Barcelona CITY REPORT

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Background

In 2002, Barcelona described the main characteristics of air pollution in the city and assessed its health impact for year 1999. Black smoke (BS) was used as pollution indicator. Different scenarios of pollution reduction were considered in order to estimate their benefits in terms of mortality and hospital admissions. Results are summarised in tables 1 and 2.

Table 1. Benefits of reducing daily BS levels to 20 µg/m^{3}and to 50 µg/m^3. Short-term mortality (excess cases per 100 000 inhabitants), 1999.

		Attributable cases		
	Number of days exceeding 20 et 50 µg/m^3	Excess cases per 100 000 central	Excess cases per 100 000 lower	Excess cases per 100 000 upper
Short-term mortality				
20 µg/m^3	256	7.90	3.97	10.51
50 µg/m^3	24	0.79	0.39	1.05

Table 2. Benefits of reducing daily BS levels to 20 µg/m3and to 50 µg/m3. Hospital admissions (excess cases), 1999.

	Number of days exceeding 20 et 50 µg/m^3	Excess cases central	Excess cases lower	Excess cases upper
Hospital admissions for cardiovascular diseases (all ages)				
20 µg/m^3	256	111,5	40,9	180,8
50 µg/m^3	24	11,2	4,1	18,2
Hospital admissions for respiratory diseases				
20 µg/m^3	256	13,1	0	116,8
50 µg/m^3	24	1,2	0	11,7

The objective of the present report is to update health risk assessment for year 2000 in Barcelona.

Sources

As it was already mentioned in the second year report, traffic is the main source of air pollution in Barcelona. According to a study carried out in 1993 , the emissions coming from cars are responsible of 35% of particles, whereas other potential sources of pollution such as industry or combustion contribute with only 1%.

Exposure data

Pollution indicators are monitored by the Direcció d'Iniciatives i Vigilància Ambiental (DIVA). BS is monitored with seven manual stations (the method of measurement is normalised smoke). However, only measurements from urban background monitoring stations that are geographically representative of the study area and are not directly influenced by local sources of air pollution have been selected (5).

For 2000:

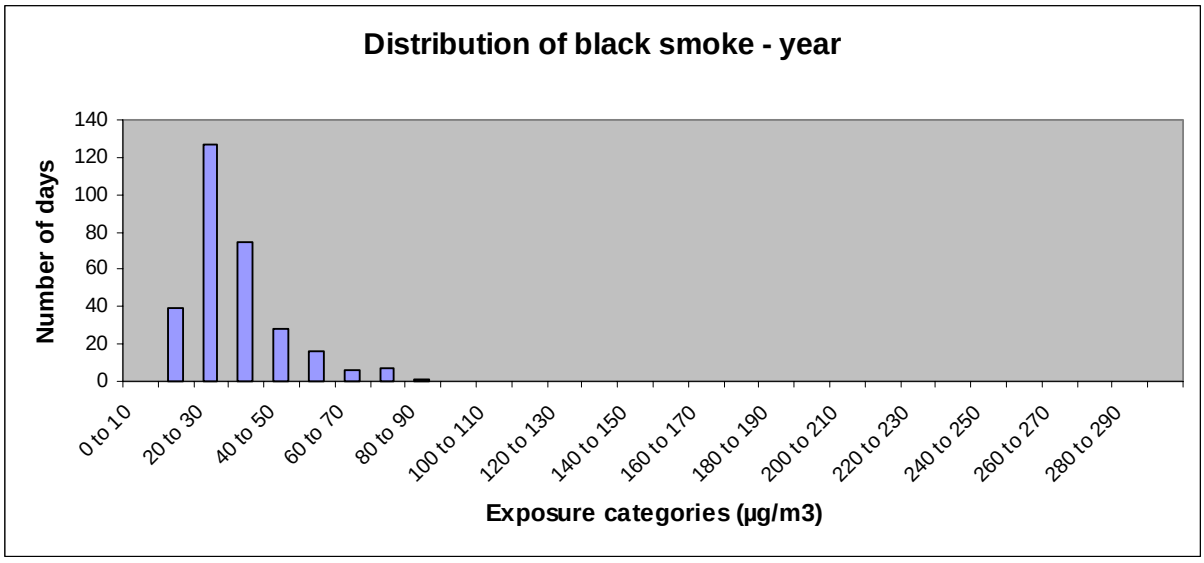
- daily mean level (SD) of BS was 31,66 µg/m3 (13.1); percentile 5=11,2; percentile 95=59,4. The levels of BS reached during 1 day with the lowest (5th percentile) and 15 days with the highest (95th percentile)ñ

