



Lyme Disease Forecasting Contest Kick-Off

Josh Tyler

31st March 2025



Outline



Introduction from SPHERE-PPL
Team



Contest, Timeline &
Communication



Getting Started





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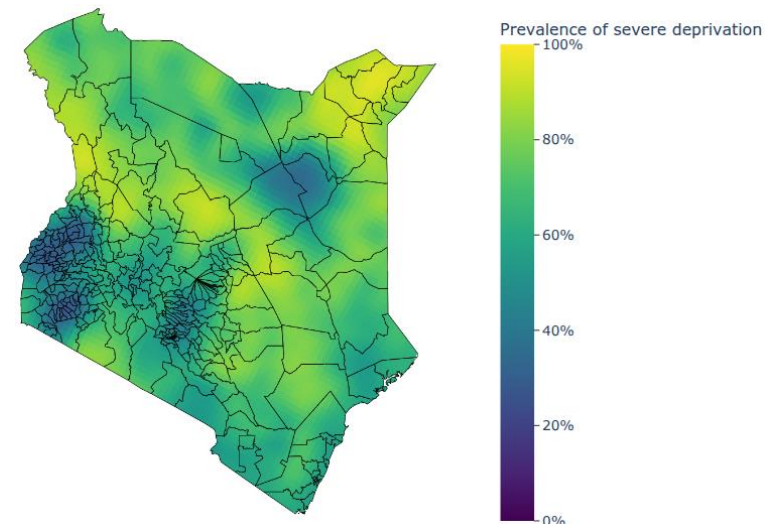
What is SPHERE-PPL doing?

- Contests
- Training
- Networking
- Research



StanCon 2024

Conference on Stan programming and Bayesian Modeling
Oxford University, UK. September 2024



Vector-Borne Diseases

- A vector-borne disease is an illness transmitted to humans or animals by living organisms, **known as vectors**, like mosquitoes, ticks, and fleas, that carry pathogens (bacteria, viruses, or parasites).
- VBDs are prevalent across the globe with **80% of world's population at risk of one or more vectors**.

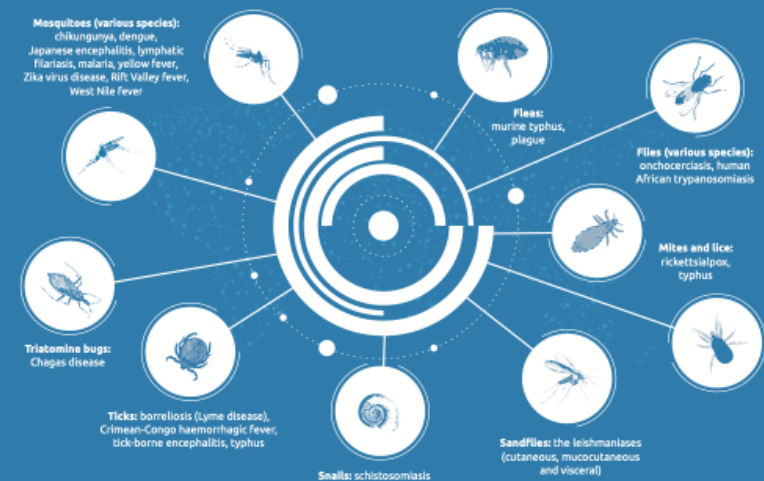
GLOBAL VECTOR CONTROL RESPONSE 2017-2030

A strategic approach to tackle vector-borne diseases

Mosquitoes, flies, bugs and other vectors transmit viruses, parasites and bacteria that infect millions of people globally. They cause many diseases, including malaria, dengue, leishmaniases, Chagas disease and Zika virus disease.

The World Health Organization (WHO) has developed a new strategy to strengthen vector control worldwide. Member States welcomed this integrated approach at the 2017 World Health Assembly and adopted a resolution to support the strategy.

VECTORS CAN CAUSE NUMEROUS DISEASES IN HUMANS



Rapid unplanned urbanization, changing land use patterns and increased international travel and trade bring humans into more frequent contact with vectors, while climate and other environmental changes fuel their spread worldwide.

