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IMPACTS OF CLIMATE VARIABILITY ON RESPIRATORY MORBIDITY.

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PROBLEM SITUATION

- DAR = f (meteorological variables, pollutants, social conditions, public policies)

Problem Situation

- climatic variations
- Increase of pollutants
- Variation in rates of human thermal comfort

- Number of admissions for respiratory diseases

There is a relationship between climatic parameters and hospitalization for respiratory diseases in Campo Grande, MS?

The main pollutants monitored by environmental protection agencies in urban areas, their sources, area of action in the respiratory system and effects on human health

- Particulate matter, particulate matter, O_3, NO_x, SO_2, CO.

- O_3- is not emitted directly into the atmosphere. Its formation occurs through complex chemical reactions between volatile organic compounds (VOCs) and oxides of nitrogen atoms (NO_x) in the presence of sunlight. Sunlight and temperature stimulate such reactions, so that on sunny and hot days, peak concentrations of ozone occur. Sources of NO_x and VOC emissions are vehicles, chemical industries, laundries and activities that use solvents.
- Affect trachea, bronchi, bronchioles and alveoli.
- It is a photochemical oxidant and very irritant. Causes inflammation of the respiratory tract mucosa. At high concentrations irritates the eyes, nasal mucosa and the oropharynx. Causes coughing and chest discomfort. Exposure for several hours leads to injury in the epithelial tissue lining the airways. Causes inflammation of the airways to stimuli such as cold and exercise.

AIR QUALITY AND HEALTH

- PATHOLOGICAL EFFECTS AND BIOLOGICAL MARKERS OF POLLUTANTS ;
- INCREASED MORTALITY CARDIO - RESPIRATORY ;
- INCREASED USE OF HEALTH SERVICES ;
- INCREASED INCIDENCE OF SYMPTOMS AND RESPIRATORY DISEASES ;
- INCREASED FREQUENCY asthma exacerbations ;
- DECREASE THE PARAMETERS OF RESPIRATORY FUNCTION ;
- PULMONARY INFLAMMATION AND DETERIORATION OF DEFENSE MECHANISMS.

RESEARCH GROUPS IN BRAZIL

- FEDERAL UNIVERSITY MATO GROSSO DO SUL
- FEDERAL UNIVERSITY PARANA;
- STATE UNIVERSITY MATO GROSSO ;
- FIOCRUZ-RIO DE JANEIRO ;
- USP-SP ;
- UNICAMP

Objective

- **General**
- assess relationships between environmental variables (pollutants, meteorological variables, indices of human thermal comfort) and number of hospital admissions for respiratory diseases in Campo Grande, MS.
- **Specific**
- describe hospitalizations;
- verify that the "lag" estimated time series of physical parameters and number of hospitalizations for respiratory diseases;
- estimate the relative risk and the increase of admissions using a Poisson regression model, including estimating the "lag";
- create a predictive model to estimate daily admissions for respiratory from pollutants and diseases biometeorological indices.

Justification of Topic

- Opportune = knowledge of the relationship between the parameters and the number of hospital admissions due to respiratory diseases.
- Important =to be able to be able to predict hospitalizations from climate and ozone variations.
- Current = create a statistical model that reflects well the effects of meteorological variables, CTH indices.
- viable existence of databases of the city of Campo Grande - MS, 2008-2011.

