Grant Agreement No. 2007105

GREQAM
GROUPEMENT DE RECHERCHE
EN ÉCONOMIE QUANTITATIVE
D'AIX-MARSEILLE

Aphekom

Improving Knowledge and Communication for Decision Making on Air Pollution and Health in Europe

Assessment of the economic benefits of a reduction in urban air pollution

Deliverable D7bis

May 2011

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[1] We would like to thank Christophe Declercq, Alistair Hunt, Alain Le Tertre, Brian Miller and Mathilde Pascal who provided helpful comments and suggestions.

Acknowledgements

The authors would like to thank the Aphekom collaborative network for its invaluable contribution to the project.

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The authors would also like to thank all the local partners in the 25 Aphekom cities, which contributed to our work, by providing data and valuable advice.

1. Introduction

This deliverable presents the monetary valuation of the traditional Health Impact Assessment (HIA) approach applied to 25 cities in Europe (see Aphekom Deliverable D7, 2011 for the HIA results). Consequently, it assesses the benefits related to acute and chronic mortality as well as acute morbidity (hospitalizations) for three air pollutants ($PM_{2.5}$, PM_{10} and O_3) and for two scenarios. The first scenario assumes a decrease of 5 $\mu g/m^3$ in air pollutant annual concentration and the second scenario assumes compliance with the WHO annual air-quality guideline (WHO-AQG) specific to each pollutant.

In addition to the uncertainties and limitations discussed in the epidemiological report, the unit economic values used in the computations also carry their own uncertainties. The results in this deliverable should thus be considered as reasonable orders of magnitude of the health impacts under consideration, and not as accurate figures.

The general guidelines underlying the economic approach used are briefly provided in Section 2 (for more detail, see Aphekom Deliverable D6, 2011). Section 3 presents the features of the traditional HIA approach as well as the different unit economic values, including country-specific values (for morbidity), used in computations for each city. Section 4 computes the monetary benefits for each of the 25 cities and Section 5 concludes.

2. Summary of the general guidelines

Choice of a reference year and currency

Because the air pollution measures as well as epidemiologic data cover the 2004-2006 period for most of the cities, all costs are expressed in **Euros 2005**.

Sensitivity analyses

In Aphekom, we perform a separate assessment of uncertainties when computing a) the number of health outcomes attributable to air pollution, and b) unit costs.[2] Indeed, we apply Low, Central (also referred to as Best) and High estimates to the range of health outcomes provided by the epidemiological computations. The complete economic results will thus represent a range of monetary valuations (Low, Central and High) for each health outcome. We apply the same rule as Cafe (2005): a +/- 33% range around the best / central estimate of the unit economic values except for the valuation of mortality, for which a specific uncertainty assessment is done.

Categorization of costs

According to accepted practice (see for instance Barnes et al., 1996; or Akobundu et al., 2006), three components related to the cost of a health outcome can be distinguished.

[2] A full and proper treatment of uncertainty would account for all these sources through an integrated approach and Monte Carlo simulations (see for instance, Burmaster and Anderson, 1994; Cafe, 2005a; or Ostro et al., 2006).

Direct costs

Direct medical costs cover medical resources consumed, like consultations (specialists, general and hospital practitioners), drugs, in-patient and out-patient hospitalizations, emergency room stays and cost of rehabilitation. **Direct non-medical costs** cover non-medical resources consumed in direct connection with the health outcome: i.e., cost of social support (like home help), transportation, major home modifications.

Indirect costs

They cover different types of resources lost:

- Loss of productive work by patient (either due to time off work or a poorer access to employment due to poorer health),
- Loss of productive work by patient's family and friends (*e.g.* mother taking time off work),
- Loss of productive work due to patient's early retirement or premature death.

Intangible costs

They apply not only to the patient but also to his/her friends and family: grief, fear, pain, unhappiness, loss of well-being and loss of quality of life.

Since Aphekom is concerned with the overall burden of air-pollution exposure, **the Society perspective** is chosen (instead of the Patient/Family or Health System perspectives).

Finally, we should bear in mind that some health outcomes may partially overlap. In Aphekom, the economic valuations for asthma, COPD and CHD hospitalizations (innovative HIA in Aphekom Deliverable D4, 2011), and those for cardiac and respiratory short-term hospitalizations (standard HIA in Aphekom Deliverable D7, 2011), cannot be added together without specific assumptions.[3]

3. Methodology and economic values chosen

Aphekom Deliverable D7 (2011) performs a traditional HIA of urban air pollution both on acute and chronic mortality and on acute morbidity (hospitalizations), for $PM_{2.5}$, PM_{10} and O_3.

3.1 Economic assessment of mortality

3.1.1 Methodological issues

We discuss below two features relevant to the monetary assessment of the mortality impacts associated with the traditional HIA approach.

A. Metrics chosen

The economic values used to assess mortality effects depend on the metrics chosen in the epidemiological computations.

For acute (ST) mortality (PM_{10} and O_3), the annual number of premature deaths avoided per year is used. In view of the way these data are computed (through time-series analyses and proportional hazard models), the gains in life expectancy corresponding to each of these

[3] Note that the metrics of the exposure to air pollution also differs: proximity to busy roads in the innovative HIA, air pollution concentration in the standard HIA.

premature deaths can be considered to be in the range of a few months, certainly lower than one year (Cafe 2005b, p. 46).

For chronic (LT) mortality ($PM_{2.5}$), the number of premature deaths avoided is also provided by epidemiology. However, unlike the acute mortality computations, they are obtained through cohort studies that monitor populations exposed to different levels of pollution. One of the crucial issues is the magnitude of the gain in life expectancy related to these premature deaths. Although no definitive answer exists, a 10-year gain seems to be supported by three pieces of evidence: medical, epidemiological and past empirical practices (see Ezzati et al., 2002; Cafe, 2005b; Watkiss et al. 2005; or Janke et al., 2009).

For chronic (LT) mortality ($PM_{2.5}$), an average individual gain in life expectancy has also been computed using life tables and following a cohort until complete extinction (see details on the methodology used in Aphekom Deliverable D7, 2011). This metrics obviously allows an annual total number of years of life gained in a city to be computed, by multiplying the average gain in life expectancy by the size of the relevant population. Because epidemiological computations do not take into account any impact of air pollutant concentration on mortality before the age of 30, the annual benefits are computed by multiplying the average gain in life expectancy by the number of 30-year-old individuals in the city, and by the VOLY. This corresponds to the benefits (in terms of life expectancy) 30-year-old people would gain over their lifetime if exposed to a lower average annual level of $PM_{2.5}$ (10 µg/m^3 in the WHO Air Quality Guideline or a decrease of 5 µg/m^3) than the current existing air pollution level in the city. These benefits hence depend on the demographic structure of the population in 2005, and will evolve with the number of 30-year-old people. Aphekom Deliverable D7 (2011) provides an extensive discussion on the assumptions that underlie the computations of the average gain in life expectancy as well as on the rationale for choosing this way to account for the effects of a reduction in the levels of $PM_{2.5}$ on mortality.

B. Valuation from a timing standpoint

Depending on the acute or chronic nature of the mortality benefits, there are two possible approaches to deal with the time that elapses between a reduction in air pollution exposure and the achievement of full health benefits.

In the **"steady-state" approach,** the mortality effects corresponding to two different levels of air pollution are assessed and the number of premature deaths attributed to a change in air pollution exposure is computed as the difference between the numbers of premature deaths resulting from the respective steady states. It is accurate for acute (or short-term, ST) mortality effects, and provides an idea of the magnitude of the public health problem for chronic (or long-term, LT) health effects. This approach is clear, simple and informative.

