Urban air pollution and respiratory emergency visits at Paediatric Unit, Reggio Emilia, Italy.- Preliminary results

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AIRNET
A Thematic Network on Air Pollution and Health

NERAM
Network for Environmental Risk Assessment and Management

Introduction and object

A large body of epidemiological research has focused on urban air pollution exposure and its consequences on respiratory function. Fewer studies have had the possibility to analyse less severe end points such as emergency room visits focusing on respiratory symptoms. Recurrence of respiratory symptoms are events certainly more numerous than admissions to hospital, they increase the demand for medical attention and they can be taken as indicators of people's life-quality worsening.

Reggio Emilia is a town of northern Italy with almost 150.000 inhabitants, with only one Hospital with a Paediatric Unit where all children emergency visits (E.V.) are fully registered; moreover an air pollution monitoring station network is working since 1989, and in winter 2001-2002 the alarm threshold has often been exceeded .

The aim of this study is to evaluate short term effects of urban air pollution levels on children E.V. due to respiratory symptoms.

Fig. 1: Reggio Emilia

Methods

Data of emergency visits

Yearly, the number of E.V. for all causes of Reggio Emilia inhabitants under 15 years of age is about 13.000.

The study has collected E.V. for respiratory symtoms during the period 03/01/2001 - 03/31/2002; children with more than 5 E.V. were not enrolled.

The E.V. were classified into 2 groups:

- allergenic –obstructive pathology (group ASTHMA)
- Other respiratory patologies (group OTHER).

Air pollution and weather variables

Reggio Emilia Department of the Agenzia Regionale Prevenzione Ambiente (ARPA) has collected air pollution monitoring data during the study period (Fig. 2).

The pollutants considered were: NO_2, SO_2, CO, TSP, PM 10, O_3, allergenic pollens.

Regional Metereological Service has collected weather variables data (temperature, humidity, precipitations).

Fig. 2: Reggio Emilia air pollution monitoring network

Statistical methods

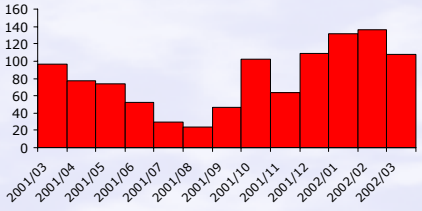
To analyse the correlation among E.V. and air pollution and weather variables, the statistical model GAM (generalized additive model) was performed. Non parametric smoother function, long temporaly trend and seasonality were considered into the model.

Results

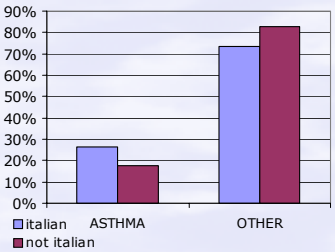
857 children
- 357 females → 444 E.V.
- 497 males → 611 E.V.

Children median age is 2 years.

797 E.V. (76%) were due to respiratory patologies of group OTHER and 254 to group ASTHMA (24%); only 26 E.V. (2,5%) were followed by admission to hospital.



Graf. 1: Number of E.V. for month



Graf. 2: Percentual of E.V. for nationality and group

Most of E.V. happen during the week-end and in the period from december to march (47,6%) (Graf. 1).

The 24,6% of E.V. is relative to "non italian children" (with non italian father).

The E.V. in the ASTHMA group are more frequent in italian children (26,5%) than in non italian (17,3%) (Graf. 2).

E.V. characteristics (time, day, month) and mean (number of E.V. per subject) are not different beetween the 2 groups.

The E.V. rate [1], stratified by nationality, is 43,2‰ among italian children and 144,8‰ among non italian.

	PM10 µg/m³	TSP µg/m³	SO2 µg/m³	NO2 µg/m³	CO mg/m³	O3 µg/m³	O3 summer µg/m³
Mean	51,2	60,4	9,3	49,0	1,4	68,6	107,5
D. S.	30,6	34,3	2,3	13,8	0,7	46,7	32,2
Min	5,0	3,7	4,6	21,6	0,4	4,5	30,9
Median	44,7	52,4	8,9	47,5	1,1	66,2	105,4
Max	196,8	272,9	20,9	107,5	4,6	200,5	200,5

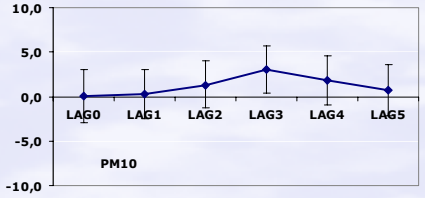
Tab. 1: Pollutant daily concentration

Mean PM10 concentration during the study period was 51,2 µg/m³ (air quality standard: 40 µg/m³ annual mean) (Tab. 1).

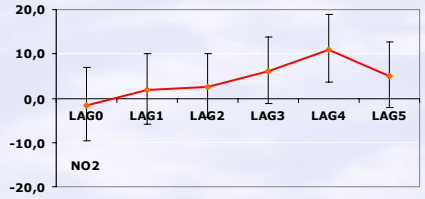
A significant association is observed beetween E.V. and some pollutant variables.

Particularly, the increase in the daily E.V. is associated with PM10 and NO_2 measurements (Graf. 3-4).

The percent increase in E.V relative risk, for 10 µg/m³ increase in PM10, is 3 (CI 95%: 0.4-5.7) (lag 3), while is 11 (IC 95%: 3.6-18.8) for an analogous change in NO_2 (lag4).



Graf. 3-4: Percentual change in E.V. relative risk associated with 10 µg/m³ increase of PM10 e NO_2 measurements.



Discussion and conclusion

The study shows a small but significant association beetween air pollution (PM10 e NO_2) and paediatric E.V. due to respiratory symtoms. This association is indipendent from the effect of temperature, humidity and pollen trend.

In contrast, no significant association is found for ozone and other pollution measurements.

Several studies have reported similar positive association.

[1] E.V. rate: E.V. number per 1.000 inhabitants in Reggio Emilia municipality on 12/31/2001 (non italian children: 1.871, italian children: 18.069)