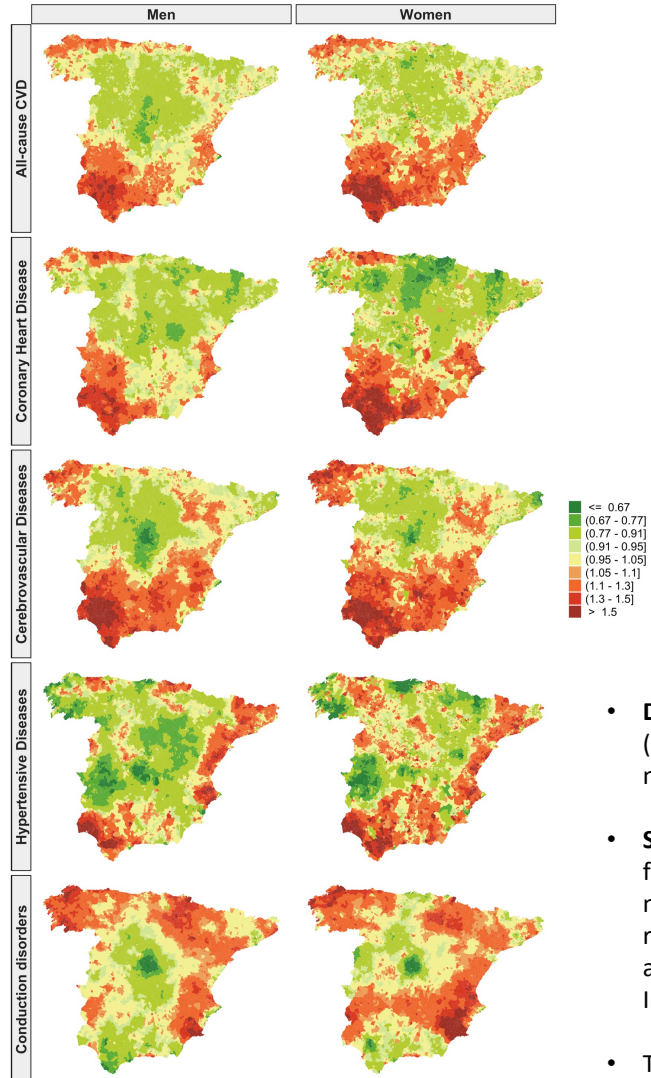
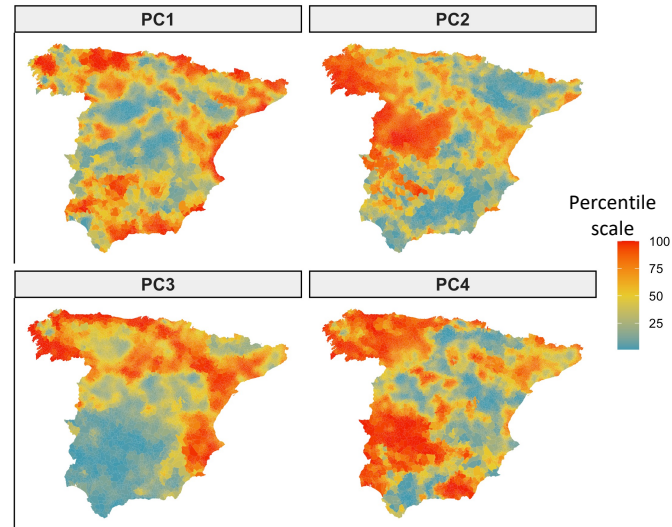


# Metal and metalloid levels in topsoil and municipal cardiovascular mortality in Spain

Municipal distribution of the smooth standardized mortality ratios (SMRs)