Methodology

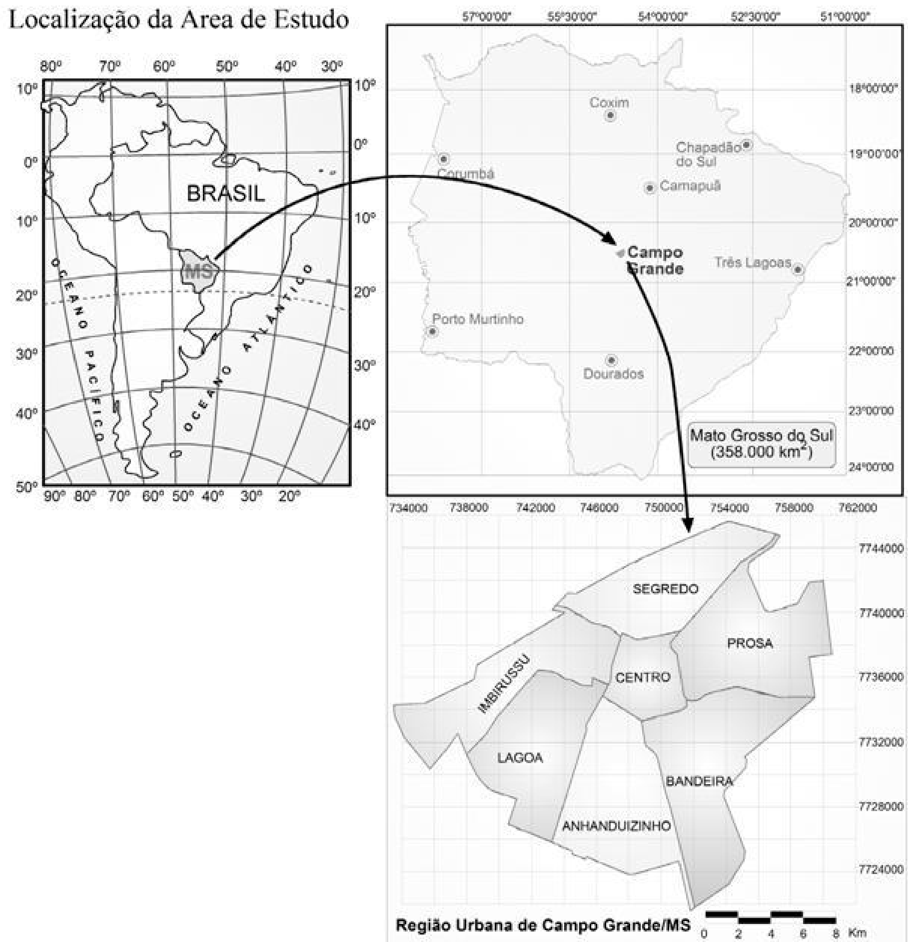
1-Local studied: Campo Grande – MS, Brazil.

2-Study population: patients treated in Campo Grande for respiratory diseases, age group (0-4 years, 5-60 years,> 60 years) in the years 2008-2011 in all public and private hospitals that cater for SUS.

3-Meteorological data: minimum, average and maximum air temperature, relative humidity, wind speed, precipitation obtained from the meteorological station of EMBRAPA-BEEF CATTLE.

4-Measures the concentration of the pollutant ozone (O3) collected daily nonstop 24 hours a day every 15 minutes by the Institute of Physics of the UFMS monitoring station. Calculating the arithmetic average per day.

Local studied: Campo Grande – MS, Brazil.



Methodology

Phases:

1) Descriptive analysis of the variables under study
Minimum and maximum air temperature, relative humidity, precipitation, wind speed, indices of human thermal comfort, concentration of O3 and No. of admissions for diseases of the airways.

2) Calculation of "lags" lag Respiratory diseases usually have lag in relation to the individual's exposure to pollutants and climatic agents.

3) Calculation of the correlation matrix

Obtaining the correlation matrix for the study variables with their respective "lags" to set the entry of these variables in the model according to the degree of statistical significance and check for collinearity among the independent variables.

Methodology

4) Modeling via Generalized Linear Models (GLM) of univariate Poisson regression models for the selection of meteorological variables that were significant (p-value <0.25) for these then go into multiple models.

Multiple Poisson regression models being: dependent variable: Number of hospitalizations.
independent variables: meteorological variables (wind speed, and precipitation indices CTH).

