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# Using temporal heat maps as a visualization tool to analyze time trends: a preliminary analysis of disability adjusted life year rates in the European Union

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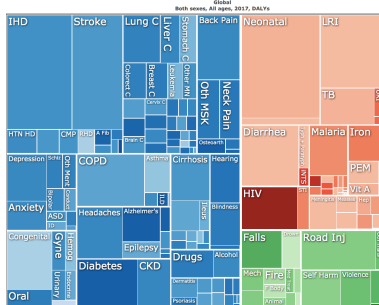
[jvasco.santos@gmail.com](mailto:jvasco.santos@gmail.com)



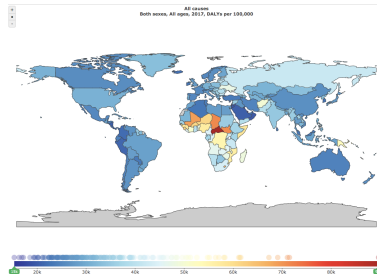
# Background (I)

- Plenty of visualization tools, including within GBD context

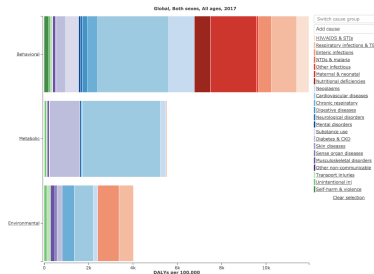
Treemap



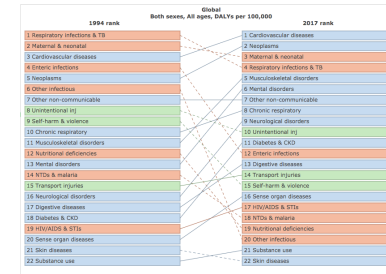
Map



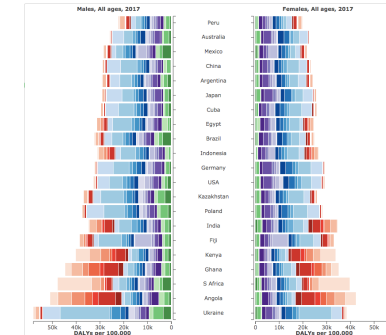
Bar chart (cumulative)



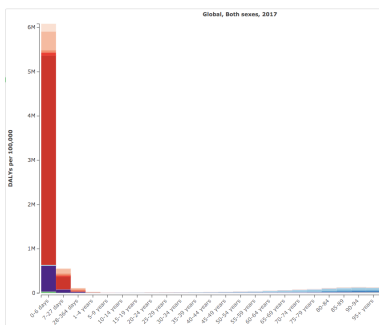
Arrow diagram



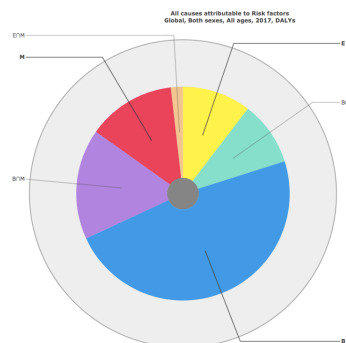
Pyramid



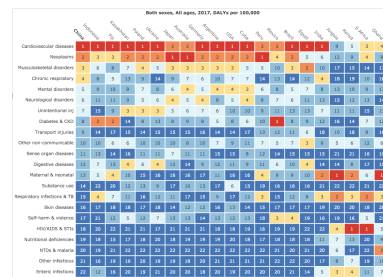
Histogram (patterns)