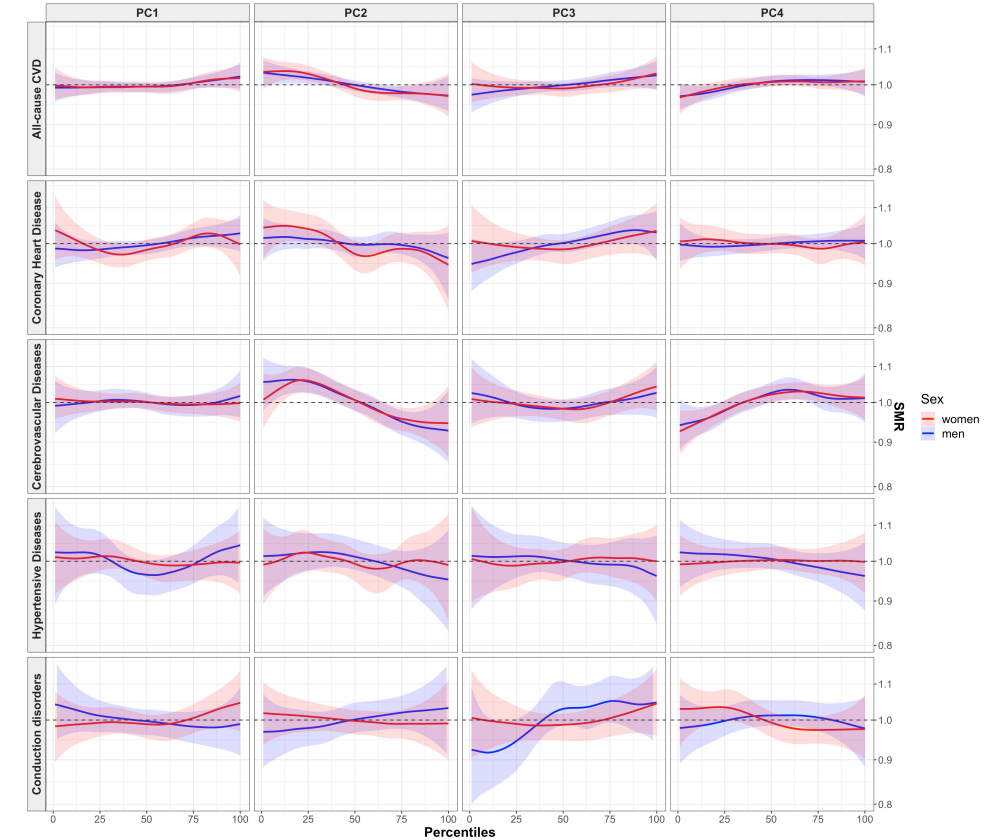
Municipal distribution of principal component scores of metals/metalloids topsoil levels.



PC1= As, Cd, Co, Cr, Cu, Fe, Mn, Mo, Ni, Pb, V and Zn; PC2= Al, Be, Tl and U; PC3= Se; PC4= Hg

- **Data:** Municipal cardiovascular mortality (Spanish Statistical Office (Instituto Nacional de Estadística – INE), 2010-2014). Metals and metalloids concentration in topsoil (Geochemical Atlas of Spain).
- **Statistical Analysis:** Bayesian Hierarchical Poisson Regression Models for mortality maps. Principal component analysis (PCA) of metal/metalloids. Bayesian models with penalized spline (second-order random walk) to model the dose-response curve (in percentile scale) associated to each principal component. Methods of Bayesian Inference: INLA.
- There is a geographical pattern in the distribution of municipal cardiovascular mortality and topsoil metals/metalloids levels.

Smooth standardized mortality ratios (SMRs) by percentiles of the PCs and sex



- At the lowest component scores range, PC2 (mainly reflecting Al, Be, Tl and U) was positively associated with coronary heart disease and cerebrovascular mortality in women and men.
- At medium/highest scores range, PC4 (mainly reflecting Hg) was positively associated with cerebrovascular mortality in men and women
- At the highest PC scores range, PC3 (reflecting Se), was positive associated with coronary heart disease mortality only in men.
- Strong suggestive positive association between all-cause CVD mortality and PC1 (partly reflecting metals such as Pb, As, Cu or Cd).