

# Identifying Signature Features from All-Cause Mortality in Digitized Danish Church-Registries

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Nr.	Katholik.	Evangelik.	Bir. dato og fødig. Sted	Matri. nummer og dato	Bor. pris pr. matri. nummer dato	Bemærkning	
						Antal	Beskrivelse
25	Jørgen		Lev. Børnehus	Jørgen i Jægers	DKR 10,-		
26	M. Engel		Jørgen Særløkken	Jørgen i Blåkær	DKR 10,-		
27	M. Engel		2. mrt.	Jørgen i Blåkær	DKR 10,-		
28				Jørgen i Blåkær	DKR 10,-		
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100				Jørgen i Blåkær	DKR 10,-		

- ▶ Danish church parish registries from about 1815 to 1915

# Re-introducing the data

No.	Dato	Beskrivelse
286	1815-09-21	de Brøndum
287	21. Sept. 1815	W. W. Carsten
288	21. Sept. 1815	Jens Jorgenson
289	21. Sept. 1815	Th. B. Christensen
290	21. Sept. 1815	Jens Jorgenson
291	21. Sept. 1815	Hans Hansen
292	21. Sept. 1815	Niels Andersen
293	21. Sept. 1815	Andreas Christensen
294	21. Sept. 1815	Andreas Christensen
295	21. Sept. 1815	Andreas Christensen
296	21. Sept. 1815	Andreas Christensen
297	21. Sept. 1815	Andreas Christensen
298	21. Sept. 1815	Andreas Christensen
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348	21. Sept. 1815	Andreas Christensen
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350	21. Sept. 1815	Andreas Christensen
351	21. Sept. 1815	Andreas Christensen
352	21. Sept. 1815	Andreas Christensen
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359	21. Sept. 1815	Andreas Christensen
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361	21. Sept. 1815	Andreas Christensen
362	21. Sept. 1815	Andreas Christensen
363	21. Sept. 1815	Andreas Christensen
364	21. Sept. 1815	Andreas Christensen
365	21. Sept. 1815	Andreas Christensen

- ▶ Danish church parish registries from about 1815 to 1915
- ▶ Digitized by Ancestry.com for the Danish National Archives

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- ▶ Danish church parish registries from about 1815 to 1915
- ▶ Digitized by Ancestry.com for the Danish National Archives
- ▶ Individual entries of burials, with date, parish, age and occasionally family information

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◆ImageFileName	48792_62821000438_2928-006666
ImageFolder	48792_62821000438_2928
unique_identifier	617180559
SequenceNumber	1020
SourceDescription	Kontraministerialbog. Vig Sogn, 1814 - 2003
SourceReferenceNumber	8025948801
SourceYearRange	1830-1848
BrowseLevel	Holbæk Amt
BrowseLevel1	Vig Sogn
BrowseLevel2	Rasmus Pedersen
GivenName	Mandlige
Surname	11.0
Gender	11.0
DeathDay	1837.0
DeathMonth	3.0
DeathYear	11.0
BurialDay	11.0
BurialMonth	1837.0
BurialYear	0
BurialAge	Holbæk Amt
BurialState	Danmark
BurialCountry	Vig Sogn
VitalDay	Peder
VitalMonth	Jensen
VitalYear	Danmark
VitalAge	FullDate
VitalParish	1837-11-03 00:00:00
VitalState	
FatherGivenName	
FatherSurname	
VitalCountry	
FullDate	

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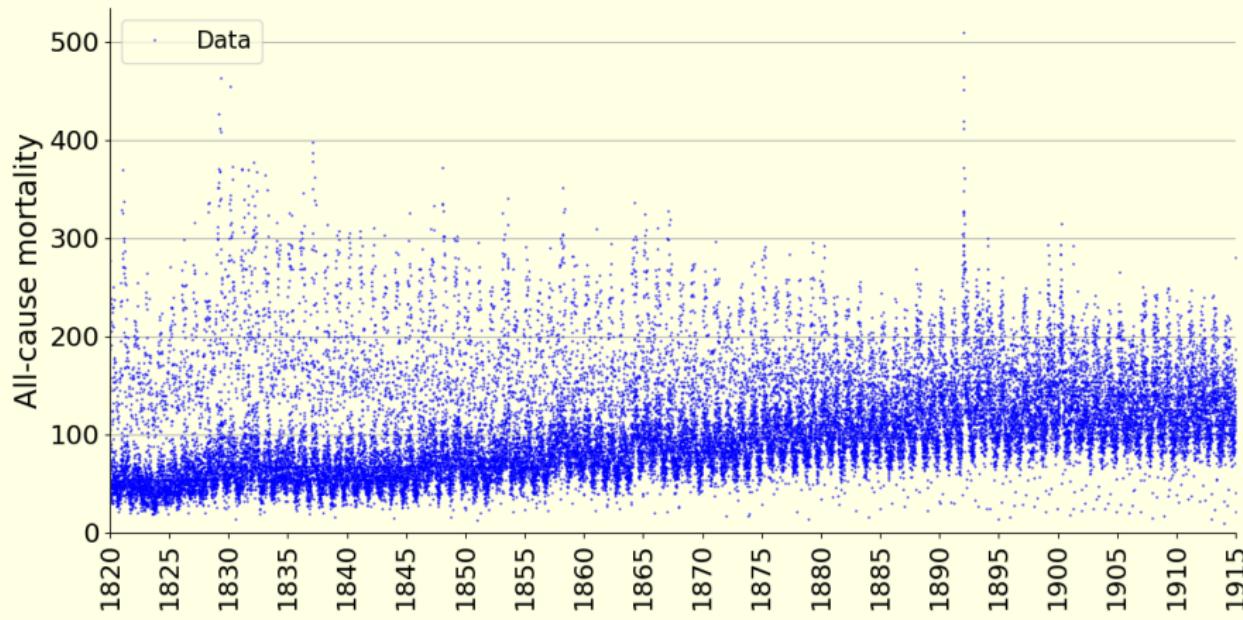
Specifics

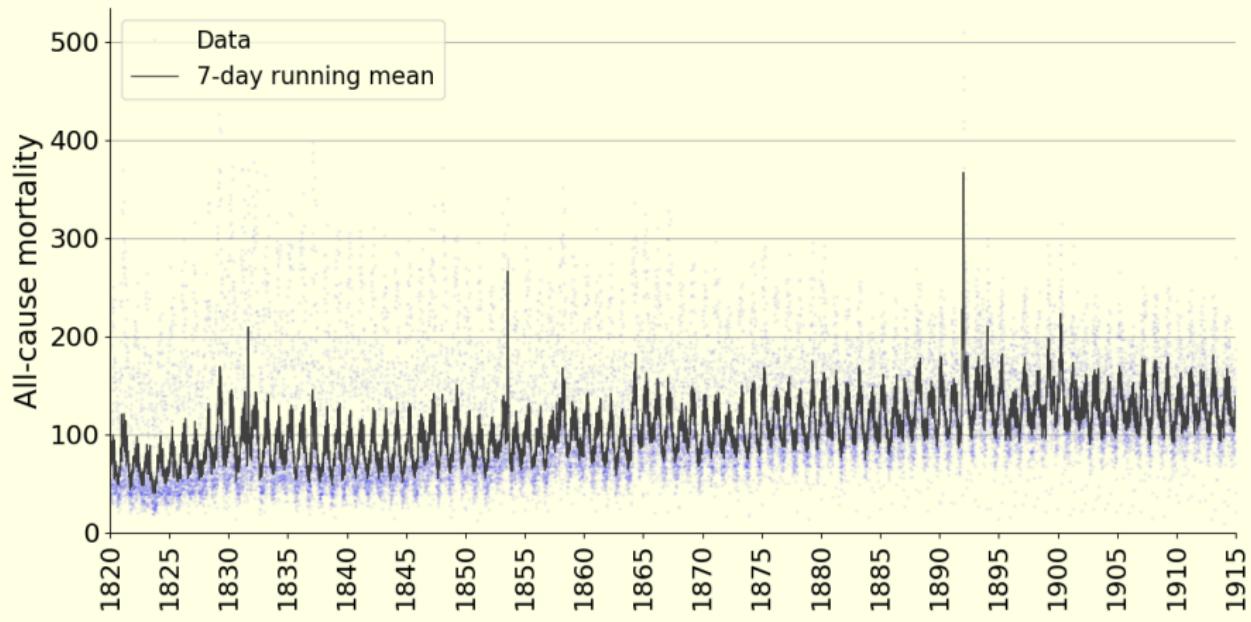
Summary

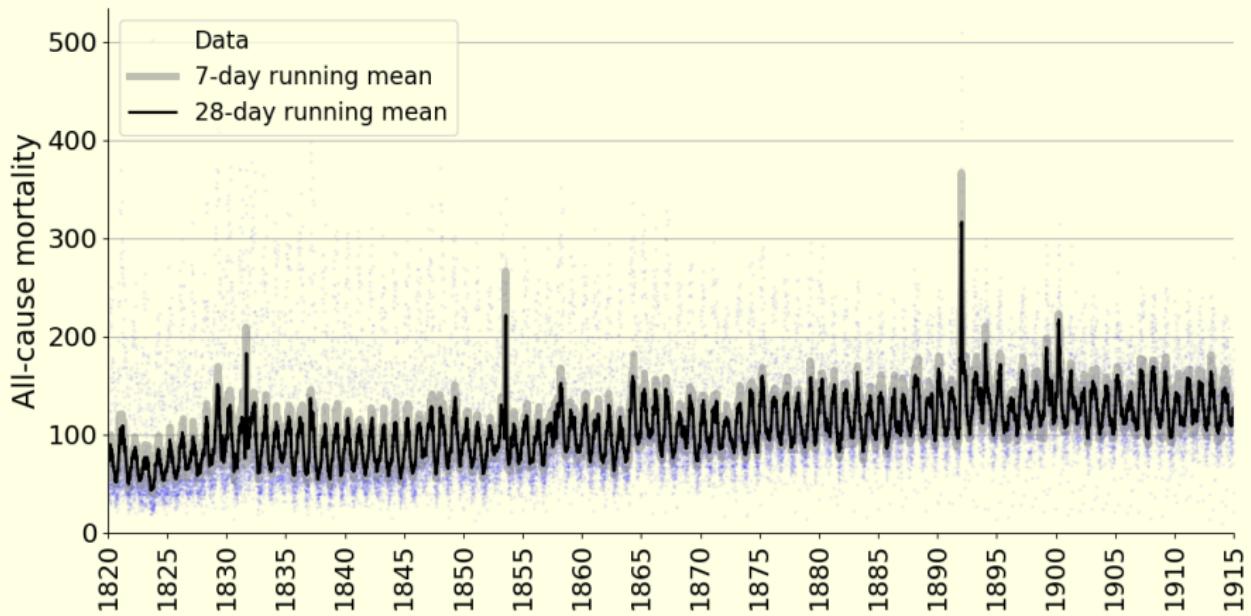
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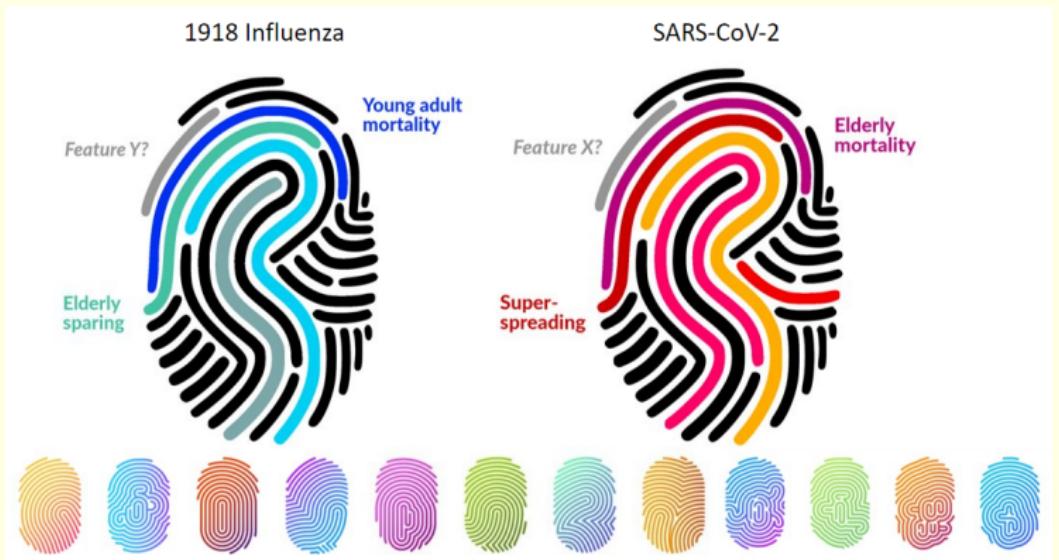
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If we have some collection of numerical values,  $\theta$ ,

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If we have some collection of numerical values,  $\theta$ , and some mathematical function

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If we have some collection of numerical values,  $\theta$ , and some mathematical function or mathematical model,

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If we have some collection of numerical values,  $\theta$ , and some mathematical function or mathematical model, we can recreate what has occurred in data.