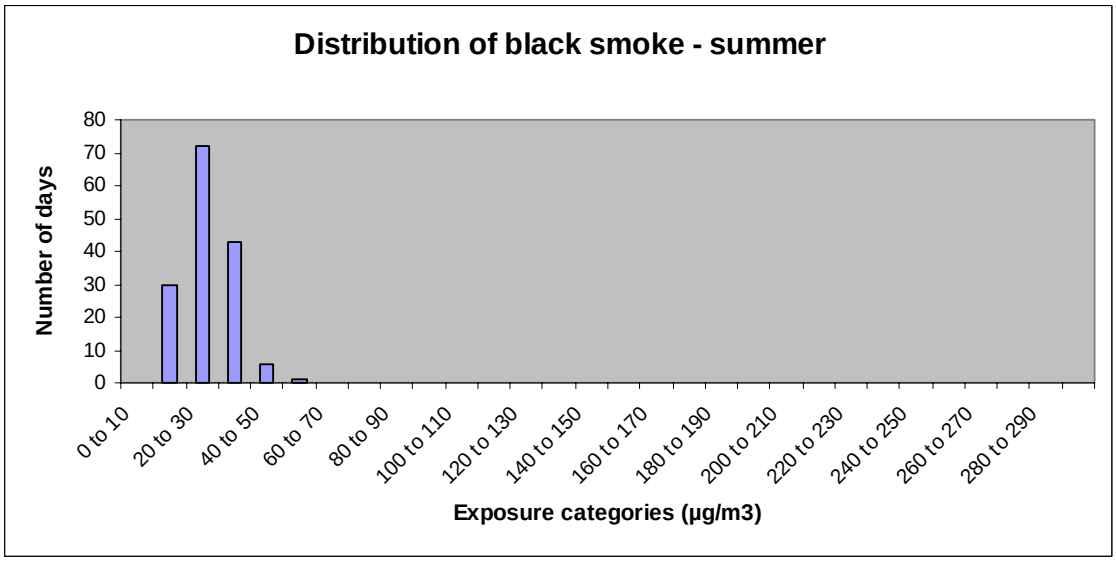
- Number of days when air pollutants exceeded limit levels:

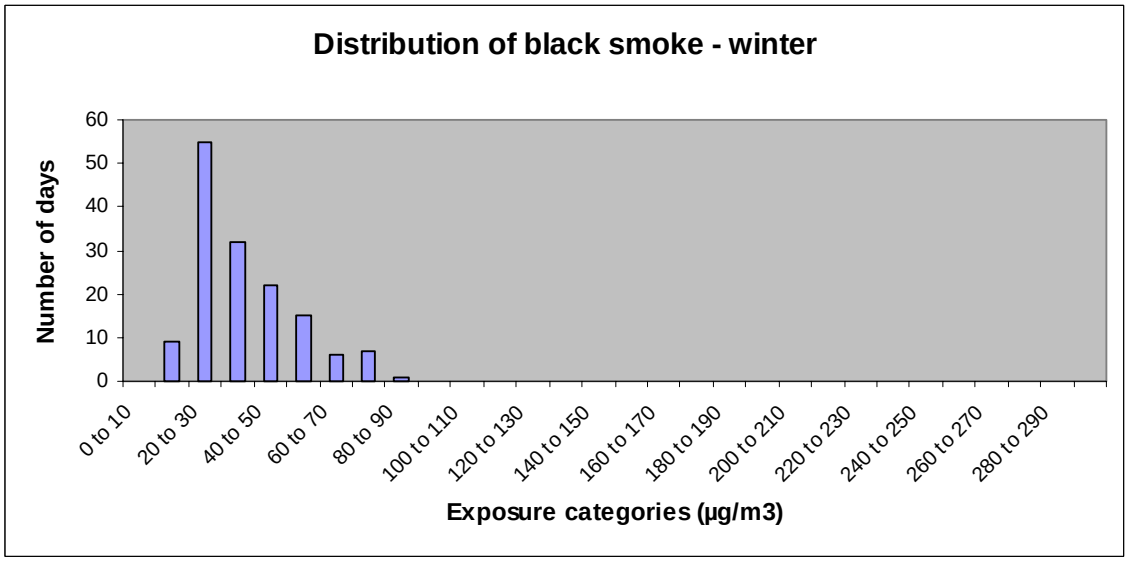
Table 2 .Number of days when air pollutants exceeded limit levels. Barcelona 2000.