In the "**marginal (benefit)" approach,** the impact of a reduction in today's air pollution exposure on the future flow of mortality effects is estimated. Indeed, a reduction in air pollution exposure today does not produce all chronic (or long-term) effects the same year, due to their cumulative properties (see Leksell and Rabl, 2001; Miller and Hurley, 2003; Röösli et al., 2005; or Chanel et al., 2006). Miller and Hurley (2006), for instance, provide a tool (IOMLIFET) that carries out the detailed calculations required by separating the dimensions of year and calendar year. This approach is appropriate for cost benefit analysis in which chronic mortality effects are involved: the flow of discounted future benefits can be properly compared with the costs of the policy that generates these benefits.

Although the two approaches are similar for acute (ST) mortality effects, they differ for chronic (LT) mortality effects due to the latency period before the achievement of full mortality benefits and the additional impact of discounting future monetary benefits.

The steady-state analysis is chosen below because it is clear, simple and informative enough to assess the LT mortality benefits that would result from a decrease in air pollution. It mimics a counterfactual approach, i.e. what if pollutant concentrations were lower, all other things being equal (see also Aphekom Deliverable D7, 2011; on this issue). It should be clear that this decrease would not fully and immediately increase the associated mortality benefits, which can only be obtained in the long term. Hence, these benefits should not be compared to the estimated costs of a policy that would result in a decrease in air pollution.

3.1.2. Economic assessment

We follow the standard valuation procedure adopted in ExternE (1999), New-Ext (2004), Cafe (2005a, b), which consists in **monetary values derived from stated preferences surveys**, hence relying on preference-derived values rather than market-derived values.

We agree with Cafe (2005b) that the use of a Value of a Statistical Life (VSL) to value acute mortality is certainly not relevant, considering "that a better estimate of the average loss of life expectancy amongst those affected by acute effects of air pollution is around 1 year" (Cafe, 2005b, p. 46). Consequently, a Value Of a Life Year (VOLY) is preferred to value the short-term effects of PM reduction on mortality (with the assumption that the gain in life expectancy associated with each related premature death is 1 year), and a VSL for long-term effects of air pollutants on mortality. Note that when long-term mortality effects are expressed in terms of number of years of life saved, a VOLY will be used for their assessment.

We choose to rely on European studies when selecting the monetary values to be used (see Table 1). First, we favour the mortality valuation study undertaken for the EC DG Research-funded New-Ext (2004) project and used in Cafe (2005a, b) for two reasons: it estimates both VSL and VOLY values and it is representative of the European population. We choose the median VSL value (annual change 5:10,000 scenario) as low value and the mean VSL and VOLY (annual change 5:10,000 scenario) as high values. For the VOLY's low value, we decided to take the recent results from the NEEDS program (Desaigues et al., 2010, based on 3 months' life expectancy (LE) gain with protesters and outliers deleted) realized on ten European countries. Finally, the respective arithmetic means of high and low values provide the central VSL and VOLY values. Note the low – high range roughly represents a +/- 33% divergence from the resulting central VSL value (€ 1,655 million).

Table 1 Monetary values chosen to assess mortality health effects (in € 2005)

	Chronic mortality	**Chronic and acute mortality**	**Source**
	VSL	VOLY	
Low estimate	1,090,000[(a)]	40,000[(b)]	[(a)] Median value of New-Ext (2004) [(b)] Mean value of Desaigues et al. (2010)
Central estimate	**1,655,000**	**86,600**	**Average of High and Low estimates**
High estimate	2,220,000	133,200	Mean value of New-Ext (2004)

Note that the valuation of mortality is based on specific stated preferences studies and will use a common VSL and a common VOLY for all cities. Indeed, accounting for differences in

countries' Gross Domestic Product (GDP) per capita would seem ethically unacceptable: it would, for instance, lead to a sevenfold lower VSL in Romania than in Ireland (World Bank, 2010). However, the unit costs used to value morbidity will differ across cities, based on specific local market prices for medical resources and wages, as shown below (for more detail regarding this issue, see Aphekom Deliverable D6, 2011; section 3.1).

3.2. Economic assessment of morbidity

The standard cost of illness approach is used for acute hospitalizations, and consists in applying a unit economic value approach to each case, including direct and indirect costs.
The direct medical costs related to cardiac and respiratory hospitalizations are computed as the cost per inpatient day times the average length of stay in hospital. These cost data are taken from CEC (2008)[4] for all twelve countries where cities analyzed in Aphekom are located (see Table 2). The average lengths of stay in days are obtained from the OECD Health Database (2010) for all countries except Romania (which is imputed from the population-weighted average lengths of the 11 other countries).

Table 2 Average lengths of stay, daily hospitalization costs and work loss, and total hospitalization cost per patient.

Country	Average length of stay in days in 2005 [(a)]		Average cost per day (€ 2005)		Total costs related to hospitalization (€ 2005)	
	Circulatory system	Respiratory system	Hosp. all causes[(b)]	Work loss[(c)]	Circulatory system	Respiratory system
Austria	8.2	6.6	319	83	3,977	3,201
Belgium	9.2	8.8	351	98	5,032	4,814
France	7.1	7.1	366	83	3,777	3,777
Greece	7.0	5.0	389	48	3,395	2,425
Hungary	7.4	6.5	59	18	703	618
Ireland	10.5	6.9	349	81	5,366	3,526
Italy	7.7	8.0	379	62	3,873	4,024
Romania	8.5[(d)]	7.4[(d)]	57	6	587	511
Slovenia	8.6	7.3	240	34	2,649	2,248
Spain	8.5	7.4	321	55	3,664	3,189
Sweden	6	5.2	427	92	3,666	3,177
United Kingdom	11.4	8.0	581	116	9,268	6,504
Mean[(d)]	**8.5**	**7.4**	**373**	**73**	**4,411**	**3,840**

Sources: [(a)] OECD Health Data (2010); [(b)] CEC (2008), annex 7, cost/bed/day corr; [(c)] Eurostat (2003); [(d)] population-weighted average, 2005 population data from OECD Health Data (2010).

The indirect medical costs are computed as the average gross loss of production per day times twice the average length of stay in hospital. Indeed, because the number of working days lost has not been assessed by specific functions (Cafe, 2005b, for instance, used a function derived from Ostro, 1987), or through actual statistics regarding sick leaves or cessation of work, we assume that the number of working days lost is twice the length of hospitalizations (Ready and al., 2004; or Sommer et al., 1999; used a similar assessment). Consequently, we cannot verify whether these days were actual working days. We thus compute the daily loss of

[4] Note that the cost per inpatient day differs depending on the Diagnosis-Related Groups. In Sweden, it is for instance € 466 for respiratory hospitalization and € 675 for cardiovascular (personal communication Bertil Forsberg, Nov. 2010) and in Cafe (2005b, p. 116) "the inpatient unit cost is 1.92 higher than the generic unit cost". We chose a single average cost per day for both circulatory and respiratory hospitalizations because more detailed data cannot easily be obtained for most of the countries.

production as the average gross earnings in industry and services (full employment) obtained from Eurostat (2003) for each country, expressed in 2005 and divided by 365 days.

The total medical costs for cardiac and respiratory hospitalizations are obtained by adding together the direct and indirect components. As mentioned in Section 2, we suggest a +/- 33% range around these estimates, to account for uncertainties specific to the economic valuation. The Low and High estimates for the sensitivity analysis are then obtained by multiplying the costs respectively by 0.66 and 1.33.

Hence, based on Table 2, the population-weighted average direct cost of a cardiac hospital admission is 8.5 days x € 373= € 3,171 and the corresponding indirect cost related to work loss is 2 x 8.5 days x € 73= € 1,241. **Overall, the cost related to a cardiac hospital admission is € 4,411.**

Similarly, the population-weighted average direct cost of a respiratory hospital admission is 7.4 days x € 373= € 2,760, and the corresponding indirect cost related to work loss is 2 x 7.4 days x € 73= € 1,080. **Overall, the cost related to a cardiac hospital admission is € 3,840**.