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If we have some collection of numerical values,  $\theta$ , and some mathematical function or mathematical model, we can recreate what has occurred in data.

(Assuming the numerical values are sufficiently accurate, that they describe the correct thing, that the model is correct, etc... )

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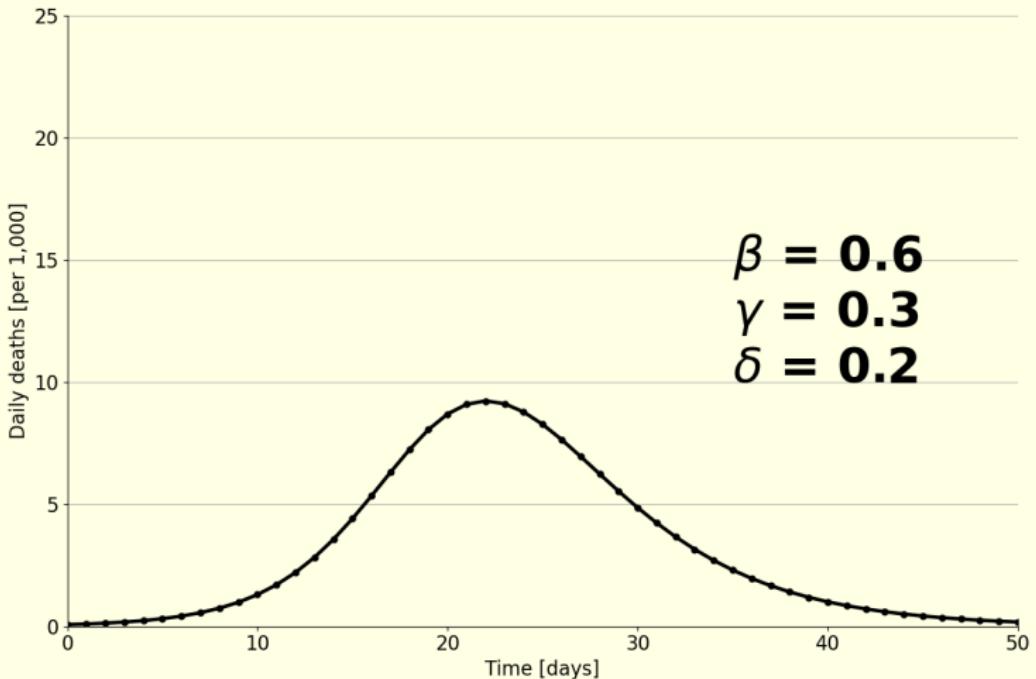
Future

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# My view on signature features

If we have some collection of numerical values,  $\theta$ , and some mathematical function or mathematical model, we can recreate what has occurred in data.

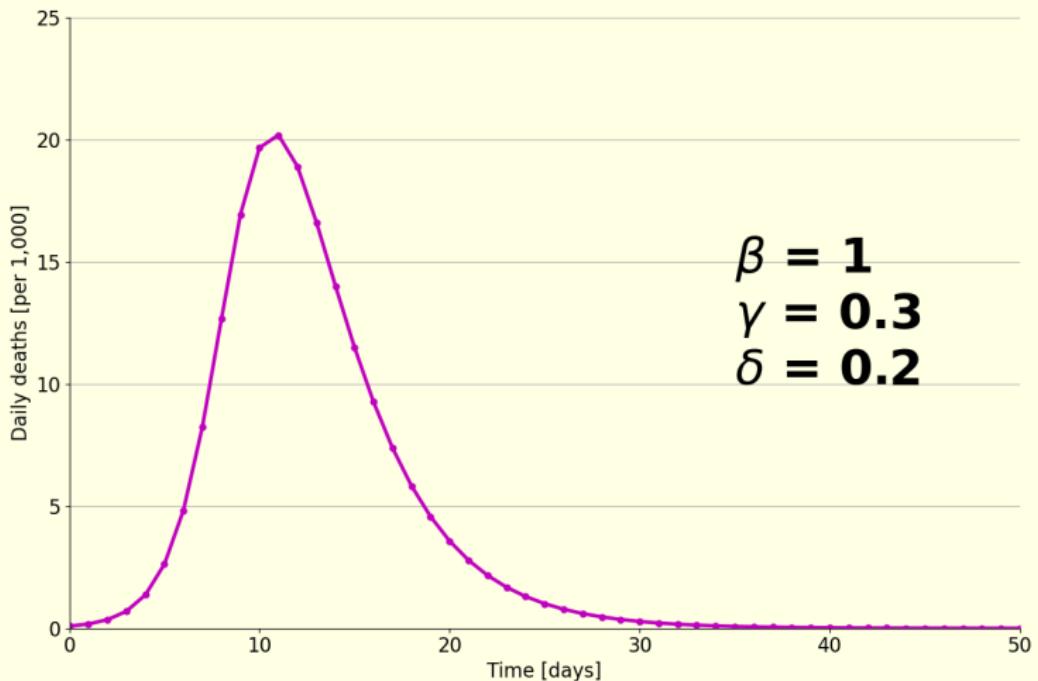
(Assuming the numerical values are sufficiently accurate, that they describe the correct thing, that the model is correct, etc... )



# My view on signature features

If we have some collection of numerical values,  $\theta$ , and some mathematical function or mathematical model, we can recreate what has occurred in data.

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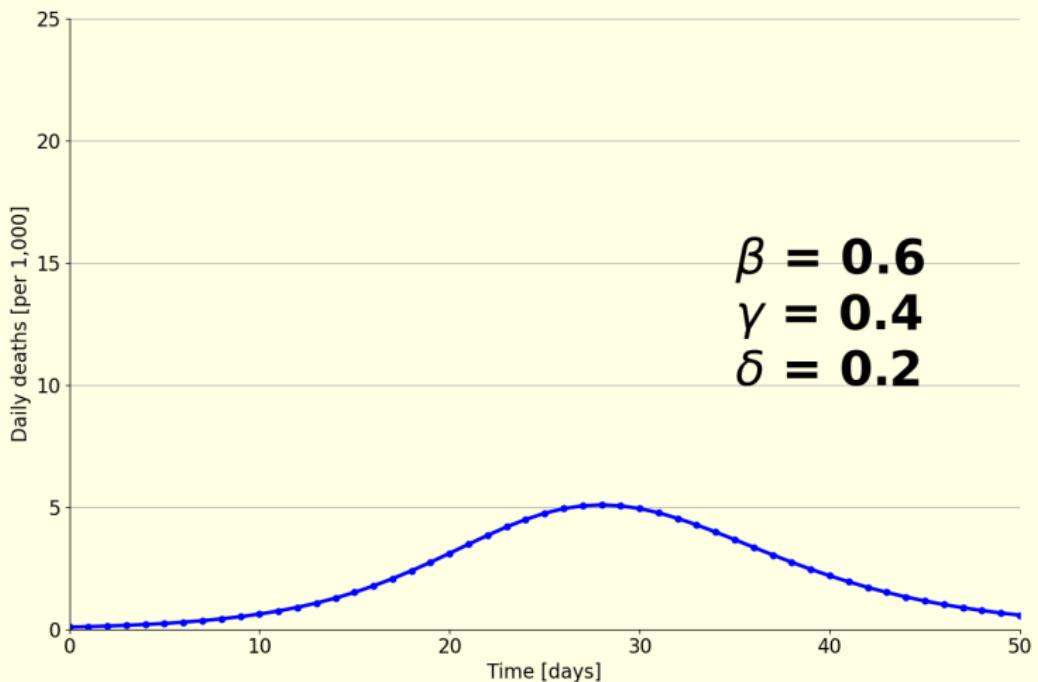
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# My view on signature features

If we have some collection of numerical values,  $\theta$ , and some mathematical function or mathematical model, we can recreate what has occurred in data.

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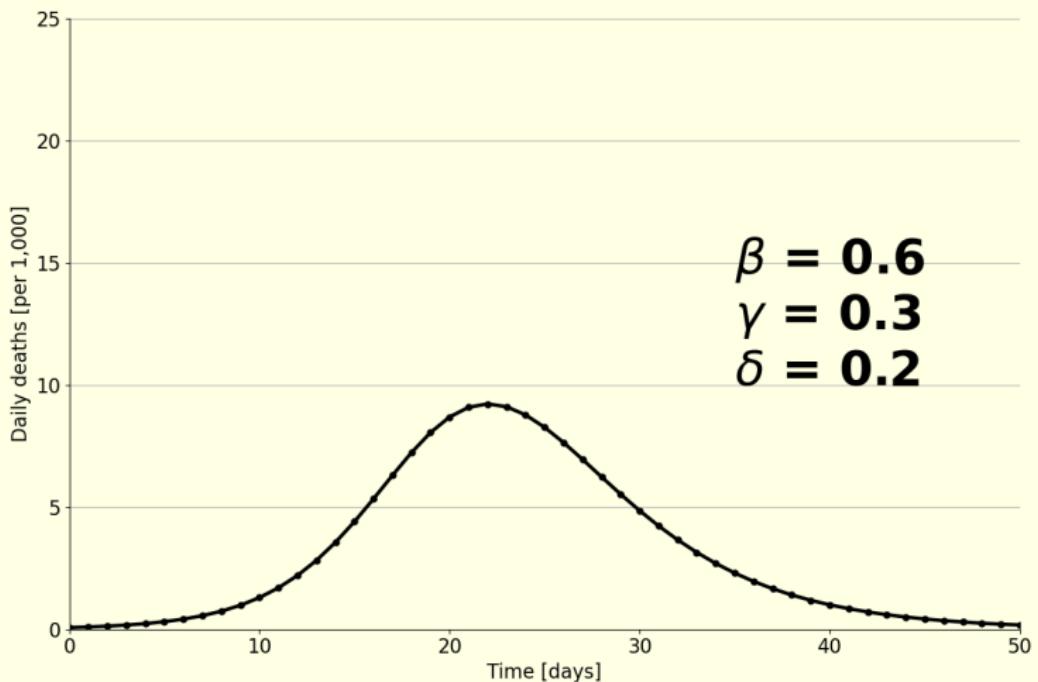
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# My view on signature features

If we have some collection of numerical values,  $\theta$ , and some mathematical function or mathematical model, we can recreate what has occurred in data.

(Assuming the numerical values are sufficiently accurate, that they describe the correct thing, that the model is correct, etc... )



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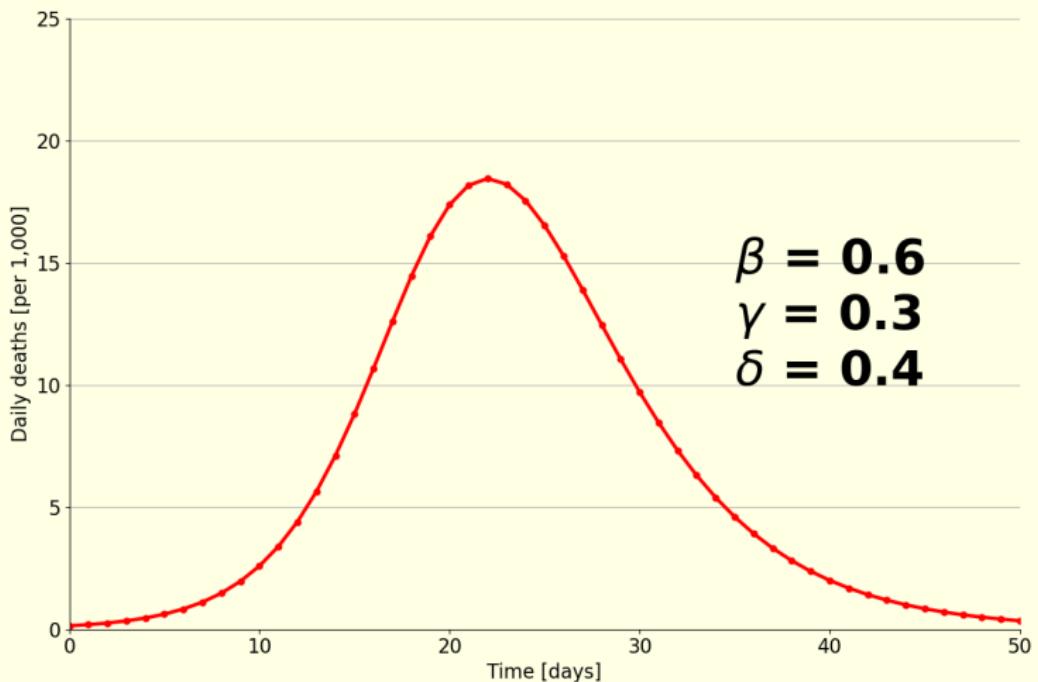
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# My view on signature features

If we have some collection of numerical values,  $\theta$ , and some mathematical function or mathematical model, we can recreate what has occurred in data.

