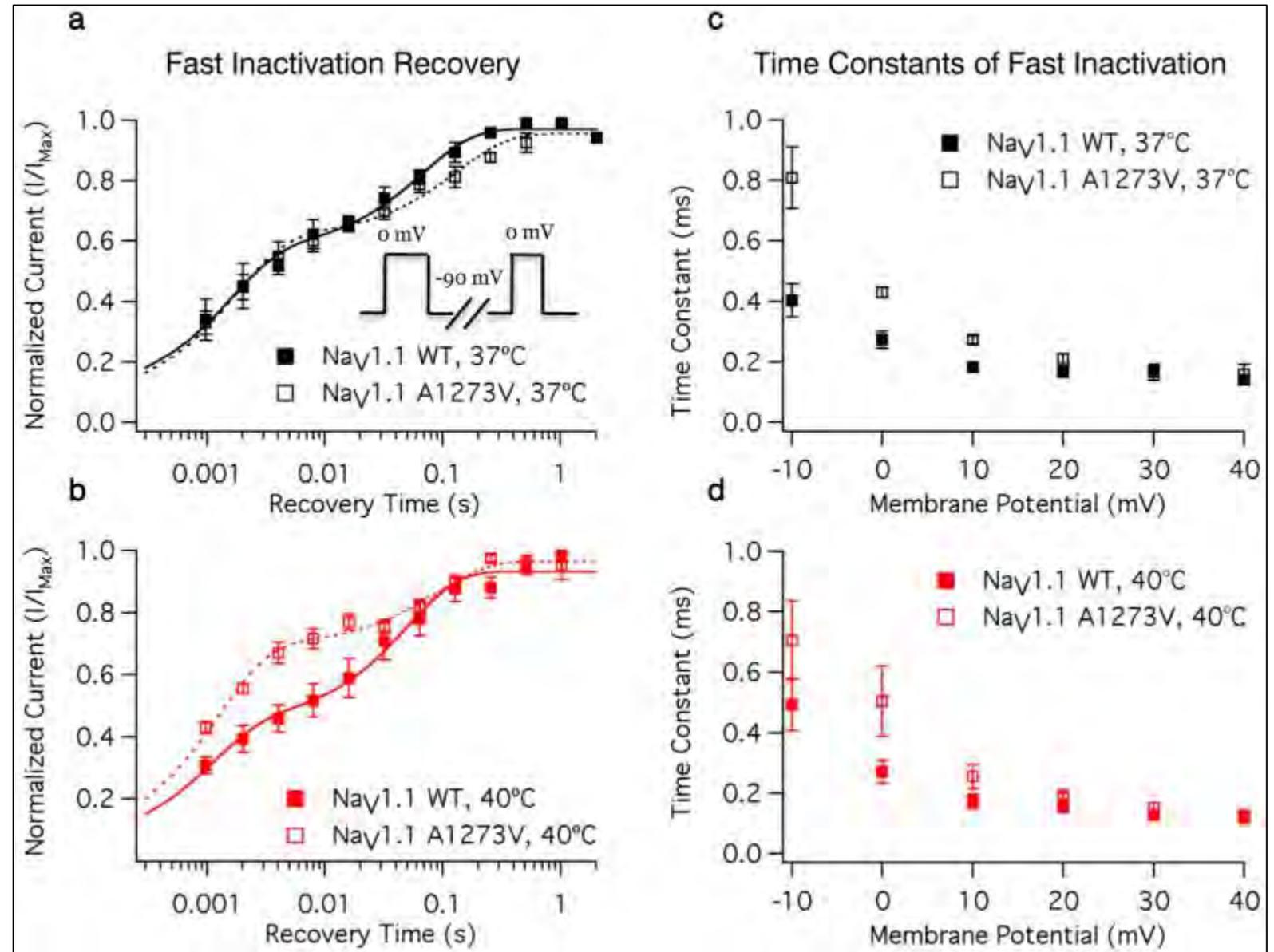
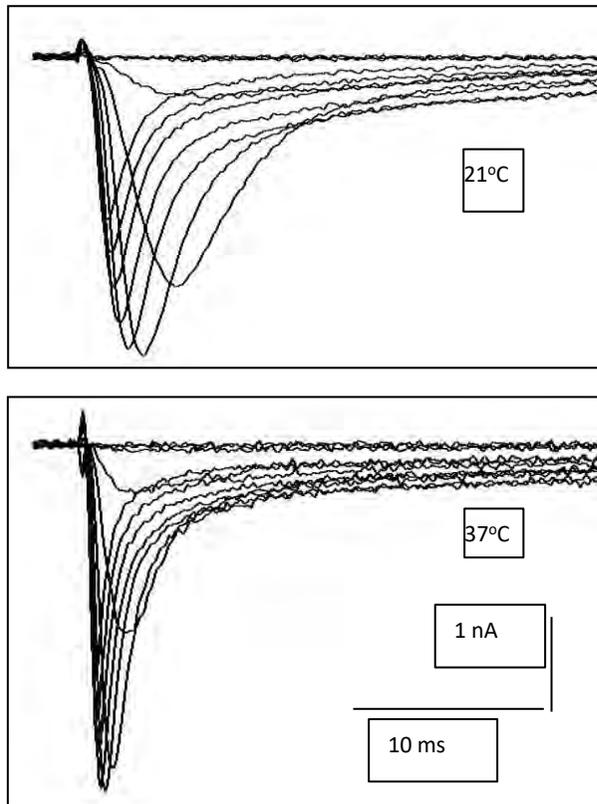
What are the main mediators?



Sisodiya et al. Epilepsia Open
2019, adapted from IPCC,
2014

Temperature and channel function

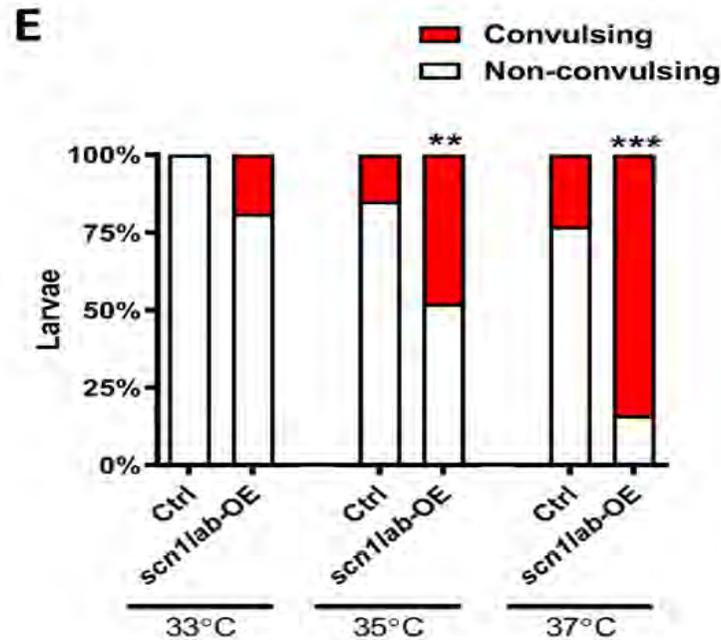
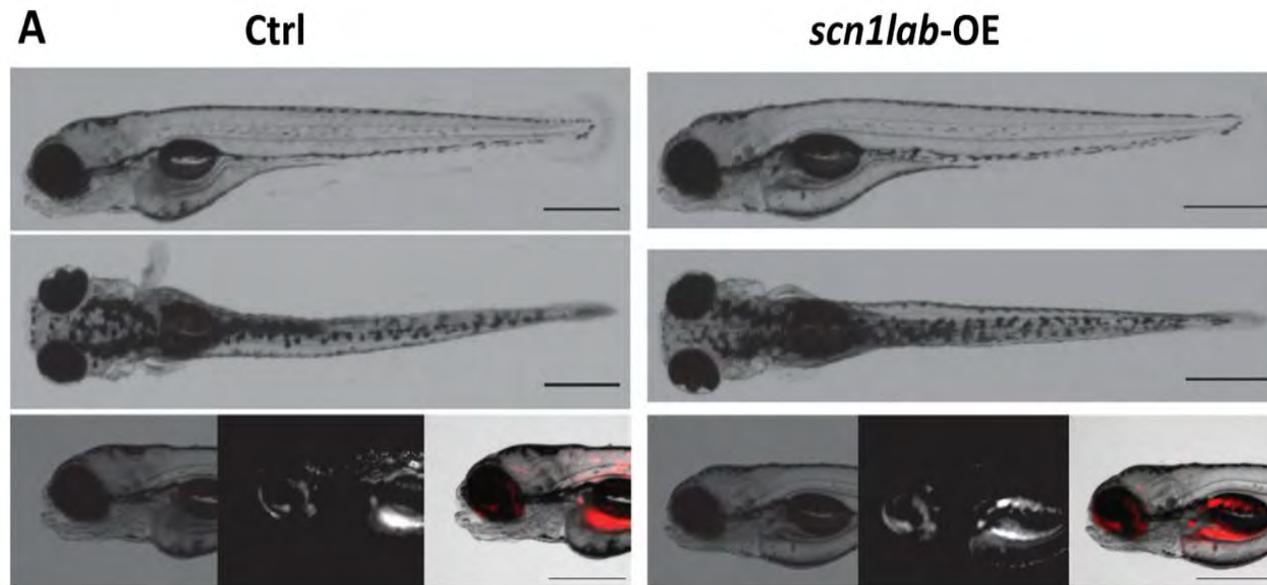
Mutation causing Dravet-like phenotype modelled in CHO cells



