ANALYSIS OF SPATIAL DATA IN EPIDEMIOLOGY

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GRUP DE RECERCA EN ESTADÍSTICA ECONOMETRIA I SALUT

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COURSE INTRODUCTION

1. Course introduction
2. Introduction to epidemiology and spatial statistics
3. Overview of mixed models
4. Overview of mixed models - Practicals
5. Introduction to INLA and R INLA
6. R INLA - Practicals

Wednesday 8

Friday 10

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COURSE INTRODUCTION

7. Disease mapping. Standardisation of incidence and mortality rates
8. Disease mapping. Smoothing standardised incidence and mortality rates
9. Disease mapping – Practicals
10. **Geographical association studies. Spatial ecological regression**
11. Spatial ecological regression - Practicals

Tuesday 14

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COURSE INTRODUCTION

12. Clustering
13. Extensions: BYM2, point processes, leaflet, pc priors
14. Extensions – Practicals

Thursday 16

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EPIDEMIOLOGY AND SPATIAL EPIDEMIOLOGY

Remember we said that it is in our interest to consider the spatial component:

- Because we are explicitly interested in the spatial pattern of the risk factor: **disease maps**
- Because it contains a large part of the non-observed confounding: **spatial regression**
- Because we observe agglomerations in the space: **cluster detection**
- Because we are interested in the effects of a pollutant source on the health of the residents in the surrounding area: **source identification**

SPATIAL ECOLOGICAL REGRESSION

The objective of **spatial ecological regression** is to examine how geographical variations in health response variables are related to geographical variations in the exposure of interest (for example, pollution).

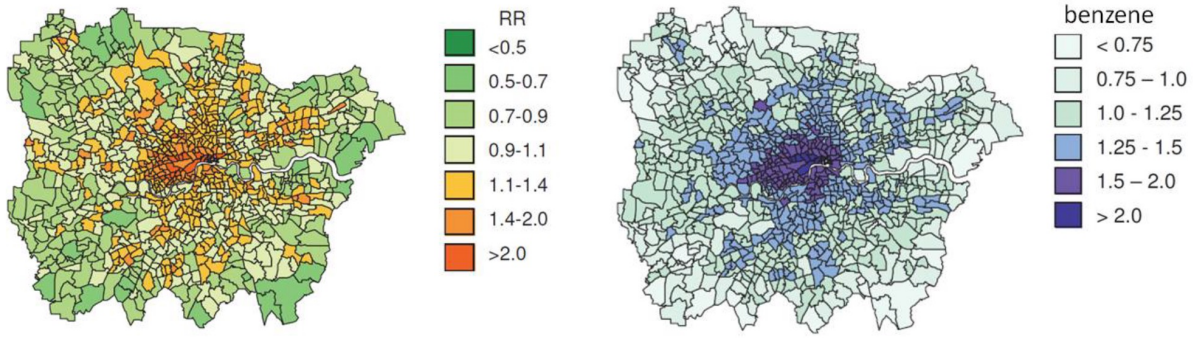
SPATIAL ECOLOGICAL REGRESSION

- Association between risk and exposure at the area level.
- It consists of introducing explanatory variables (that capture the geographical variations in the exposure of interest) in the hierarchical models used to smooth the mortality and/or incidence rates (BYM or log-Cox-Gaussian).
- In these models, we can control for other possible confounding factors by introducing them as additional explanatory variables.