(Assuming the numerical values are sufficiently accurate, that they describe the correct thing, that the model is correct, etc... )



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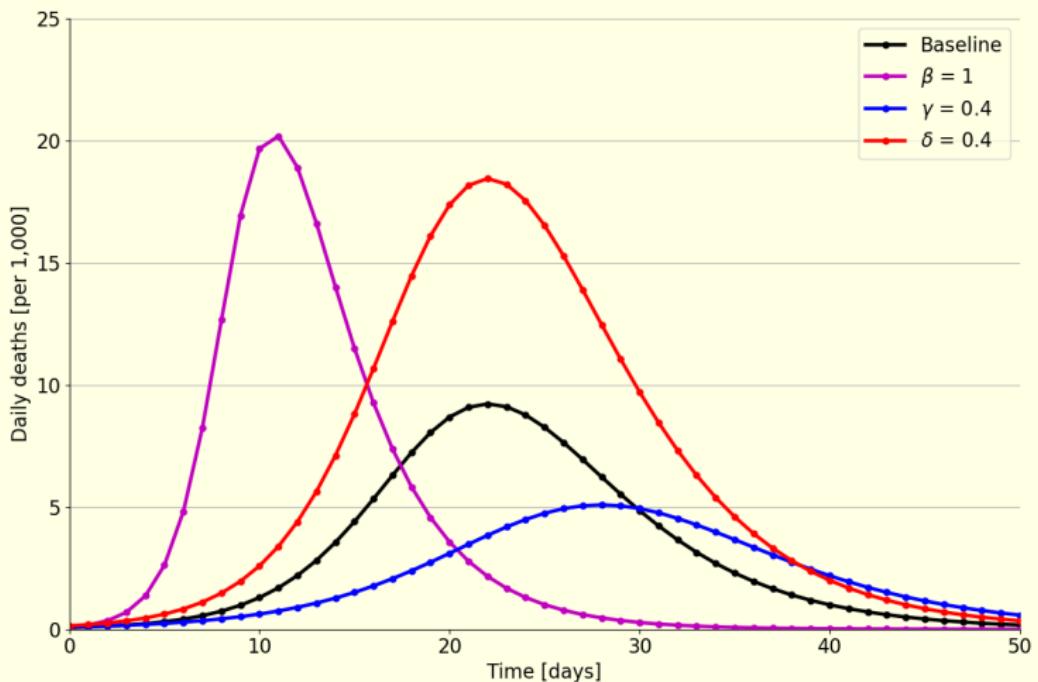
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# My view on signature features

If we have some collection of numerical values,  $\theta$ , and some mathematical function or mathematical model, we can recreate what has occurred in data.

(Assuming the numerical values are sufficiently accurate, that they describe the correct thing, that the model is correct, etc... )



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What is possible, and what does it require?

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What is possible, and what does it require?

No work

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What is possible, and what does it require?

## No work

- ▶ All-cause deaths for all ages, whole country

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What is possible, and what does it require?

## No work

- ▶ All-cause deaths for all ages, whole country

## Some analysis and/or some calculation

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What is possible, and what does it require?

## No work

- ▶ All-cause deaths for all ages, whole country

## Some analysis and/or some calculation

- ▶ All-cause deaths for specific ages

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What is possible, and what does it require?

## No work

- ▶ All-cause deaths for all ages, whole country

## Some analysis and/or some calculation

- ▶ All-cause deaths for specific ages
- ▶ All-cause deaths for specific geography

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What is possible, and what does it require?

## No work

- ▶ All-cause deaths for all ages, whole country

## Some analysis and/or some calculation

- ▶ All-cause deaths for specific ages
- ▶ All-cause deaths for specific geography
- ▶ Excess mortality (count or relative to baseline)

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- ▶ All-cause deaths for all ages, whole country

## Some analysis and/or some calculation

- ▶ All-cause deaths for specific ages
- ▶ All-cause deaths for specific geography
- ▶ Excess mortality (count or relative to baseline)

## Calculation, analysis and historical digging

# Possibilities with all-cause mortality data

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## Some analysis and/or some calculation

- ▶ All-cause deaths for specific ages
- ▶ All-cause deaths for specific geography
- ▶ Excess mortality (count or relative to baseline)

## Calculation, analysis and historical digging

- ▶ Excess mortality per 1000 citizens.

# Possibilities with all-cause mortality data

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What is possible, and what does it require?

## No work

- ▶ All-cause deaths for all ages, whole country

## Some analysis and/or some calculation

- ▶ All-cause deaths for specific ages
- ▶ All-cause deaths for specific geography
- ▶ Excess mortality (count or relative to baseline)

## Calculation, analysis and historical digging

- ▶ Excess mortality per 1000 citizens.
- ▶ Determining disease-specific features.

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What is possible, and what does it require?

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- ▶ All-cause deaths for all ages, whole country

## Some analysis and/or some calculation

- ▶ All-cause deaths for specific ages
- ▶ All-cause deaths for specific geography
- ▶ Excess mortality (count or relative to baseline)

## Calculation, analysis and historical digging

- ▶ Excess mortality per 1000 citizens.
- ▶ Determining disease-specific features.
- ▶ Suggesting that something in data is an epidemic of a particular disease.

# Let's take a look at a particular example

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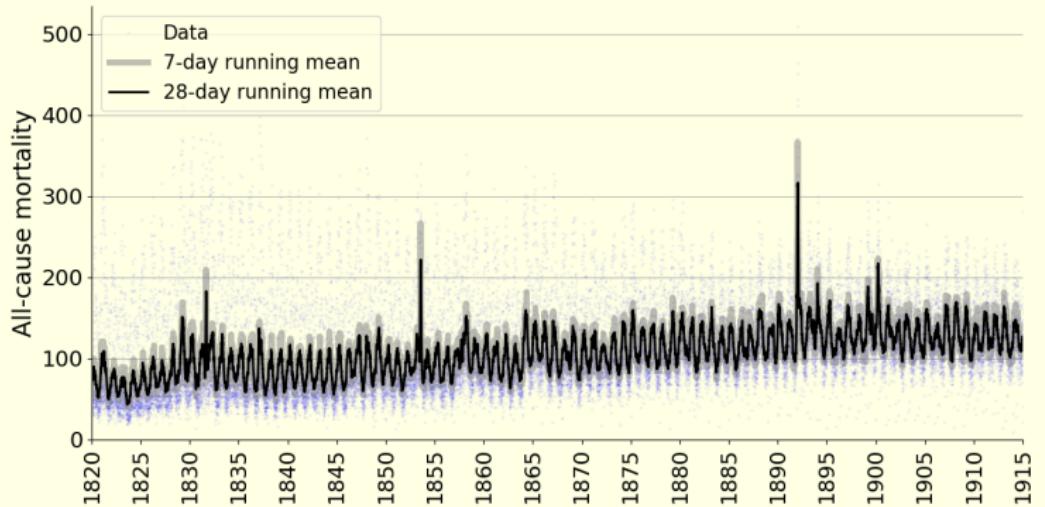
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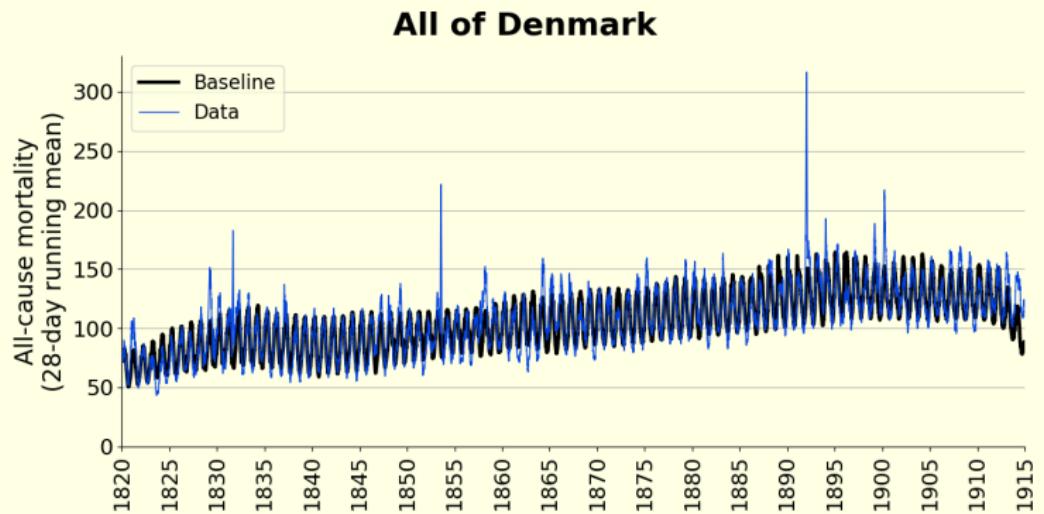
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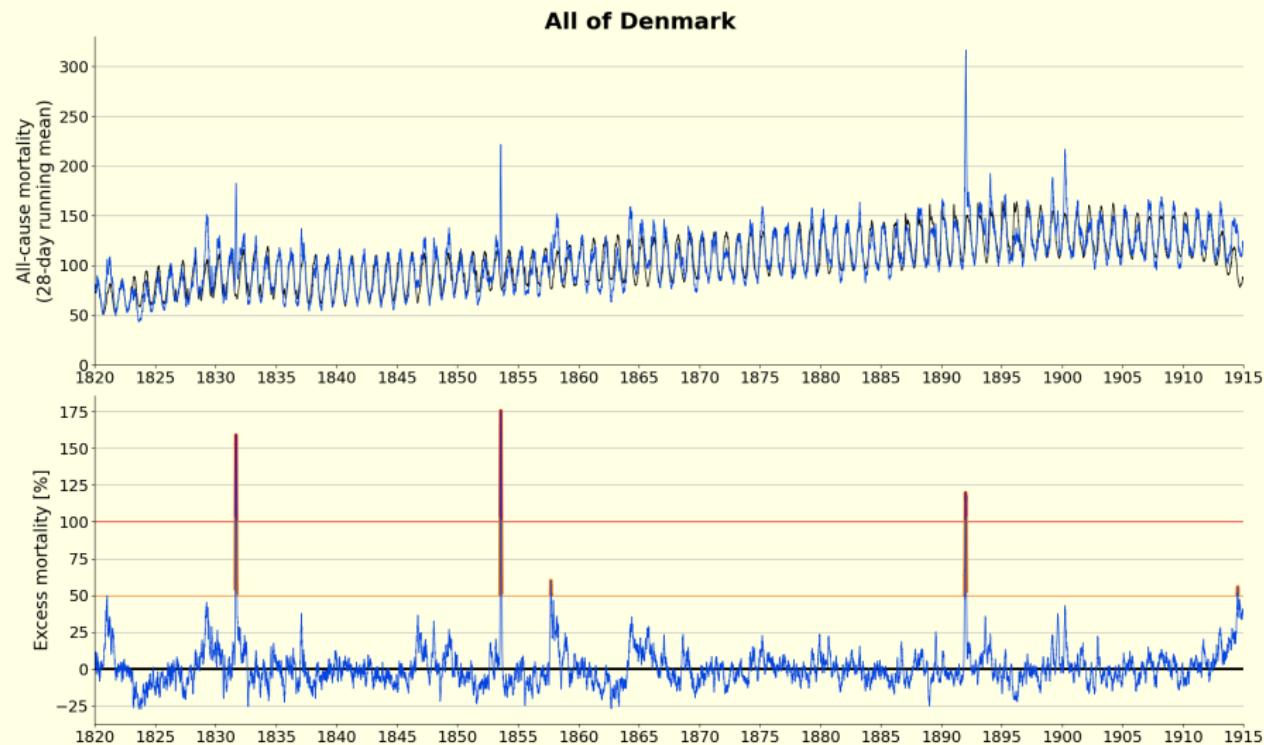
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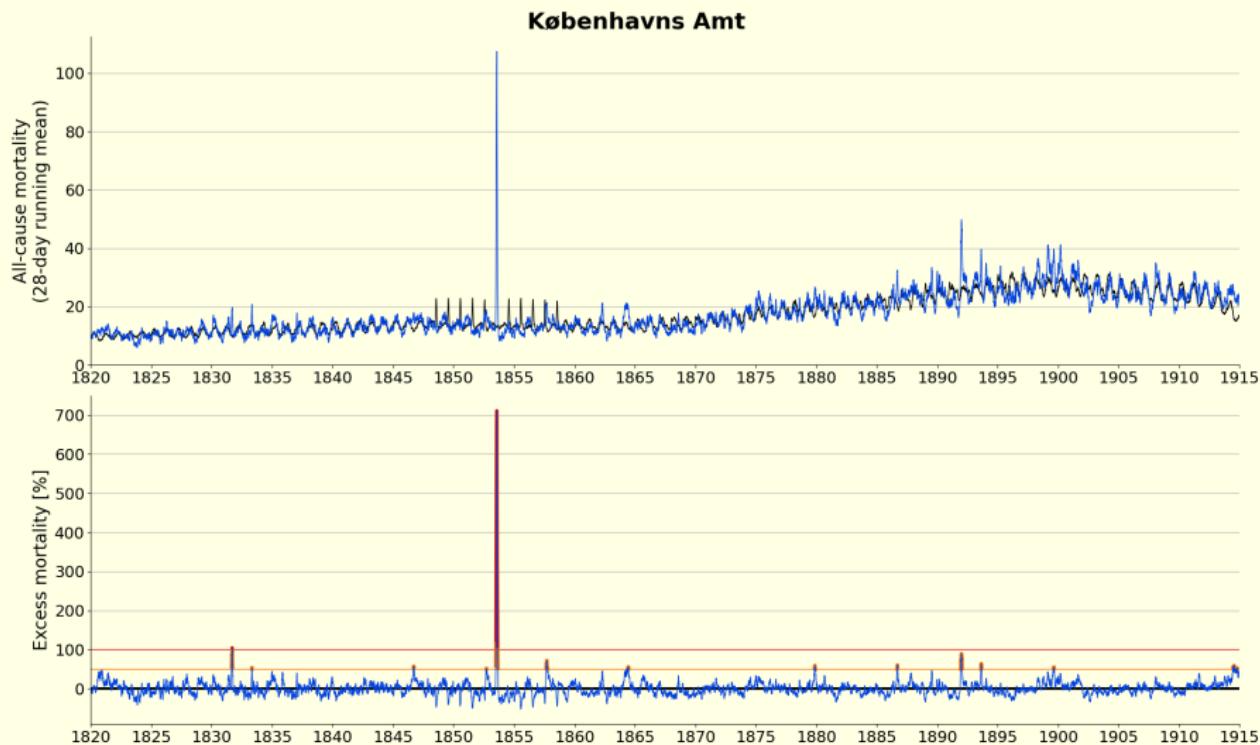