Fletcher et al.
J Biol Chem. 2011;286:36700-8

Peters et al. Sci Rep. 2016;6:31879

Genetic risk: not just in rare epilepsies



Risks: multifactorial



2°C rise: 3-4 weeks of activity/year by 2030 in Southern England

Medlock & Leach, Lancet Infect Dis 2015

Emerging pathogens:
SARS-CoV-2

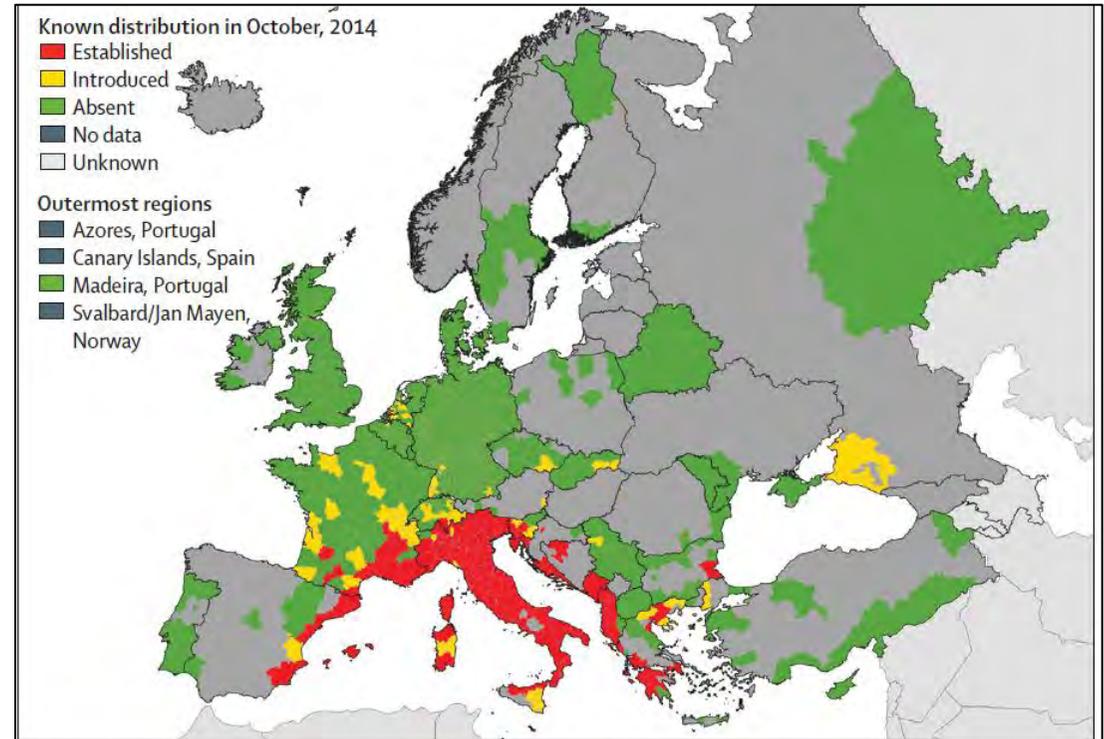
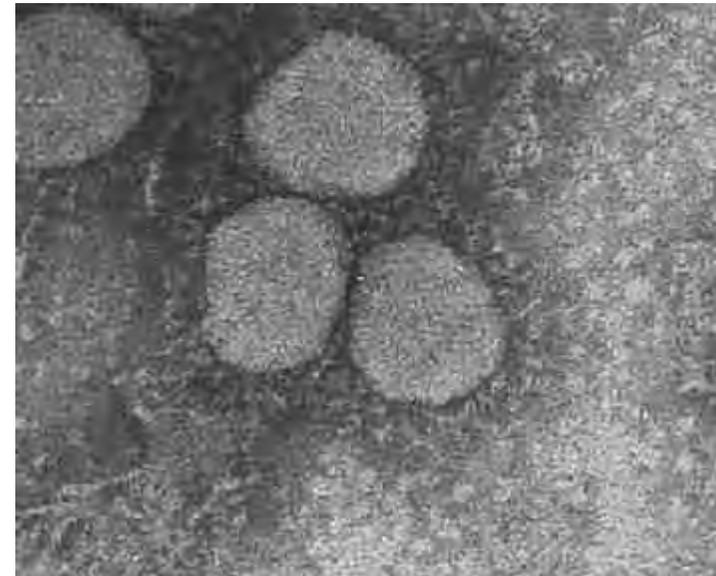


Figure 1: Distribution of *Aedes albopictus* in Europe, October, 2014



Risks: multifactorial

Fukushima Daiichi
Nuclear Power Station
(NPS) Accident

Damage due to the Great East Japan Earthquake

- A 9.0-magnitude earthquake occurred off the coast of Sanriku at 14:46 p.m. on Friday, March 11, 2011. The Earthquake and subsequent tsunami caused severe damage mainly to the Tohoku region.
- The earthquake was the largest ever recorded in Japan and the fourth biggest in the world since 1900.



