HEALTH IMPACT ASSESSMENT OF AIR POLLUTION

ENHIS-1 PROJECT: WP5 HEALTH IMPACT ASSESSMENT

LOCAL CITY REPORT

Seville

Summary of main findings for Seville

In 2001 the PM_{10} annual mean (SD) was 45.8(10.1) µg/m^3, above the 1999/30/EC Directive limit value for 2010 (20 µg/m^3), and above that established for 2005 (40 µg/m^3). For the summer period of the same year, the mean (SD), P5 (5th percentile) and P95 of the maximum daily 8-hour moving average concentration of ozone (O_3) were 76.9(16.7), 50.9 and 105.5 µg/m^3.

Regarding children, infant mortality in Europe is quite low and consequently, the expected attributable number of deaths related to air pollution is also very low. All other things being equal, the reduction of the annual average levels of PM_{10} to 20 µg/m^3 would prevent 1.25 total postneonatal deaths. Reducing PM_{10} daily mean values to 20 µg/m^3 would prevent 11.07 hospital respiratory admissions.

As far as short-term effects of O_3 in summer are concerned, all other things being equal, each reduction by 10 µg/m^3 of the daily maximum 8-hour moving average concentrations would delay 8.58 deaths per year in the general population in the study area, 4.61 from cardiovascular diseases, and 1.94 from respiratory causes. In terms of hospital admissions, this would represent 0.16 respiratory admissions in the adult population and 1.22 in the population over 64 years.

Summary of HIA of outdoor air pollution in Seville in ENHIS-1

Health outcome	**Population**	**Pollutant**	**Period**	**Mean type**	**RR (for 10 µg.m^3 increase)**	*References*	**Number of attributable cases by scenario[1]**	
Mortality							**Ozone: Reduction by 10 µg.m^3**	**PM10: Reduction by 5 µg/m^3**
Total mortality excluding external causes (ICD9 < 800 - ICD10 A00-R99)	All ages	O_3 8h max	Summer[2]	Daily	1.0031 (1.0017-1.0052)	Gryparis et al 2004	8.58	
Cardiovascular mortality (ICD9 390-459 - ICD10 I00-I99)					1.0046 (1.0022-0.0073)		4.61	
Respiratory mortality (ICD9 460-519 - ICD10 J00-J99)					1.0113 (1.0074-1.0151)		1.94	
Total postneonatal mortality	1 month-1 year	Corrected PM_{10}[3]	Year	Annual	1.048 (1.022-1.075)	Lacasaña et al 2005		0.25
Postneonatal respiratory mortality (ICD9 460-519 - ICD10 J00-J99)					1.216 (1.102-1.342)			0
Postneonatal Sudden Infant Death Syndrom Mortality (ICD9 798.0 - ICD10 R95)					1.12 (1.07-1.17)	Woodruff 1997		0.11
Morbidity								
Emergency room visits for asthma (ICD-9 codes 493, ICD-10 codes J45, J46)	< 18 years	O_3 1h max	Year	Daily	1.0115 (1.0067-1.0163)	CARB 2004	not available	
Cough	< 18 years	Measured PM_{10}			1.0407 (1.0202-1.0511)	Ward and Ayres 2004		not available
Lower respiratory symptoms LRS	< 18 years	Measured PM_{10}			1.0407 (1.0202 -1.617)	Ward and Ayres 2004		not available
Hospital respiratory admissions (ICD9 460-519 - ICD10 J00-J99)	< 15 years	Measured PM_{10}			1.010 (0.998-1.021)	Anderson et al 2004		2.09
Hospital respiratory admissions (ICD9 460-519 - ICD10 J00-J99)	15 - 64 years	**O_3 8h max**	Summer		1.001 (0.991-1.012)		0.16	
Hospital respiratory admissions (ICD9 460-519 - ICD10 J00-J99)	> 64 years				1.005 (0.998-1.012)		1.22	

[1] For ozone: absolute reduction by 10 µg/m^3. For PM_{10} absolute reduction by 5 µg/m^3.

