

## INTRODUCTION

Geographical differences in coronary heart disease (CHD) mortality have been described. Although, still, little is known about time and spatial trends of its occurrence.

## OBJECTIVE(S)

- To examine the spatial distribution of CHD hospital admissions from 1997 to 2008, in Continental Portugal.
- To explore possible explanations for the detected patterns based on classic cardiovascular risk factors and on the physical and socioeconomic environment.

## MATERIALS & METHODS

Hospital admissions due to CHD (International Codification of Diseases 9<sup>th</sup> revision – Clinical Modification (ICD9-CM) 410-414x and 429.2x) were obtained from the National Hospital Discharge Register (1997-2008).

Age-standardized hospitalization rates (ASHR) were computed by triennium, per municipality, for age groups 35-74 years.

Data about risk factors:

- Mean yearly temperature and precipitation
- Population Lifestyle and Health Status variables.
- Socioeconomic status (SES) – obtained by principal component analysis (PCA).

Spatial statistics methods were applied to smooth ASHR and identify statistically significant spatial clusters:

- Moran Index** (Global Index of Spatial Autocorrelation) and **LISA** (Local Index of Spatial Autocorrelation)

Results were overlaid with a map of climate regions and further explanations were explored applying multiple linear regression analysis.

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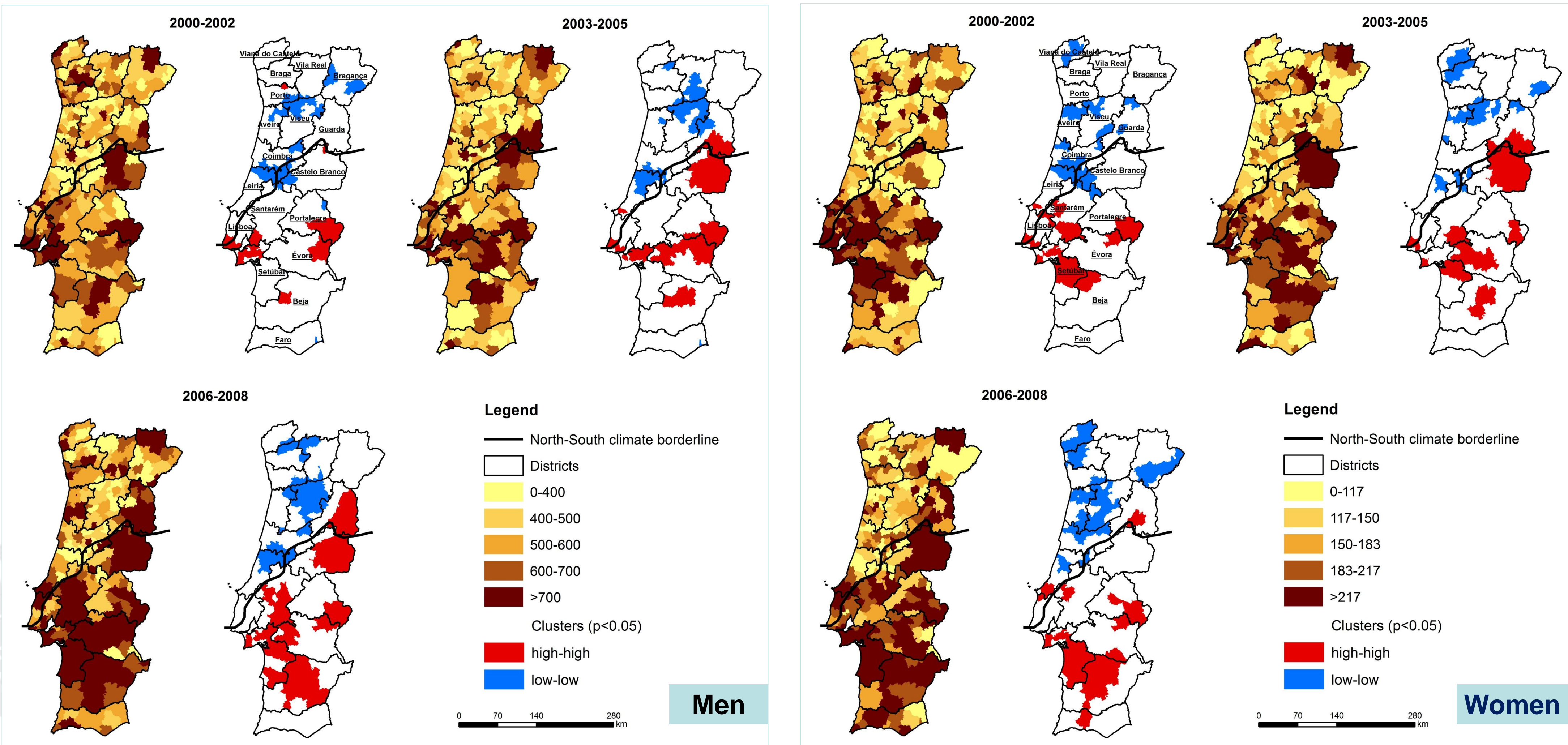
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# Areas of high risk of Coronary Heart Disease in a country of low incidence