Human damage	
Dead	15,894
Missing	2,546
Injured	6,156

Damage to buildings	
Completely destroyed	121,772
Half destroyed	280,921
Partially destroyed	726,509

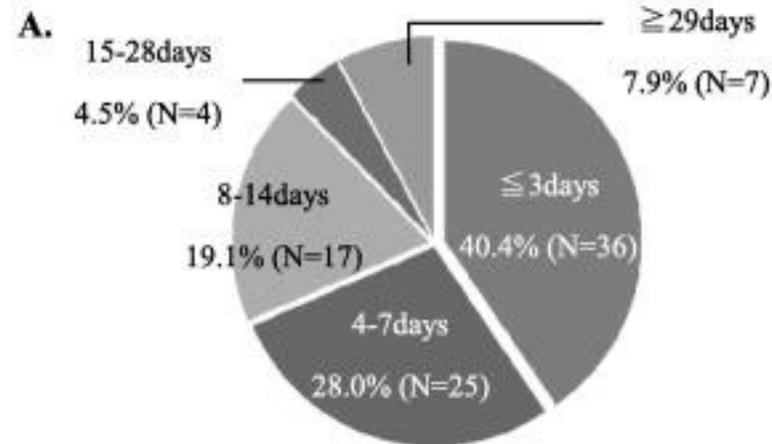
(Surveyed by the National Police Agency; as of December 8, 2017)

Disaster victim support	
Evacuees nationwide	75,206

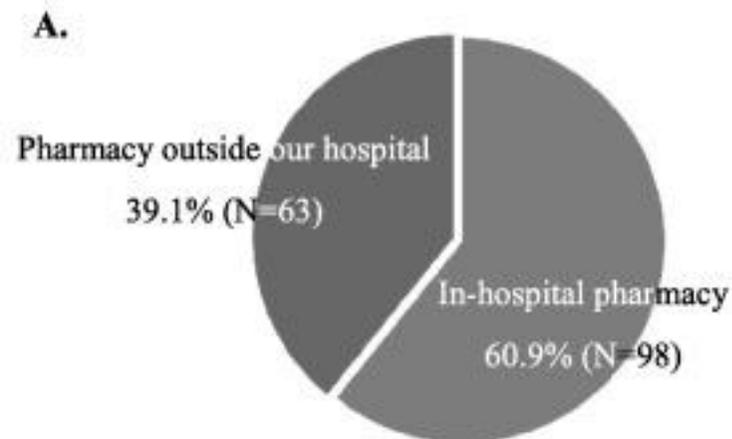
(Surveyed by the Reconstruction Agency; as of January 16, 2018)

Drugs and supply chains

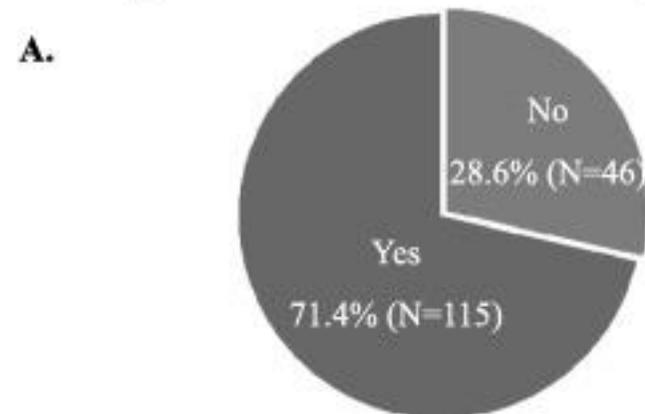
Q1. How many days of usually antiepileptic drugs stockpiled before the earthquake occurred? (N=89)



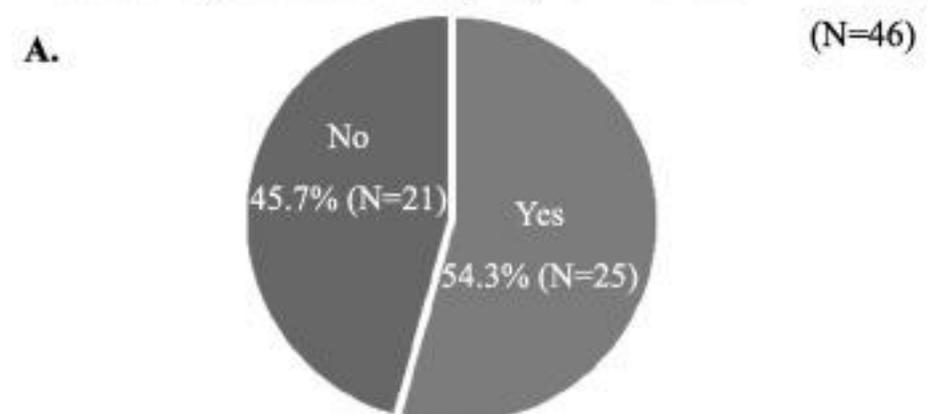
Q2. Before the earthquake, where had the patient been obtaining his/her medicine? (N=161)



Q3. Did the patient have sufficient medicine during the acute phase of the disaster after the earthquake? (N=161)



Q4. For patients answered “No” at Q3. Could they contact us through any communication methods? (N=46)



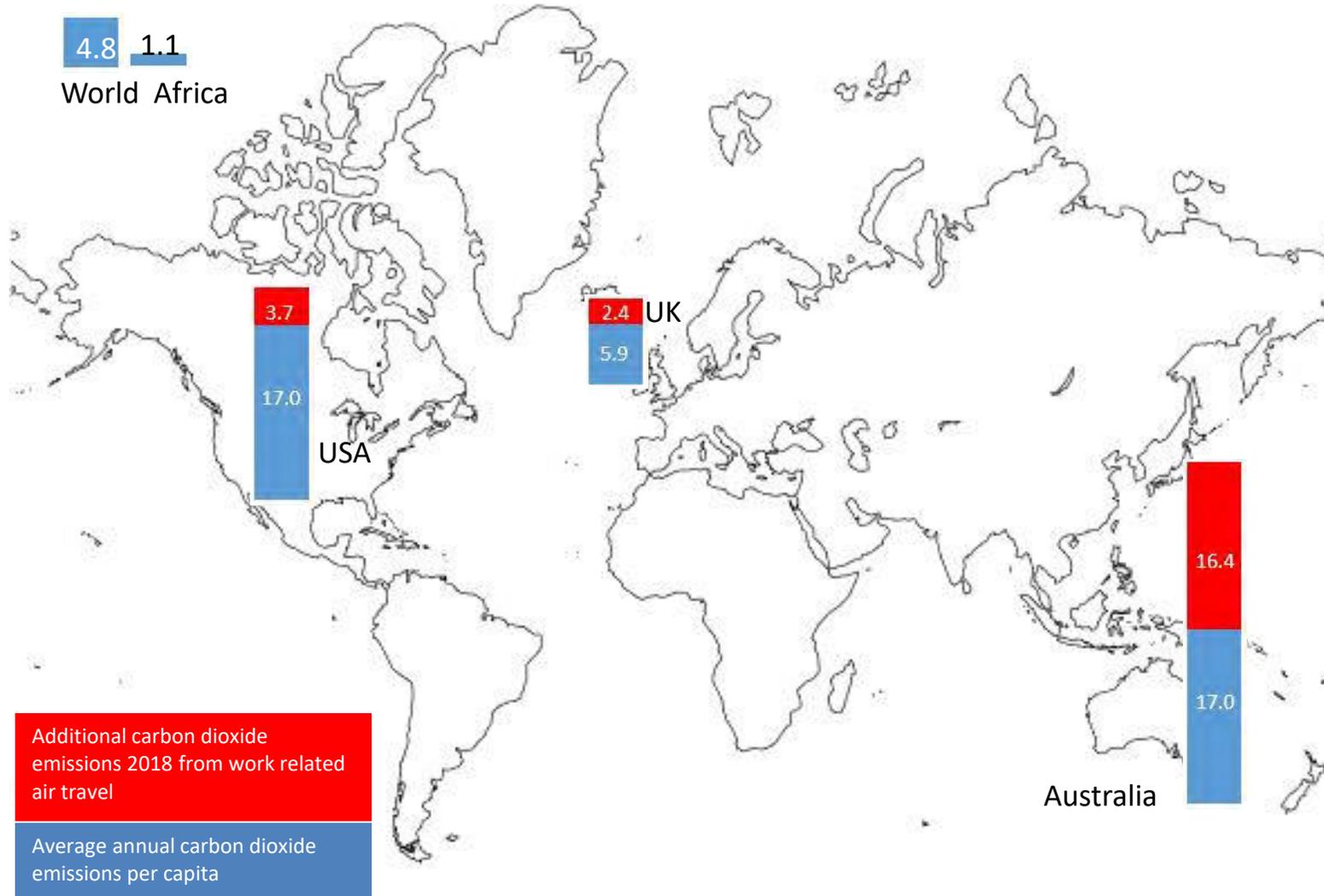
Drugs and supply chains



UK, 2020

(ABN Epilepsy Advisory Group re drug shortages)

Do we contribute to climate change?