[2] Definition of summer period : 01 April – 30 September

[3] *PM_{10} reference papers for HIA on postneonatal mortality use gravimetric methods to measure PM_{10}. If the local air quality network uses automatic methods (TEOM or other) a correction factor is required to compensate for loss of volatile compounds: if available, a local correction factor recommended by the air quality network or, by default, the European factor 1.3.*

Introduction

Seville is located in the south of Andalusia. The city is the political and administrative center of Andalusia. Seville and its metropolitan area have an important radial system of communication infrastructures. At the moment, there is a plan to build a network underground in the city. The services sector represents almost 70% of the total economic activity in the city, followed by the construction sector. Industry is much less important in the city, being only 5% of the total economic activity.

About the air pollution situation, in the previous HIA it was noted that PM_{10} levels in the city were above the limits set by the European Union for 2005 and 2010.

Cardiovascular and cancer are the main causes of total mortality in Seville. Most of the hospital admissions are caused by cardiovascular diseases too. Postneonatal illnesses are the most frequent cause of children mortality.

The previous health impact assessment (HIA) of air pollution carried out in Seville (APHEIS 3) showed that if the daily mean of PM_{10} were kept under 20 $\mu g/m^3$, 82 deaths and 178 hospital admissions could have been avoided yearly. This represents a rate of 12 deaths , 72 hospital admissions for cardiac diseases, and 106 hospital admissions for respiratory diseases.

In this HIA we present the results regarding children and the general population, based on data for the year 2001. The annual number of postneonatal deaths attributable to PM_{10} levels higher than 20 $?g/m^3$ was 1.25 (95% CI: 0.56 – 2.00), which is equivalent to an annual rate of 0.18 deaths per 100.000 (95% CI: 0.08 – 0.28). Regarding PM_{10} levels higher than 40 $?g/m^3$, attributable postneonatal deaths would be 0.29 (0.14 – 0.26).

Total mortality in the general population attributable to ozone levels during summer (daily 8 h max) higher than 10 $?g/m^3$ are 1.22 (0.67– 2.05) per 100.000 people.

Only 1.22 hospital respiratory admissions in people over 64 years of age are attributable to ozone levels greater than 10 $?g/m^3$, representing 0.17 (-0.7– 0.42) per 100.000 people.

This work has been carried out within the framework of work package WP5 on health impact assessment of ENHIS-1 project (www.enhis.net).

Sources of air pollution

Transportation constitutes the main source of air pollution in Seville and its metropolitan area: 87.3% of CO, 48.3% of CO_2 and 67.4% of NO_X emissions come from traffic sources.

In the year 2000, high ozone levels were the cause of all the negative environmental assessments. The reason for ozone peaks is the special weather conditions in the summer: strong sun radiation, calm wind situation, and transportation emissions, which lead to ozone levels above the maximum allowed concentrations.

Exposure data

The Surveillance System for Air Pollution has been gradually implemented in the city. Its run by the Regional Environment Department of the Andalusian Government. The air quality control system of stations does not cover the whole municipality, but presents an acceptable distribution, covering the urban area of the city, where more than 80% of the population resides.

In the year 2001, Seville had 8 air pollution monitoring stations. The eight stations used for PM_{10} are background stations: Torneo, Santa Clara, San Jerónimo, Príncipes, Reina Mercedes, Macarena, Enramadilla, and Ranilla. There are only three stations with ozone measurements: Torneo, San Jerónimo and Ranilla.

Automated method(beta -radiation attenuation, UNE-EN 12341-1999) was used for PM_{10} measurements. In order to compensate losses of volatile particulate matter, a local conversion factor of 1.13 was used.

Ozone measurements were obtained by automated method (UV absorption, UNE 77-221-2000).

PM_{10} levels were calculated as the arithmetic mean of the daily concentrations of all stations.

Ozone: The daily maximum 1-hour indicator was calculated measuring ozone as the arithmetic mean of the 1-hour maximum of all stations. The daily maximum 8-hour moving average for each day was calculated as the arithmetic mean of the maximum 8-hour moving averages for the summer period (April 1st to September 30th) .