In recent years, vector-borne diseases have moved into new territory: many diseases once limited to tropical and subtropical zones are now increasingly seen in temperate areas. Vector-borne diseases cause ongoing disease or outbreaks in all WHO regions.

RISK

80% of the world's population is at risk of one or more vector-borne disease

BURDEN

17% of the global burden of communicable diseases is due to vector-borne diseases

MORTALITY

Over 700 000 deaths are caused by vector-borne diseases annually



VBD Hub

- The *One Health Vector-Borne Diseases Hub* is a research hub for data sharing, exploration, and collaboration on vector-borne diseases both in the UK and globally.
- <https://vbdhub.org/>



VBD Hub

Partners

IMPERIAL



UNIVERSITY OF
LIVERPOOL

LONDON
SCHOOL of
HYGIENE
& TROPICAL
MEDICINE



THE
Pirbright
INSTITUTE



UK Centre for
Ecology & Hydrology

UK
RI



Biotechnology and
Biological Sciences
Research Council



Department
for Environment
Food & Rural Affairs

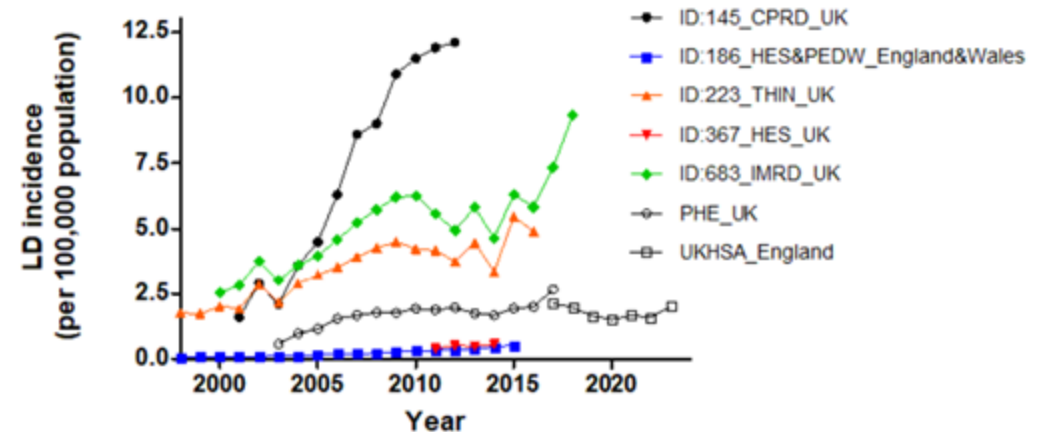


UK Health
Security
Agency



Lyme Disease

- **Lyme Disease** is the most prevalent VBD in the UK, USA & most of Western Europe
- The Bacteria that causes the disease, *Borrelia burgdorferi*, is transmitted to humans through the **bite of the black-legged tick**
- In the UK, it is the **only endemic VBD** and incidence rates have been rising steadily, tracked through routine surveillance



Lyme disease



Lyme disease is a bacterial infection caused by ticks

Contact your GP if you think you've been bitten, or develop symptoms.



Symptoms

- Circular/oval rash around the bite
- Temperature, hot or shivery
- Muscle/joint pain
- Extreme fatigue
- Symptoms can last years

Avoid ticks

- Cover the skin completely
- Insect repellent
- Wear light coloured clothes so ticks are easier to see

Source: NHS

B B C





Contest Outputs

For this contest, we are looking to forecast Lyme Disease Cases at a range of geographical scales for 2023 & 2024 AND a narrative report describing how you got the results!