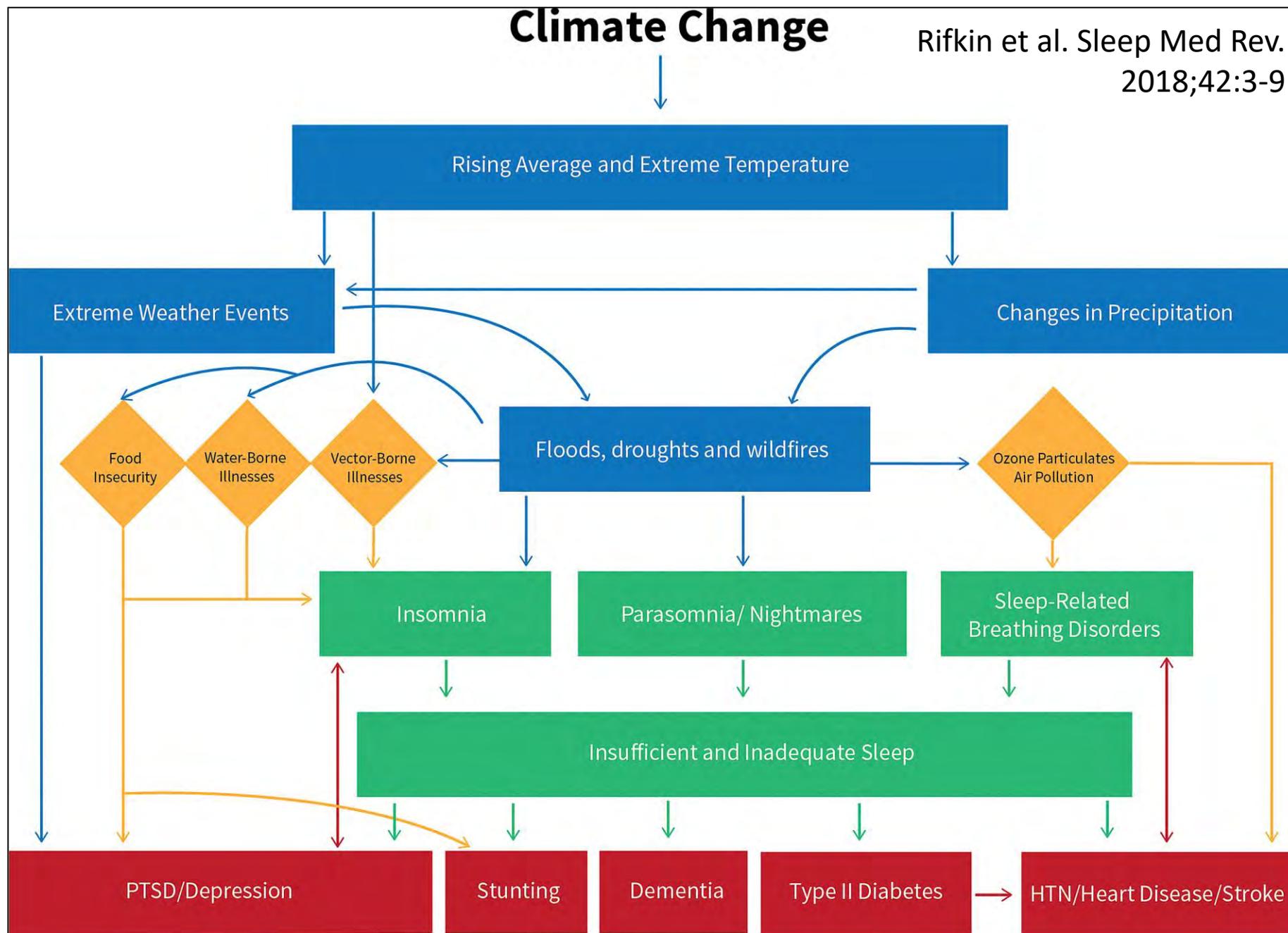


2014 SFN meeting in Washington, DC, we estimate the mean round-trip distance traveled per person at ~7,500 kilometers, which gives the meeting a carbon footprint of 22,000 metric tons, roughly equivalent to the annual carbon footprint of 1000 medium-sized laboratories.

eLife 2016;5:e15928

Driving 10miles/day generates ~1 ton CO₂/year

Complexities in epilepsy



+1°C deviation in night-time temperature was associated with an increase of three nights of self-reported insufficient sleep per 100 people per month