For city- or country-specific valuation, the last two columns of Table 2 provide average hospitalization costs computed following the same rationale but using average lengths of stay, cost per day of hospitalization and daily work loss that are country-specific.

4. Results

4.1 Methodology

Based on computed numbers of cases for the health outcomes considered on the one hand (see Aphekom Deliverable D7, 2011), and the unit economic values respectively associated with each of these outcomes on the other hand, we compute the overall economic burden related to **a reduction in urban air pollution** for each of the 25 cities. This is done for two scenarios: a decrease of 5 µg/m^3 in air pollutant concentration and compliance with WHO-AQG values.

The results for each city are given in Appendix 1 (Tables A1-1 to A1-25) for the 5 µg/m^3 decrease, and in Appendix 2 (Tables A2-1 to A2-25) for compliance with WHO-AQG values. Each of these tables contains a description of the health outcomes in the first column, their mean (and 95% confidence interval (95%CI) in brackets) in the second column, their economic assessment based on Low cost estimates in the third column (with 95%CI in brackets), their economic assessment based on Central cost estimates in the fourth column (with 95%CI in brackets), and their economic assessment based on High cost estimates in the last column (with 95%CI in brackets). The combined results for the 25 cities are given in Tables 3 and 4 below.

Before commenting on the results, three points require clarification.

First, the benefits associated with a decrease in $PM_{2.5}$ concentration are computed for three health outcomes: the annual numbers of deaths based on cardiovascular (30+) and total (30+) mortality, the annual number of life years saved based on total mortality (30+). These benefits cannot be added together, since the two former partially overlap, and the two latter represent two different ways of expressing the same decrease in mortality.

Second, the results rely on a counterfactual approach, i.e. what if pollutant concentrations were lower, all other things being equal. This implies that the length of time required to obtain this decrease is not accounted for, so that caution should be taken when comparing the economic benefits with the costs of a policy that would result in this decrease. Moreover, specific assumptions have been made when extrapolating the future birth rates and mortality rates or when computing the chronic mortality impacts of the decrease. Alternative ways of computing chronic mortality impacts under different assumptions can be found in Comeap (2010), or in Miller and Hurley (2006).

Third, precisely what acute and chronic mortality effects represent in terms of total effect of exposure to air pollution and whether or not these effects can be added together is debatable (see for instance Künzli et al., 2001; Martuzzi, 2001; Burnett et al., 2003; Rabl, 2003; Thomas, 2005). One of the difficulties is that acute and chronic mortality effects are computed on the basis of different populations, using different ways to account for confounding factors and based on different exposure data. Hence, in the tables of results, we choose to present the chronic mortality effects based on $PM_{2.5}$ separately from the acute mortality effects based on PM_{10} and O_3, rather than attempting to compute a global mortality effect.

Overall results are presented separately by air pollutant, and are only added together for the health outcomes attributed to PM_{10} and O_3.

4.2 Scenario of a 5 µg/m^3 decrease

Let us consider the results for the scenario of a 5 µg/m^3 decrease for each of the three air pollutants (see Table 3 for combined results for the 25 cities, and Appendix 1 for city-by-city results).

For chronic exposure to $PM_{2.5}$, the results are presented in Figure 1. Total mortality (30+) benefits, when measured by the annual number of deaths attributable, and based on the Central estimate results, amount to € 14.5 billion per year (95% CI: € 4.97 billion; € 25.68 billion), the greatest share for London (€ 2,351 million), and the smallest share for Granada (€ 100.5 million).

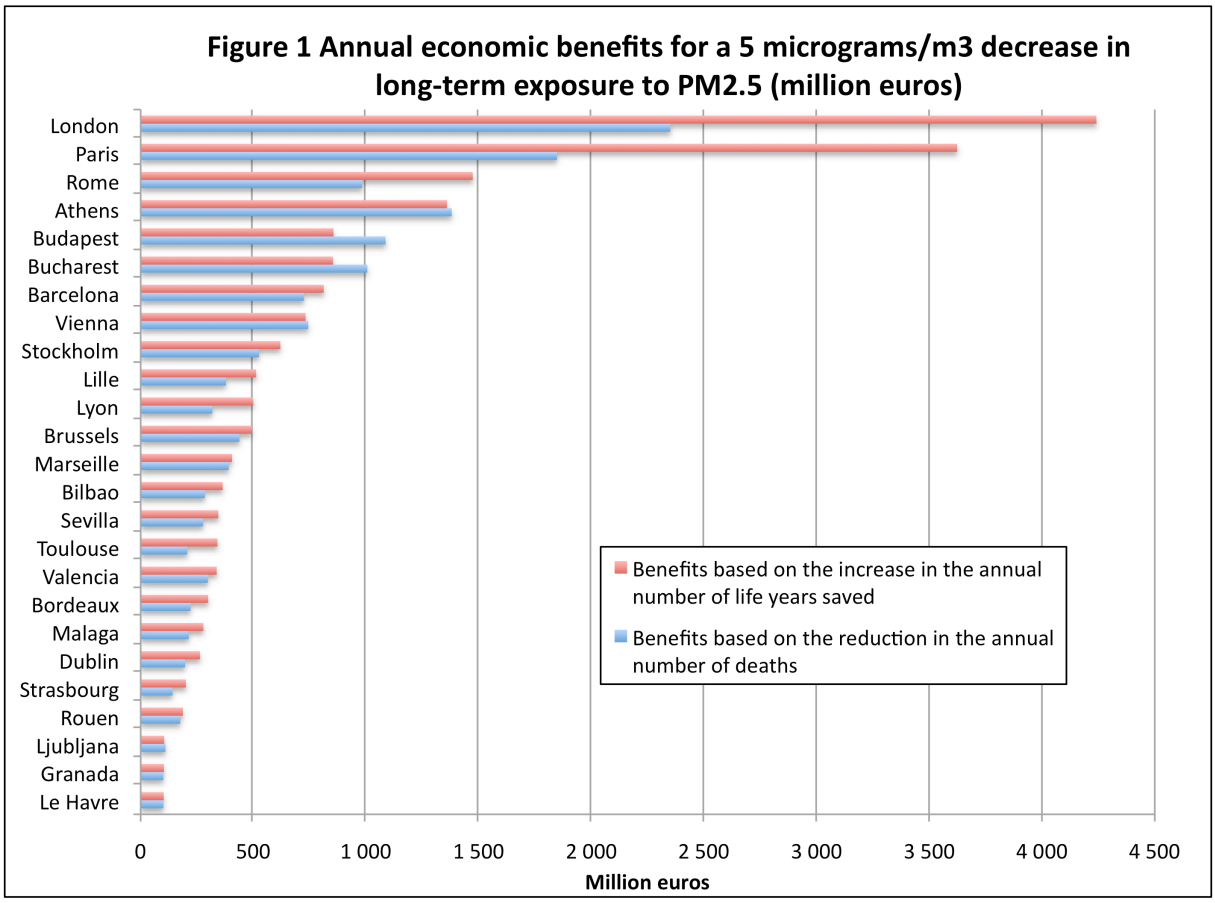
When the benefits are measured in terms of number of life years saved, total annual economic benefits amount to € 19.41 billion (95% CI: € 6.57 billion; € 34.91 billion), the greatest share still for London (€ 4,241 million) and the smallest share for Le Havre (€ 102 million). Despite the fact that annual economic benefits differ slightly depending on the metrics used to measure chronic mortality effects, relative ranking and total annual benefits do not differ markedly.