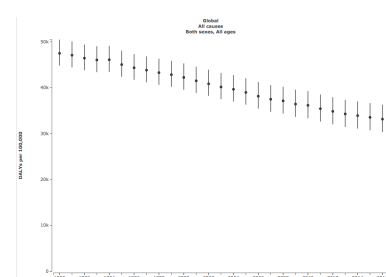
Pie chart



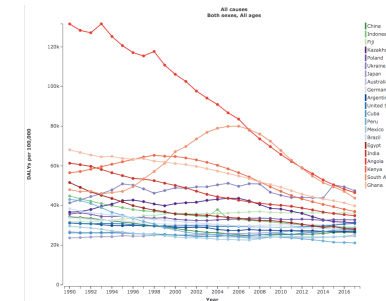
Heat map



Error bar chart



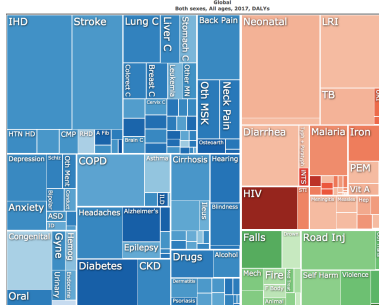
Line chart



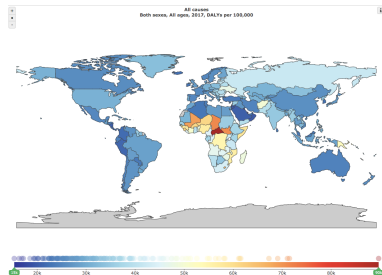
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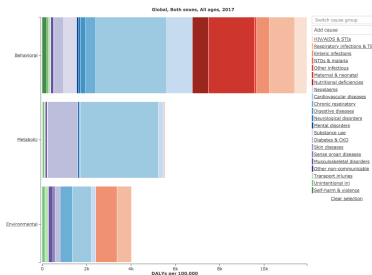
Treemap



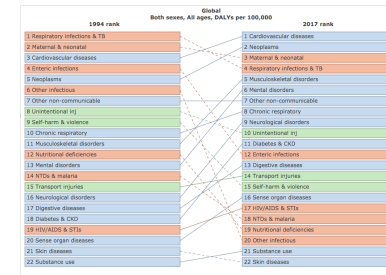
Map



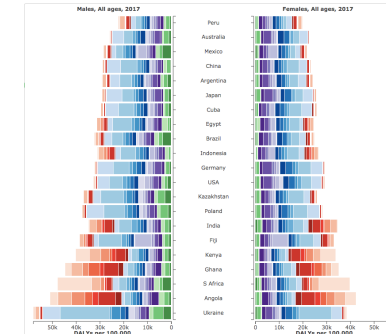
Bar chart (cumulative)



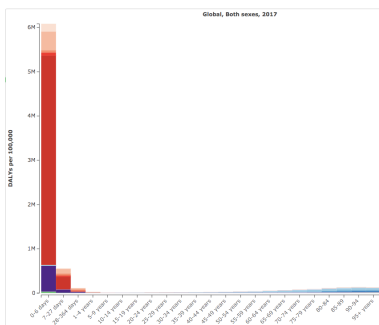
Arrow diagram



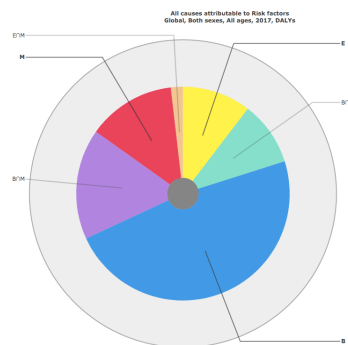
Pyramid



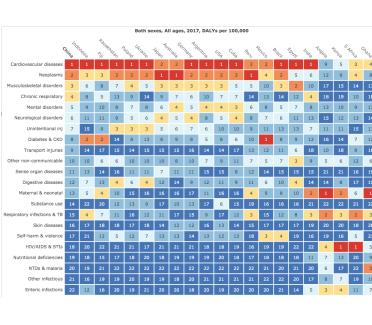
Histogram (patterns)



