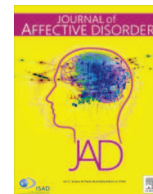




Contents lists available at ScienceDirect

Journal of Affective Disorders

journal homepage: [www.elsevier.com/locate/jad](http://www.elsevier.com/locate/jad)

## Research paper

# A multi-level analysis of the relationship between spatial clusters of outpatient-treated depression, risk factors and mental health service planning in Catalonia (Spain)



María Luisa Rodero-Cosano<sup>a,\*</sup>, José A. Salinas-Pérez<sup>a</sup>, Juan Luis González-Caballero<sup>b</sup>, Carlos R. García-Alonso<sup>a</sup>, Carolina Lagares-Franco<sup>b</sup>, Luis Salvador-Carulla<sup>c</sup>

<sup>a</sup> Department of Mathematics and Engineering, Universidad Loyola Andalucía, Sevilla and Córdoba, Spain

<sup>b</sup> Department of Statistics and Operational Research, University of Cadiz, Cádiz, Spain

<sup>c</sup> Mental Health Policy Unit, Brain & Mind Research Institute, the University of Sydney, Sydney, Australia

## ARTICLE INFO

## Article history:

Received 3 September 2015

Received in revised form

31 March 2016

Accepted 16 April 2016

Available online 27 April 2016

## Keywords:

Depression

Spatial clustering

Multilevel model

Health planning

Risk factors

## ABSTRACT

**Background:** Previous research identified high/low clusters of prevalence of outpatient-treated depression at municipal level in Catalonia (Spain). This study aims to analyse potential risk factors, both socioeconomic and related to the mental health service planning, which could influence the occurrence of hot/cold spots of depressed outpatients at two geographical levels: municipalities and service catchment areas.

**Method:** Hot/cold spots were examined in relation to socioeconomic indicators at municipal level, such as population density, unemployment, university education, personal income, and also those related to service planning at catchment area level, such as adequacy of healthcare, urbanicity, accessibility and the availability of mental health community centres. The analysis has been carried out through multilevel logistic regression models in order to consider the two different scales.

**Results:** Hot spots are related to high population density, unemployment, urbanicity, the adequacy of provision of mental health services, and accessibility to mental health community centres at both study levels. On the other hand, the multilevel model weakly explains cold spots, associating them with high personal incomes.

**Limitations:** The dependent variables of the multi-level models are binary. This limits the interpretation of the results, since they cannot provide information about the variance of the dependent variables explained by the models.

**Conclusions:** The results described diverse risk factors at two levels which are related to a high likelihood of hot and cold spots of depression. The findings show the relevance of health planning in the distribution of diseases and the utilisation of healthcare services.

© 2016 Elsevier B.V. All rights reserved.

## 1. Introduction

There are not many studies on the geographical clustering of depression cases, although this disease is one of the most common mental health disorders according to the literature. The European Study of the Epidemiology of Mental Disorders (ESEMeD) project stated that around 13% of the population reported a lifetime

history of major depressive disorder in a large sample from six European countries (Alonso et al., 2004). Furthermore, mood disorders were found as the second most frequent group of mental disorders and the first contributor to the burden of disease in Europe in a systematic literature review and meta-analysis on 25 studies (Wittchen et al., 2011). In Spain, the ESEMeD group calculated the major depression lifetime prevalence to be 10.6%, which is a low value in comparison with other Western countries (Gabilondo et al., 2010).

Spatial patterns of depressed outpatients were analysed in Spain in previous research. A Multi-Objective Evolutionary Algorithm (MOEA), especially designed for solving multi-objective spatial problems (García-Alonso et al., 2010), was used to identify clusters of treated prevalence of depression in outpatient Mental Health Community Centres (MHCC) at municipality level in

\* Corresponding author.

E-mail addresses: [mlrodero@uloyola.es](mailto:mlrodero@uloyola.es) (M.L. Rodero-Cosano), [jsalinas@uloyola.es](mailto:jsalinas@uloyola.es) (J.A. Salinas-Pérez), [juanluis.gonzalez@uca.es](mailto:juanluis.gonzalez@uca.es) (J.L. González-Caballero), [cgarcia@uloyola.es](mailto:cgarcia@uloyola.es) (C.R. García-Alonso), [carolina.lagares@uca.es](mailto:carolina.lagares@uca.es) (C. Lagares-Franco), [luis.salvador-carulla@sydney.edu.au](mailto:luis.salvador-carulla@sydney.edu.au) (L. Salvador-Carulla).