Table 3 Annual monetary valuations for a 5 µg/m^3 decrease in the 25 cities (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest million)

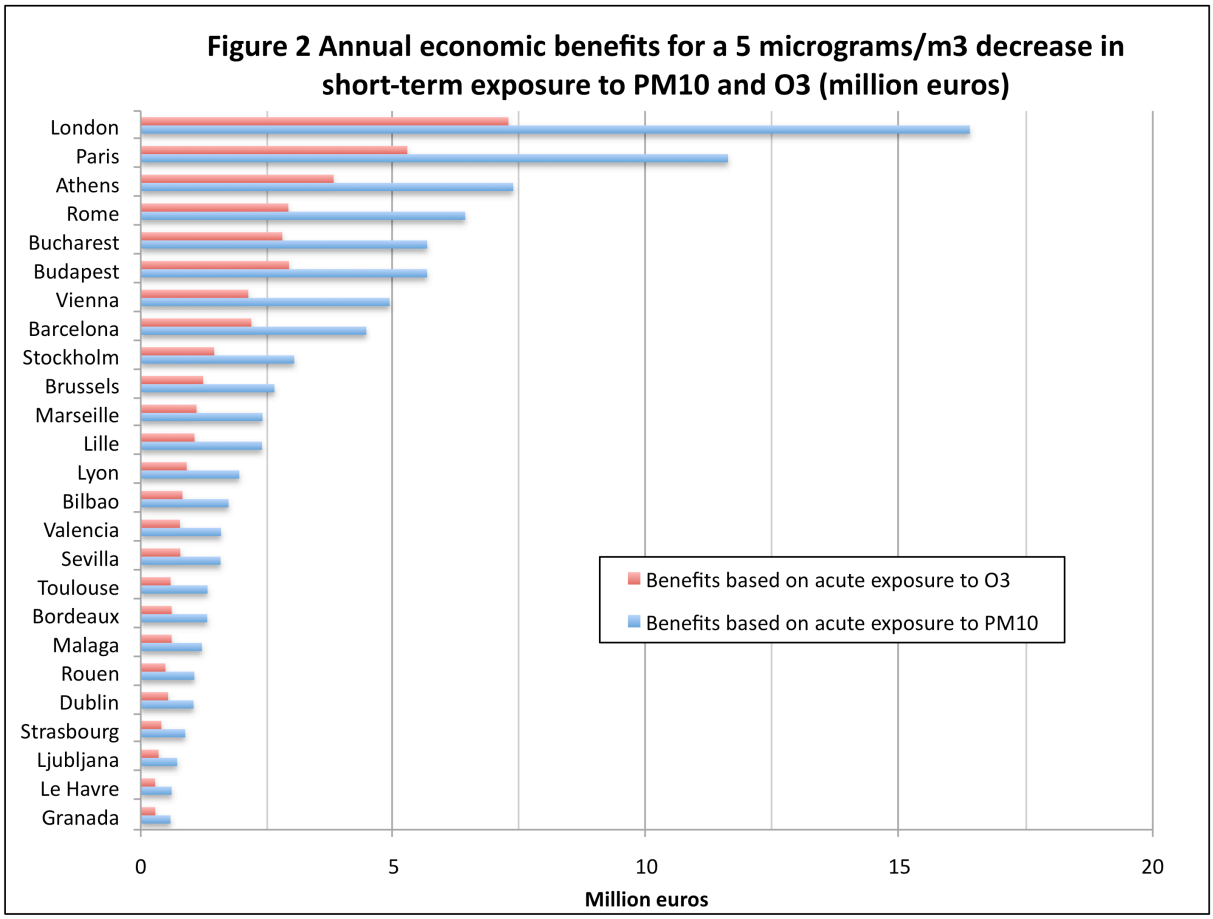
All 25 cities	Number of cases	Monetary valuation (million € 2005)		
	Mean (95% CI)	**Low estimate** Mean (95% CI)	**Central estimate** Mean (95% CI)	**High estimate** Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	8 761.42	9 550	14 500	19
- Annual number of deaths	(3 006 – 15 515)	(3 277 – 16 911)	(4 975 – 25 677)	(6 673 – 34 443)
Total mortality (30+)*	224 101.78	8 964	19 407	29 850
-Annual number of life years saved	(75 886 – 403 148)	(3 035 – 16 126)	(6 572 – 34 913)	(10 108 – 53 699)
Cardiovascular mortality (30+)*	6 399.44	6 975	10 591	14 207
- Annual number of deaths	(4 385 – 7 840)	(4 780 – 8 546)	(7 257 – 12 975)	(9 735 – 17 405)
PM10 - Acute				
Total non-accidental mortality (All)	893.05	36	77	119
- Annual number of deaths	(597 – 1 188)	(24 – 48)	(52 – 103)	(80 – 158)
Cardiac hospitalizations (All)	1 018.44	3	4	5
- Annual number	(509 – 1 524)	(1 – 4)	(2 - 6)	(3 – 8)
Respiratory hospitalizations (All)	2 035.44	5	7	10
- Annual number	(1 109 – 2 970)	(3 - 7)	(4 – 10)	(5 – 14)
Sub-total PM10		**43**	**89**	**134**
		(28 - 59)	**(58 - 120)**	**(88 – 180)**
Ozone - Acute				
All non-accidental mortality (All)	463.18	19	40	62
- Annual number of deaths	(256 - 776)	(10 – 31)	(22 – 67)	(34 – 103)
Respiratory hospitalizations (15-64)	63,44	0	0	0
- Annual number	(0 - 756)	(0 – 2)	(0 – 3)	(0 – 4)
Respiratory hospitalizations (65+)	313.93	1	1	2
- Annual number	(0 - 749)	(0 – 2)	(0 – 3)	(0 – 4)
Sub-total Ozone		**20**	**42**	**64**
		(10 - 35)	**(22 – 73)**	**(34- 110)**

* These alternative valuations of chronic mortality are not additive.

For acute exposure to PM_{10}, total annual economic benefits (covering total mortality, cardiac and respiratory hospitalizations) are presented in Figure 2. Total annual economic benefits amount to € 89 million (95% CI: € 58 million; € 120 million), the greatest share still for London (€ 16.4 million) and the smallest share for Le Havre and Granada (€ 0.6 million). Mortality effects represent on average 86.5% of total benefits.



For acute exposure to O_3, the total annual economic benefits (covering total mortality and respiratory hospitalizations for 15-64 and 65+) are presented in Figure 2. Total annual economic benefits amount to € 42 million (95% CI: € 22 million; € 73 million), the greatest share still for London (€ 7.3 million) and the smallest share for Le Havre and Granada (€ 0.3 million). Mortality effects represent on average 96.5% of total benefits.



4.3. Scenario of compliance with WHO-AQG values

Let us now consider the results from the scenario of compliance with WHO-AQG values for each of the three air pollutants (see Table 4 for combined results for the 25 cities, and Appendix 2 for city-by-city results). This corresponds respectively to a decrease in the annual $PM_{2.5}$ average concentration to 10 µg/m^3, to a decrease in the annual PM_{10} average concentration to 20 µg/m^3 and to a decrease in all O_3 daily maximum 8h values greater than 100 µg/m^3 to 100 µg/m^3. Note that one city (Stockholm) already meets the WHO-AQG requirements for $PM_{2.5}$, and three cities (Dublin, Malaga and Stockholm) already meet the WHO-AQG requirements for PM_{10}. Consequently, the annual economic benefits that can be obtained by complying with WHO-AQG values are nil for these cities and air pollutants.