Baseline: Average of 5 previous years and 5 following years

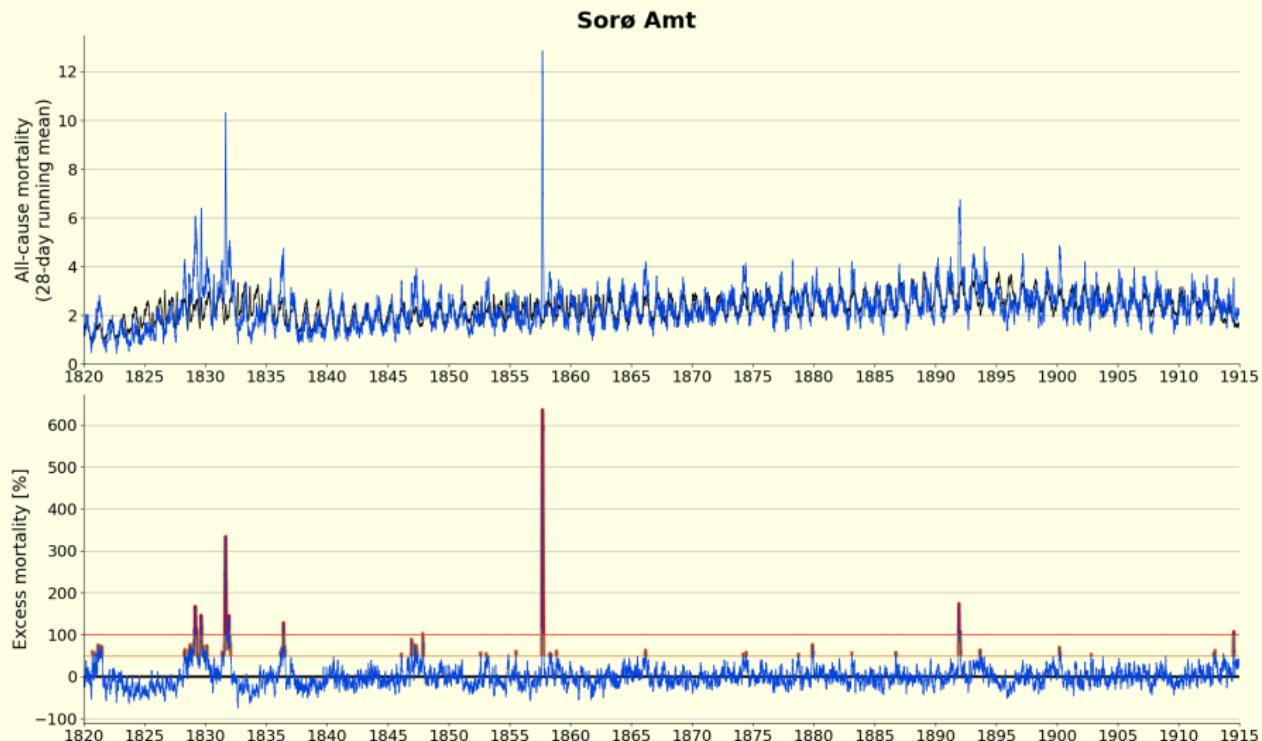
## Overview on “Amt” level



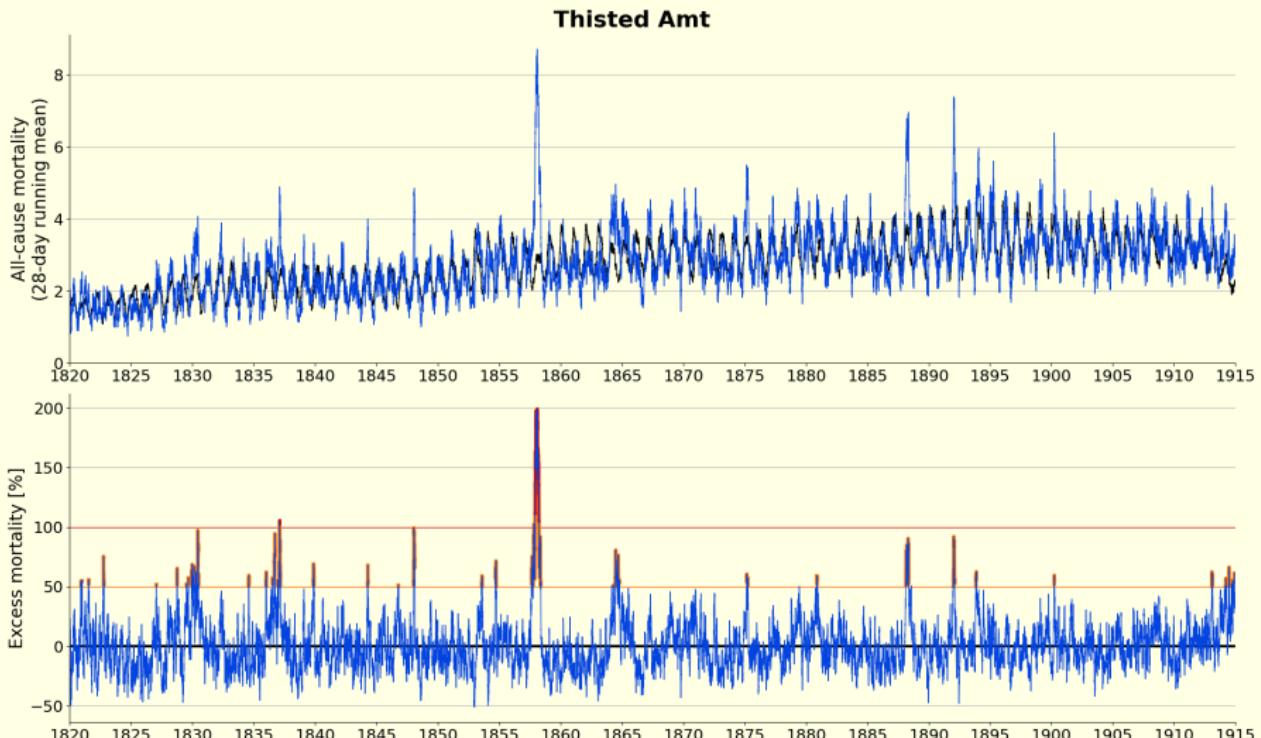
## Overview on “Amt” level



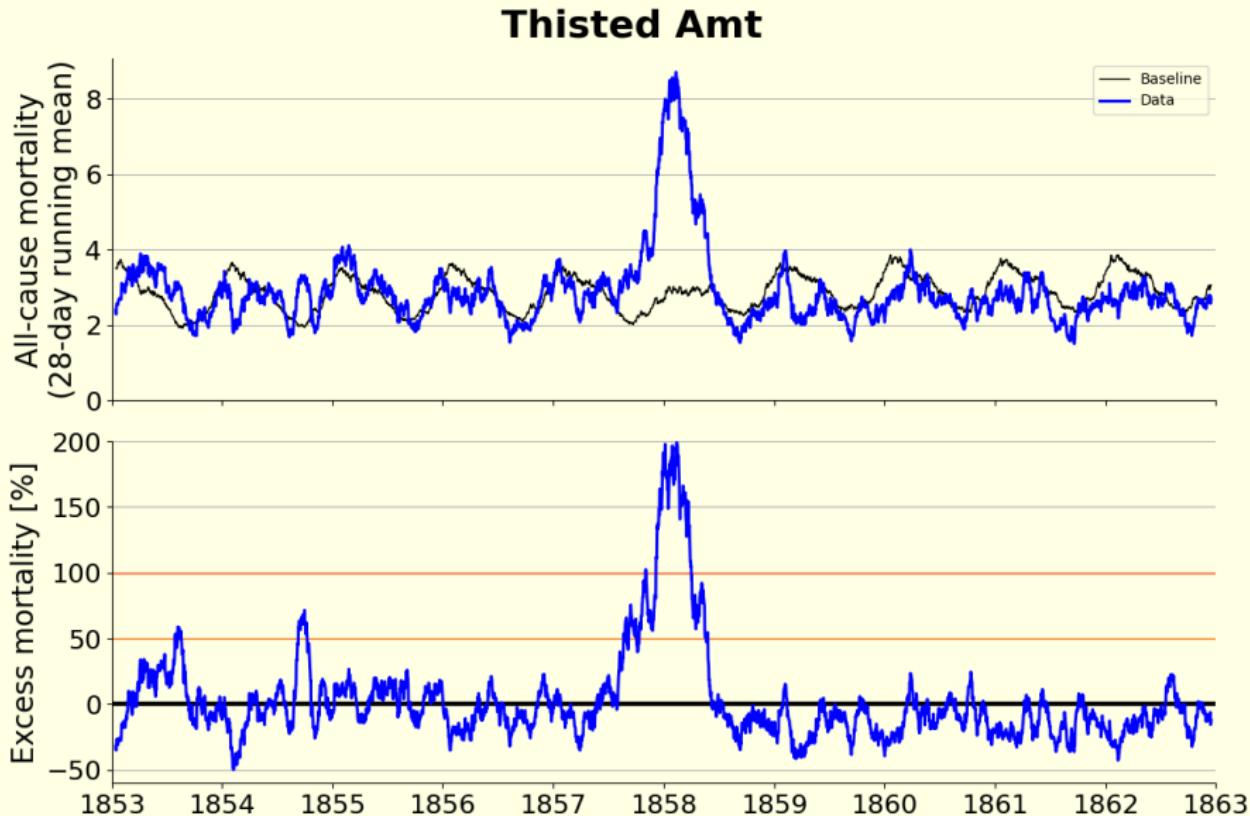
## Overview on “Amt” level



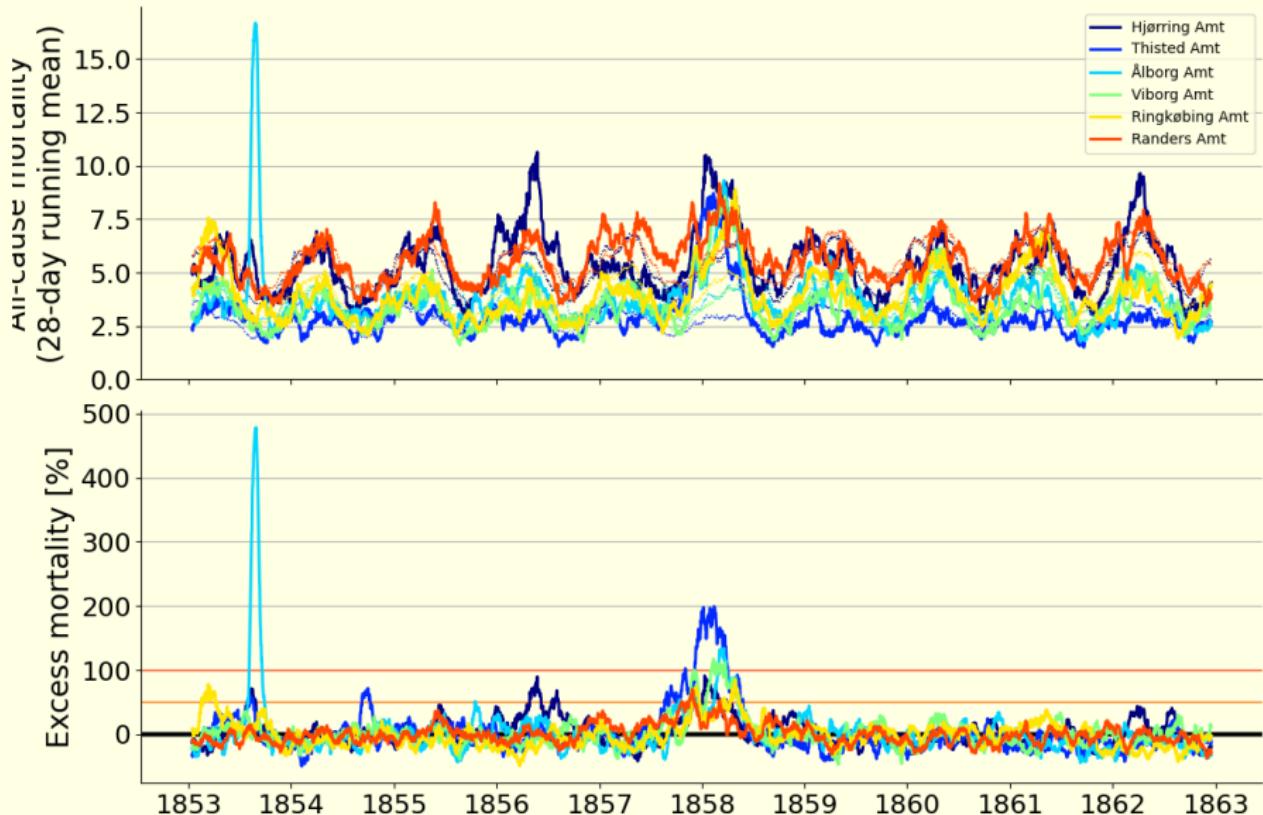
