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Vieira da Silva, Manuela; Oliveira, Rui; Rodrigues, Matilde; Nunes, Mafalda;  
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**Scientific Area of Environmental Health of  
Allied Health Sciences School of Polytechnic Institute of Porto**

Rua de Valente Perfeito, 322  
4400-330 Vila Nova de Gaia  
Porto - Portugal  
t. +351 222 061 000  
f. +351 222 061 001  
e. geral@estsp.ipp.pt  
w. www.estsp.ipp.pt

# Geographic Information Systems in assessment of risk factors in cancer prevention planning

**Authors:** [Cristina Amil-Dias<sup>1</sup>](#), Paulo Veloso Gomes<sup>1</sup>

*<sup>1</sup> Allied Health Sciences School of Polytechnic Institute of Porto, Portugal*

**Presenting Author:** Email: [avd@estsp.ipp.pt](mailto:avd@estsp.ipp.pt) | Tel.: +351 919 386 493 | Fax : + 351 222 061 001

## **INTRODUCTION:**

Between 2002 and 2012 almost 24% of deaths registered in Portugal originated from malignant diseases (INE, 2014).

According to the International Agency for Research on Cancer in the coming years as a consequence of demographic evolution and exposure to risk factors, the incidence of oncology diseases is expected to increase. According to the WHO (2005) it is expected that 40% of cancer might be avoided if the main risk factors could be modified. The Implementation of preventive measures, most of low cost but poorly applied, depends on systematic evaluation of national risk factors (WHO, 2007).

## **OBJECTIVES:**

This work presents a model of crossing information about incidence of cancer and risk factors using Geographic Information Systems.

## **MATERIALS AND METHODS:**

This work proposes an experimental model of geographic mapping of data crossing information related to risk factors and geographic prevalence of oncologic disease.

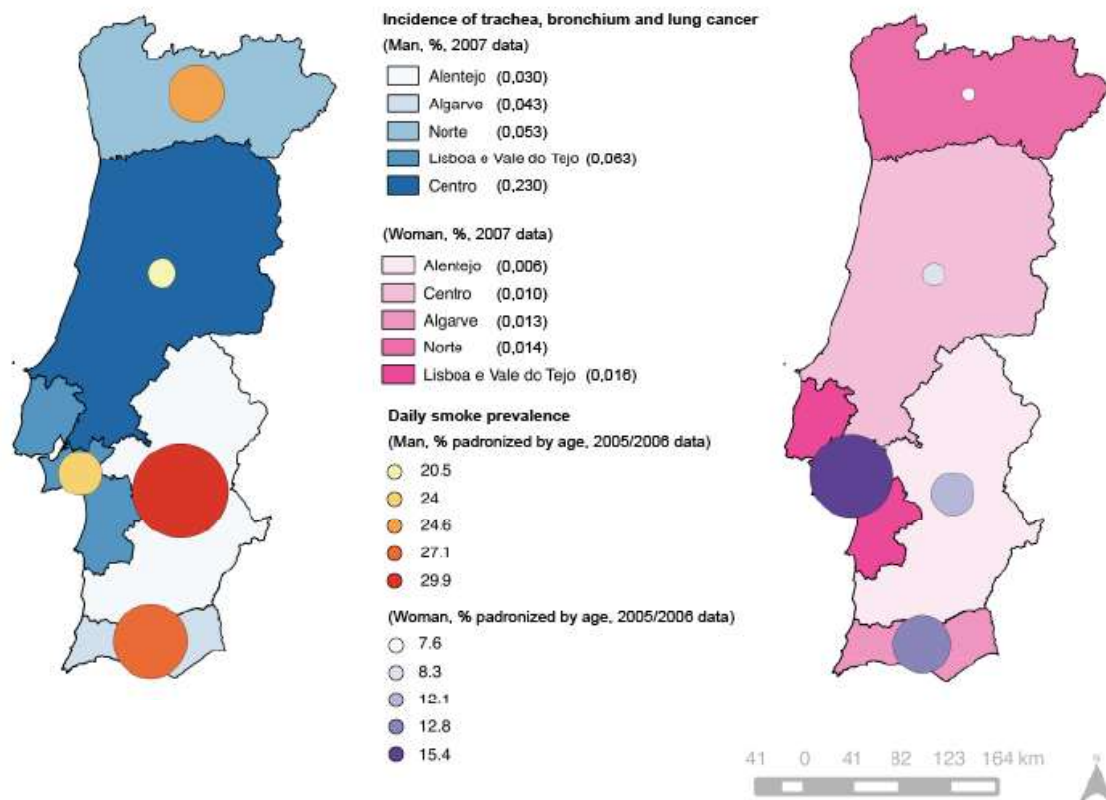
## **RESULTS AND DISCUSSION:**

Several risk factors have been identified as potential causes for neoplasia, namely smoking habits, consumption of alcohol, overweight/obesity, prolonged physical inactivity, dietary habits, hepatitis B virus, Human papiloma virus, environmental pollution and exposure to radiation, among others.

The importance of knowledge of the location of patterns of cancer is well known for the implementation of national health policies (Registo Oncológico Regional do Norte, 2013), but this analysis has not been yet crossed with local risk factors.

Crossing information of geographic distribution of cancer with that of risk factors is quite essential to define the appropriate strategic policies in Public Health. This planning depends on the existence and monitoring of complex population data, that must include smoking habits, alcohol consumption and timing of those data related to each factor on one hand and the prevalence of cancer on the other for a given region.

The value of crossing information in infectious conditions is well known, but for chronic diseases and cancer in particular it has a very relevant role to forecast epidemiologic evolution of those diseases. This process may allow planning and intervention to identify individual factors that may explain variations in the expected epidemiology and evolution of the disease.



**Figure 1** - Geographic distribution of the incidence of trachea, bronchial and lung cancer (% , 2007) and daily smoke prevalence (padronized % , 2005/2006), by gender in Portugal

The figure shows superimposed geographic epidemiological data of 3 variables on a reference map related to the incidence of trachea, bronchium and lung cancer (2007 data), daily smoke prevalence (2006 data) and gender. These data are provided as an example and show how geographical co-location may be used to identify potential areas of interest for subsequent individual analysis of risk factors, as well as a tool to compare risk factors in countries with the same cancer incidence or drastic difference. This type of evaluation maybe regarded as a first line of data mining in the epidemiological studies of disease.

## CONCLUSION:

The model of multifactorial co-location may help identifying clusters of oncology disease, guiding strategic measures of health promotion and screening in areas of higher risk.

This type of analysis may bring additional value in research and identification of potential risks poorly characterised for hotspots of incidence above expected values for a specific region.

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