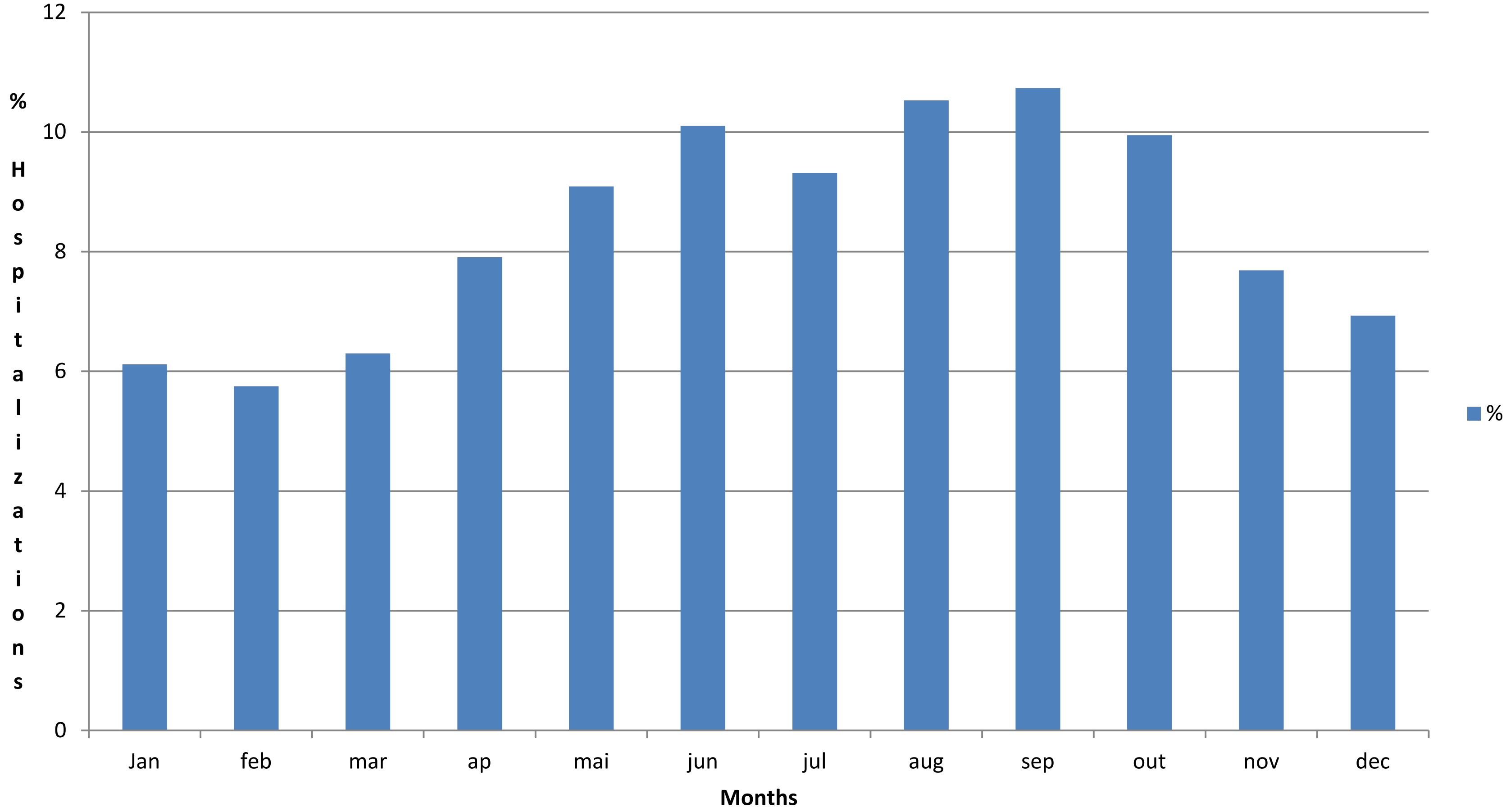
explanatory variables: day of week, holidays and year (used to control the seasonality of short and long term)

5) Calculation of RR (relative risk) using the parameters estimated by the model chosen.

Descriptions of the variables of admissions of respiratory diseases by age group

Descriptions of the variables of admissions of respiratory diseases (DAR).							
Variable.	average	DP	Variânce	Minimum	Median	Maximum	hospitalizations
DAR Total (all ages)	10.54	3.3	10.86	2	10	23	26941
0-4 years	5.06	1.75	3.05	1	5	13	12945
5-60 years	2.67	1.21	1.47	0	2	8	6835
> 60 years	2.8	1.07	1.14	0	3	7	7160

Percentage of average monthly frequency of respiratory morbidity (DAR) in the years 2008-2011



Daily averages of admissions cataloged in the International Coding of Diseases (CID 9th and 10th revisions) and respiratory diseases (460-496 and J00-J99)