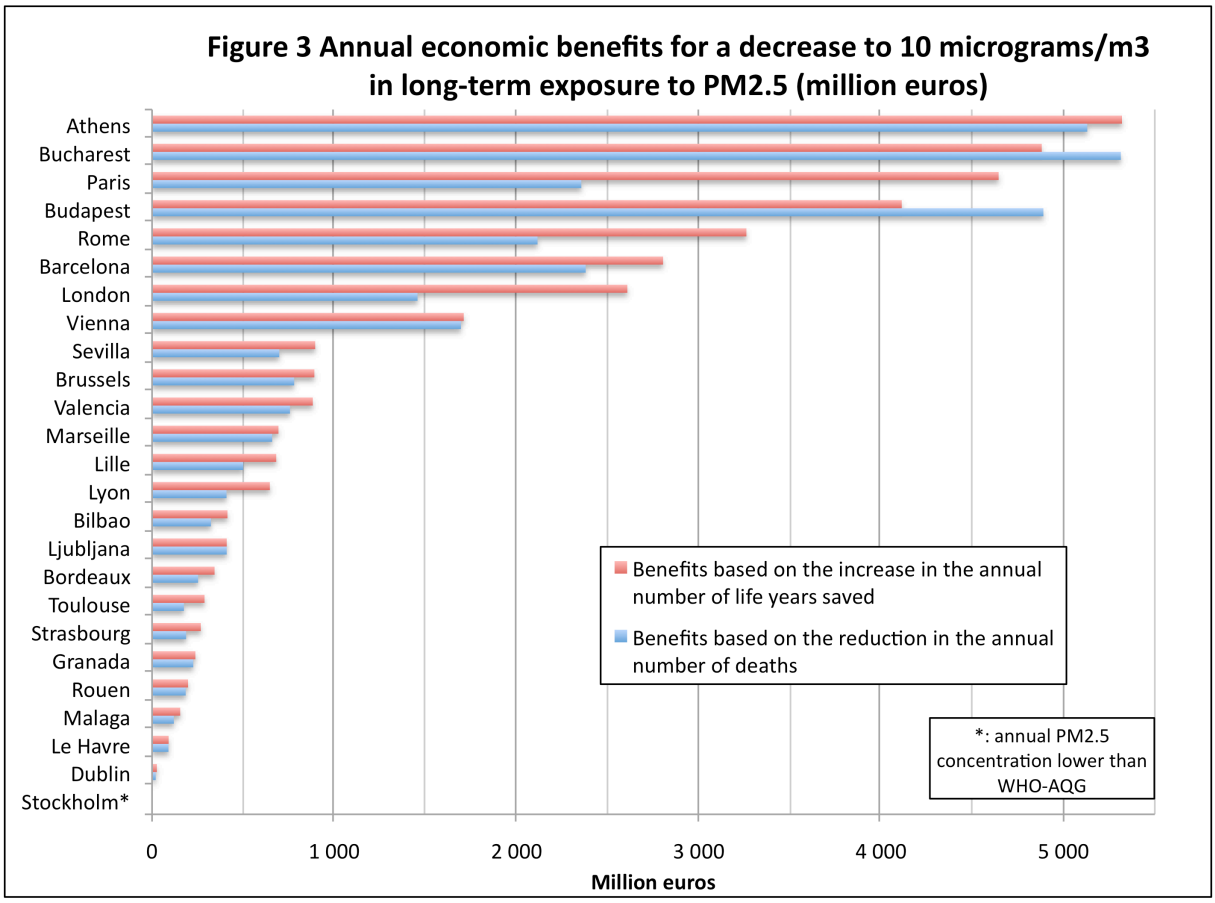
For chronic exposure to $PM_{2.5}$, the results are presented in Figure 3. Total mortality (30+) benefits, when measured by the annual number of deaths attributable, and based on the Central estimate results, amount to € 31.1 billion per year (95% CI: € 10.92 billion; € 53.68 billion), the greatest share for Bucharest (€ 5,314 million), and the smallest shares for Dublin (€ 20.1 million) and Stockholm (€ 0 as explained above).

Table 4 Annual monetary valuations for compliance with WHO-AQG in the 25 cities (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest million.)

All 25 cities	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	**Low estimate** Mean (95% CI)	**Central estimate** Mean (95% CI)	**High estimate** Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	18 801.34	20 493	31 116	41 739
- Annual number of deaths	(6 596 – 32 433)	(7 190 – 35 352)	(10 916 – 53 677)	(14 643 – 72 001)
Total mortality (30+)*	420 895.57	16 836	36 450	56 063
-Annual number of life years saved	(141 305 – 762 769)	(5 652 – 30 511)	(12 237 – 66 056)	(18 822 – 101 601)
Cardiovascular mortality (30+)*	15 015.06	16 366	24 850	33 333
- Annual number of deaths	(10 534 – 18 094)	(11 482 – 19 722)	(17 434 – 29 946)	(23 385 – 40 169)
PM10 - Acute				
Total non-accidental mortality (All)	2 239.81	90	194	298
- Annual number of deaths	(1 497 – 2 979	(60 – 119)	(130 - 258)	(199 – 397)
Cardiac hospitalizations (All)	2 647.56	5	7	9
- Annual number	(1 330 – 3 951)	(2 – 7)	(3 - 10)	(5 - 14)
Respiratory hospitalizations (All)	5 325.42	8	12	16
- Annual number	(2 921 – 7 736)	(4 - 12)	(6 - 17)	(9 - 23)
Sub-total PM10		**103**	**213**	**323**
		(66 - 138)	**(139 - 285)**	**(213 – 434)**
Ozone - Acute				
All non-accidental mortality (All)	210.86	8	18	28
- Annual number of deaths	(115 – 353)	(5 - 14)	(10 – 31)	(15 – 47)
Respiratory hospitalizations (15-64)	27.24	0	0	0
- Annual number	(0 – 322)	(0 – 0)	(0 - 1)	(0 – 1)
Respiratory hospitalizations (65+)	129.47	0	0	1
- Annual number	(0 - 308)	(0 - 0)	(0 - 1)	(0 – 1)
Sub-total Ozone		**9**	**19**	**29**
		(5 - 15)	**(10 - 33)**	**(15 - 49)**

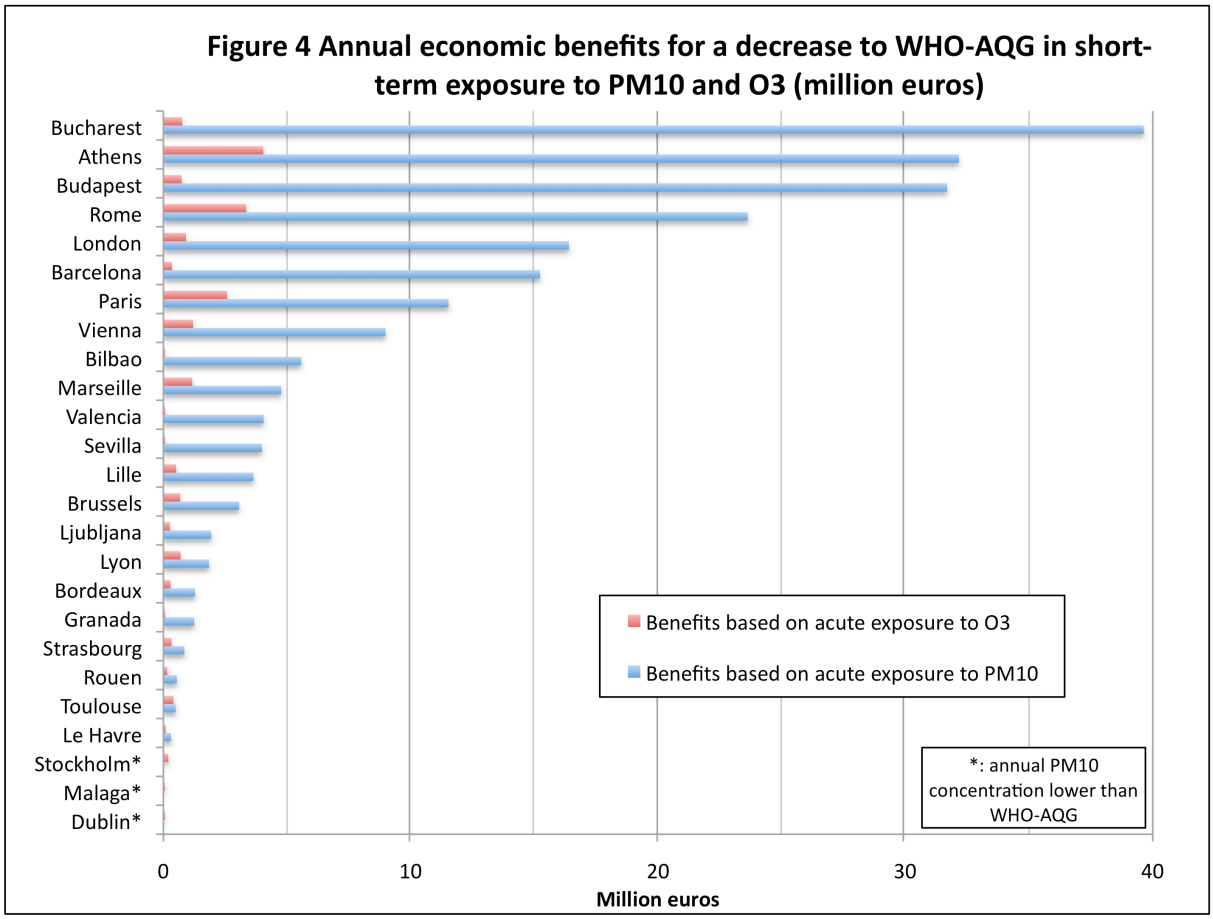
* These alternative valuations of chronic mortality are not additive.