## Overview on “Amt” level



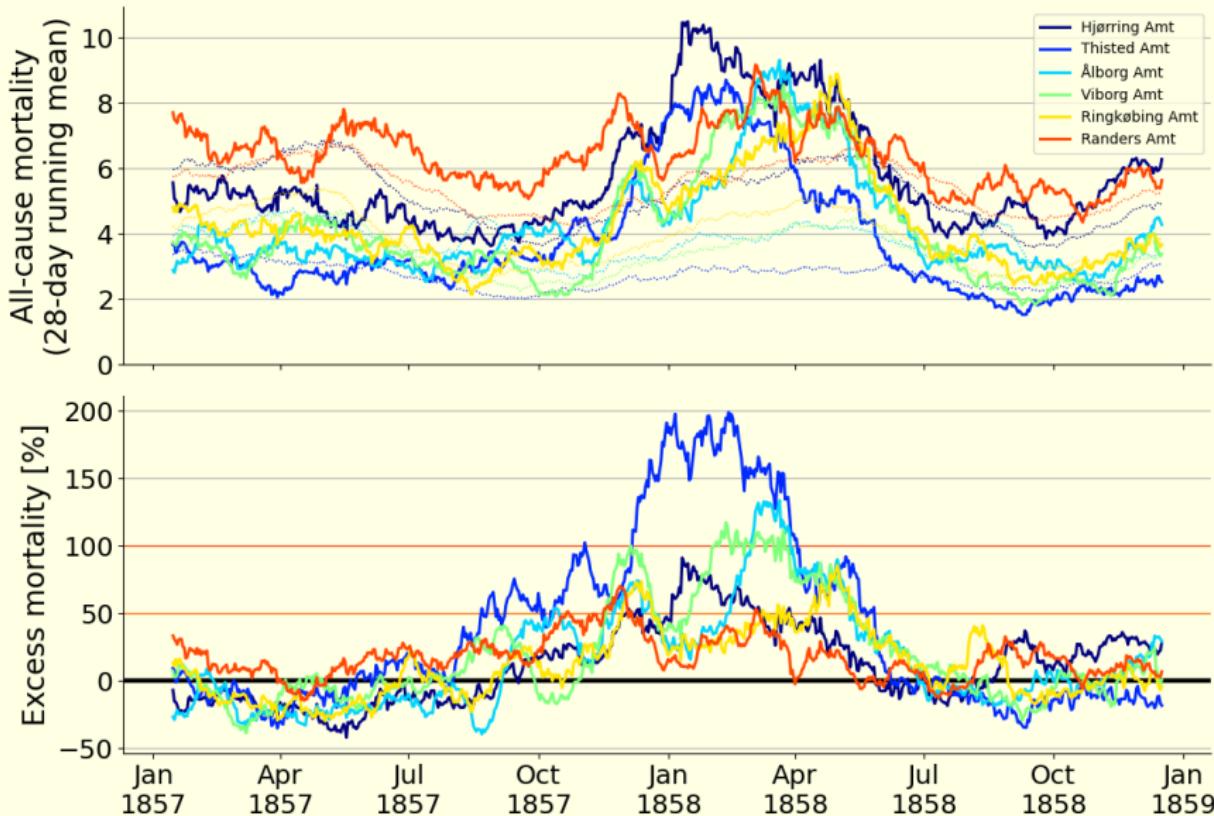
# Thisted Amt in 1858, overview



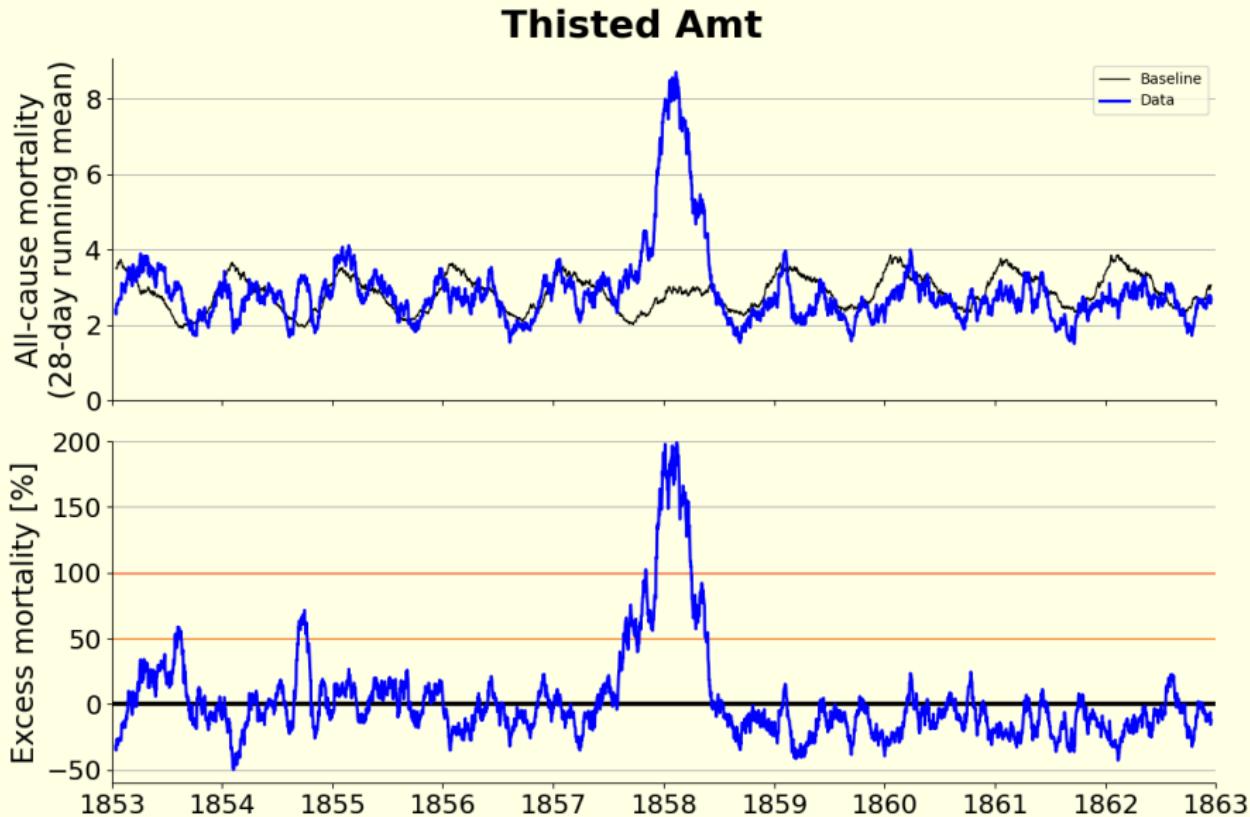
# Thisted Amt in 1858, overview



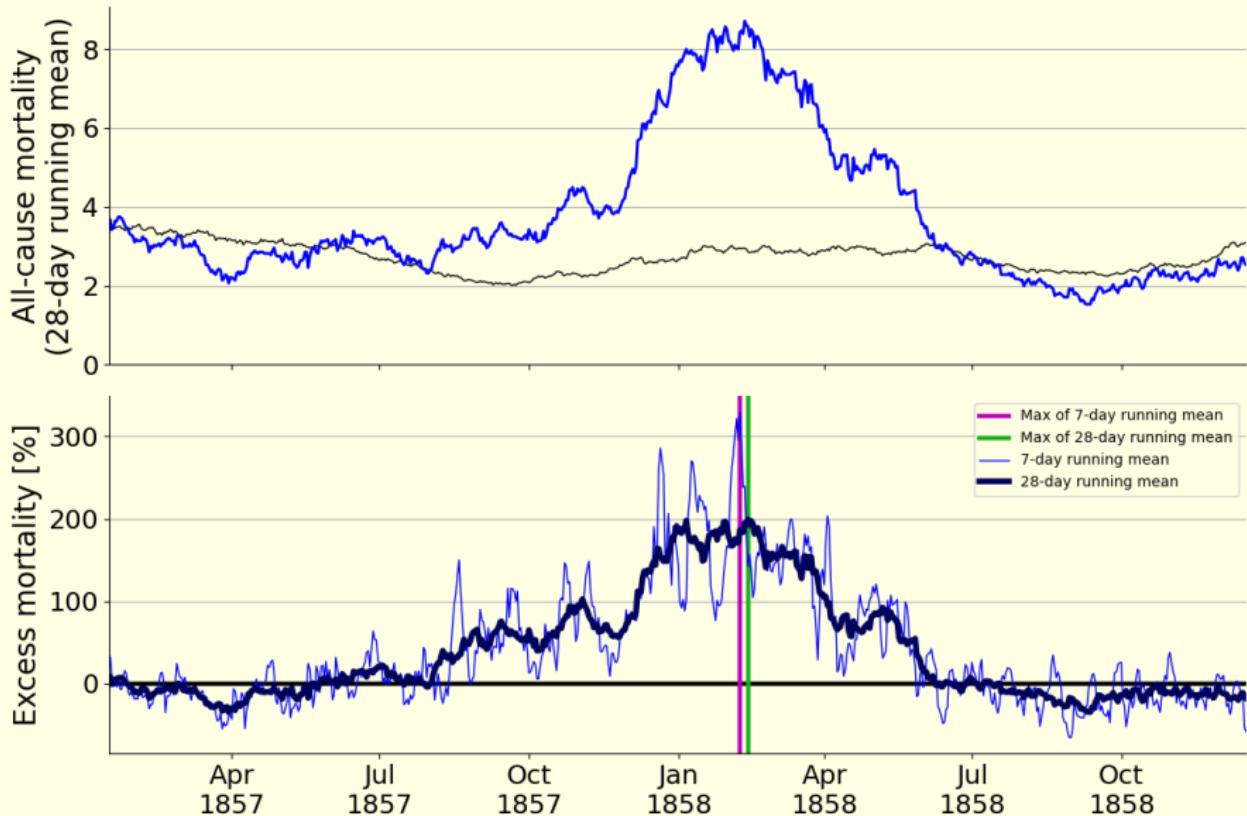