There are 3 columns to be filled for the forecast:

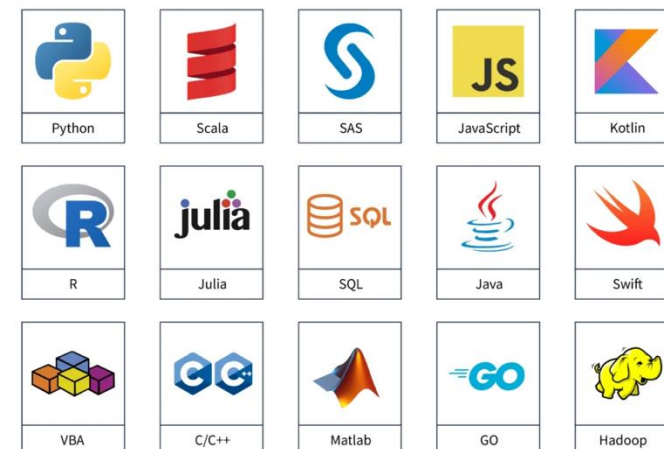
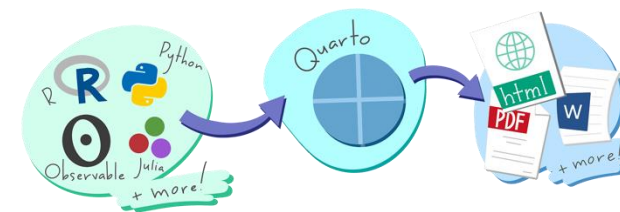
- Incidence (Mean)
- Incidence (Lower 95th Confidence Interval)
- Incidence (Upper 95th Confidence Interval)

Incidence rates should be given as cases per 100,000 population.



Contest Rules

- Any coding languages are allowed but all analyses must be reproducible by the panel.
- All entries must be loaded into a public Github repo.
- All entries must follow the submission formats outlined below.
- All entries must include a max 1000 word report to accompany the forecast analyses. This can be as a separate PDF/html or incorporated into a quarto/jupyter notebook.





Contest Winners

For this contest, there are 2 prize categories:

- **Most Accurate Estimates (as measured by RSME)**
- **Most Novel Report (e.g. storytelling, figures, insights)**

The winners will be selected by the SPHERE-PPL Team and will be invited to present their forecasts at the next Annual Meeting, with travel supported by the project (within funding limits).





Contest Timeline

Monday 31st March

- Contest Kick-Off Meeting & Contest Opens

Throughout April & May

- Drop-in sessions for contest advice & guidance (run by SPHERE-PPL Team)

Friday 30th May

- Contest Closes

Throughout June

- Entries will be aggregated into a single output report and winners will be chosen.





Communication

- We have a SPHERE-PPL Zulip group (akin to Teams or Slack) where we will be available to answer questions and interact with the community.
- Please also use it for communicating within your own teams!
- [Join Here!](#)