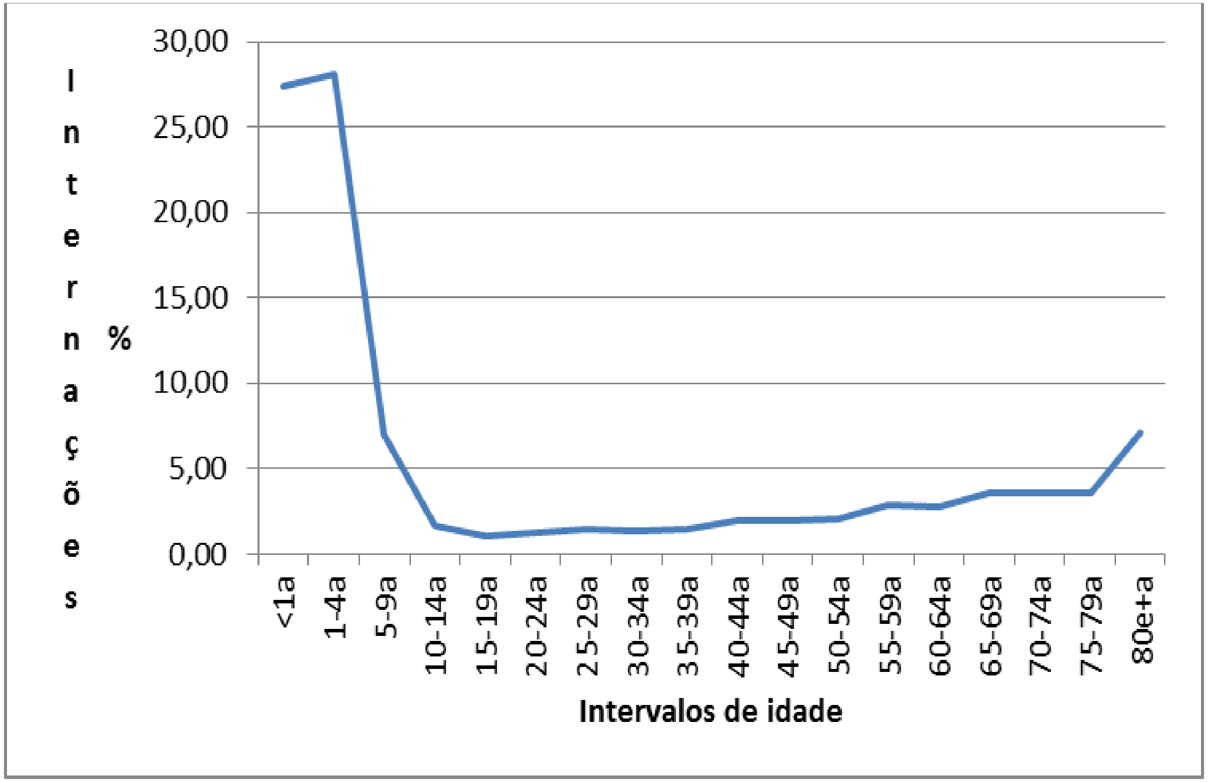
- influenza (flu) and pneumonia (480-487 and J10-J18) representing 52.3% of total admissions;

- chronic bronchitis, simple bronchitis and muco-purulent, emphysema, asthma, status asthmaticus and bronchiectasis (J40-J47 and 490-496) with 19.3%;

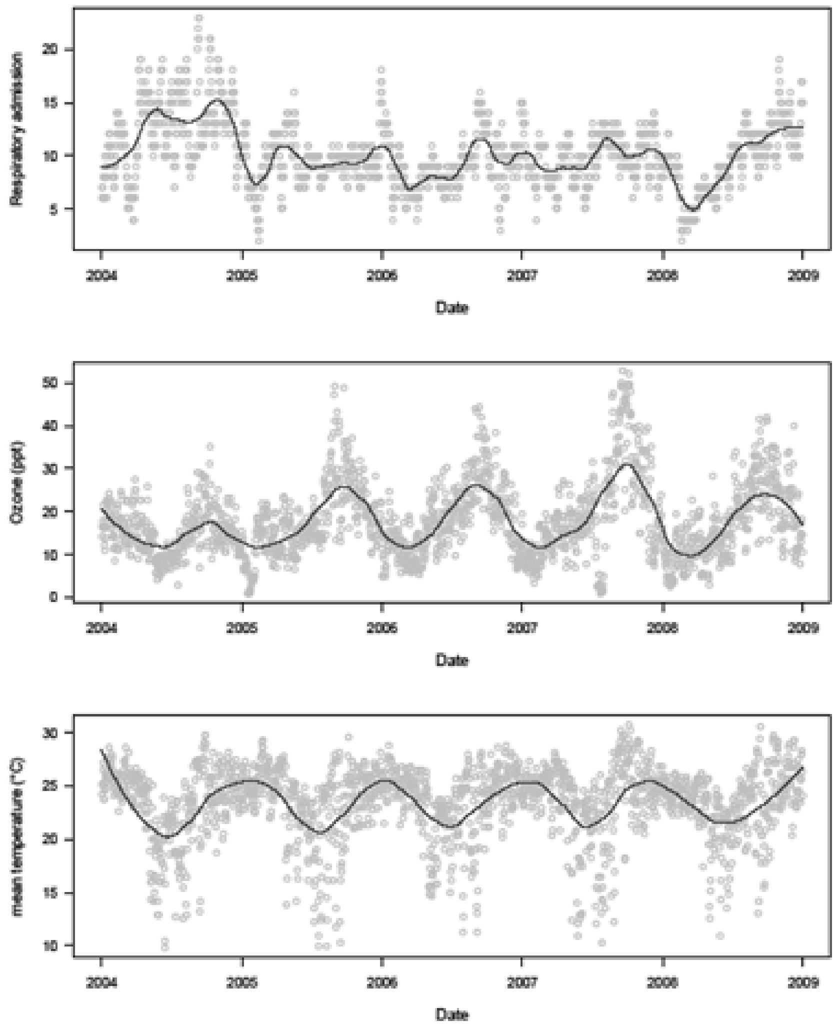
Vasomotor and allergic rhinitis, rhinitis, nasopharyngitis and chronic pharyngitis, chronic sinusitis, nasal polyps, and other disorders of the nose and paranasal sinuses, chronic diseases of tonsils and adenoids, and chronic laryngitis laryngo-tracheitis (470-478 and J30-J39) with 11.3%;