# Thisted Amt in 1858, overview



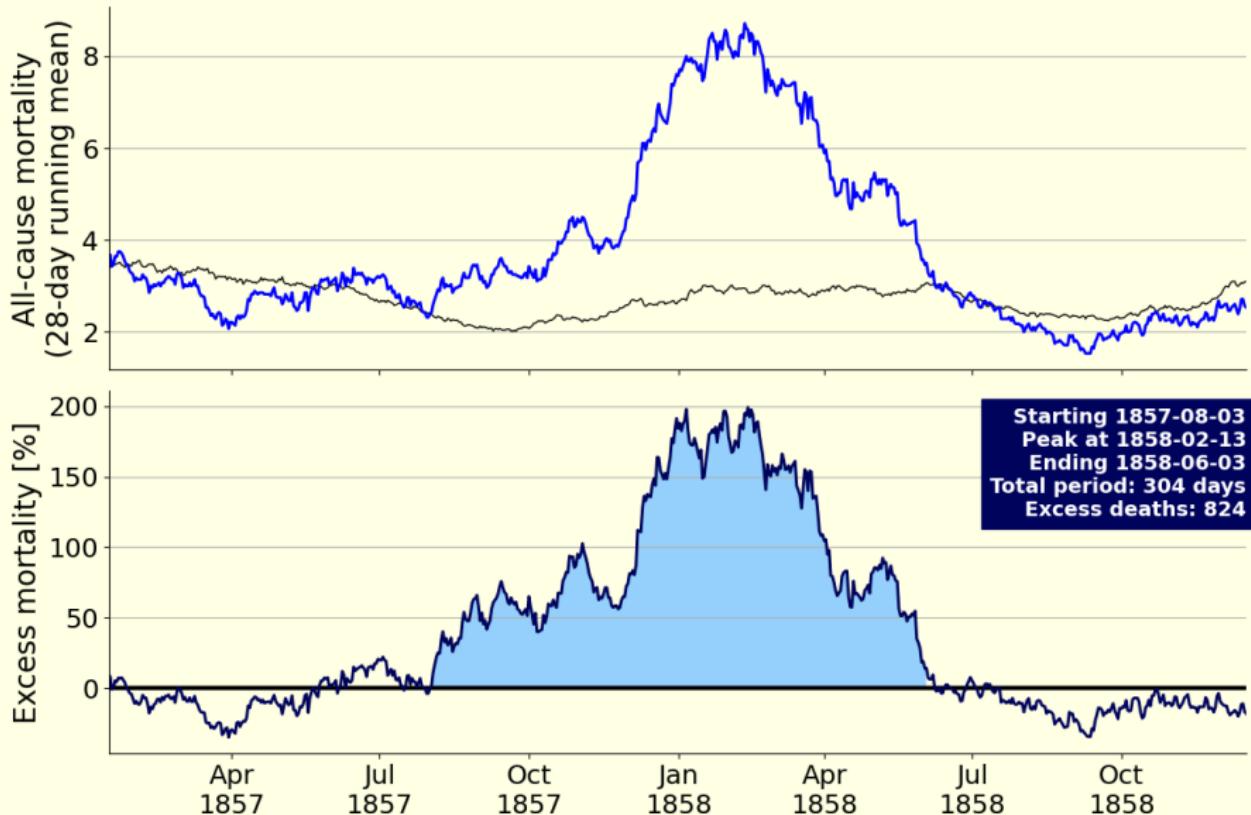
# Thisted Amt in 1858, overview



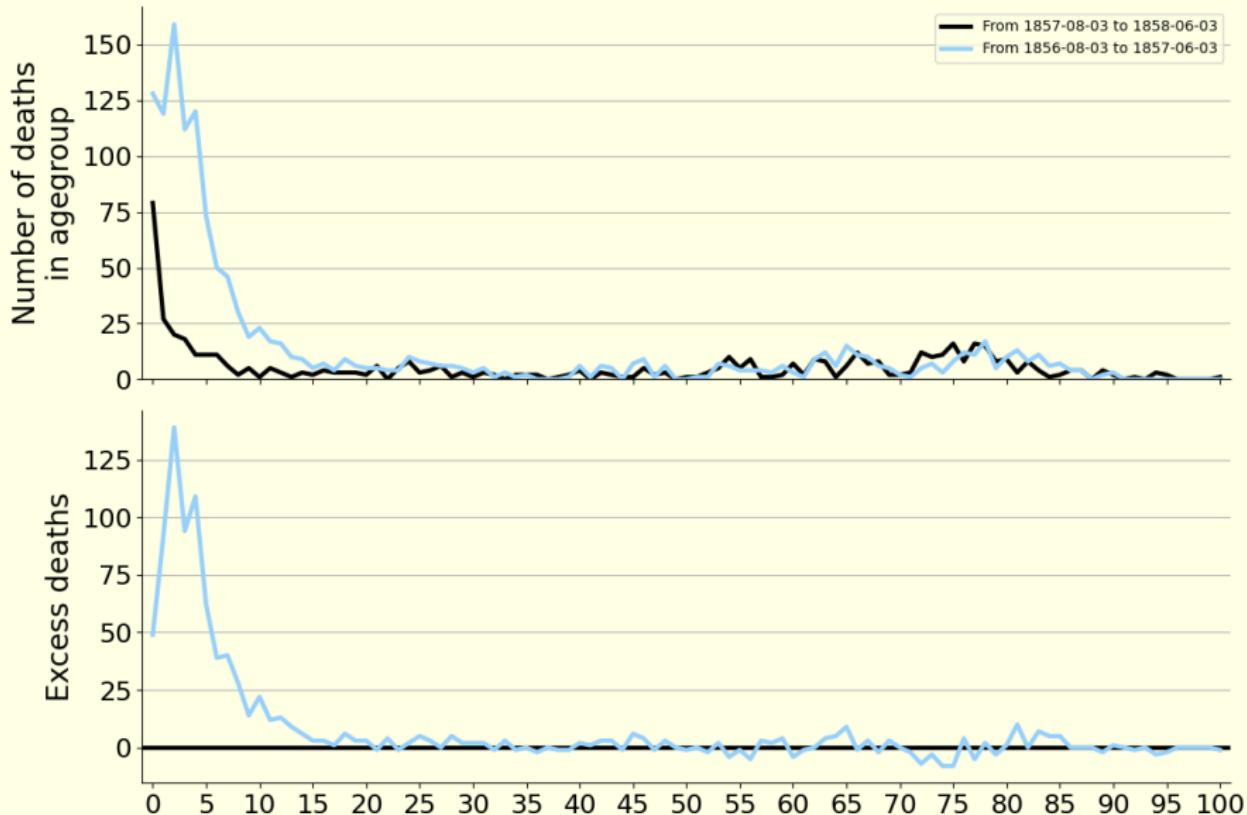
# Thisted Amt in 1858, overview



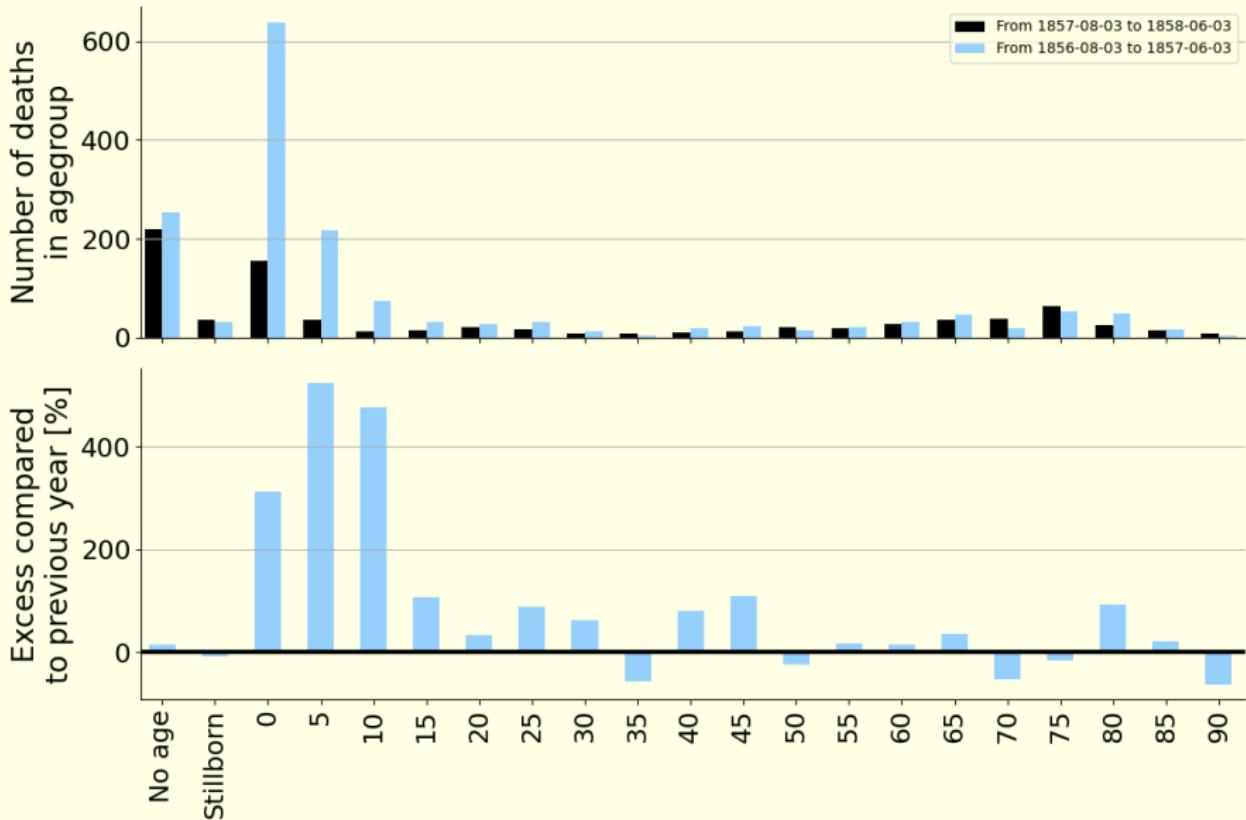
# Thisted Amt in 1858, overview



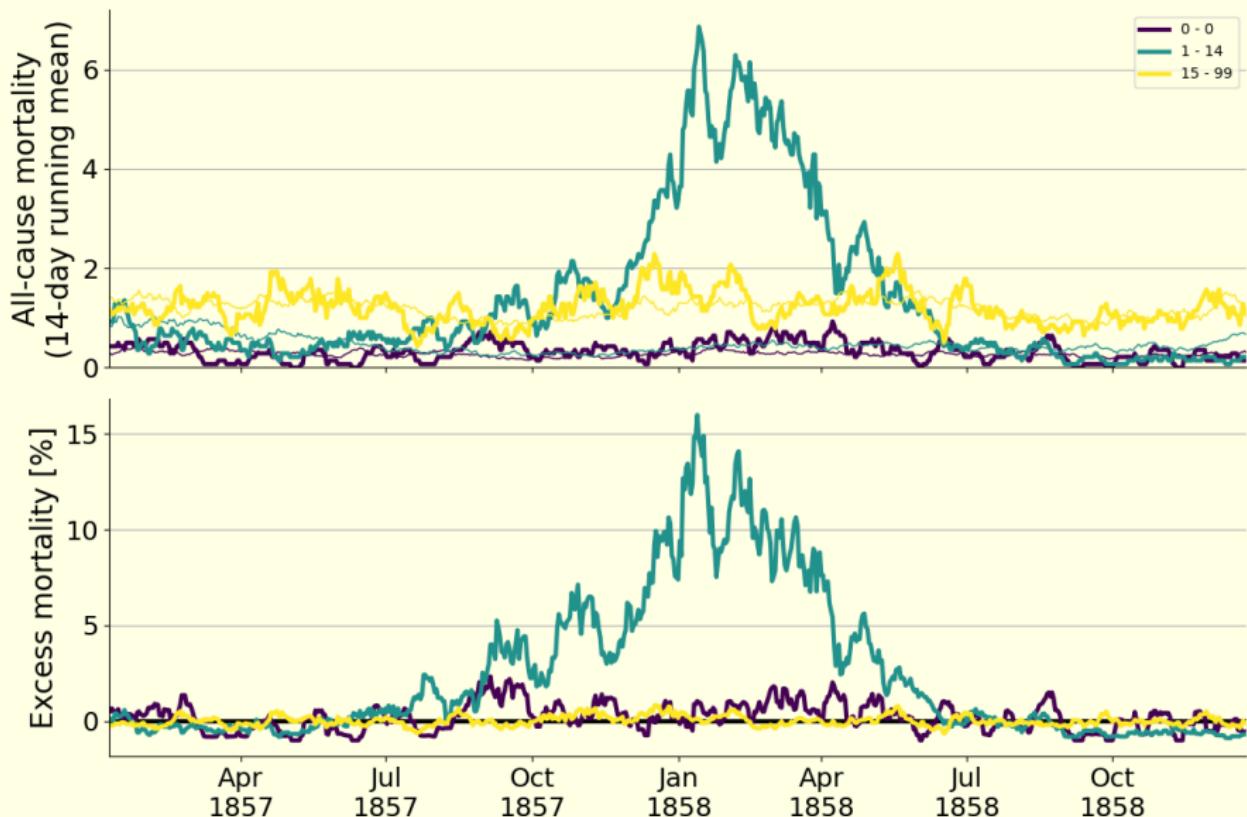