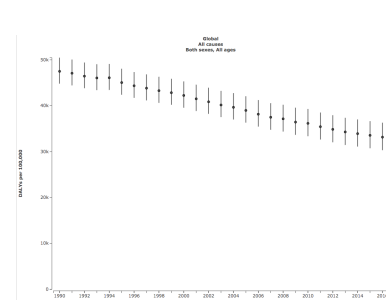
Pie chart



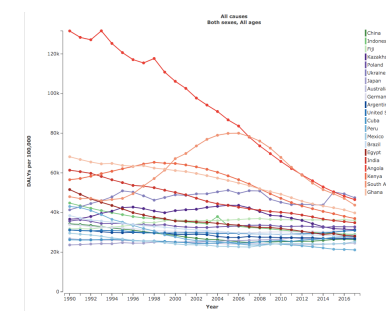
Heat map



Error bar chart

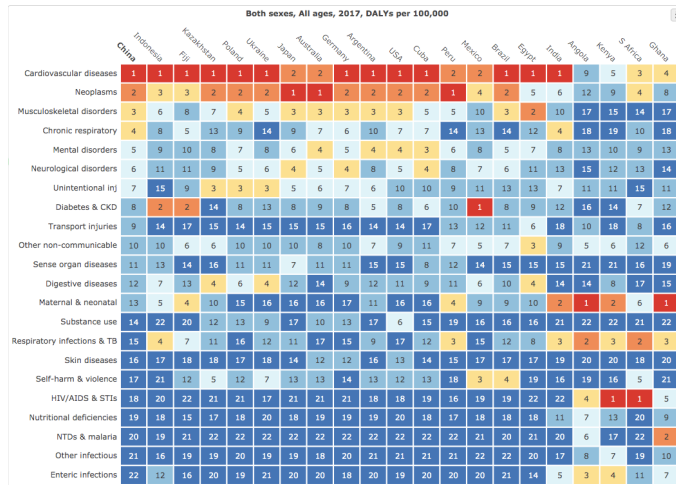


Line chart



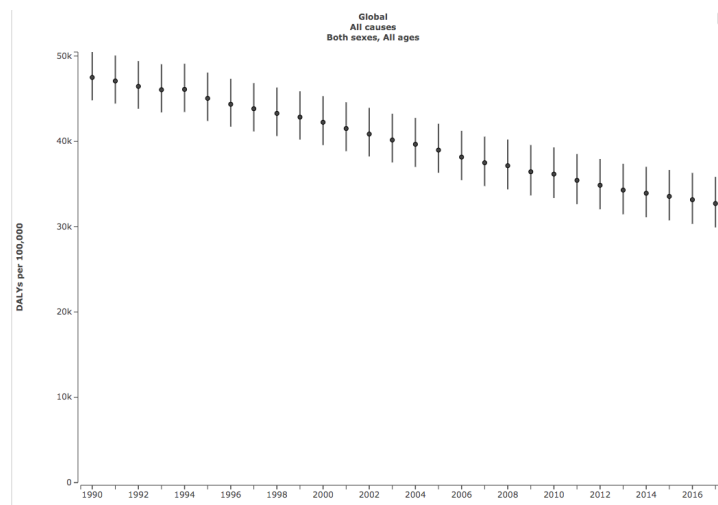
# Background (II)

## Heat map

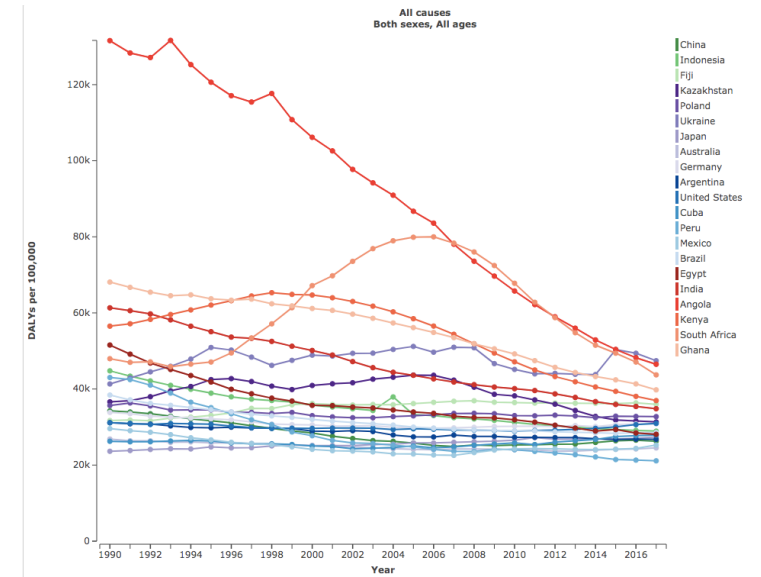


## Temporal

## Error bar chart



## Line chart



- How can a temporal heatmap help us analyzing time trends?



## Methods (I)

Data – age-standardized DALY rates (level 3) in EU-28 (and countries) between 1990-2017

