

## Influence of Atmospheric Pollutants on Child Respiratory Disease in Cartagena De Indias, Colombia

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**Abstract :** Up to five statistical pre-processings have been carried out considering the pollutant records of the stations present in Cartagena de Indias, Colombia, also taking into account the childhood asthma incidence surveys conducted in hospitals in the city by the Health Ministry of Colombia for this study. These pre-processings have consisted of different techniques such as the determination of the quality of data collection, determination of the quality of the registration network, identification and debugging of errors in data collection, completion of missing data and purified data, as well as the improvement of the time scale of records. The characterization of the quality of the data has been conducted by means of density analysis of the pollutant registration stations using ArcGis Software and through mass balance techniques, making it possible to determine inconsistencies in the records relating the registration data between stations following the linear regression. The results obtained in this process have highlighted the positive quality in the pollutant registration process. Consequently, debugging of errors has allowed us to identify certain data as statistically non-significant in the incidence and series of contamination. This data, together with certain missing records in the series recorded by the measuring stations, have been completed by statistical imputation equations. Following the application of these prior processes, the basic series of incidence data for respiratory disease and pollutant records have allowed the characterization of the influence of pollutants on respiratory diseases such as, for example, childhood asthma. This characterization has been carried out using statistical correlation methods, including visual correlation, simple linear regression correlation and spectral analysis with PAST Software which identifies maximum periodicity cycles and minimums under the formula of the Lomb periodogram. In relation to part of the results obtained, up to eleven maximums and minimums considered contemporary between the incidence records and the particles have been identified taking into account the visual comparison. The spectral analyses that have been performed on the incidence and the PM2.5 have returned a series of similar maximum periods in both registers, which are at a maximum during a period of one year and another every 25 days (0.9 and 0.07 years). The bivariate analysis has managed to characterize the variable "Daily Vehicular Flow" in the ninth position of importance of a total of 55 variables. However, the statistical correlation has not obtained a favorable result, having obtained a low value of the R2 coefficient. The series of analyses conducted has demonstrated the importance of the influence of pollutants such as PM2.5 in the development of childhood asthma in Cartagena. The quantification of the influence of the variables has been able to determine that there is a 56% probability of dependence between PM2.5 and childhood respiratory asthma in Cartagena. Considering this justification, the study could be completed through the application of the BenMap Software, throwing a series of spatial results of interpolated values of the pollutant contamination records that exceeded the established legal limits (represented by homogeneous units up to the neighborhood level) and results of the impact on the exacerbation of pediatric asthma. As a final result, an economic estimate (in Colombian Pesos) of the monthly and individual savings derived from the percentage reduction of the influence of pollutants in relation to visits to the Hospital Emergency Room due to asthma exacerbation in pediatric patients has been granted.

**Keywords :** Asthma Incidence, BenMap, PM2.5, Statistical Analysis

**Conference Title :** ICMAUQAQ 2020 : International Conference on Methods for Assessing Urban Air Quality

**Conference Location :** Dubai, United Arab Emirates

**Conference Dates :** March 19-20, 2020