## Thisted Amt in 1858, specifics



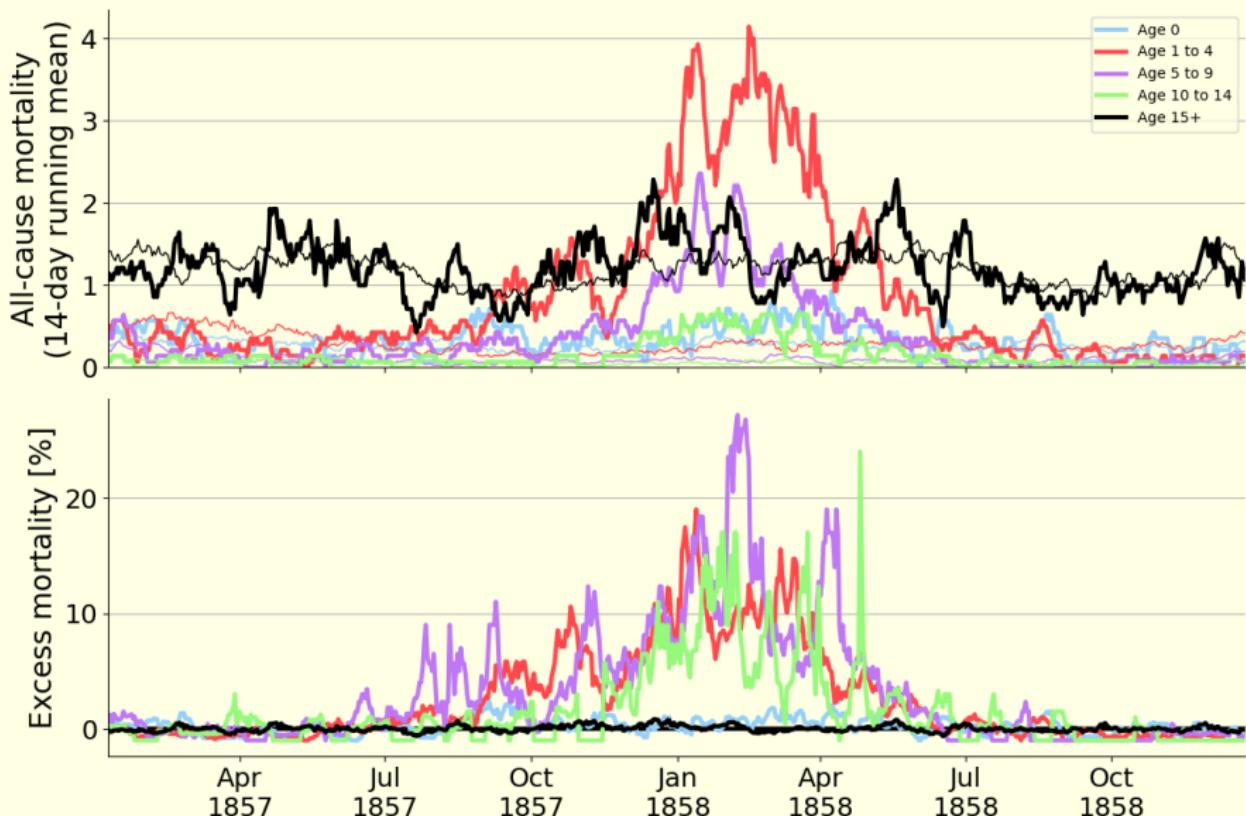
# Thisted Amt in 1858, specifics



## Thisted Amt in 1858, specifics

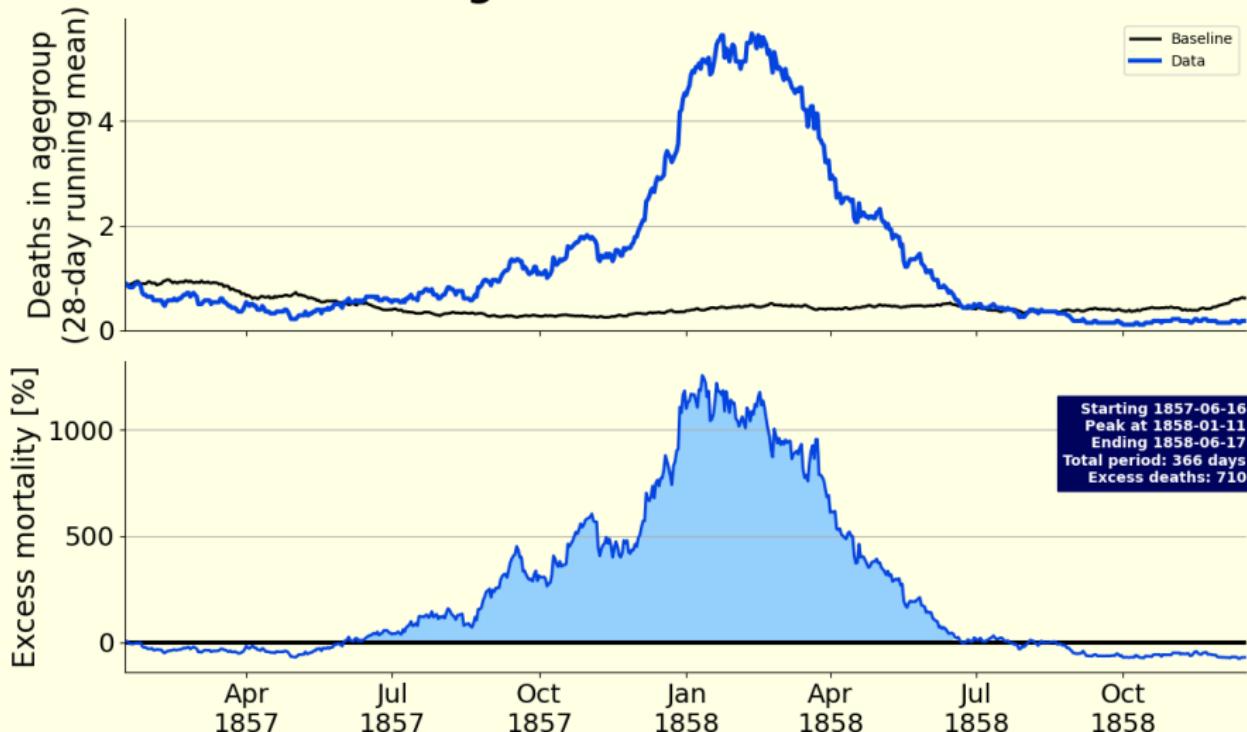


# Thisted Amt in 1858, specifics

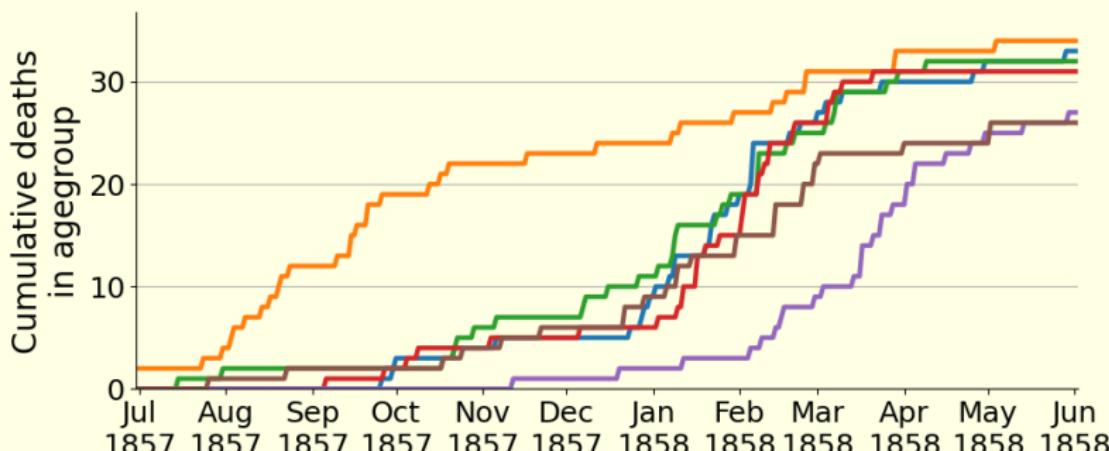
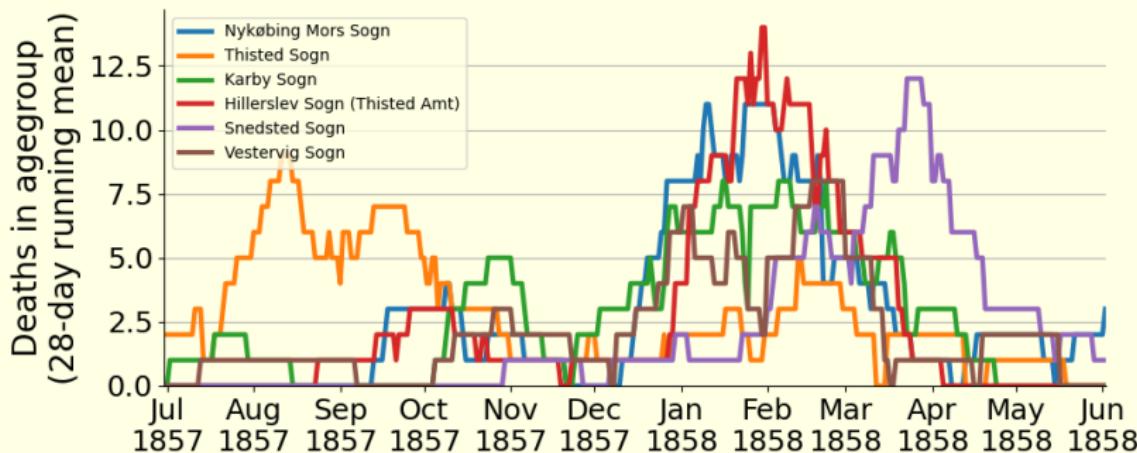