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### CHD HOSPITALIZATION RATES AND SPATIAL CLUSTERS



RATE RATIO (RR) BETWEEN THE MUNICIPALITIES (HIGHEST:LOWEST) AND INDEX OF SPATIAL AUTOCORRELATION (I-MORAN)						
	2002-2002		2003-2005		2006-2008	
	RR	I-Moran	RR	I-Moran	RR	I-Moran
Men	5.2	+0.36	5.5	+0.33	4.1	+0.43
Women	9.7	+0.35	6.5	+0.33	5.5	+0.41

### MULTIPLE LINEAR REGRESSION - RATES VS. ENVIRONMENTAL/CARDIOVASCULAR RISK FACTORS

Dependent variable: ASHR Independent variable	2000-2002			2003-2005			2006-2008		
	Men	Women	All	Men	Women	All	Men	Women	All
Prevalence of hypertension	---	0.185 (0.001)	0.186 (0.003)	---	0.179 (0.001)	0.219 (0.001)	- 0.188 (0.009)	---	---
Prevalence of diabetes	---	---	---	0.134 (0.014)	---	---	0.143 (0.018)	0.149 (0.005)	0.206 ( $<0.001$ )
Prevalence of negative health self-perception	---	---	- 0.161 (0.037)	- 0.135 (0.039)	---	- 0.245 (0.001)	- 0.209 (0.006)	---	- 0.246 ( $<0.001$ )
Prevalence of overweight/obesity	---	---	---	---	---	---	---	---	---
Prevalence of heavy alcohol consumption	---	- 0.141 (0.053)	---	---	- 0.192 (0.007)	- 0.140 (0.059)	0.128 (0.079)	- 0.295 ( $<0.001$ )	---
Prevalence of sedentarism	---	0.141 (0.031)	0.116 (0.054)	---	---	---	- 0.166 (0.015)	0.144 (0.012)	- 0.179 ( $<0.001$ )
Prevalence of ex-smokers	---	0.146 (0.031)	---	---	0.138 (0.013)	---	---	---	---
Prevalence of smokers	---	---	---	---	---	---	---	---	---
Mean annual temperature	---	---	---	---	---	---	---	---	---
Mean annual precipitation	---	---	---	---	---	---	- 0.256 ( $<0.001$ )	- 0.171 (0.015)	- 0.292 ( $<0.001$ )
Socioeconomic status clusters	- 0.252 ( $<0.001$ )	- 0.218 (0.001)	- 0.227 (0.001)	- 0.229 ( $<0.001$ )	- 0.272 ( $<0.001$ )	- 0.162 (0.010)	- 0.134 (0.017)	---	---
Climate region	- 0.266 ( $<0.001$ )	- 0.224 (0.004)	- 0.242 ( $<0.001$ )	- 0.266 ( $<0.001$ )	- 0.219 (0.002)	- 0.270 ( $<0.001$ )	- 0.188 (0.014)	- 0.185 (0.010)	- 0.254 ( $<0.001$ )
Average distance to the nearest hospital	- 0.151 (0.027)	- 0.125 (0.065)	- 0.178 (0.007)	---	---	- 0.131 (0.039)	---	- 0.164 (0.002)	- 0.108 (0.031)
R <sup>2</sup> (%)	19.1	24.8	27.8	22.8	26.8	32.0	32.0	33.2	40.8

REGRESSION COEFFICIENTS (AND P-VALUES) FOR THE MULTIPLE LINEAR REGRESSION MODELS

Determinant factors were mainly environmental – climate and socioeconomic status – although prevalence of diabetes, as well as several other classic CVD risk factors, even if affecting differently men and women, were also strongly associated with CHD hospitalization rates.

## CONCLUSIONS

Accentuated geographic differences in ASHR were observed.

The Northeast-Southwest trend is coincident with the borderline of the two climate regions (the Atlantic North and the Mediterranean South).

Additionally, socioeconomic status and classic CVD risk factors, partially explained the geographic inequalities in CHD occurrence.