acute bronchitis and bronchiolitis (466 and J20-J22) of 6%; Acute nasopharyngitis (common cold), sinusitis, pharyngitis, tonsillitis, laryngitis, obstructive laryngitis, epiglottitis and tracheitis (J00-J06 and 460-465) with 4.3%.

Percentage average number of admissions for respiratory diseases according to age in the period 2008-2011



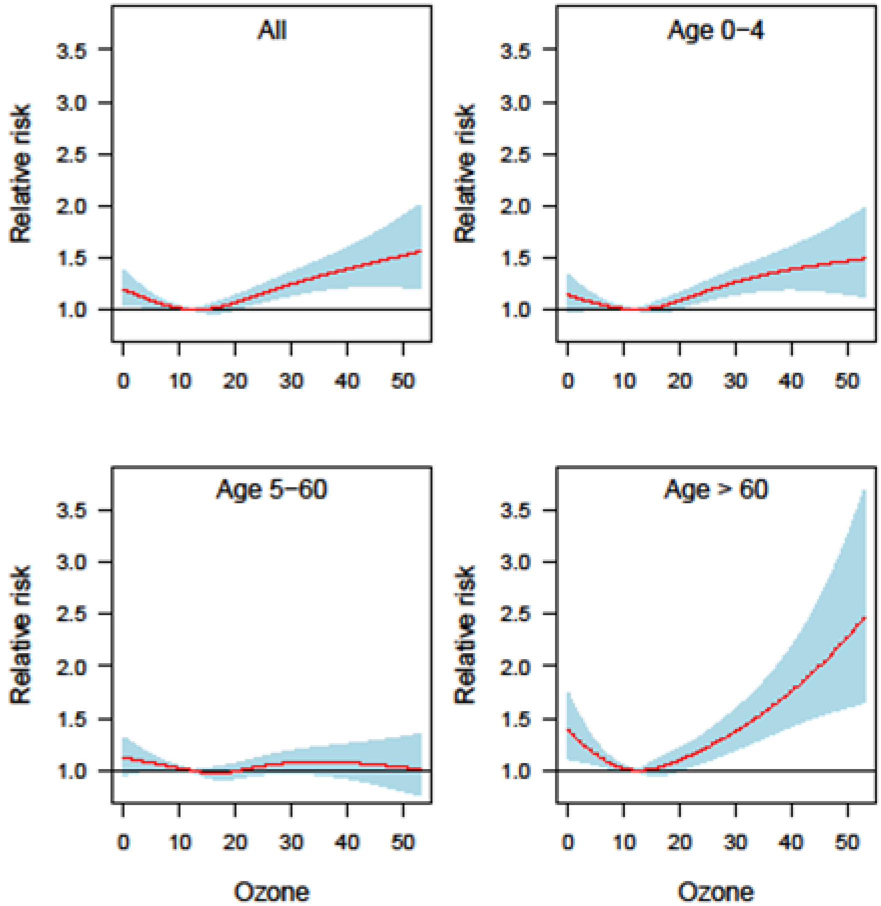
Time series of respiratory hospital admissions, ozone concentration (ppb) and mean temperature (˚C) during 2008-2011.