Air pollutant	BS, short-term
Number of days above	20 µg/m^3
	260
Number of days above	50 µg/m^3
	30

The three following figures show the distribution of BS during the year, in summer and winter. In most days levels range from 20-50 µg/m^3. BS levels are higher in winter.




Distribution of black smoke - summer
Number of days
80
70
60
50
40
30
20
10
0
0 to 10
20 to 30
40 to 50
60 to 70
80 to 90
100 to 110
120 to 130
140 to 150
160 to 170
180 to 190
200 to 210
220 to 230
240 to 250
260 to 270
280 to 290
Exposure categories (µg/m3)


Distribution of black smoke - winter
Number of days
60
50
40
30
20
10
0
0 to 10
20 to 30
40 to 50
60 to 70
80 to 90
100 to 110
120 to 130
140 to 150
160 to 170
180 to 190
200 to 210
220 to 230
240 to 250
260 to 270
280 to 290
Exposure categories (µg/m3)

Health data

Health data come from two different sources. Mortality data are provided by the Institut de Medicina i Salut and covers deaths of all residents, independently of place of death (for the HIA only deaths occurred in Barcelona have been selected), whereas hospital admissions data are provided by the Departament de Sanitat i Seguretat Social. They are coded with the ICD9. In 2000, Barcelona had 1512971 inhabitants.

The age-standardised mortality rate (per 100 000 inhabitants) for Barcelona is 613,09 (The reference population is the total European population, both sexes combined: 727 304 (in thousands) for year 2000) [1]

Table 3. Daily mean number and annual rate per 100 000 of deaths and hospital admissions. Barcelona, 2000.

Health outcome	ICD9	ICD10	Daily mean number (SD)	Number of cases per 100 000
Short term HIA				
All causes mortality*	< 800	A00-Q99	38.47 (8,34)	2,5
Cardiovascular mortality	390-459	I00-I99	13.3 (6,74)	0,9
Respiratory mortality	460-519	J00-J99	4.65 (2,29)	0,3
Cardiac mortality	390-429	I00-I52	8.34 (5,06)	0,6
Cardiac hospital admissions	390-429	I00-I52	27.07 (7,51)	1,8
Respiratory hospital admissions	460-519	J00-J99	38.32 (17,42)	2,5
Long term HIA				
Total mortality	0-999	A00-T98		
Cardiopulmonary mortality	401-440	I10-I70		
Lung cancer mortality	162	C33-C34		

Health impact assessment

Different scenarios were used to evaluate the short and long term exposure to particulate pollution.

Short term HIA for BS

- for a reduction of BS levels on all days above 24-hour value of 20 $\mu g/m^3$ to 20 $\mu g/m^3$
- for a reduction of BS levels on all days above 24-hour value of 50 $\mu g/m^3$ to 50 $\mu g/m^3$
- for a reduction by 5 $\mu g/m^3$ in the annual mean value of BS

[1] UNITED NATIONS. Population Division Department of Economic and Social Affairs. World Population Prospects: The 2000 Revision.