### 1. Temporal heatmaps with all causes

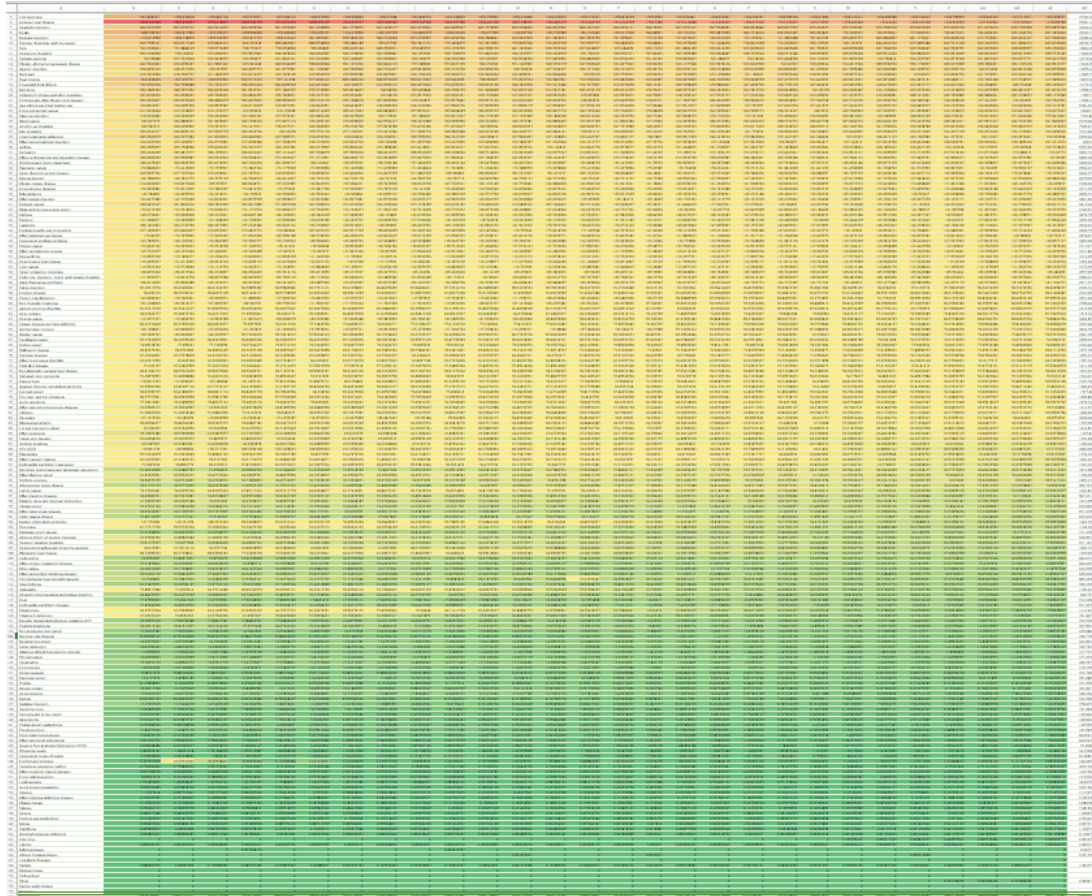
- Microsoft Excel approach
- EHRtemporalVariability (R package)

### 2. Temporal heatmaps by cause

- EHRtemporalVariability (R package)

