

Territorial aspects of seasonal mortality in France

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Energy poverty and excess winter mortality

Excess winter mortality (EWD) is a key cornerstone of the discussions on **energy poverty**

- EWD refers to the additional deaths occurring in winter (relative to other seasons)
- EWD is viewed as a consequence of the cold but also of an inadequate protection against it
- Especially in the UK the debate focuses on energy poverty as a cause of excess winter deaths even if further assessment of the causality is still required

Excess winter mortality exists all over Europe (Fowler et al, 2015)

Magnitudes differ significantly (from 8% in Iceland or Finland to more than 20% in Spain and Portugal)...

and the geographical distribution provides the intuition that **there is more to EWD than just temperatures**

Excess winter mortality: the French framework

Contrary to the UK, **the link between excess winter mortality and energy poverty is not yet recognised in France**

- Explanations for EWD focus on cold spikes and influenza epidemics
- both in the policy debate and in the literature

International studies for France provide a figure for **EWD around 15%** at the country level whereas there is a lack of local data

- Since France is a large, diversified country in terms of climatic conditions and housing characteristics
- the focus on the national wide figures cancels out territorial differences
- which could be attributed to elements other than temperatures

Research objective

Can French excess winter mortality be better understood if, on top of temperature, structural elements are taken into account?

It raises the question of the **geographical scale suitable for the analysis**

- By definition the national level cannot account for local differences
- The household level would be best but the data does not exist
- We introduce a **territorial dimension** in the analysis of EWD: we look at the data at the NUTS3 level, «départements»

Research agenda: towards a better characterisation of seasonal mortality in France