Sci Adv. 2017;3(5):e1601555

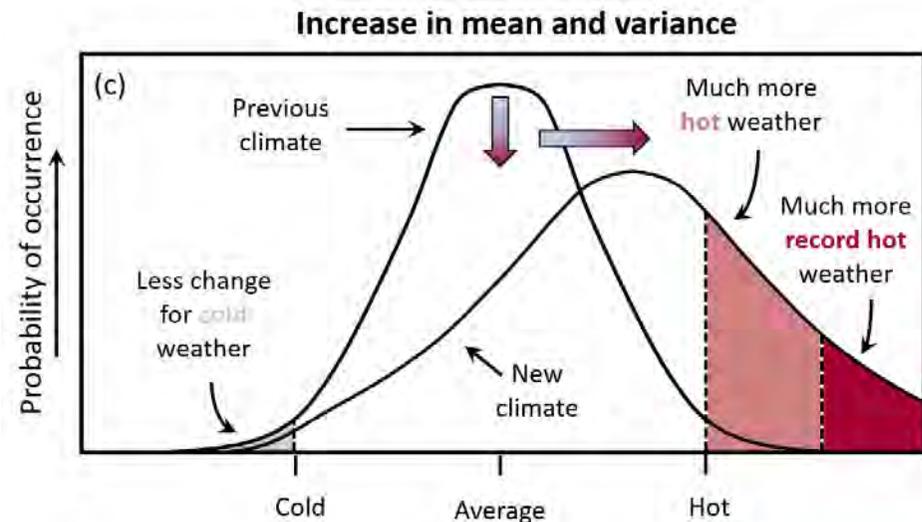
Inequality

Changes will not be the same across the world

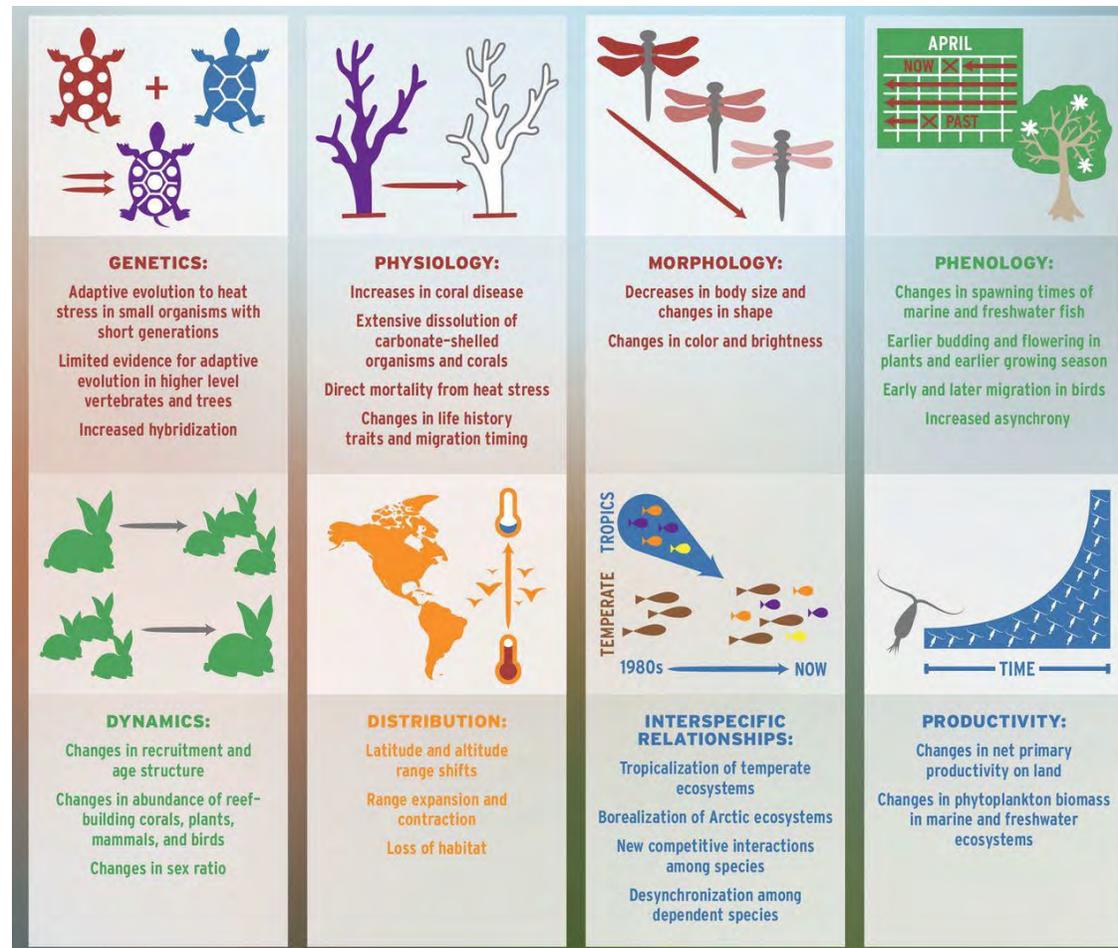
Low and middle income countries will be most affected

Regional variation will occur: those with historically least variation are already showing signals of change

Africa, Central and South America and South East Asia projected to experience more than 30 extra seasonal heatwave days per °C of global warming



Today's reality



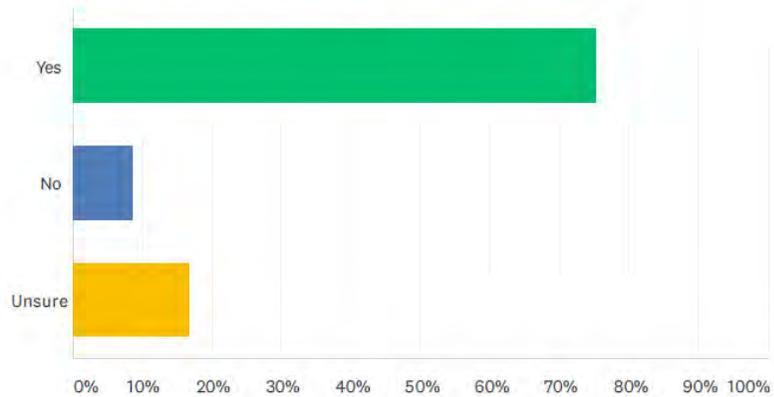
“impacts ... have been observed across genes, species, and ecosystems to reveal a world already undergoing substantial change.”

“Multiplicative impacts from gene to community levels scale up to produce ecological regime shifts, in which one ecosystem state shifts to an alternative state”

What do people with epilepsy think?

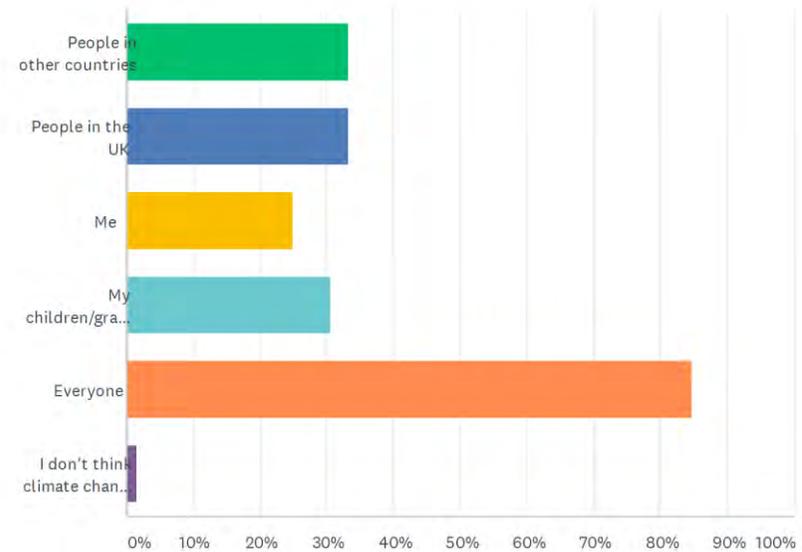
Q5 Would you be interested in seeing more work on the possible effects of climate change on epilepsy and what we could do about it?

Answered: 966 Skipped: 3



Q6 Do you think climate change will have a significant effect on:

Answered: 72 Skipped: 0



Welcome to Epilepsy Climate Change (EpiCC)



What is EpiCC?

We are, as fellow professionals, deeply concerned about the possible effects of climate change on people with epilepsy. We outline our concerns and thoughts in this article published in *Epilepsia Open*.

As the renowned naturalist Sir David Attenborough said recently, 'we face an existential threat to life on earth'.

The Bulletin of the Atomic Scientists' Doomsday Clock places us close to the midnight hour.

[Find out more](#)

In both cases, climate change is cited as a key driver for these catastrophic potential outcomes.

[Find out more](#)

Whether we choose to take action collectively or as individuals, as epilepsy professionals we wish to do what we can through our professional lives to counter these events. The purpose of Epilepsy Climate Change (EpiCC), our new virtual global initiative, is to foster research, share knowledge, disseminate information and promote practices that reduce contributions to climate change and help mitigate its effects for people with epilepsy. EpiCC is a venue for discourse, generation of useful activities and encouraging change from within the epilepsy community.

We invite everyone interested to join EpiCC, by completing and returning the Memorandum of Understanding and googleform.

[Register here](#)

What's next?

Healthcare organisations across the world are already considering, and responding to, many of the issues around climate change and healthcare. We argue for more research in this area, but also for action today. Actions today are likely to generate co-benefits for healthcare, including care in epilepsy, resulting from efforts to decarbonise, mitigate effects of climate change that has already happened, and plan for adaptation to climate change.

EpiCC may seem a small effort in the face of overwhelming odds, but we feel that for every one of us today, including people with epilepsy, and for all those to come tomorrow, this is important. If we all act, we can help make a difference.