# Results (I) - with all causes

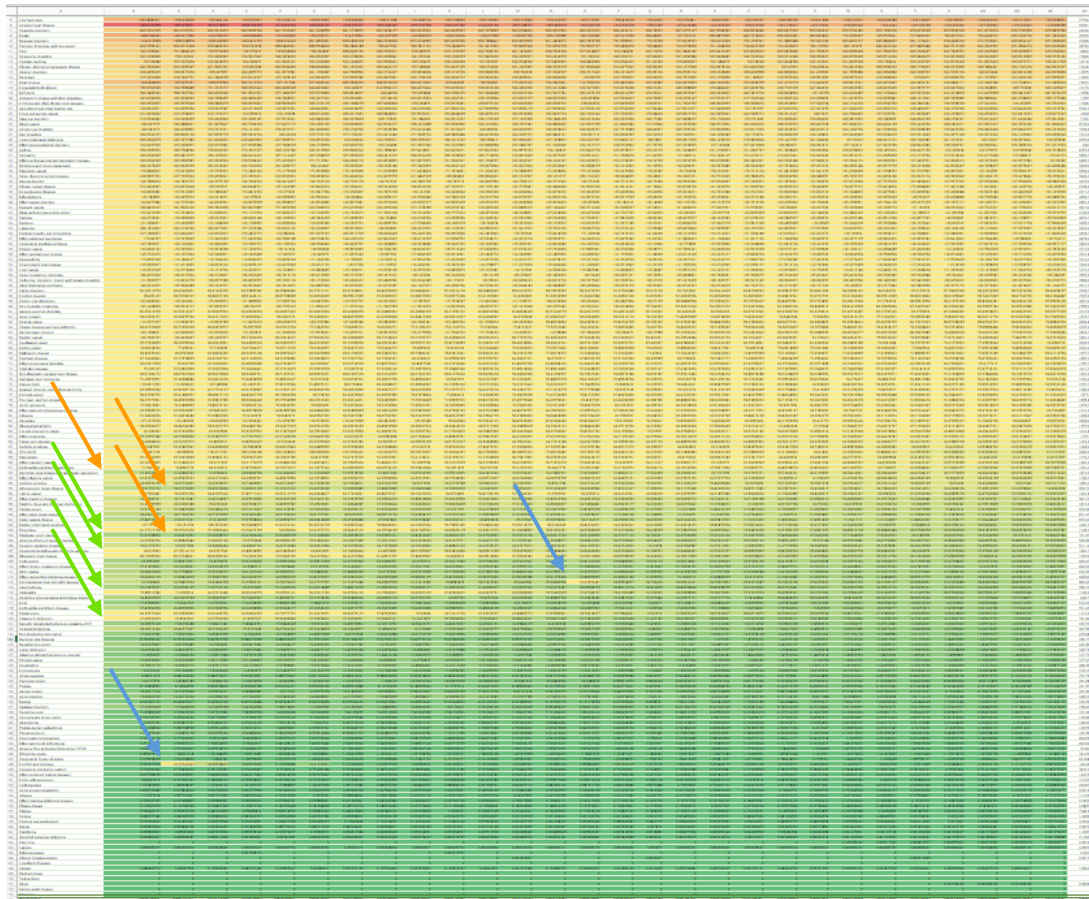
Microsoft Excel



EU-28 age-standardized DALY rates between 1990-2017, by (level 3) cause

## Results (II) - with all causes

Microsoft Excel



### — Interruptions / abrupt changes

2003 – Environmental heat and cold exposure  
1991 – Conflict and terrorism

### — Decreasing trends

Sudden infant death syndrome  
Tuberculosis  
Meningitis  
Vitamin A deficiency

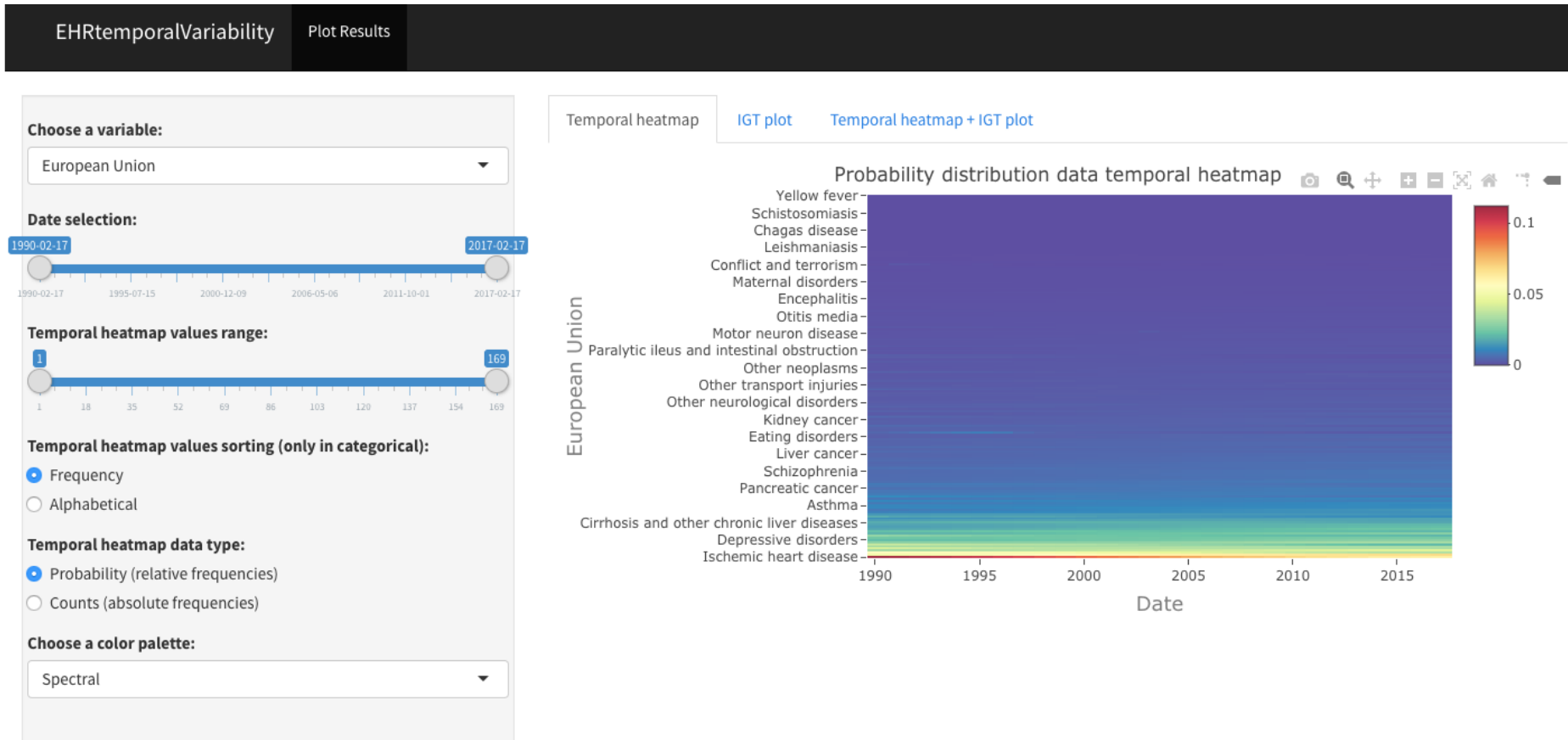
### — Increasing trends

Peripheral arterial disease  
Inflammatory bowel disease  
Interstitial lung disease and pulmonary sarcoidosis

EU-28 age-standardized DALY rates between 1990-2017, by (level 3) cause

# Results (III) - with all causes

EHRtemporalVariability (R package)