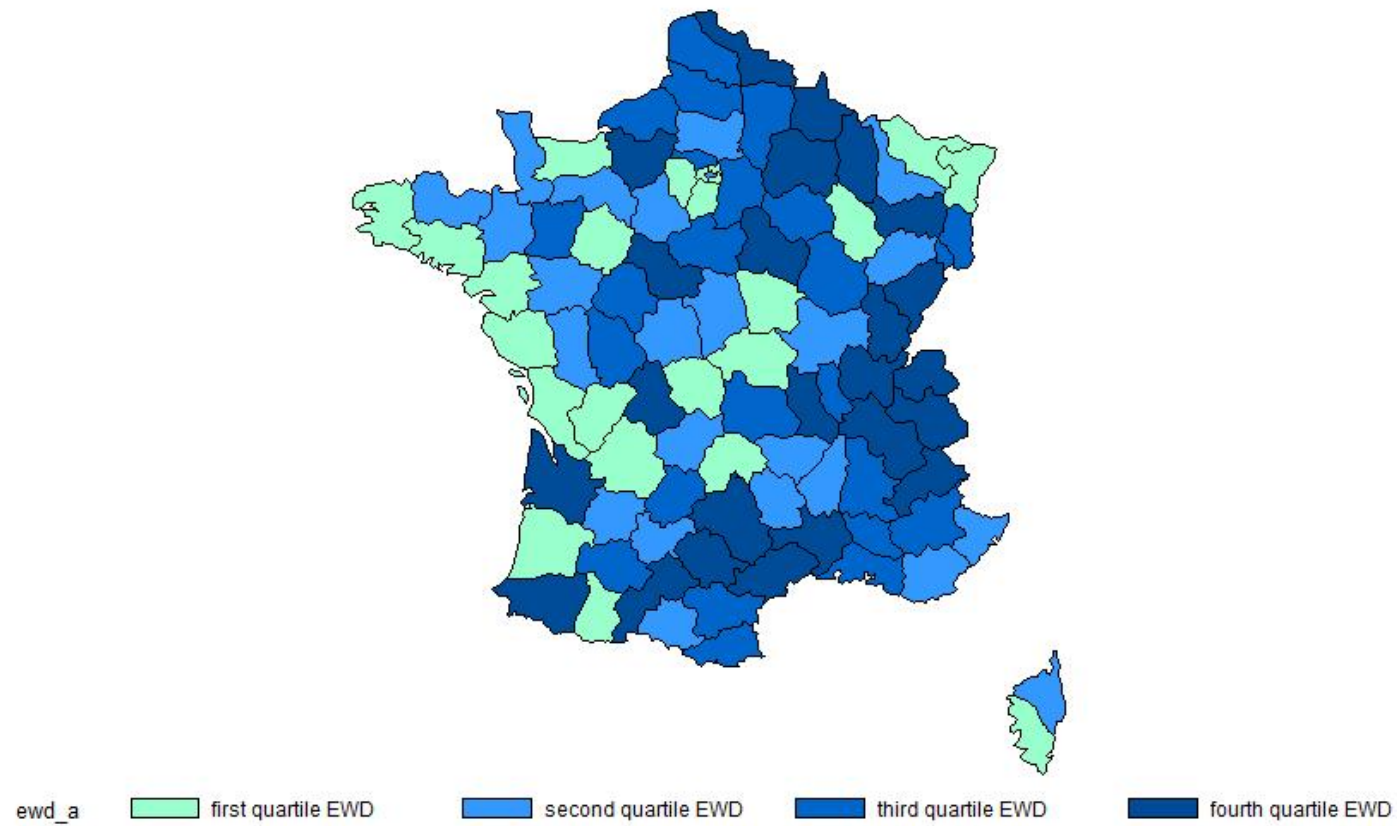
Methodology (1): excess winter deaths

We focus on excess winter mortality (EWD)

Computed as $EWD = \frac{\text{daily deaths (dec to march)}}{0,5 * \text{daily deaths (march to nov)}} - 1$

- We compute an age adjusted index
- The index is computed at the NUTS3 level
- We focus on the long run trend and compute the average EWD index between 1998 and 2016

EWD in France - 1998-2016 - NUTS3 level



Methodology (2):

3 composite indexes:

Based on deprivation indexes (Townsend, 1987 and Carstairs and Morris, 1989) we characterise the **vulnerability of territories** along 3 dimensions

Index 1: access to health services

Number of hospital beds
Accessibility to GPs

Index 2: socio-economic vulnerability factors

Poverty rate
Education: proportion without high school diploma
Proportion of rural population

Index 3: Housing characteristics

Dwellings older than 1970
Insufficient heating
Overcrowding
Dwellings with at least one person older than 75

Control for temperature and influenza

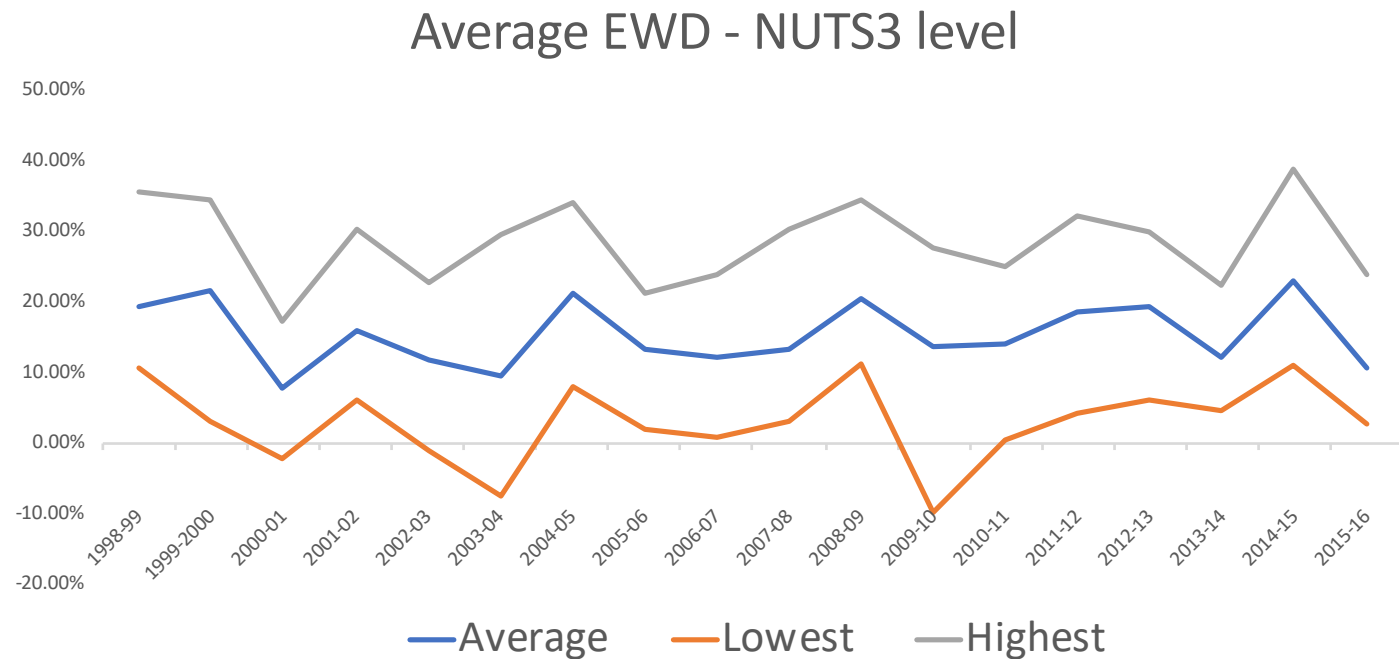
Data

We work with imperfect databases

- Mortality: census monthly data, 1998-2017
- Health services index: social security data, 2016
- Socio-economic vulnerability factors: census data, 2014
- Housing characteristics : census data, 2014
- Temperatures: daily heating degree days (average for NUTS3 areas)
- Influenza: GPs self reported weekly visits for influenza, NUTS2 level