The annual mean level (SD) of PM10 in Seville was 4.8 (10,1) $\mu g/m^3$, and P5 and P95 of the daily mean values were, respectively, 29 $\mu g/m^3$ and 63 $\mu g/m^3$. The mean (SD) , P5 and P95 of the daily maximum 8-hour moving average concentrations of O_3 were, respectively, 77 (17), 52 and 105 $\mu g/ m^3$, and those of the daily maximum 1-hour concentrations 71(24), 40 and 118 µg/m3 (Table 1)

Annual mean levels of PM_{10} in 2001 were above the limit values for 2005 and 2010, (1999/30/EC) .

Table 1. Descriptive statistics for ozone and PM_{10} levels in Seville, 2001

	O3 8h - summer	O3 1h max - year	PM10 - year
Number	183	365	365
Minimum	37	13	17
Percentile 5	52	40	29
Percentile 25	66	54	38
Median	75	67	45
Percentile 75	89	84	53
Percentile 95	105	118	63
Percentile 98	108	128	66
Maximum	118	158	70
Daily mean	77	71	46
standard error	17	24	10
% missing values	0.00%	0.00%	0.00%

Figure 1 shows the distribution of daily ozone levels (max O_3 8 h) in the summer of 2001. During fifty days the level was between 70-80 $\mu g/ m^3$.

The more frequent exposure category for ozone (max 1 h) level in the year was 50 to 60 $\mu g/m^3$ (Fig 2).

The more frequent exposure category for PM_{10} (Fig 3) was 40 to 50 $\mu g/m^3$.

Fig 1. Distribution of daily O3 8h max in Seville area. Summer 2001

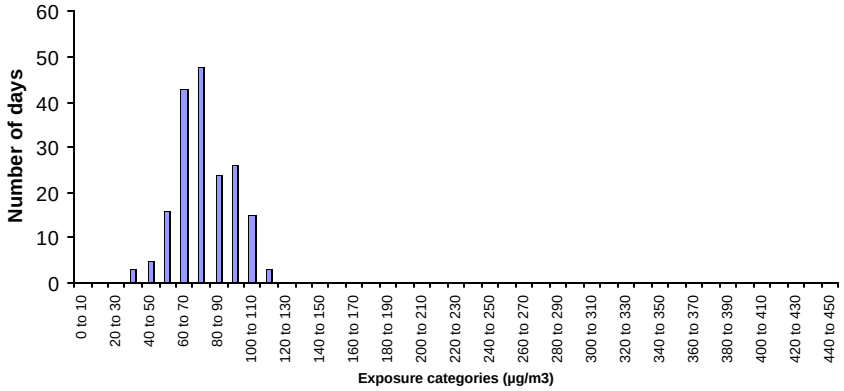


Fig 2. Distribution of daily O3 1h max in Seville area. Year 2001

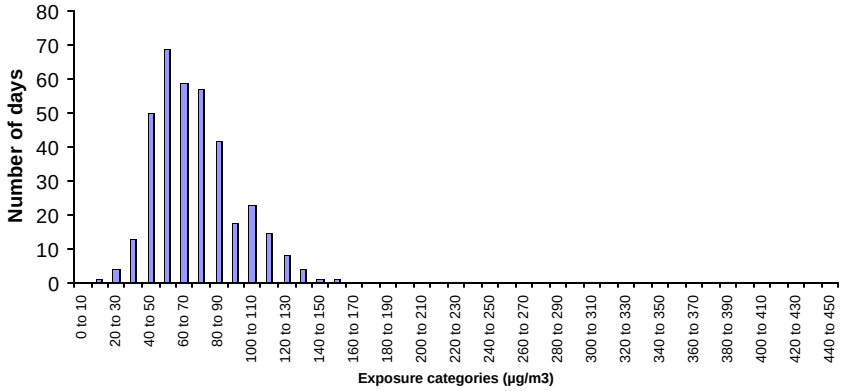
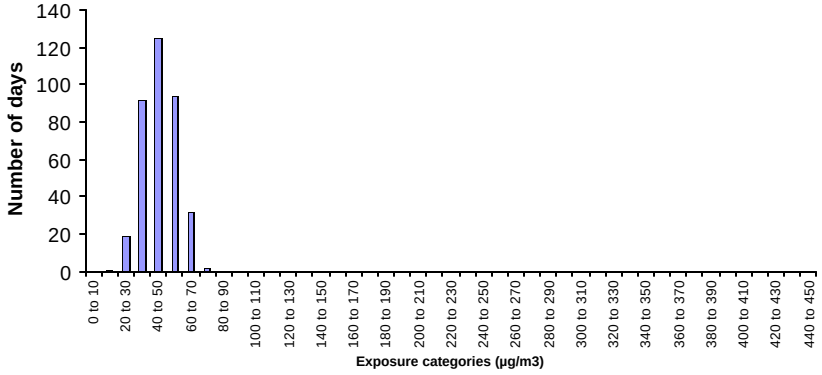