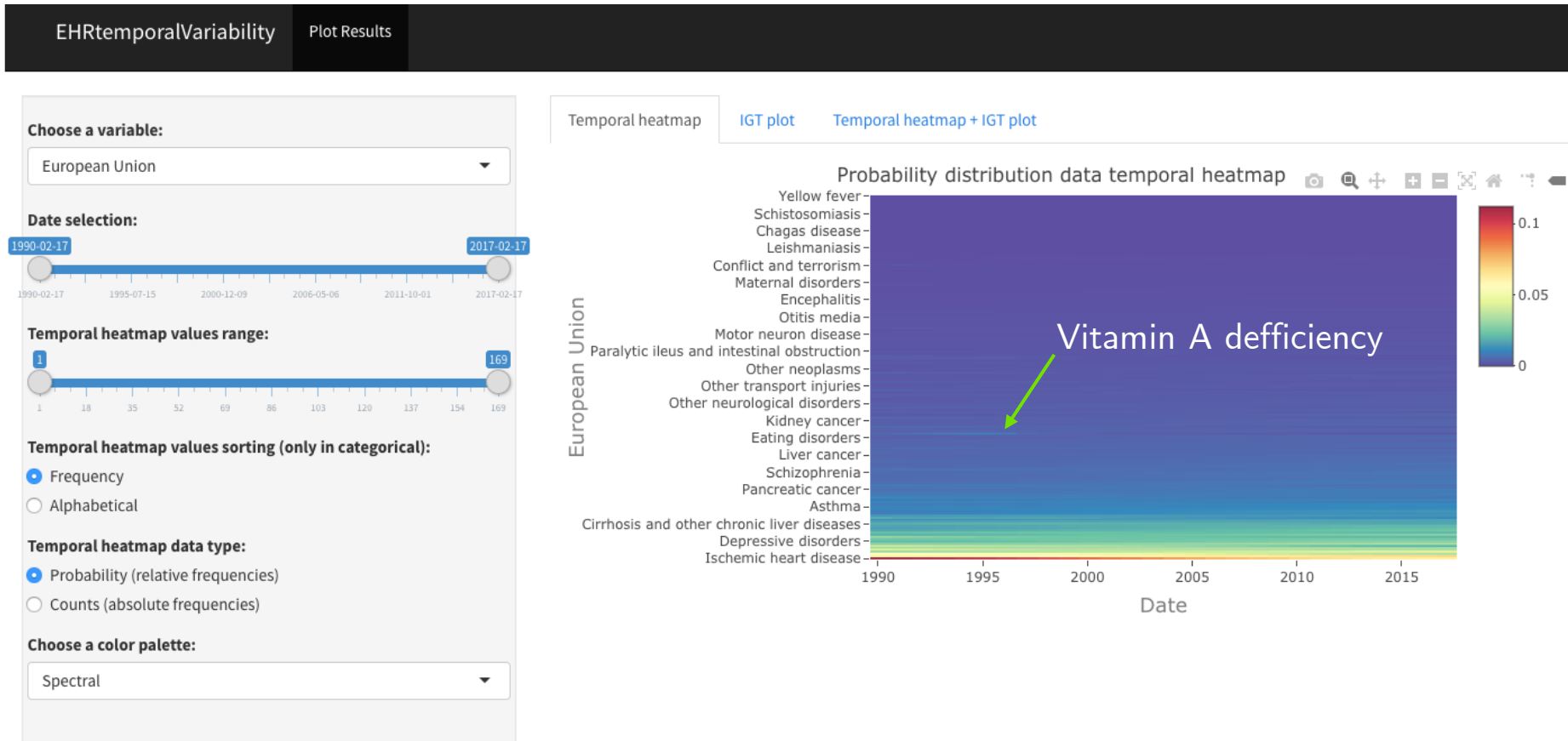


EU-28 age-standardized DALY rates between 1990-2017, by (level 3) cause



# Results (IV) - with all causes

EHRtemporalVariability (R package)

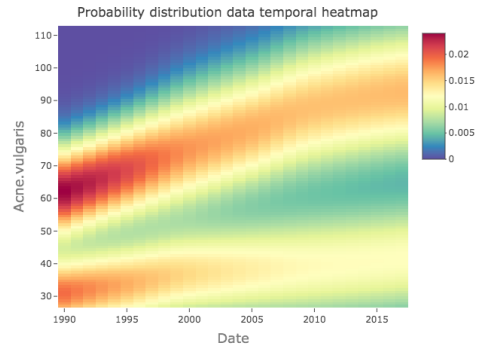


EU-28 age-standardized DALY rates between 1990-2017, by (level 3) cause

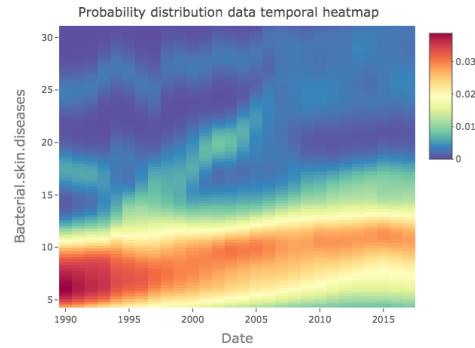
# Results (V) - by causes

EHRtemporalVariability (R package)