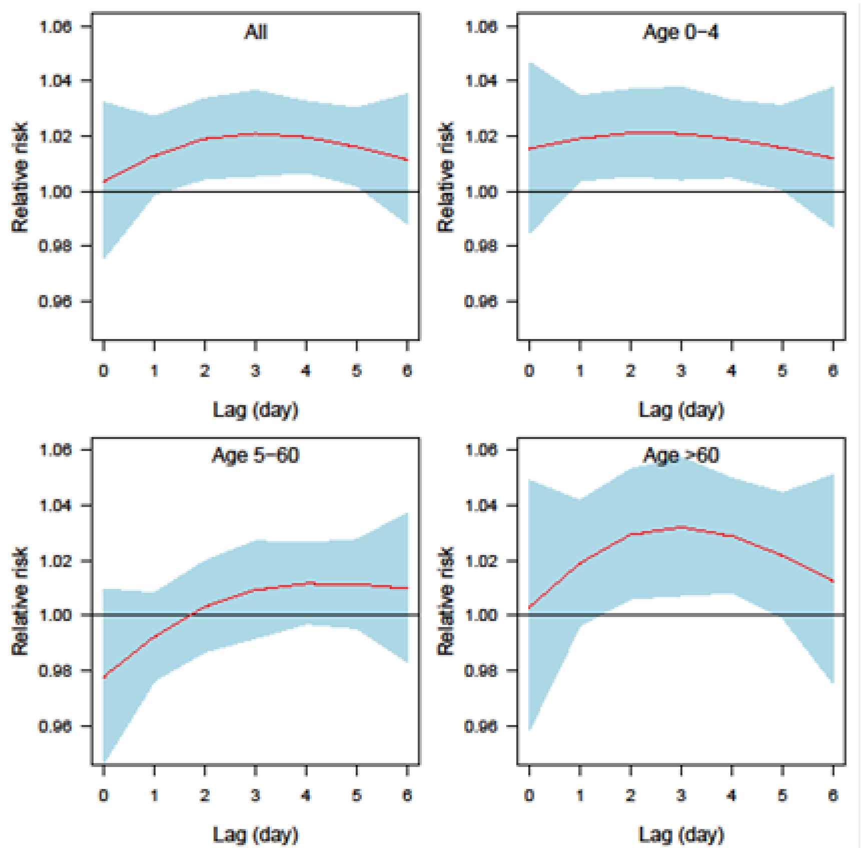
Calculo dos riscos relativos

	Todas idades	0-4 anos	5-60 anos	> 60 anos
	RR-CI	RR-CI	RR-CI	RR-CI
lag 0	1.0035;(0.9758-1.0321)	1.0153;(0.9850-1.0466)	0.9775;(0.9465-1.0095)	1.0028;(0.9587-1.0488)
lag 1	1.0128;(0.9989-1.0270)	1.0191; (1.0039-1.0345)	0.9921; (0.9764-1.0080)	1.0188; (0.9965-1.0416)
lag 2	1.0119; (1.0046-1.0336)	1.0211; (1.0056-1.0369)	1.0031; (0.9868-1.0196)	1.0292; (1.0061-1.0530)
lag 3	**1.0209; (1.0056-1.0365**)	**1.0209; (1.0043-1.0376**)	1.0092; (0.9918-1.0269)	**1.0320; (1.0073-1.0573**)
lag 4	1.0196; (1.0068-1.0325)	1.0189; (1.0051-1.0328)	**1.0115; (0.9970-1.0263**)	1.0287; (1.0082-1.0496)
lag 5	1.0160; (1.0021-1.0302)	1.0157; (1.0006-1.0310)	1.0113; (0.9954-1.0274)	1.0215; (0.9992-1.0444)
lag 6	1.0114; (0.9883-1.0352)	1.0120; (0.9870-1.0376)	1.0097; (0.9832-1.0369)	1.0125; (0.9754-1.0509)

In the relationship between ozone and respiratory hospital admission in Campo Grande, Brazil during 2008-2011.



- Relative risk of respiratory hospitalizations at 75% percentile of ozone distribution compared with 25% percentile along the lag days in Campo Grande, Brazil during 2008-2011.



CONCLUSIONS

- This study suggests that ozone pollution has negative impacts on respiratory diseases in Campo Grande, Brazil. Children and elderly were susceptible to zone exposure. These findings should be used to develop policies for protecting people from ozone pollution.