Fig 3. Distibution of daily PM 10 in Seville area. Year 2001



Health data

Mortality data for 2001 comes from the Regional Registry of Mortality, coded according to the International Classification of Diseases (ICD10). There is a quality control system based on: llegibility of writing, use of abbreviation, filling in cause death, clinic sequence in death diagnosis, use WHO international criterion of cause death.

Hospital admissions for 2001 on respiratory causes come from the Andalusian Health Services Information System, and it is coded using the International Classification of Diseases (ICD-9). The quality control program is based on an external audit.

There aren't registers for emergency room visits or medical consultation, so data on cough, lower respiratory symptoms or asthma, is not available in this HIA.

The number of total postneonatal mortality is 11, that represents 156 deaths per 100.000 children, between 1 month and 1 year of age. Respiratory mortality didn't caused postneonatal deaths. About sudden infant death syndrome, the rate is 28.5 deaths per 100.000.

The average of general population total mortality is 15 (4.1), and the daily rate per 100.000 is 2.2. The means (SD) for cardiovascular mortality or respiratory mortality are 5.7 (2.5) and 1 (0.8) respectively, and the rates 0.8 and 0.1 per 100.000.

The annual incidence rate for respiratory admissions in children under 15 years of age is 412.2, for these aged 15 to 64 is 64.4, and 472.6 were respiratory admissions rate for 64 and older.

Table 2. Descriptive statistics for health outcomes in Seville. 2001

Health outcome	ICD9	ICD10	Annual deaths	Annual rate (per 100 000)	Daily mean (SD)	Daily rate (per 100 000)	Annual incidence rate (per 100 000)
POSTNEONATAL MORTALITY							
Total			11	156.6			
Respiratory *ICD9 460-519 ICD10 J00-J99*	460-519	J00-J99	0	0			
Sudden infant death syndrome *ICD9 798.0 – ICD10 R95*	798.0	R95	2	28.5			
GENERAL POPULATION MORTALITY							
Total mortality all causes *ICD9 <800 ICD10 A00-R99*	<800	A00-R99			15 (4.1)	2.2	
Cardiovascular mortality *ICD9 390-459 ICD10 I00-I99*	390-459	I00-I99			5.7 (2.5)	0.8	
Respiratory mortality *ICD9 460-519 ICD10 J00-J99*	460-519	J00-J99			1(0.8)	0.1	
MORBIDITY							
Cough					not available		
Lower respiratory symptoms LRS					not available		
Emergency room visits for asthma - Age < 18 years *ICD9 493, ICD10 J45 J46*	493	J45-J46			not available	not available	
Hospital respiratory admissions - Age < 15 years *ICD9 460-519 ICD10 J00-J99*	460-519	J00-J99					412.2
Hospital respiratory admissions - Age 15 -64 years	460-519	J00-J99					64.4
Hospital respiratory admissions - Age > 64 years	460-519	J00-J99					472.6

Health Impact Assessment

Methodology

Health impact of air pollution (AP) has been calculated as the annual number of health events attributable to AP in the target population. A causal relationship between AP and the effects is assumed, and therefore HIA can only be performed for those outcomes with sufficient evidence of causality. Once the effects with sufficient evidence of causal relationship with AP have been determined, the next step is to find the best exposure-response functions (ERFs) for each of the selected outcomes. Table 3 shows the result of a systematic review on these issues carried out by the Bilbao Apheis team[1] for WP5 of ENHIS-1. This table summarizes the health outcomes and ERFs deemed suitable for HIA according to the criteria established by WP5 with the advice of the air pollution experts of WP5[2].