SPATIAL ECOLOGICAL REGRESSION

Example: Leukaemia in children and benzene

Best et al, 2001, JRSSA

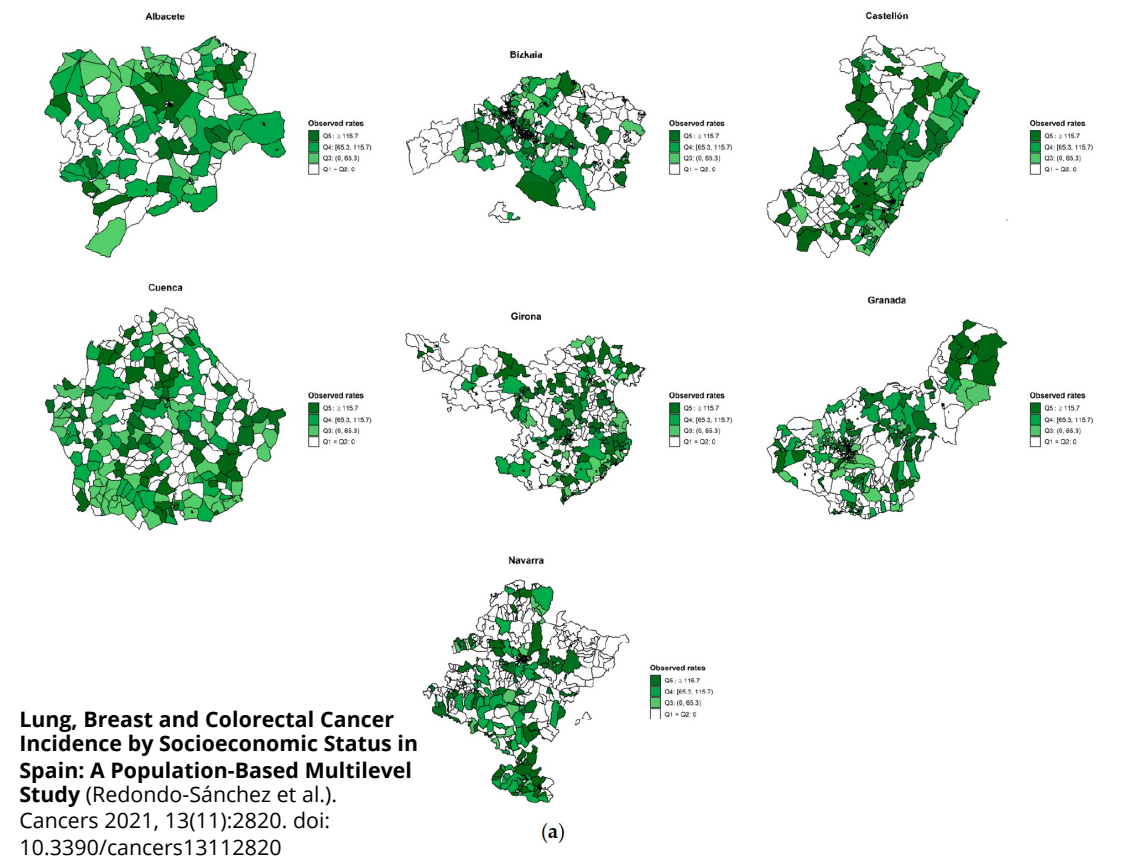


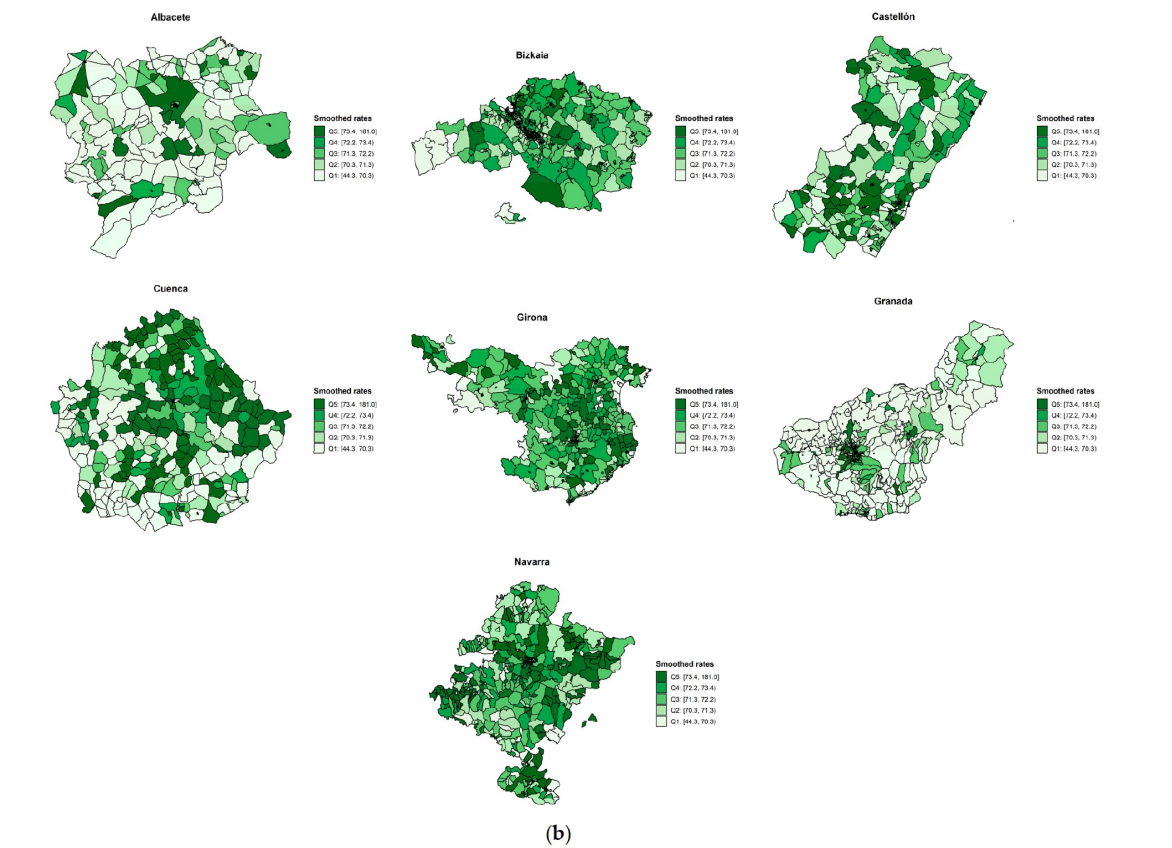
Small positive association found between average annual benzene emissions and risk of childhood leukaemia