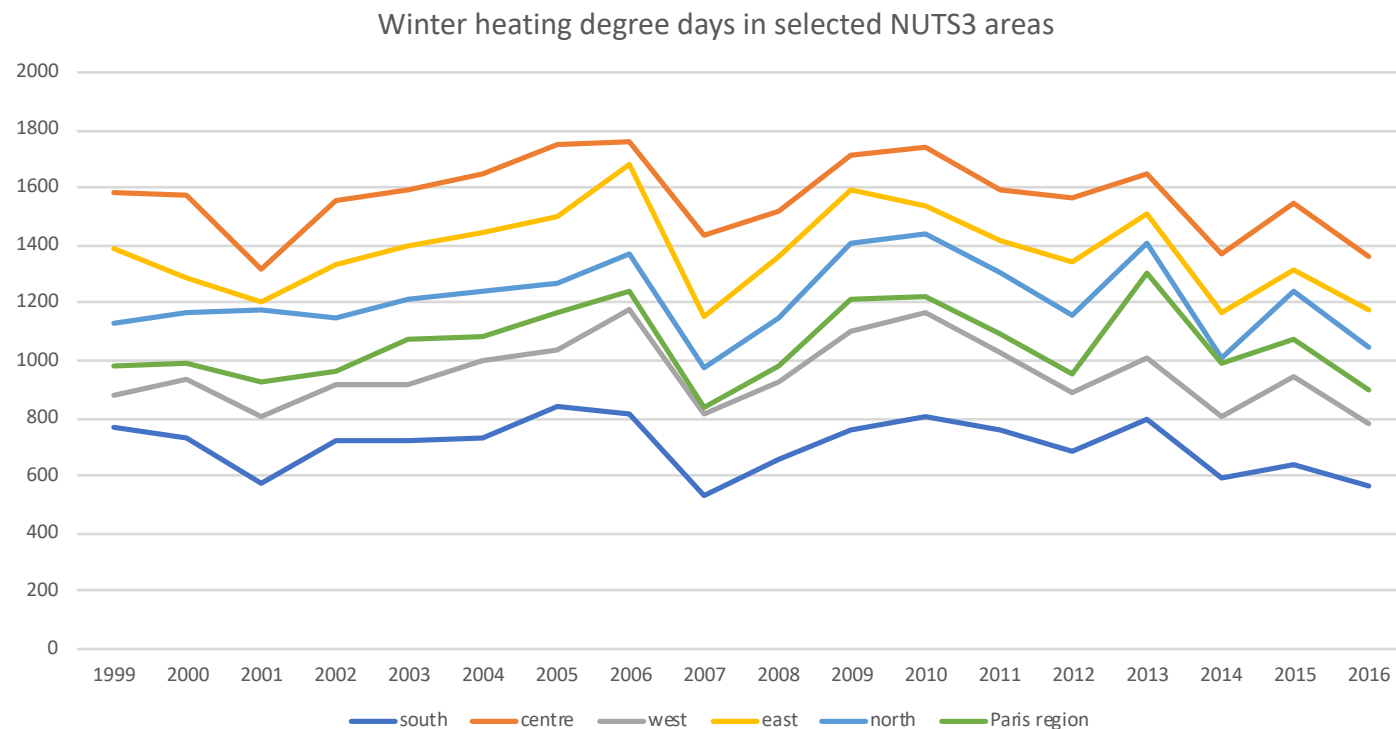
... which are the best available to compute proxies of structural characteristics of territories

Data description (1): territorial disparities of EWD



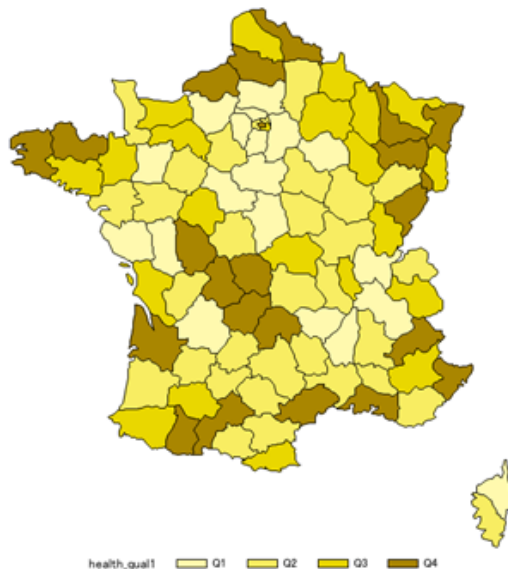
Average over the period: 15,5%
 σ between 3% and 6% per year