& Association of British Neurologists Sustainability Special Interest Group

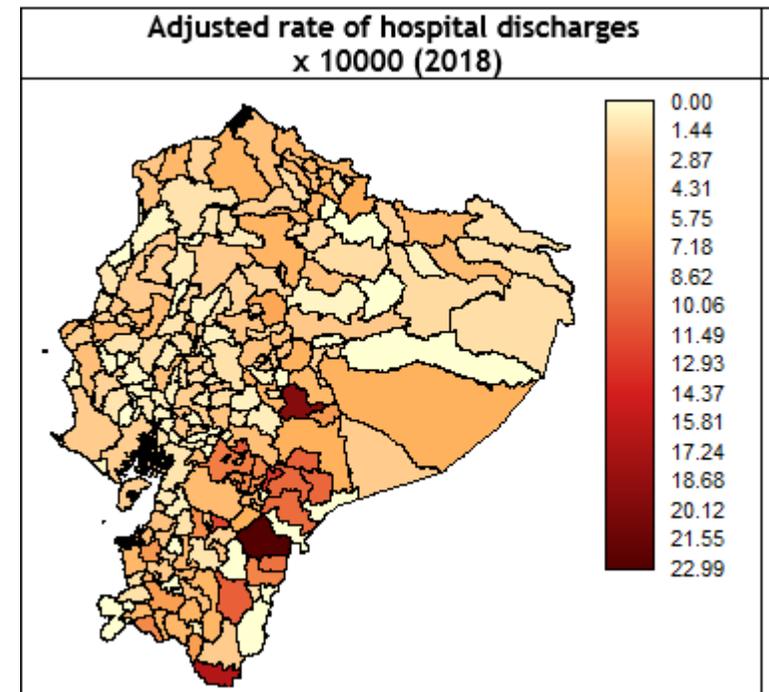
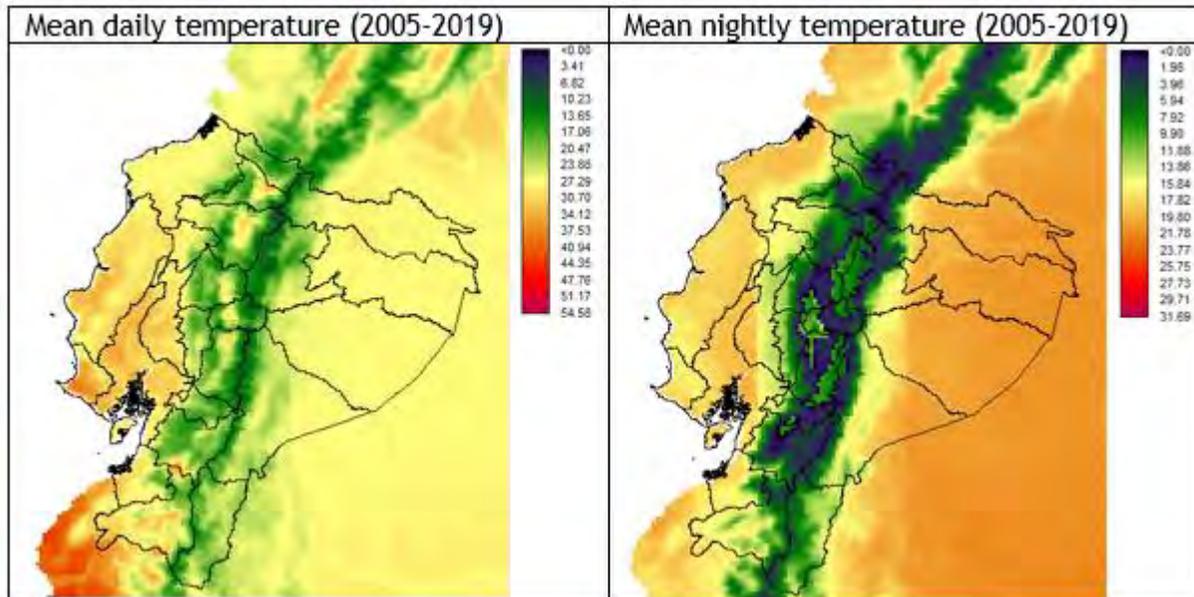
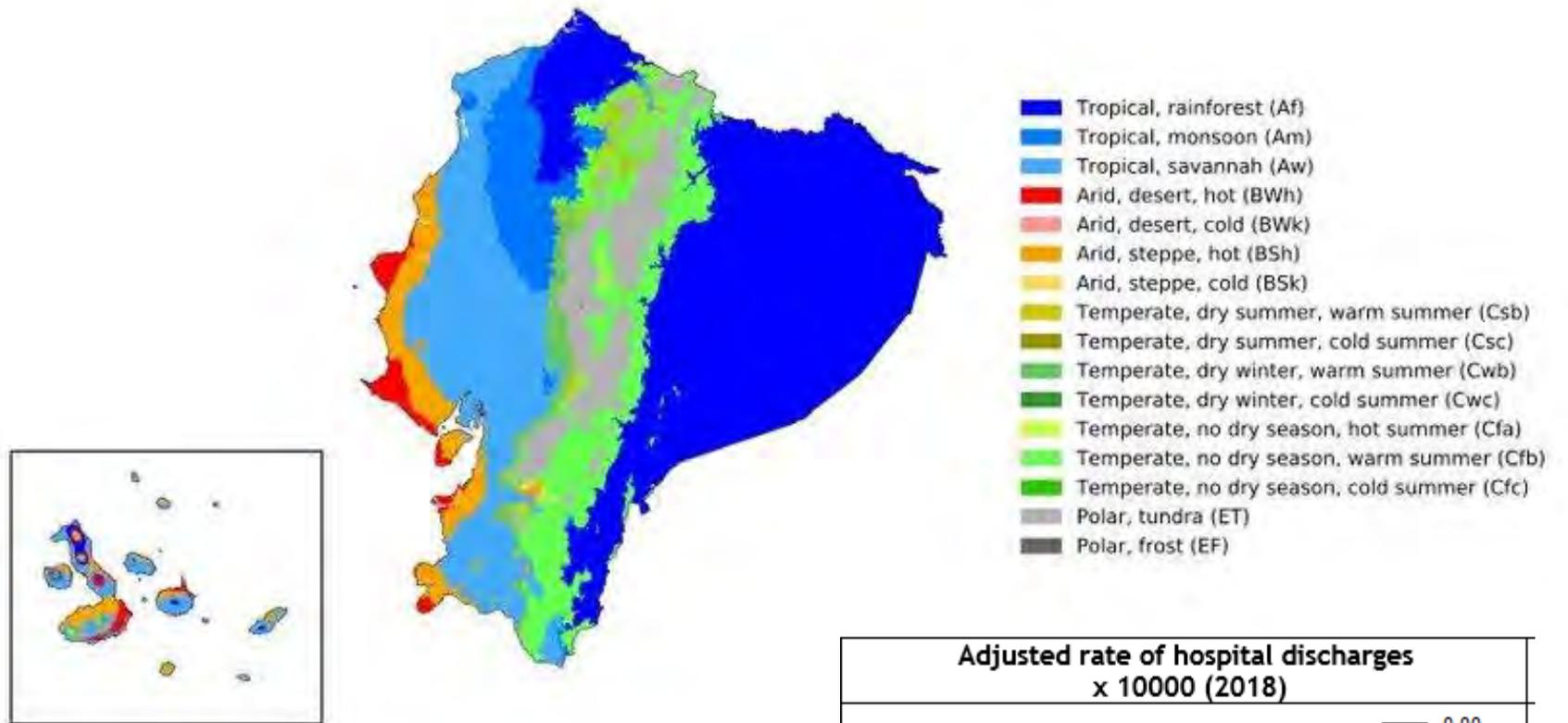
Research Raise awareness Take action: move to sustainability

What can we do?