Tables 1, 2, 3 present the attributable number of all causes, cardiovascular and respiratory deaths expressed as absolute numbers and as rates per 100 000 inhabitants. Table 4 presents the results for cardiac and respiratory hospital admissions.

Table 1. Deaths all causes (ICD9 < 800). Potential benefits of reducing daily BS levels above 20 to 20 µg/m^3, above 50 to 50 µg/m^3 and all days by 5 µg/m^3. Absolute number and number per 100 000 inhabitants (95% confidence limits) attributable to the acute effects of BS. Barcelona, 2000.

		Attributable cases per year					
Scenarios	Number of days per year exceeding 20 and 50 µg/m^3	N° of deaths central	N° of deaths lower	N° of deaths upper	N° of deaths per 100 000 central	N° of deaths per 100 000 lower	N° of deaths per 100 000 upper
20 µg/m^3	260	83.79	55.78	125.98	5.54	3.69	8.33
50 µg/m^3	30	8.56	5.70	12.86	0.57	0.38	0.85
By 5 µg/m^3	NA*	33.91	22.62	50.83	2.24	1.49	3.36

**NA: not applicable*

Table 2. Cardiovascular deaths (ICD9 390-459). Potential benefits of reducing daily BS levels above 20 to 20 µg/m^3, above 50 to 50 µg/m^3 and all days by 5 µg/m^3. Absolute number and number per 100 000 inhabitants (95% confidence limits) attributable to the acute effect of BS Barcelona, 2000.

		Attributable cases per year					
Scenarios	Number of days per year exceeding 20 and 50 µg/m^3	N° of deaths central	N° of deaths lower	N° of deaths upper	N° of deaths per 100 000 central	N° of deaths per 100 000 lower	N° of deaths per 100 000 upper
20 µg/m^3	260	19.33	9.65	33.90	1.28	0.64	2.24
50 µg/m^3	30	1.96	0.98	3.44	0.13	0.06	0.23
By 5 µg/m^3	NA*	7.9	3.9	13.7	0.52	0.26	0.91

**NA: not applicable*

Table 3. Respiratory deaths (ICD9 460-519). Potential benefits of reducing daily BS levels above 20 to 20 µg/m^3, above 50 to 50 µg/m^3 and all days by 5 µg/m^3. Absolute number and number per 100 000 inhabitants (95% confidence limits) attributable to the acute effects of BS. Barcelona, 2000.

		Attributable cases per year					
Scenarios	Number of days per year exceeding 20 and 50 µg/m^3	N° of deaths central	N° of deaths lower	N° of deaths upper	N° of deaths per 100 000 central	N° of deaths per 100 000 lower	N° of deaths per 100 000 upper
20 µg/m^3	260	10.13	0	25.50	0.67	0	1.69
50 µg/m^3	30	1.03	0	2.60	0.07	0	0.17
By 5 µg/m^3	NA*	4.1	0.0	10.2	0.27	0.00	0.68