Data description (2): territorial disparities of heating degree days

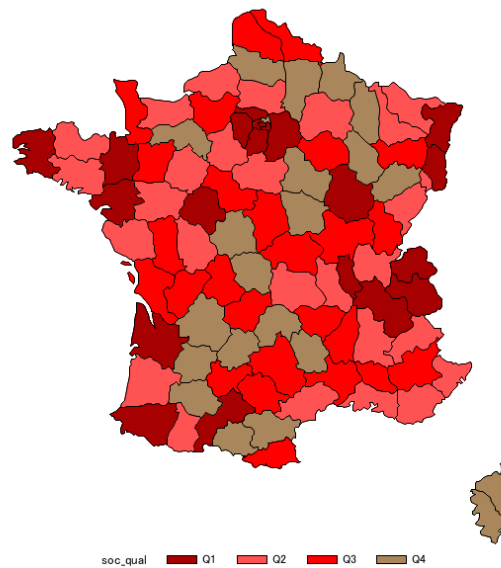


Data description (3): territorial disparities of composite vulnerability indexes

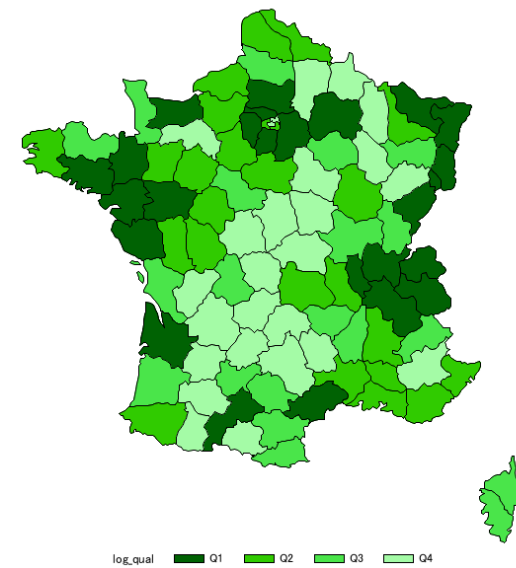
Access to health services index – 1998–2016 – NUTS3 level



Socio-economic vulnerability factors – 1998–2016 – NUTS3 level



Housing characteristics – 1998–2016 – NUTS3 level



VULNERABILITY IS HIGHER IN LIGHTER AREAS

Results (1)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Dependent variable: age adjusted EWDI						
HDD	0,000016 (***)		0,000014 (***)	0,000014 (***)	0,000016 (***)	0,000015 (***)
Influenza epidemics		0,00002 (***)	0,000021 (***)	0,000021 (***)	0,00002 (***)	0,000017 (***)
Access to health services			-0,00007 (**)			-0,00069 (**)
Socio-economics vulnerability factors				0,0002 (***)		0,00258 (**)
Housing characteristics					-0,0014 (***)	-0,00356 (**)
R2	0,04	0,13	0,16	0,16	0,19	0,23
Fisher	0,04	0,0004	0,0015	0,0015	0,003	0,0003

Results (2)

- Regression confirms the influence of heating degree days on excess winter mortality
- Access to health services, socio-economic vulnerability characteristics of territories and housing characteristics are significantly related to excess winter mortality
- Additional finding: two contiguous territories will not experience similar patterns of excess winter deaths (no spatial autocorrelation)

Discussion (1)

Our findings on French data reinforces the knowledge that structural determinants matter for seasonal mortality

We advocate the importance of additional analyses (cooling degree days) and we stress the need for more detailed data

In terms of **public policy**, we highlight

- the importance of **investing in improvement of the housing stock**
- that **targeting vulnerable populations** is one key element to address the mortality consequences of cold homes

Discussion (2)

Methodological and data availability problems

➤ Geographical level

NUTS3 level is at the same time too narrow (inavailability of data at that level on the French territory) and too broad (since it aggregates very different situations in terms of housing, social environments and climate)

➤ Use of EWD measure

EWD relies on cold season being between december and march

EWD is influenced by mortality in the non-winter season. At least, cooling degree days should be included

➤ Use of a single EWD measure over the whole period

Averaging over annual data cancels out possible long run evolutions of EWD, due to policy, changes in the indexes or even global warming

➤ Flaws of the housing characteristics index

Housing quality cannot be restricted to age and heating (insulation, damp, etc)

Indoor temperatures should be taken into account («cold homes»)

Measures of energy poverty should be included in the explanatory variables

Thank you!

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