Table 3. Health outcomes and Exposure-response functions (ERFs) selected for health impact assessment

	OUTCOME	POLLUTANT	ERFs	ORIGINAL SOURCE
CHILDREN - PARTICLES				
	Total postneonatal mortality (1 month-1 year)	PM_{10} Annual Mean	RR=1.048 (1.022-1.075) ?10µg/m^3	Lacasaña et al 2005
	Postneonatal respiratory mortality ICD9 460-519 ICD10 J00-J99	PM_{10} Annual Mean	RR=1.216 (1.102-1.342) ?10µg/m^3	Lacasaña et al 2005
	Postneonatal Sudden Infant Death Syndrome (SIDS) mortality (normal birth weight =2500g) ICD9 798.0 –ICD10 R95	PM_{10} Annual Mean	Adjusted Odds Ratio AOR=1.12 (1.07-1.17) ?10µg/m^3	Woodruff et al. 1997
	Cough	PM_{10} Daily Mean	OR=1.041 (1.020-1.062) ?10µg/m^3	Ward & Ayres 2004
	Lower respiratory symptoms LRS	PM_{10} Daily Mean	OR=1.041 (1.020-1.051) ?10µg/m^3	Ward & Ayres 2004
CHILDREN – OZONE				
	Emergency room visits for asthma <18 Y ICD9 493, ICD10 J45 J46	Ozone Maximum 1 h	RR=1.0116 (1.0067-1.0165) ?10µg/m^3	CARB 2004
ADULTS/GENERAL POPULATION				
	Total mortality all causes ICD9 <800 ICD10 A00-R99	Ozone Maximum 8 h Summer	RR= 1.0031 (1.0017-1.0052) ?10µg/m^3	Gryparis et al 2004 (APHEA 2)
	Respiratory mortality ICD9 460-519 ICD10 J00-J99	Ozone Maximum 8 h Summer	RR= 1.0113 (1.0074-1.0151) ?10µg/m^3	Gryparis et al 2004 (APHEA 2)
	Cardiovascular mortality ICD9 390-459 ICD10 I00-I99	Ozone Maximum 8 h Summer	RR= 1.0046 (1.0022-1.0073) ?10µg/m^3	Gryparis et al 2004 (APHEA 2)

To be coherent with mortality findings, it was decided, with the experts' advice, to include RRs of hospital admissions in the health impact assessment calculations, even if they were not statistically significant. More concretely, it was decided that if there was not any new RR published by the time of making the calculations, the RRs for respiratory hospital admissions from Anderson's meta-analysis could be used, although they were not statistically significant (see Table 2). The rationale for that is that if there is sufficient evidence to accept a causal

[1] Cambra K, Alonso E, Cirarda FB, Martínez-Rueda T. Bilbao APHEIS group. Selection of outcomes and exposure response functions for health impact assessment of particles and ozone. Review of the evidence. ENHIS project. WORK PACKAGE 5. Bilbao, February 2005. Http:

[2] Ferran Ballester: Valencian School of Health Studies, Valencia, Spain; Sylvie Cassadou: National Institute of Public Health Surveillance, InVS, Toulouse, France; Fintan Hurley: Institute of Occupational Medicine, Edinburgh, Scotland, UK; Nino Künzli: University of Southern California, Division of Occupational and Environmental Health, Los Angeles, CA, USA; Odile Meckel: Institute of Public Health NRW (LOEGD), Bielfeld, Germany; Hans-Guido Mücke: WHO Collaborating Center (Air)-Federal Environmental Agency, Berlin, Germany; Nikolaos Stilianakis: Institute for Environment and Sustainability, European Commission – JRC, Ispra, Italy.

relationship between air pollution and respiratory mortality -both in children-PM and adults-O_3- we should easily accept that there will also be an impact on hospital admissions.

