

# Generalized linear model spatio-temporal for the bovine brucellosis in Colombia

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Brucellosis is an infectious disease that occurs primarily in bovines among other species like goats, sheep, horses and pigs. These latter animals usually do not show symptoms. In this work, we developed a complete analysis for count data with excess of zeros applied on a sample of domestic animals that inhabit Colombia, different from cattle and buffaloes. The study is regarded to the presence of the disease in departmental areas, as well as, a temporal evolution of it during a period of seven years (2006-2012), and its relationship with different variables that influence a disease exposure such as: the introduction of animal husbandry practices and epidemiological surveillance. We propose three different models to address the problem: (i) a generalized linear model, (ii) a generalized linear model with spatial correlation, and (iii) a generalized linear model for spatio-temporal count variable with excess of zeros. The possibility to test the fixed effect specification against the random effect specification of the panel data model is extended to include space-time error autocorrelation or a space-time lagged dependent variable. Space-time generalized estimating equations (GEE) is used to estimate the spatio-temporal parameters in the model. We also present a measure of goodness-of-fit, and show the pseudo-best linear unbiased predictor for prediction purposes. In addition, we applied the AIC and BIC criteria with the finality to assess the best model to fit our response variable. Finally, we found that a negative binomial distribution using the generalized linear model with a spatio-temporal correlation fit adequately the bovine brucellosis in other species.

**Keywords:** Zero-inflated spatio-temporal, Binomial Negative spatio-temporal, Bovine Brucellosis