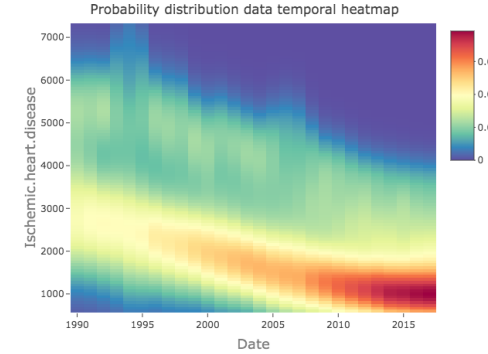
### Acne vulgaris



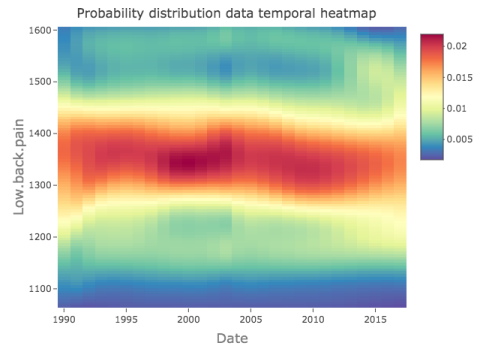
### Bacterial skin disease



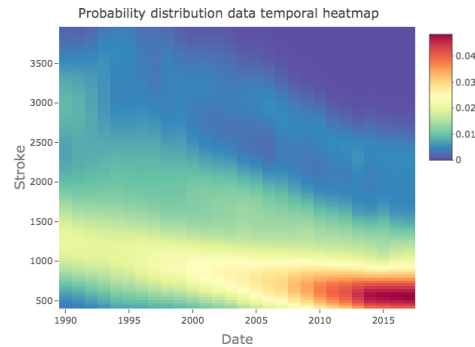
### Ischemic heart disease



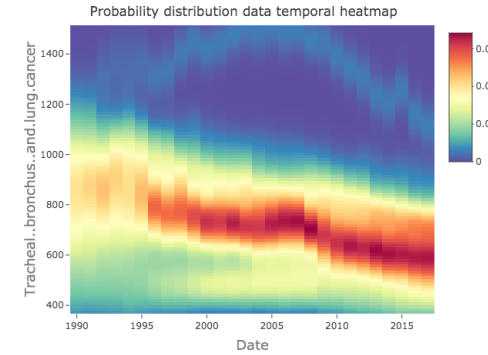
### Low back pain



### Stroke



### Tracheal, bronchus and lung cancer



EU-28 age-standardized DALY rates between 1990-2017 – each heatmap, one (level 3) cause