Thisted Amt in 1858, specifics

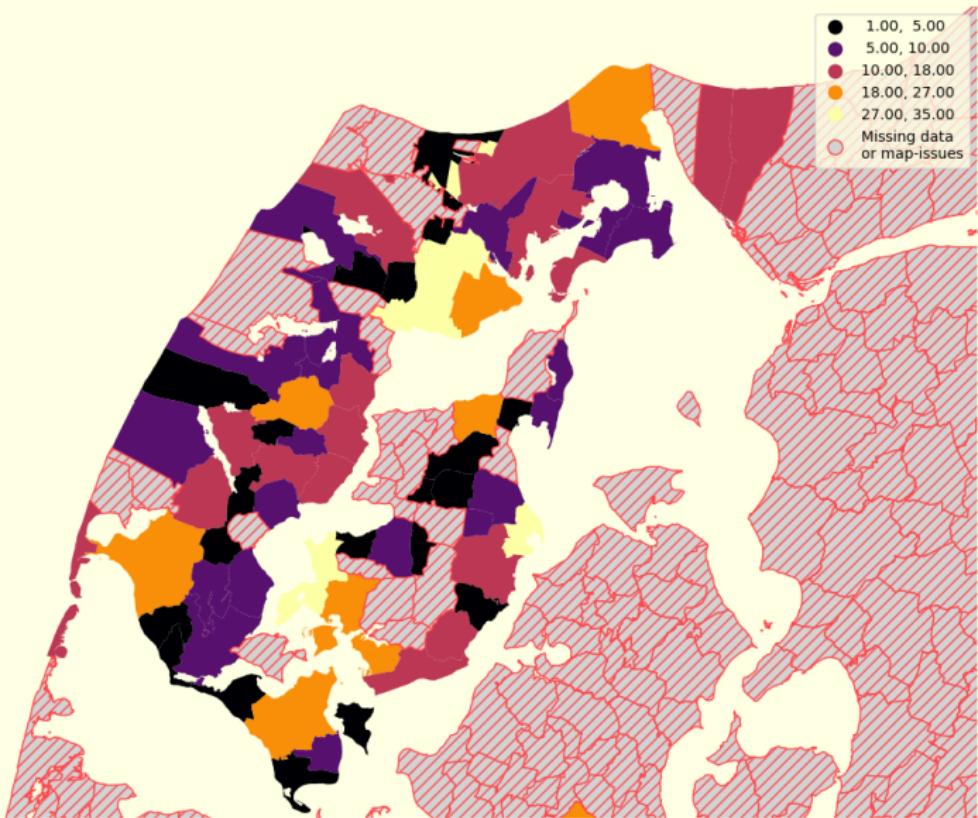
### All-cause mortality, Thisted Amt, Ages from 1 to 15



# Thisted Amt in 1858, specifics

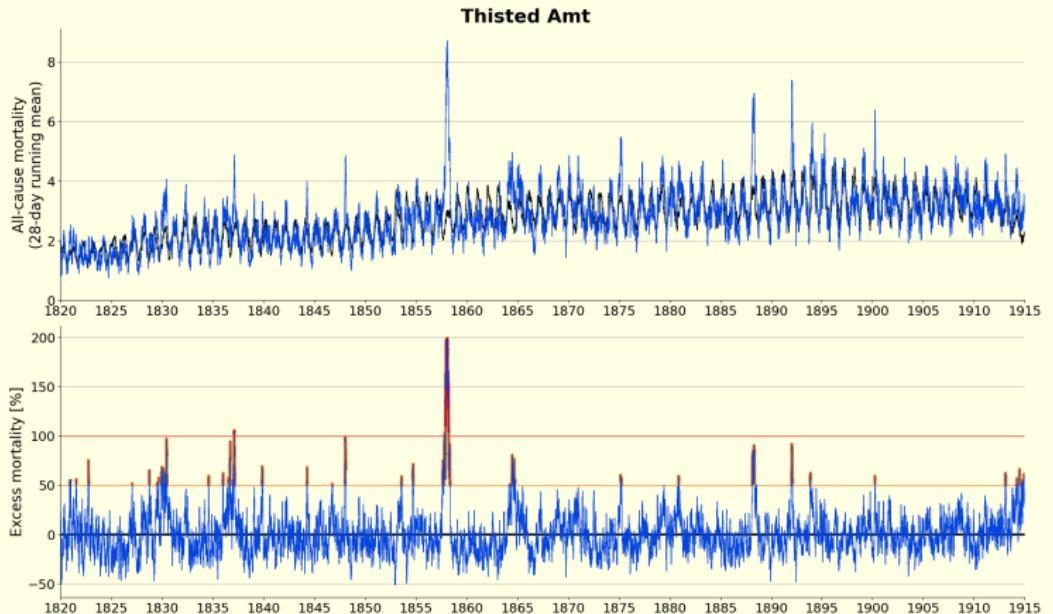


# Thisted Amt in 1858, specifics



# So, what did we learn?

A sustained period of high mortality in Thisted Amt



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# So, what did we learn?

A sustained period of high mortality in Thisted Amt

- ▶ Possibly related to smaller peaks in neighbouring areas

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A sustained period of high mortality in Thisted Amt

- ▶ Possibly related to smaller peaks in neighbouring areas
- ▶ Lasted about 300 days from August 1857 to June 1858, peaking in January and February

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A sustained period of high mortality in Thisted Amt

- ▶ Possibly related to smaller peaks in neighbouring areas
- ▶ Lasted about 300 days from August 1857 to June 1858, peaking in January and February
- ▶ A total of upwards 800 excess deaths

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## A sustained period of high mortality in Thisted Amt

- ▶ Possibly related to smaller peaks in neighbouring areas
- ▶ Lasted about 300 days from August 1857 to June 1858, peaking in January and February
- ▶ A total of upwards 800 excess deaths
- ▶ Primarily hit ages 1 to 15 (and perhaps 0-year olds).

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## A sustained period of high mortality in Thisted Amt

- ▶ Possibly related to smaller peaks in neighbouring areas
- ▶ Lasted about 300 days from August 1857 to June 1858, peaking in January and February
- ▶ A total of upwards 800 excess deaths
- ▶ Primarily hit ages 1 to 15 (and perhaps 0-year olds).
- ▶ In age-range: About 700 excess deaths, peaking at 1000% excess mortality in January and February.

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## A sustained period of high mortality in Thisted Amt

- ▶ Possibly related to smaller peaks in neighbouring areas
- ▶ Lasted about 300 days from August 1857 to June 1858, peaking in January and February
- ▶ A total of upwards 800 excess deaths
- ▶ Primarily hit ages 1 to 15 (and perhaps 0-year olds).
- ▶ In age-range: About 700 excess deaths, peaking at 1000% excess mortality in January and February.
- ▶ Perhaps limited to larger towns, but data-material is insufficient for any conclusions.

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Excess deaths	

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Epidemic Library Card	
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<i>Disease:</i>	
Peak	February 1858
Period	
Age-groups	
Excess deaths	

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Epidemic Library Card	
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<i>Disease:</i>	
Peak	February 1858
Period	≈ 300 days
Age-groups	
Excess deaths	

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Epidemic Library Card	
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<i>Disease:</i>	
Peak	February 1858
Period	≈ 300 days
Age-groups	1 to 15-year olds
Excess deaths	

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<i>Disease:</i>	
Peak	February 1858
Period	≈ 300 days
Age-groups	1 to 15-year olds
Excess deaths	700

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Epidemic Library Card	
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Disease: Scarlatina	
Peak	February 1858
Period	≈ 300 days
Age-groups	1 to 15-year olds
Excess deaths	700

# Now what?

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- ▶ Automating the process.

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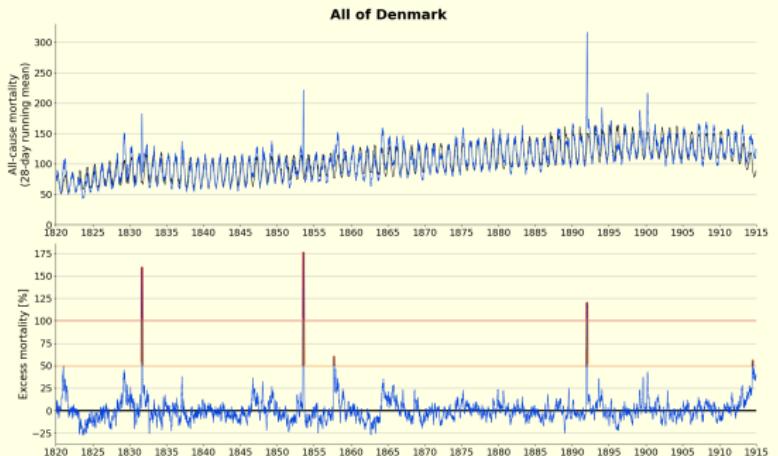
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# Now what?

- ▶ Automating the process.



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# Now what?

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- ▶ Automating the process.
- ▶ Collecting information in a database.

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- ▶ Automating the process.
- ▶ Collecting information in a database.
- ▶ Cross-checking with medical records of known epidemics.

# Now what?

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- ▶ Automating the process.
- ▶ Collecting information in a database.
- ▶ Cross-checking with medical records of known epidemics.
- ▶ ... and data verification.

# Now what?

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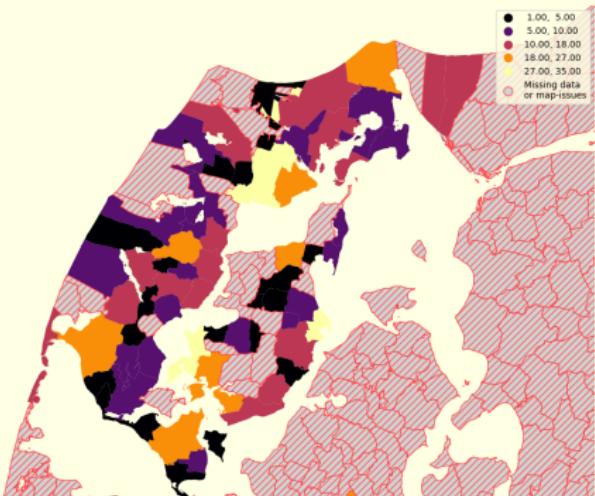
## Future plans and discussion

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- ▶ Automating the process.
- ▶ Collecting information in a database.
- ▶ Cross-checking with medical records of known epidemics.
- ▶ ... and data verification.
- ▶ ... and manual fixing of parishes where GIS-mapping doesn't work.

# Now what?

- ▶ Automating the process.
- ▶ Collecting information in a database.
- ▶ Cross-checking with medical records of known epidemics.
- ▶ ... and data verification.
- ▶ ... and manual fixing of parishes where GIS-mapping doesn't work.



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- ▶ Collecting *signature features* of epidemics from all-cause mortality.

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- ▶ Collecting *signature features* of epidemics from all-cause mortality.
- ▶ Methodology and baseline estimation has to be discussed and documented.

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- ▶ Collecting *signature features* of epidemics from all-cause mortality.
- ▶ Methodology and baseline estimation has to be discussed and documented.
- ▶ An overview of missing data is needed.

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- ▶ Collecting *signature features* of epidemics from all-cause mortality.
- ▶ Methodology and baseline estimation has to be discussed and documented.
- ▶ An overview of missing data is needed.
- ▶ and a way to handle known missing data.

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- ▶ Collecting *signature features* of epidemics from all-cause mortality.
- ▶ Methodology and baseline estimation has to be discussed and documented.
- ▶ An overview of missing data is needed.
- ▶ and a way to handle known missing data.
- ▶ Additional features can possibly be extracted as well, e.g. through mathematical modelling.

# Thank you for your attention.

## Any questions?



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[rasmuspedersen.com](http://rasmuspedersen.com)

RUC



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