Table 4. Complementary Exposure-response functions (ERFs) for health impact assesment on respiratory hospital admissions for children (particles) and adults (ozone)

	OUTCOME	POLLUTANT	RR	SOURCE
CHILDREN - PARTICLES				
	Respiratory hospital admissions 0-14 Y ICD9 460-519 ICD10 J00-J99	*PM_{10}* Daily Mean	*RR= 1.010 (0.998-1.021) ?10µg/m³*	*Anderson 2004*
ADULTS/GENERAL POPULATION				
	Hospital respiratory admissions 15-64 Y ICD9 460-519 ICD10 J00-J99	*Ozone Maximum 8 h*	*RR=1.001 (0.991-1.012) ?10µg/m³*	*Anderson et al 2004*
	Hospital respiratory admissions >64 Y ICD9 460-519 ICD10 J00-J99	*Ozone Maximum 8 h*	*RR=1.005 (0.998-1.012) ?10µg/m³*	*Anderson et al 2004*

Finally, HIA needs defining the evaluation scenarios, i.e. the hypothetical scenario with which we want to compare the current air pollution situation. We calculate the impact on health of the (current) air pollution levels in the city that are above the pollution level of the evaluation scenario. In other words, the attributable number of health events (deaths, hospital admissions…) calculated for each scenario represents the number of events that would be prevented if, all other things being equal, air pollution levels were reduced to the evaluation scenario level. These evaluation scenarios are based on the objectives and limits established in 1999/30/CE, and 2002/3/CE Directives.

HIA scenarios

1 - HIA scenarios for PM_{10}

1.1.- Scenarios for HIA on **short-term** effects of PM_{10} and **cough, lower respiratory symptoms** in people under 18 year (<18), and **hospital respiratory admissions** in people under 15 year (< 15)

1.1.1 Reduction of PM_{10} levels to a 24-hour value of **50 µg/m^3** in all days exceeding this value (Limit of 1999/30/CE Directive)

1.1.2. Reduction of PM_{10} levels to a 24-hour value of **20 µg/m^3** in all days exceeding this value

1.1.3 Reduction **by 5 µg/m^3** of all the 24-hour values

1.2.- Scenarios for HIA on **long-term** effects of PM_{10} and **postneonatal mortality** (total, respiratory and sudden infant death syndrome-SIDS)

1.2.1 Reduction of the annual mean value of PM_{10} to a level of **40 µg/m^3** (Limit of 1999/30/CE Directive for 2005)

1.2.2 Reduction of the annual mean value of PM_{10} to a level of **20 µg/m^3** (Limit of 1999/30/CE Directive for 2010)

1.2.3 Reduction **by 5 µg/m^3** of the annual mean value of PM_{10}

2.- HIA scenarios on short-term effects of Ozone

1.2.1 Daily maximum 1-hour concentration and **emergency room visits for asthma** in people under 18 year (< 18)

1.2.1.1 Reduction of O_3 daily maximum 1-hour concentrations to a level of **180 µg/m^3** in all days exceeding this value (Information threshold of 2002/3/CE Directive)

1.2.1.2 Reduction **by 10 µg/m^3** of the daily maximum 1-hour concentrations

1.2.2 Daily maximum 8-hour moving average concentration and **mortality** in general population

1.2.2.1 Reduction of O_3 daily maximum 8-hour moving average concentrations to **120 µg/m^3** in all days exceeding this value (Limit for health protection of 2002/3/CE Directive)

1.2.2.2 Reduction **by 10 µg/m^3** in the daily maximum 8-hour moving average concentrations.

Findings

The annual number of postneonatal deaths attributable to PM_{10} levels higher than 20 ?g/m^3 was 1.25 (95%CI: 0.56 – 2.00), which is equivalent to an annual rate of 0.18 deaths per 100 000 (95%CI: 0.08– 0.28).

Table 5. Potential benefits of reducing PM_{10} levels. Absolute numbers and rates (per 100 000 children) (95% confidence limits) attributable to the health effects of PM_{10}.