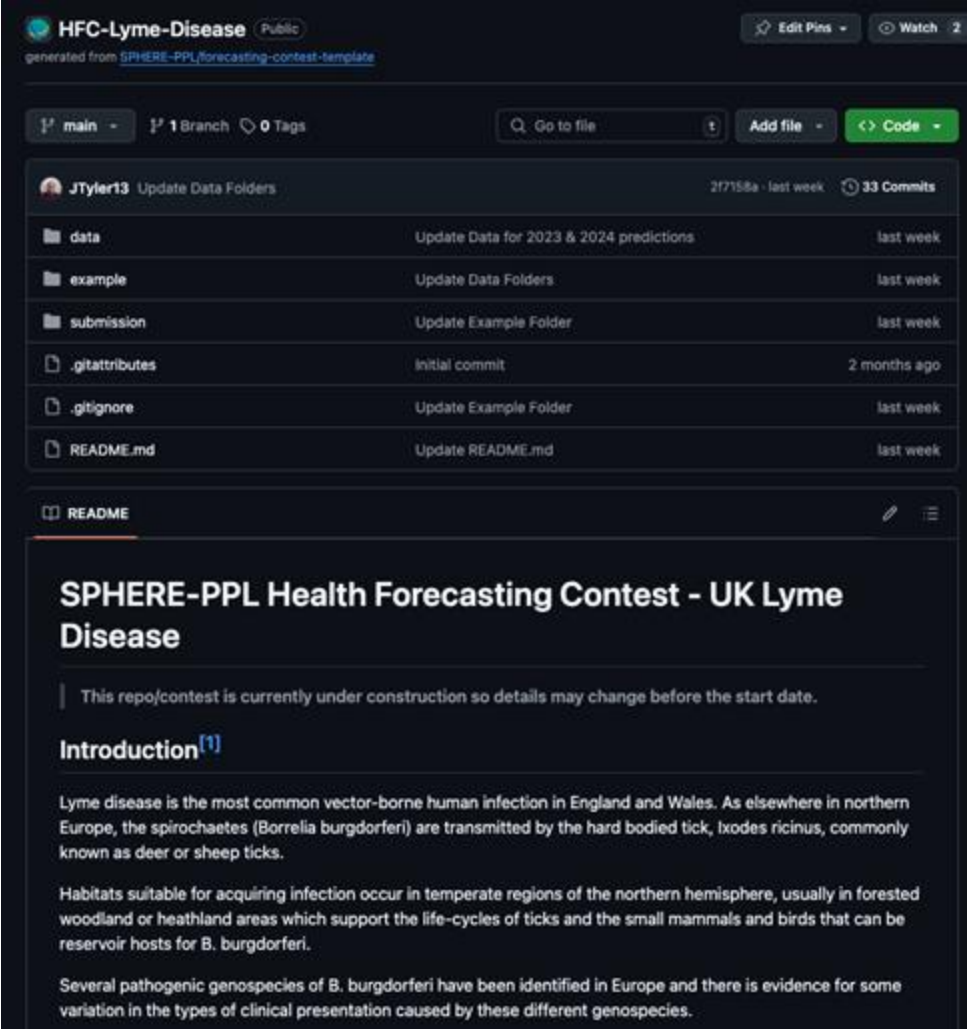


Getting Started

Main Link: [Lyme Disease Forecasting Contest](#)

Resources

- [Overview & Quick-Start Videos](#)
- [Example Contest – Mpox](#)



The screenshot shows the GitHub repository page for 'HFC-Lyme-Disease'. The repository is public and was generated from the 'SPHERE-PPL/forecasting-contest-template'. It has 1 branch (main) and 0 tags. The commit history shows updates to the 'data' folder for 2023 & 2024 predictions, the 'example' folder, the 'submission' folder, and the 'README.md' file. The README file is titled 'SPHERE-PPL Health Forecasting Contest - UK Lyme Disease' and contains an introduction to the contest.

HFC-Lyme-Disease Public
generated from [SPHERE-PPL/forecasting-contest-template](#)

main 1 Branch 0 Tags

Go to file Add file Code

JTyler13 Update Data Folders 2f7158a · last week 33 Commits

File	Commit Message	Time
data	Update Data for 2023 & 2024 predictions	last week
example	Update Data Folders	last week
submission	Update Example Folder	last week
.gitattributes	Initial commit	2 months ago
.gitignore	Update Example Folder	last week
README.md	Update README.md	last week

README

SPHERE-PPL Health Forecasting Contest - UK Lyme Disease

This repo/contest is currently under construction so details may change before the start date.

Introduction^[1]

Lyme disease is the most common vector-borne human infection in England and Wales. As elsewhere in northern Europe, the spirochaetes (*Borrelia burgdorferi*) are transmitted by the hard bodied tick, *Ixodes ricinus*, commonly known as deer or sheep ticks.

Habitats suitable for acquiring infection occur in temperate regions of the northern hemisphere, usually in forested woodland or heathland areas which support the life-cycles of ticks and the small mammals and birds that can be reservoir hosts for *B. burgdorferi*.

Several pathogenic genospecies of *B. burgdorferi* have been identified in Europe and there is evidence for some variation in the types of clinical presentation caused by these different genospecies.





Thanks For Joining!

Get more information at our website: www.sphere-ppl.org

Email us at: info@sphere-ppl.org