When the benefits are measured in terms of number of life years saved, total annual economic benefits amount to € 36.45 billion (95% CI: € 12.24 billion; € 66.06 billion), the greatest share for Athens (€ 5,320 million) and the smallest share for Dublin (€ 26.4 million). Here again, as shown in Figure 3, the annual economic benefits that could be obtained if the WHO-AQG requirements were met differ slightly depending on the metrics used to measure chronic mortality effects, but relative ranking and total annual benefits do not differ markedly. However, the relative city ranking differs more markedly from the ranking obtained for a 5 $\mu g/m^3$ decrease (Figure 1). The explanation is that the level of $PM_{2.5}$ in each city now enters into the computations of economic benefits, whereas size of population was the main factor in the ranking in Figure 1.



For acute exposure to PM_{10}, the total annual economic benefits (covering total mortality, cardiac and respiratory hospitalizations) are presented in Figure 4. Total annual economic benefits amount to € 213 million (95% CI: € 139 million; € 285 million), the greatest share still for Bucharest (€ 39.6 million) and the smallest shares for Le Havre (€ 0.3 million) as well as, obviously, for Dublin, Malaga and Stockholm (€ 0, as explained above). Mortality effects represent on average 91.1% of the total benefits.

For acute exposure to O_3, the total annual economic benefits (covering total mortality and respiratory hospitalizations for 15-64 and 65+) are presented in Figure 4. Total annual economic benefits amount to € 19 million (95% CI: € 10 million; € 33 million), the greatest share for Athens (€ 4.04 million) and the smallest share for Dublin (€ 0.008 million). Mortality effects represent on average 96.9% of the total benefits.



5. Conclusion

Two particularly striking results emerge from the economic assessment of the benefits that could be obtained through a decrease in urban air pollutant concentrations.

First, effects corresponding to mortality largely exceed those corresponding to morbidity, even when only acute effects are considered. Indeed, for PM_{10} and O_3, they represent between 86.5% and 96.9% of total acute benefits, depending on the scenario and on the air pollutant. Second, chronic effects largely exceed acute effects. Indeed, for mortality measured by annual number of deaths, chronic $PM_{2.5}$ benefits are 160 to 187 times greater than acute PM_{10} benefits, depending on the scenario.

These two findings emphasize the importance of accounting for chronic morbidity benefits, not accounted for by the traditional HIA. The novel HIA proposed in Aphekom Deliverable D4 (2011) does this by assessing the number of cases of prevalence (chronic effects) and of all exacerbations (acute effects) due to traffic air pollution exposure for three chronic diseases. Generally speaking, the traditional HIA represents only a tiny share - between 0.1 % and 1% - of the total morbidity benefits associated with urban air pollution exposure and which are assessed by the innovative HIA (see Aphekom Deliverable D4bis, 2011).

To sum up, for the 25 cities studied, the long-term monetary health benefits from complying with the WHO air quality guidelines would total around €30 billion annually, including savings on health expenditures, absenteeism and intangible costs such as well-being, life expectancy and quality of life. This certainly deserves the attention of public decision-makers.

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Appendix 1

Scenario of a 5 µg/m^3 decrease: Results by city

Table A1-1 Annual monetary valuations for a 5 µg/m^3 decrease in Athens (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest thousand).

Athens	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	833.89	908 940	1 380 088	1 851 236
- Annual number of deaths	(286 – 1 477)	(311 740 – 1 609 930)	(473 330 – 2 444 435)	(634 920 – 3 278 940)
Total mortality (30+)*	15 698.58	627 943	1 359 497	2 091 051
- Annual number of life years saved	(5 324 – 28 190)	(212 954 – 1 127 618)	(461 046 – 2 441 292)	(709 138 – 3 754 967)
Cardiovascular mortality (30+)*	753.67	821 500	1 247 324	1 673 147
- Annual number of deaths	(516 - 923)	(562 440 – 1 006 070)	(853 980 – 1 527 565)	(1 145 520 – 2 049 060)
PM10 - Acute				
Total non-accidental mortality (All)	85.00	3 400	7 361	11 322
- Annual number of deaths	(57 - 113)	(2280 - 4520)	(4 936 – 9 786)	(7 592 – 15 052)
Cardiac hospitalizations (All)	N/A	N/A	N/A	N/A
- Annual number				
Respiratory hospitalizations (All)	N/A	N/A	N/A	N/A
- Annual number				
Sub-total PM10		**3 400**	**7 361**	**11 322**
		(2280 - 4520)	**(4 936 – 9 786)**	**(7 592 – 15 052)**
Ozone - Acute				
All non-accidental mortality (All)	44.01	1 760	3 811	5 862
- Annual number of deaths	(24 - 74)	(960 – 2 960)	(2 078 – 6 408)	(3 197 – 9 857)
Respiratory hospitalizations (15-64)	N/A	N/A	N/A	N/A
- Annual number				
Respiratory hospitalizations (65+)	N/A	N/A	N/A	N/A
- Annual number				
Sub-total Ozone		**1 760**	**3 811**	**5 862**
		(960 – 2 960)	**(2 078 – 6 408)**	**(3 197 – 9 857)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A1-2 Annual monetary valuations for a 5 µg/m^3 decrease in Barcelona (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest thousand).