SPATIAL ECOLOGICAL REGRESSION

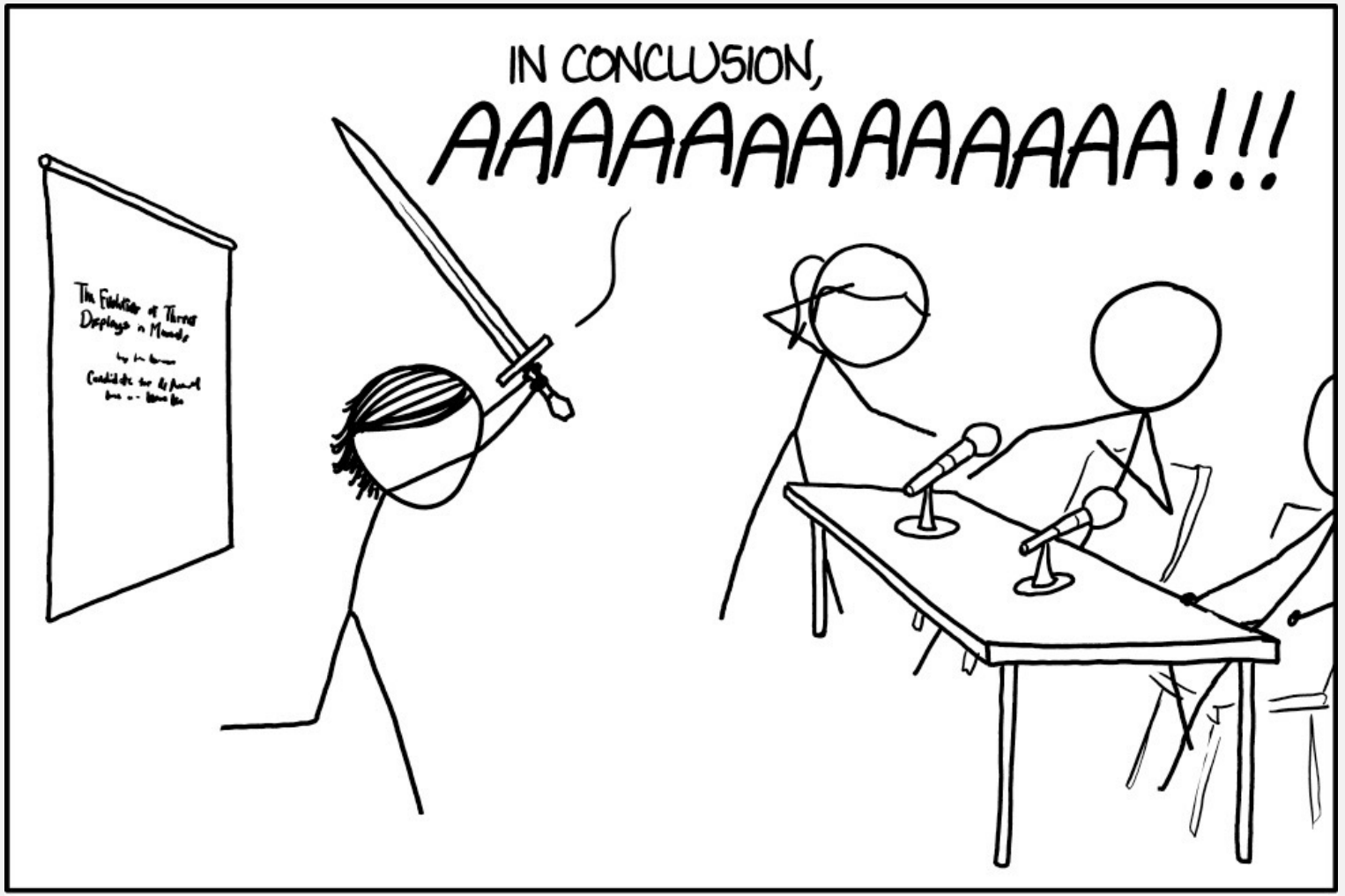
Example:

Figure 2. (**a**) Observed colorectal incidence rates and (**b**) smoothed cancer incidence rates adjusted for deprivation and age by census tract in seven Spanish provinces during the period 2010–2013.





Lung, Breast and Colorectal Cancer Incidence by Socioeconomic Status in Spain: A Population-Based Multilevel Study (Redondo-Sánchez et al.). Cancers 2021, 13(11):2820. doi: 10.3390/cancers13112820


IN CONCLUSION,
AAAAAAAAAAAAAAA!!!
THE BEST THESIS DEFENSE IS A GOOD THESIS OFFENSE.