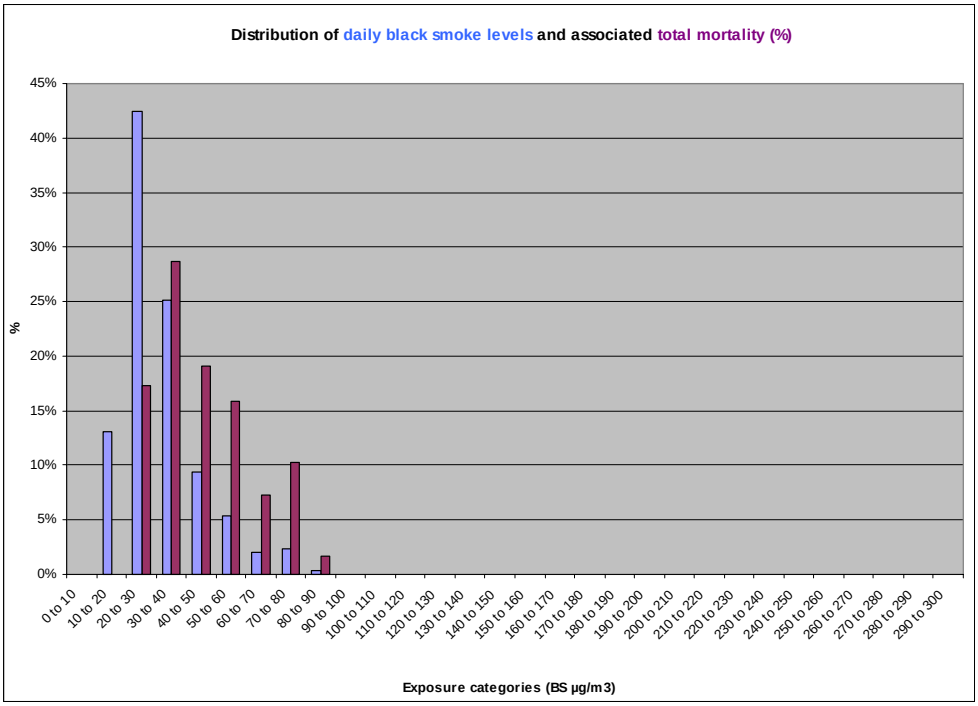
**NA: not applicable*

Table 4. Cardiac (ICD9 390-429) and respiratory (ICD9 460-519) hospital admissions. Potential benefits of reducing daily BS levels above 20 to 20 µg/m^3, above 50 to 50 µg/m^3 and all days by 5 µg/m^3. Absolute number (95% confidence limits) attributable to the acute effects of BS. Barcelona, 2000.

		Attributable cases per year		
Scenarios	Number of days per year exceeding 20 and 50 µg/m^3	N° of admissions central	N° of admissions lower	N° of admissions upper
Hospital admissions for cardiac diseases (all ages)				
20 µg/m^3	260	103.31	46.74	169.96
50 µg/m^3	30	10.69	4.85	17.54
By 5 µg/m^3	NA*	41.3	18.8	67.4
Hospital admissions for respiratory diseases (all ages)				
20 µg/m^3	260	39.84	-19.85	99.95
50 µg/m^3	30	4.04	-2.02	10.11
By 5 µg/m^3	NA*	16.2	0.0	40.6

Interpretation of findings

In Barcelona, achieving a scenario with all days with BS mean levels under 20 µg/m^3 could reduce the number of total deaths by 84 persons (5.5 deaths per 100000 inhabitants), of cardiovascular deaths by 19 persons (1.3 deaths per 100000 inhabitants) and respiratory deaths by 10 persons (0.7 deaths per 100000 inhabitants). Additionally, cardiac and respiratory hospital admissions would be reduced by 218 and 78 persons respectively.



General comments

In Barcelona, APHEIS has contributed to coordinate environmental and public health institutions of both local and autonomic levels of administration in working on environmental health issues. This can be a good starting point in order to more efficiently manage health problems related to air quality.

According to the interviews carried out with some professionals working on environmental and related public health topics in the context of the APHEIS project, most of them are convinced that air pollution is a high priority issue. However, differences exist between people working on the environmental or on the public health sector. Whereas both of them consider that in order to change people's minds about the importance of air pollution information is needed, people coming from the public health sector makes a distinction between scientific information about its health impact and administrative information. The most noticeable difference between subjects in the public health and environment sectors is that subjects from the environment sector tend not to mention information on the health impact of air pollution as key information to raise awareness of air pollution. Rather, they tended to talk about environmental aspects of air pollution only. Consistent with this finding, subjects from the public health sector gave more favorable evaluations on the APHEIS 2nd year report than people working in the environment sector *across all* of the different criteria.

There are noticeable differences in information needs according to whether individuals worked in the public health or the environment sector. However, since APHEIS favours an integrated, multidisciplinary approach to the study of air pollution and its impact on public health, this division should not be reflected in the type of information contained in its communications tools.