Barcelona	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
Total mortality (30+)*	437.71	477 104	724 410	971 716
- Annual number of deaths	(150 - 775)	(163 500 – 844 750)	(248 250 – 1 282 625)	(333 000 – 1 720 500)
Total mortality (30+)*	9 381.07	375 243	812 401	1 249 559
- Annual number of life years saved	(3 176 – 16 883)	(127 024 – 675 318)	(275 006 – 1 462 064)	(422 989 – 2 248 809)
Cardiovascular mortality (30+)*	274.67	299 390	454 579	609 767
- Annual number of deaths	(188 - 337)	(204 920 – 367 330)	(311 140 – 557 735)	(417 360 – 748 140)
PM10 - Acute				
Total non-accidental mortality (All)	45.86	1 834	3 971	6 109
- Annual number of deaths	(31 - 61)	(1 240 – 2 440)	(2 685 – 5 283)	(4 129 – 8 125)
Cardiac hospitalizations (All)	42.54	104	156	208
- Annual number	(21 - 64)	(51 - 156)	(77 - 234)	(103 - 313)
Respiratory hospitalizations (All)	103.71	220	331	441
- Annual number	(57 - 151)	(121 - 321)	(182 - 482)	(242 - 642)
Sub-total PM10		**2 159**	**4 458**	**6 757**
		(1 412 – 2 917)	**(2 943 – 5 999)**	**(4 474 – 9 080)**
Ozone - Acute				
All non-accidental mortality (All)	24.09	964	2 086	3 209
- Annual number of deaths	(13 - 40)	(520 – 1 600)	(1 126 – 3 464)	(1 732 – 5 328)
Respiratory hospitalizations (15-64)	2.57	5	8	11
- Annual number	(0 - 31)	(0 - 66)	(0 - 99)	(0 - 132)
Respiratory hospitalizations (65+)	28.61	61	91	122
- Annual number	(0 - 68)	(0 - 145)	(0 - 217)	(0 - 289)
Sub-total Ozone		**1 030**	**2 185**	**3 342**
		(520 – 1 810)	**(1 126 – 3 780)**	**(1 732 – 5 749)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A1-3 Annual monetary valuations for a 5 µg/m^3 decrease in Bilbao (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest thousand).

Bilbao	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	172.07	187 556	284 776	381 995
- Annual number of deaths	(59 - 305)	(64 310 – 332 450)	(97 645 – 504 775)	(130 980 – 677 100)
Total mortality (30+)*	4 199.97	167 999	363 717	559 436
-Annual number of life years saved	(1 421 – 7 561)	(56 856 – 302 429)	(123 094 – 654 759)	(189 331 – 1 007 089)
Cardiovascular mortality (30+)*	103.71	113 044	171 640	230 236
- Annual number of deaths	(71 - 127)	(77 390 – 138 430)	(117 505 – 210 185)	(157 620 – 281 940)
PM10 - Acute				
Total non-accidental mortality (All)	17.44	698	1 510	2 323
- Annual number of deaths	(12 - 23)	(480 - 920)	(1 039 – 1 992)	(1 598 – 3 064)
Cardiac hospitalizations (All)	19.54	48	72	95
- Annual number	(10 - 29)	(24 - 71)	(37 - 106)	(49 - 142)
Respiratory hospitalizations (All)	47.84	102	153	203
- Annual number	(26 - 70)	(55 - 149)	(83 - 223)	(111 - 298)
Sub-total PM10		**847**	**1 734**	**2 622**
		(560 – 1 140)	**(1 159 – 2 321)**	**(1 758 – 3 503)**
Ozone - Acute				
All non-accidental mortality (All)	9.03	361	782	1 203
- Annual number of deaths	(5 - 15)	(200 - 600)	(433 – 1 299)	(666 – 1 998)
Respiratory hospitalizations (15-64)	1.30	3	4	6
- Annual number	(0 - 15)	(0 - 32)	(0 - 48)	(0 - 64)
Respiratory hospitalizations (65+)	11.67	25	37	50
- Annual number	(0 - 28)	(0 - 60)	(0 - 89)	(0 - 119)
Sub-total Ozone		**389**	**823**	**1 259**
		(200 - 691)	**(433 – 1 436)**	**(666 – 2 181)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A1-4 Annual monetary valuations for a 5 µg/m^3 decrease in Bordeaux (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest

Bordeaux	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	133.70	145 733	221 274	296 814
- Annual number of deaths	(46 - 237)	(50 140 – 258 330)	(76 130 – 392 235)	(102 120 – 526 140)
Total mortality (30+)*	3 458.42	138 337	299 499	460 662
-Annual number of life years saved	(1 171 – 6 223)	(46 837 – 248 906)	(101 403 – 538 882)	(155 968 – 828 857)
Cardiovascular mortality (30+)*	75.56	82 360	125 052	167 743
- Annual number of deaths	(52 - 93)	(56 680 – 101 370)	(86 060 – 153 915)	(115 440 – 206 460)
PM10 - Acute				
Total non-accidental mortality (All)	13.20	528	1 143	1 758
- Annual number of deaths	(9 - 18)	(360 - 720)	(779 – 1 559)	(1 199 – 2 398)
Cardiac hospitalizations (All)	16.73	42	63	84
- Annual number	(8 - 25)	(20 - 63)	(30 - 94)	(40 - 126)
Respiratory hospitalizations (All)	28.38	71	107	143
- Annual number	(15 - 41)	(38 - 103)	(57 - 155)	(76 - 206)
Sub-total PM10		**642**	**1 314**	**1 985**
		(418 - 886)	**(866 – 1 808)**	**(1 315 – 2 730)**
Ozone - Acute				
All non-accidental mortality (All)	6.83	273	591	910
- Annual number of deaths	(4 - 11)	(160 - 440)	(346 - 953)	(533 – 1 465)
Respiratory hospitalizations (15-64)	0.93	2	4	5
- Annual number	(0 - 11)	(0 - 28)	(0 - 42)	(0 - 55)
Respiratory hospitalizations (65+)	4.07	10	15	20
- Annual number	(0 - 10)	(0 - 25)	(0 - 38)	(0 - 50)
Sub-total Ozone		**285**	**610**	**935**
		(160 - 493)	**(346 – 1 032)**	**(533 – 1 571)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A1-5 Annual monetary valuations for a 5 µg/m^3 decrease in Brussels (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest thousand).

Brussels	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	264.86	288 697	438 343	587 989
- Annual number of deaths	(91 - 469)	(99 190 – 511 210)	(150 605 – 776 195)	(202 020 – 1 041 180)
Total mortality (30+)*	5 695.03	227 801	493 190	758 578
-Annual number of life years saved	(1 930 – 10 235)	(77 203 – 409 395)	(167 144 – 886 341)	(257 085 – 1 363 287)
Cardiovascular mortality (30+)*	173.55	189 170	287 225	385 281
- Annual number of deaths	(119 - 213)	(129 710 – 232 170)	(196 945 – 352 515)	(264 180 – 472 860)
PM10 - Acute				
Total non-accidental mortality (All)	26.33	1 053	2 280	3 507
- Annual number of deaths	(18 - 35)	(720 – 1 400)	(1 559 – 3 031)	(2 398 – 4 662)
Cardiac hospitalizations (All)	19.53	66	98	131
- Annual number	(10 - 29)	(34 - 97)	(50 - 146)	(67 - 195)
Respiratory hospitalizations (All)	54.68	175	263	351
- Annual number	(30 - 80)	(96 - 257)	(144 - 385)	(193 - 513)
Sub-total PM10		**1 294**	**2 642**	**3 989**
		(850 – 1 754)	**(1 754 – 3 562)**	**(2 657 – 5 370)**
Ozone - Acute				
All non-accidental mortality (All)	13.63	545	1 180	1 816
- Annual number of deaths	(7 - 23)	(280 - 920)	(606 – 1 992)	(932 – 3 064)
Respiratory hospitalizations (15-64)	1.32	4	6	8
- Annual number	(0 - 16)	(0 - 51)	(0 - 77)	(0 - 103)
Respiratory hospitalizations (65+)	9.38	30	45	60
- Annual number	(0 - 22)	(0 - 71)	(0 - 106)	(0 - 141)
Sub-total Ozone		**579**	**1 231**	**1 884**
		(280 – 1 042)	**(606 – 2 175)**	**(932 – 3 308)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A1-6 Annual monetary valuations for a 5 µg/m^3 decrease in Bucharest (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest thousand).