	PM10 reduction	**Number of attributable cases per year**	**Annual rates (per 100.000)**
POSTNEONATAL MORTALITY	**Annual mean levels**		
Total	by 5 µg/m^3	0.25 (0.12-0.40)	0.04 (0.02-0.06)
	to 20 µg/m^3	1.25 (0,56-2,.0)	0.18 (0.08-0.28)
	to 40 µg/m^3	0.29 (0,14-0,46)	0.04 (0.02-0.06)
Respiratory	by 5 µg/m^3	0	0
	to 20 µg/m^3	0	0
	to 40 µg/m^3	0	0
SIDS	by 5 µg/m^3	0.11 (0.07-0.15)	0.02 (0.01-0.02)
	to 20 µg/m^3	0.51 (0.28-0.74)	0.07 (0.04-0.11)
	to 40 µg/m^3	0.13 (0.07-0.18)	0.02 (0.01-0.03)
MORBIDITY	**Daily levels**		
Cough <18 y	by 5 µg/m^3	not available	not available
	to 20 µg/m^3	-	-
	to 50 µg/m^3	-	-
LRS <18 y	by 5 µg/m^3	not available	not available
	to 20 µg/m^3	-	-
	to 50 µg/m^3	-	-
Hospital respiratory admissions <15 y	by 5 µg/m^3	2.09 (-0.42 - 4.37)	0.30 (-0.06 - 0.62)
	to 20 µg/m^3	11.07 (-2.19-23.49)	1.58 (-0.31 - 3.34)
	to 50 µg/m^3	1.06 (-0.21- 2.23)	0.15 (-0.03 - 0.32)

Regarding short-term effects of O_3, each reduction by 10 µg/m^3 of daily maximum 8-hour moving average concentrations would delay 8.58 (95%CI: 4.71 –14.40) deaths per year in the study area, 4.61 (95%CI: 2.20 – 7.32) from cardiovascular diseases, and 1.94 (95%CI: 1.27 – 2.60) from respiratory causes.

Table 6. Potential benefits of reducing ozone daily levels. Absolute numbers and rates (per 100 000 inhabitants) (95% confidence limits) attributable to the health effects of ozone.

	OZONE reduction	Number of attributable cases per year	Annual rates (per 100.000)
MORTALITY	**Daily 8-h max**		
Total excluding external causes	by 10 µg/m^3	8.58 (4.71- 14.40)	1,22 (0,67-2,05)
	to 120 µg/m^3	NA	NA
Cardiovascular	by 10 µg/m^3	4,61 (2,20- 7.32)	0,66 (0,31-1.04)
	to 120 µg/m^3	NA	NA
Respiratory	by 10 µg/m^3	1.94(1.27- 2.60)	0.28 (0,18-0.37)
	to 120 µg/m^3	NA	NA
MORBIDITY	**Daily 1-h max**		
Emergency room visits for asthma <18 y	by 10 µg/m^3	not available	not available
	to 180 µg/m^3	…..	
	Daily 8-h max		
Hospital respiratory admissions 15-64 y	by 10 µg/m^3	0.16(-1.42-1.89)	0.02 (-0.20 - 0.27)
	to 120 µg/m^3	NA	NA
Hospital respiratory admissions > 64 y	by 10 µg/m^3	1.22(-0.49-2.92)	0.17(-.0.7-0.42)
	to 120 µg/m^3	NA	NA

NA: Not applicable if air pollution levels are lower than the scenario level

Discussion

Air pollution in Seville represents a public health problem. The city has high levels of PM_{10}. For th year 2001, daily means levels of PM_{10} were above the EC Directive limits, because the acceptable levels are 40 µg/m^3 for 2005 and 20 µg/m^3 for 2010(1999/30/EC).

If PM_{10} levels were 20 µg/m^3, there would have been 1.25 (0.56 – 2.0) cases attributable to this pollutant scenario, (Seville daily mean in 2001 was 45.8 µg/m^3).

In this HIA, it is showed that air pollution levels in Seville should be an important local concern. Seville an its metropolitan area have around 1.000.000 people home and no important contaminating industries exist. It is clear that traffic is the main source of air pollution in the city. Seville is th only large city in Spain without underground transportation network. The metro is nowadays being built.

At the moment it exits a project of building a metro network in Seville, because traffic is the main source of air pollution in Seville, and public transportation consist in bus and taxis.

In Andalusia, there are some actions to reduce air pollution levels, among them, before 2010, all new buildings will use solar energy, and public transport will use "biodiesel" fuel. Also wind power is being used by energy source.

Another national action measure is the prohibition to smoke at workplaces and public places, in January 2006.

Conclusion

In 2001, Seville PM_{10} levels were above the UE limits set for 2005 and 2010. It is necessary to develop actions to reduce air pollution levels.

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