In EpilepsyClimateChange:

- engagement with organisations
- surveys of opinions of people with epilepsy
- review of existing information
- effects of temperature & humidity on various aspects of epilepsy
- longitudinal data
- models, genetics, laboratory studies

Research

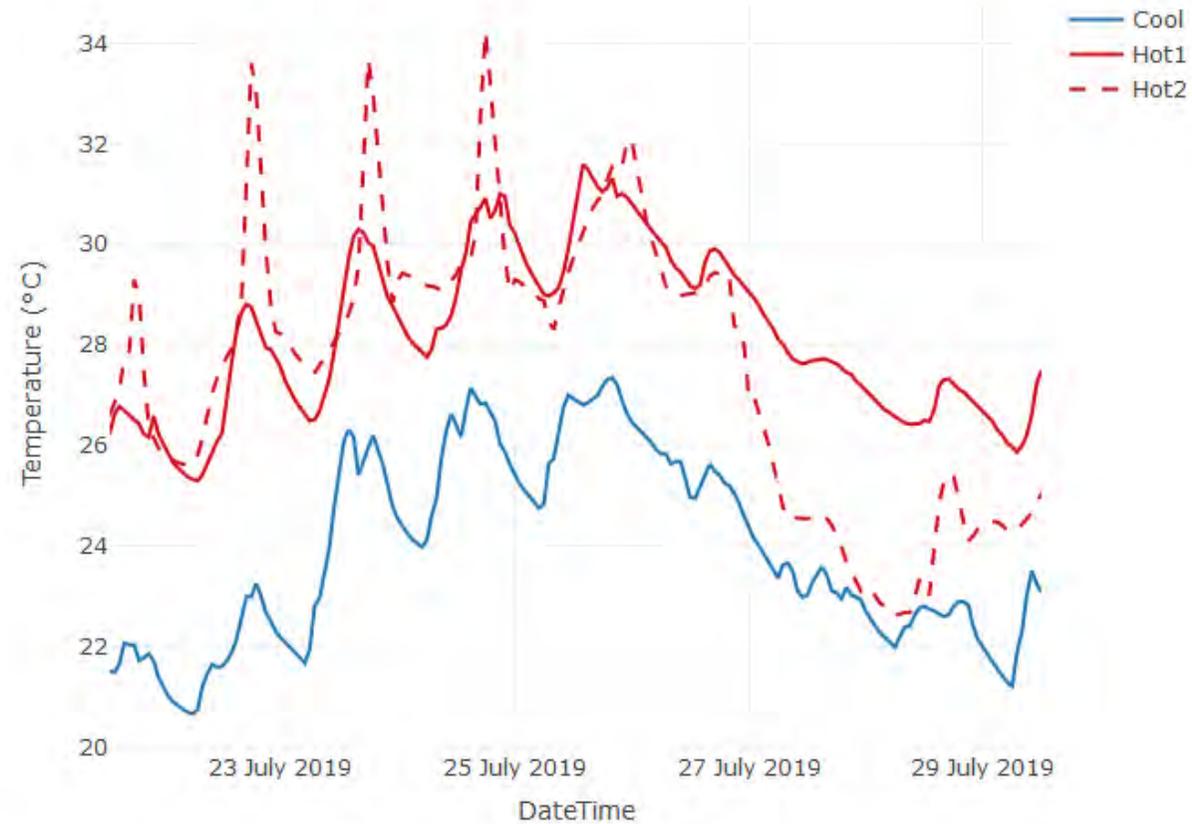


Courtesy of Diego Jimenez-Jimenez, Emmanuelle Quentin, Francisco Perez

Research

2. Hot Period

2.1. Living Room



L1	min	Q1	median	mean	Q3	max
cool	20.662	22.29258	23.50667	23.91639	25.63783	27.34917
hot1	25.303	26.70346	27.93042	28.19818	29.53050	31.59067
hot2	22.621	24.84804	28.08683	27.58900	29.37596	34.24667

Action

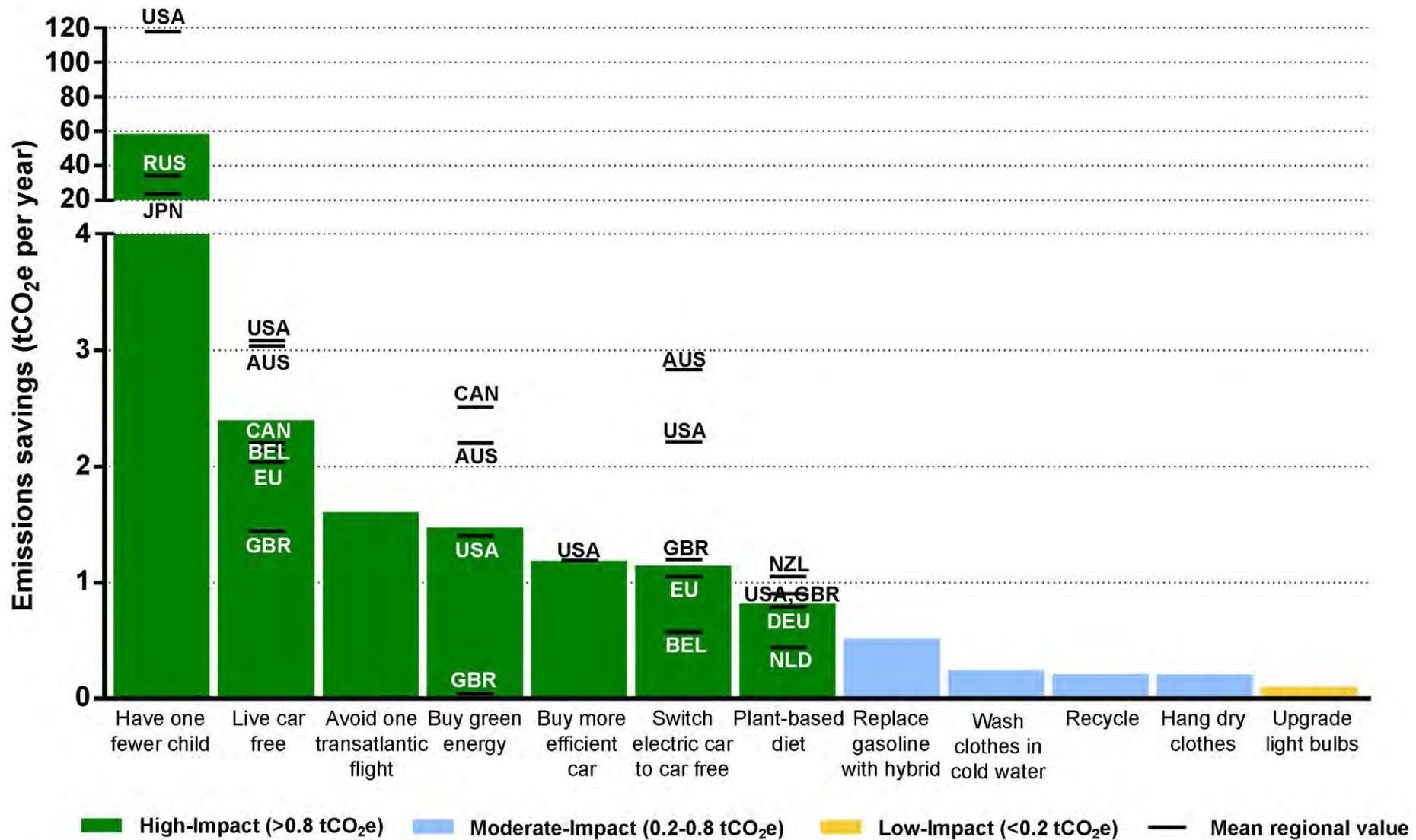
Take action: move to sustainability

- NHS is the UK's (& Europe's) largest public greenhouse gas emitter
- NHS emissions ~21 million tonnes CO₂e/year = whole of Northern Ireland
- Main contributors are:
 - building energy use (22%)
 - pharmaceuticals and their production (20%)
 - travel (18%)
- NHS patient, visitor and staff travel = 5% of all road traffic in England in 2007, with 12 billion km driven.

