REVSTAT-STATISTICAL JOURNAL

This Volume of **REVSTAT: Volume 13, No. 1 - March 2015**, is about **"Spatial-temporal Models in Epidemiology and Health "**. It presents the following scientific articles:

ASSESSING THE EVOLUTION OF TERRITORIAL DISPARITIES IN HEALTH
Authors*: Daniela Cocchi, Fedele Greco* and *Francesco Scalone.*

ON PREDICTING CANCER MORTALITY USING ANOVA-TYPE P-SPLINE MODELS
Authors*: Jaione Etxeberria, María Dolores Ugarte, Tomás Goicoa* and *Ana F. Militino.*

STATISTICAL METHODS FOR DETECTING THE ONSET OF INFLUENZA OUTBREAKS: A REVIEW
Authors: *Rubén Amorós, David Conesa, Miguel Angel Martinez-Beneito* and *Antonio López-Quílez.*

LONGITUDINAL ANALYSIS OF TUMOR MARKER CEA OF BREAST CANCER PATIENTS FROM BRAGA'S HOSPITAL
Authors: *Ana Borges, Inês Sousa* and *Luís Castro.*

ALCOHOL ABUSE DISORDER PREVALENCE AND ITS DISTRIBUTION ACROSS PORTUGAL. A DISEASE MAPPING APPROACH
Authors*: Helena Baptista, Jorge M. Mendes, José Caldas de Almeida* and *Miguel Xavier.*
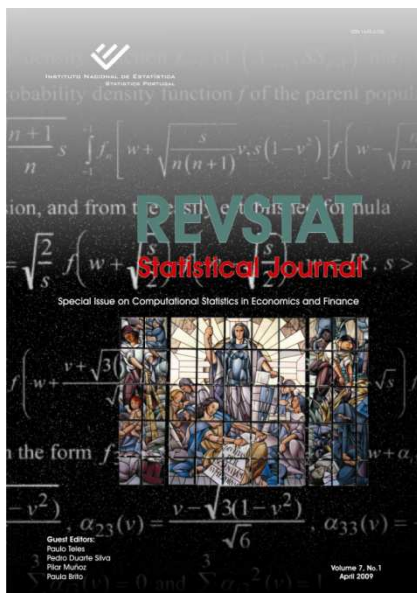
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This Volume of **REVSTAT: Volume 13, No. 1 - March 2015**, includes five articles. Their abstracts are presented below:

ASSESSING THE EVOLUTION OF TERRITORIAL DISPARITIES IN HEALTH

Authors: *Daniela Cocchi, Fedele Greco* and *Francesco Scalone.*

The paper investigates spatio-temporal trends in health disparities through an empirical example. We deal with geographical health pattern in Italy from 1991 to 2010, starting from infant mortality data available at the provincial level and assessing the existent disparity among macro-regions (the conventional Northern, Central and Southern macro-regions). After a discussion concerning suitable inequality indices and their decompositions when dealing with small area data, we propose a model-based approach that allows to properly tackle sampling variability. Results give evidences of persisting spatial disparity in infant mortality along time.

ON PREDICTING CANCER MORTALITY USING ANOVA-TYPE P-SPLINE MODELS

Authors: *Jaione Etxeberria, María Dolores Ugarte, Tomás Goicoa* and *Ana F. Militino.*

Extrapolating cancer mortality trends can be very valuable as a tool to predict cancer burden. National Health Agencies use different models to figure out future evolution of cancer, but they mainly work at national level. However, developed countries are divided into different regions with their own governments and health care systems, and this should be taken into account. In this paper, an ANOVA-type P-spline model is considered to predict the number of mortality cases in forthcoming years in regions within a country. The model is very interesting as it allows to split the predictions into components representing region-specific features and characteristics common to the whole country. Prediction variability is also calculated to provide prediction intervals. Real data on cancer mortality are used for illustration.

STATISTICAL METHODS FOR DETECTING THE ONSET OF INFLUENZA OUTBREAKS: A REVIEW

Authors: *Rubén Amorós, David Conesa, Miguel Angel Martinez-Beneito* and *Antonio López-Quílez.*

This paper reviews different approaches for determining the epidemic period from influenza surveillance data. In the first approach, the process of differenced incidence rates is modeled either with a first-order autoregressive process or with a Gaussian white noise process depending on whether the system is in an epidemic or a non-epidemic phase. The second approach allows us to directly model the process of the observed cases via a Bayesian hierarchical Poisson model with Gaussian incidence rates whose parameters are modeled differently, depending on the epidemic phase of the system. In both cases transitions between both phases are modeled with a hidden Markov switching model over the epidemic state. Bayesian inference is carried out and both models provide the probability of being in epidemic state at any given moment. A comparison of both methodologies with previous approaches in terms of sensitivity, specificity and timeliness is also performed. Finally, we also review a web-based client application which implements the first methodology for obtaining the posterior probability of being in an epidemic phase.

LONGITUDINAL ANALYSIS OF TUMOR MARKER CEA OF BREAST CANCER PATIENTS FROM BRAGA'S HOSPITAL

Authors: *Ana Borges, Inês Sousa* and *Luís Castro.*

Allied to an epidemiological study of population of the Senology Unit of Braga's Hospital that have been diagnosed with malignant breast cancer, we describe the progression in time of repeated measurements of tumor marker Carcinoembryonic antigen (CEA). Our main purpose is to describe the progression of this tumor marker as a function of possible risk factors and, hence, to understand how these risk factors influences that progression. The response variable, values of CEA, was analyzed making use of longitudinal models, testing for different correlation structures. The same covariates used in a previous survival analysis were considered in the longitudinal model. The reference time used was time from diagnose until death from breast cancer. For diagnostic of the models fitted we have used empirical and theoretical variograms. To evaluate the fixed term of the longitudinal model we have tested for a changing point on the effect of time on the tumor marker progression. A longitudinal model was also fitted only to the subset of patients that died from breast cancer, using the reference time as time from date of death until blood test.

ALCOHOL ABUSE DISORDER PREVALENCE AND ITS DISTRIBUTION ACROSS PORTUGAL. A DISEASE MAPPING APPROACH

Authors: *Helena Baptista, Jorge M. Mendes, José Caldas de Almeida* and *Miguel Xavier*.

Disease mapping is linked to two other scientific areas: small area estimation and ecological-spatial regression. This paper reviews similarities and differences among them. Bayesian hierarchical models are typically used in this context, using a combination of covariate data and a set of spatial random effects to represent the risk surface. The random effects are typically modeled by a conditional autoregressive prior distribution, and a number of alternative specifications have been proposed in the literature. The four models assessed here are applied to a study on alcohol abuse in Portugal, using data collected by the World Mental Health Survey Initiative.

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