## Methods (II)

To account for uncertainty (95% UI)

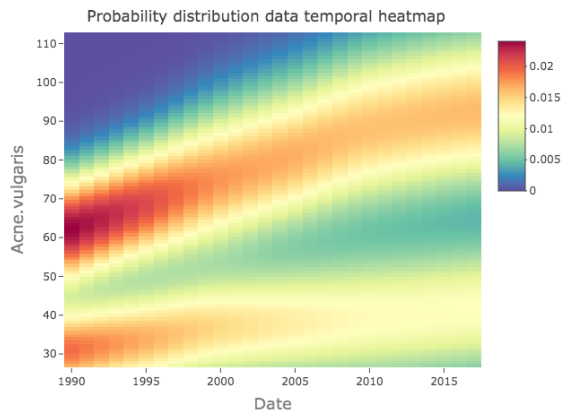
### 3. Temporal heatmap by cause (using uncertainty)

- EHRtemporalVariability (R package)
- Triangular distribution (95%UI lower limit, mean estimate, 95% UI upper limit -> min, mode, max)
- 100 draws for each country-year - CircStats (R Package)

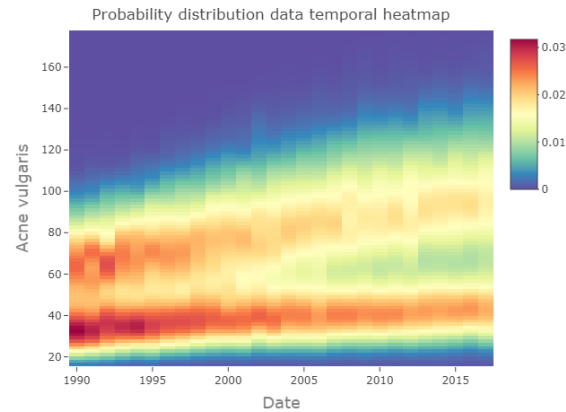
# Results (VI) - by causes

EHRtemporalVariability (R package)

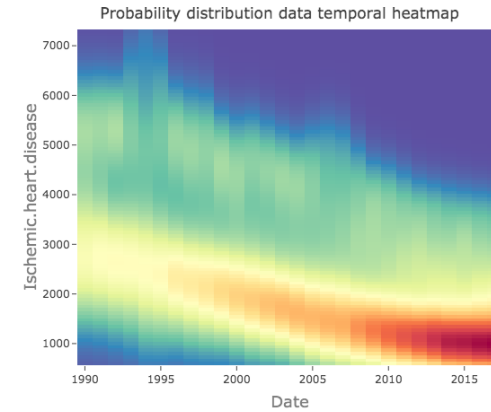
### Acne vulgaris



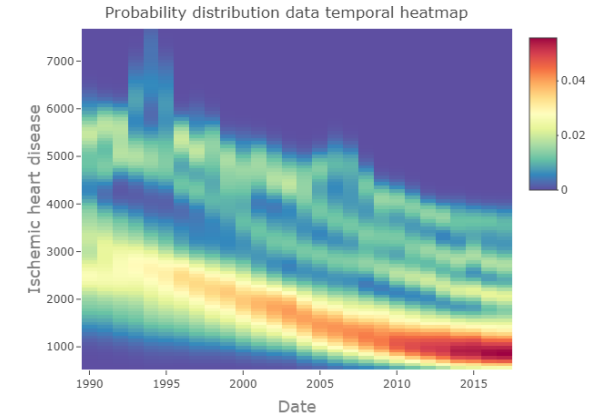
### Acne vulgaris (using uncertainty)



### Ischemic heart disease - IHD



### IHD (using uncertainty)



EU-28 age-standardized DALY rates between 1990-2017 – each heatmap, one (level 3) cause



## Conclusion (I)

- Temporal heat maps seems an interesting method for rapid data assessments in an epidemiological context
- They allow sub-analyses by all the variables that might be considered (e.g. age groups, sex and country)
- Heat maps are particularly useful in detecting temporal patterns in big datasets



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