Laboratories: cost proportionately more than offices, produce more plastic and generate more emissions

Action

Take action: move to sustainability



Action

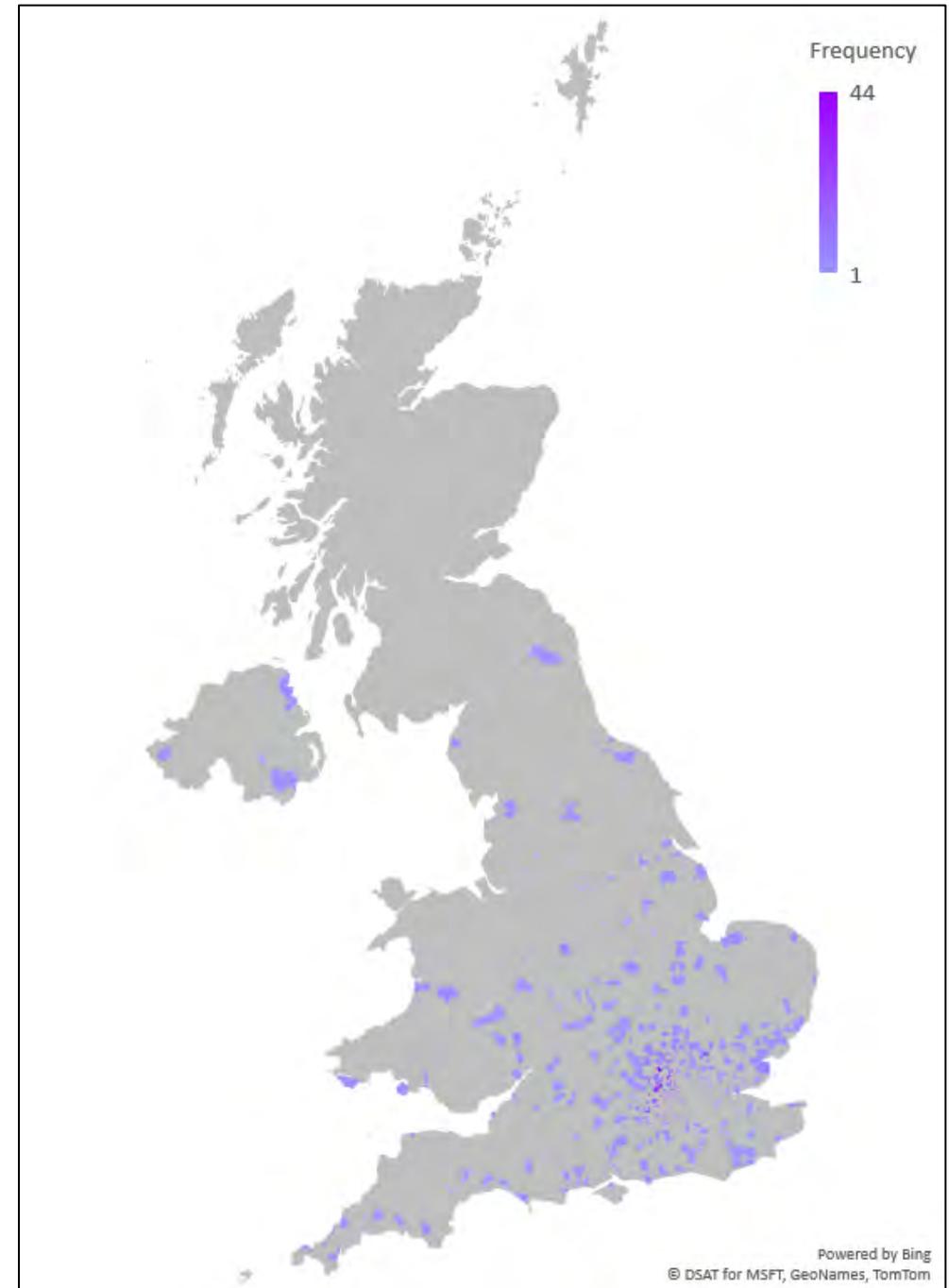
10 outpatient clinics at Chalfont site

6.5 months (16/03/20 – 30/09/20)

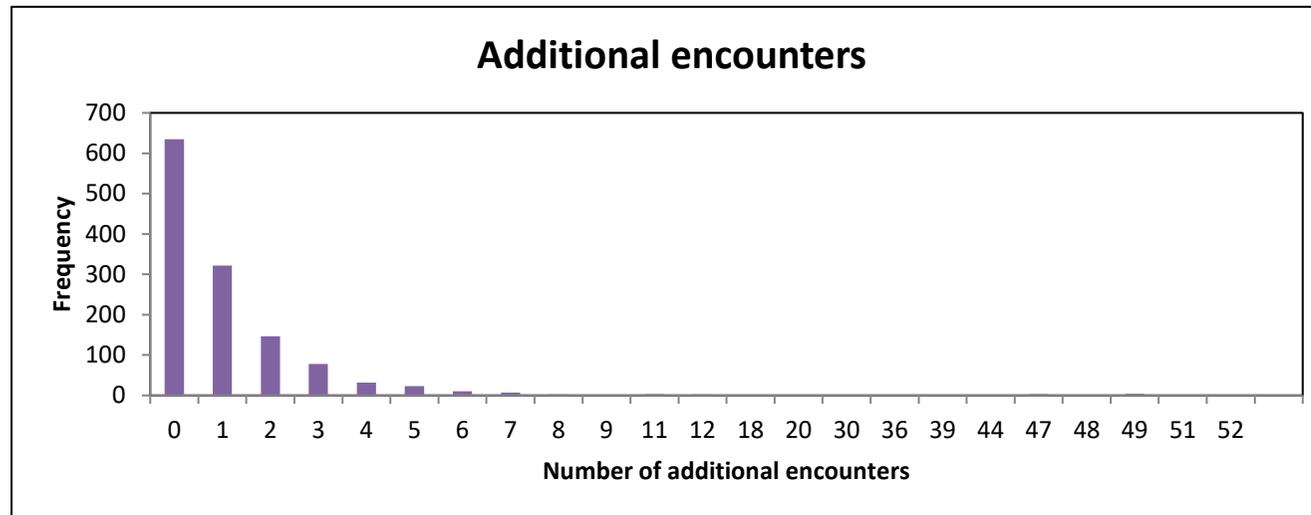
1567 virtual appointments

1277 patients

112 additional attendees



Action



Of course more complicated....

embedded and lifetime costs

health costs....

- unable to judge consequences of treatment changes
- unable to admit as easily
- still being evaluated

psychological benefits for patients (and clinicians)

Action

Take action: move to sustainability

Actions in epilepsy care

- Clinics and Travel – new ways of working; hub+spoke
- Conferences – reducing carbon footprint, changing the model
- Labs + Offices – sustainability, energy saving: <https://www.mygreenlab.org/>
- Goods – cost and carbon
- Lobbying – governments, administrations, healthcare providers
- Information – colleagues, people with epilepsy, carers

- Travel less
- Become as paperless as possible
- Appropriate triaging to increase efficiency and reduce travel
- Support telephone clinics where appropriate
- Regular rationalisation of medication
- Review the effectiveness of regular immunoglobulin use in patients
- Join hospital sustainability group to help raise awareness
- Open meetings to remote attendance
- Support measures which, although small in themselves, raise awareness of the issues:
 - reusing conference badges and bags, having electronic meeting programmes
 - raising freezer temp from -80 to -70; close fume hoods when not in use

CO-BENEFITS

Acknowledgements

**epilepsy
society**



University College London Hospitals **NHS**
NHS Foundation Trust

UCB Pharma

Association of British Neurologists Sustainability Special Interest Group

<https://www.epilepsysociety.org.uk/climatechange>



cf: 'fine old crusted characters who had a decided taste for living without worry'

Thomas Hardy, *The Mayor of Casterbridge*