Bucharest	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	607.72	662 415	1 005 777	1 349 138
- Annual number of deaths	(209 – 1 076)	(227 810 – 1 172 840)	(345 895 – 1 780 780)	(463 980 – 2 388 720)
Total mortality (30+)*	9 854.57	394 183	853 406	1 312 629
-Annual number of life years saved	(3 344 – 17 684)	(133 753 – 707 356)	(289 576 – 1 531 425)	(445 399 – 2 355 494)
Cardiovascular mortality (30+)*	674.43	735 129	1 116 182	1 497 235
- Annual number of deaths	(462 - 826)	(503 580 – 900 340)	(764 610 – 1 367 030)	(1 025 640 – 1 833 720)
PM10 - Acute				
Total non-accidental mortality (All)	61.95	2 478	5 365	8 252
- Annual number of deaths	(41 - 82)	(1 640 – 3 280)	(3 551 – 7 101)	(5 461 – 10 922)
Cardiac hospitalizations (All)	172.32	67	101	135
- Annual number	(86 - 258)	(34 - 101)	(50 - 151)	(67 - 202)
Respiratory hospitalizations (All)	381.41	130	195	260
- Annual number	(208 - 557)	(71 - 190)	(106 - 285)	(142 - 380)
Sub-total PM10		**2 675**	**5 661**	**8 646**
		(1 745 – 3 571)	**(3 707 – 7 537)**	**(5 670 – 11 504)**
Ozone - Acute				
All non-accidental mortality (All)	32.08	1 283	2 778	4 273
- Annual number of deaths	(18 - 54)	(720 – 2 160)	(1 559 – 4 676)	(2 398 – 7 193)
Respiratory hospitalizations (15-64)	14.29	5	7	10
- Annual number	(0 - 170)	(0 - 58)	(0 - 87)	(0 - 116)
Respiratory hospitalizations (65+)	21.81	7	11	15
- Annual number	(0 - 52)	(0 - 18)	(0 - 27)	(0 - 35)
Sub-total Ozone		**1 295**	**2 796**	**4 298**
		(720 – 2 236)	**(1 559 – 4 790)**	**(2 398 – 7 344)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A1-7 Annual monetary valuations for a 5 µg/m^3 decrease in Budapest (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest

Budapest	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	656.72	715 825	1 086 872	1 457 918
- Annual number of deaths	(225 – 1 163)	(245 250 – 1 267 670)	(372 375 – 1 924 765)	(499 500 – 2 581 860)
Total mortality (30+)*	9 880.54	395 222	855 655	1 316 088
-Annual number of life years saved	(3 351 – 17 739)	(134 050 – 709 576)	(290 219 – 1 536 231)	(446 388 – 2 362 886)
Cardiovascular mortality (30+)*	633.74	690 777	1 048 840	1 406 903
- Annual number of deaths	(434 - 776)	(473 060 – 845 840)	(718 270 – 1 284 280)	(963 480 – 1 722 720)
PM10 - Acute				
Total non-accidental mortality (All)	65.34	2 614	5 658	8 703
- Annual number of deaths	(44 - 87)	(1 760 – 3 480)	(3 810 – 7 534)	(5 861 – 11 588)
Cardiac hospitalizations (All)	N/A	N/A	N/A	N/A
- Annual number				
Respiratory hospitalizations (All)	N/A	N/A	N/A	N/A
- Annual number				
Sub-total PM10		**2 614**	**5 658**	**8 703**
		(1 760 – 3 480)	**(3 810 – 7 534)**	**(5 861 – 11 588)**
Ozone - Acute				
All non-accidental mortality (All)	33.83	1 353	2 930	4 506
- Annual number of deaths	(19 - 57)	(760 – 2 280)	(1 645 – 4 936)	(2 531 – 7 592)
Respiratory hospitalizations (15-64)	N/A	N/A	N/A	N/A
- Annual number				
Respiratory hospitalizations (65+)	N/A	N/A	N/A	N/A
- Annual number				
Sub-total Ozone		**1 353**	**2 930**	**4 506**
		(760 – 2 280)	**(1 645 – 4 936)**	**(2 531 – 7 592)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A1-8 Annual monetary valuations for a 5 µg/m^3 decrease in Dublin (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest thousand).

Dublin	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	119.00	129 710	196 945	264 180
- Annual number of deaths	(41 - 211)	(44 690 – 229 990)	(67 855 – 349 205)	(91 020 – 468 420)
Total mortality (30+)*	3 043.76	121 750	263 590	405 429
-Annual number of life years saved	(1 032 – 5 468)	(41 276 – 218 714)	(89 362 – 473 516)	(137 448 – 728 319)
Cardiovascular mortality (30+)*	79.73	86 906	131 953	177 001
- Annual number of deaths	(55 - 98)	(59 950 – 106 820)	(91 025 – 162 190)	(122 100 – 217 560)
PM10 - Acute				
Total non-accidental mortality (All)	12.05	482	1 044	1 605
- Annual number of deaths	(8 - 16)	(320 - 640)	(693 – 1 386)	(1 066 – 2 131)
Cardiac hospitalizations (All)	N/A	N/A	N/A	N/A
- Annual number				
Respiratory hospitalizations (All)	N/A	N/A	N/A	N/A
- Annual number				
Sub-total PM10		**482**	**1 044**	**1 605**
		(320 - 640)	**(693 – 1 386)**	**(1 066 – 2 131)**
Ozone - Acute				
All non-accidental mortality (All)	6.24	250	540	831
- Annual number of deaths	(3 - 10)	(120 - 400)	(260 - 866)	(400 – 1 332)
Respiratory hospitalizations (15-64)	N/A	N/A	N/A	N/A
- Annual number				
Respiratory hospitalizations (65+)	N/A	N/A	N/A	N/A
- Annual number				
Sub-total Ozone		**250**	**540**	**831**
		(120 - 400)	**(260 - 866)**	**(400 – 1 332)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A1-9 Annual monetary valuations for a 5 µg/m^3 decrease in Granada (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest thousand).

Granada	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	60.73	66 196	100 508	134 821
- Annual number of deaths	(21 - 108)	(22 890 – 117 720)	(34 755 – 178 740)	(46 620 – 239 760)
Total mortality (30+)*	1 190.75	47 630	103 119	158 608
-Annual number of life years saved	(403 – 2 142)	(16 131 – 85 667)	(34 924 – 185 468)	(53 717 – 285 270)
Cardiovascular mortality (30+)*	43.15	47 034	71 413	95 793
- Annual number of deaths	(30 - 53)	(32 700 – 57 770)	(49 650 – 87 715)	(66 600 – 117 660)
PM10 - Acute				
Total non-accidental mortality (All)	6.27	251	543	835
- Annual number of deaths	(4 - 8)	(160 - 320)	(346 - 693)	(533 – 1 066)
Cardiac hospitalizations (All)	4.40	11	16	21
- Annual number	(2 - 7)	(5 - 17)	(7 - 26)	(10 - 34)
Respiratory hospitalizations (All)	8.87	19	28	38
- Annual number	(5 - 13)	(11 - 28)	(16 - 41)	(21 - 55)
Sub-total PM10		**280**	**587**	**894**
		(176 - 365)	**(370 - 760)**	**(564 – 1 155)**
Ozone - Acute				
All non-accidental mortality (All)	3.25	130	281	433
- Annual number of deaths	(2 - 5)	(80 - 200)	(173 - 433)	(266 - 666)
Respiratory hospitalizations (15-64)	0.28	1	1	1
- Annual number	(0 - 3)	(0 - 6)	(0 - 10)	(0 - 13)
Respiratory hospitalizations (65+)	1.41	3	4	6
- Annual number	(0 - 3)	(0 - 6)	(0 - 10)	(0 - 13)
Sub-total Ozone		**134**	**286**	**440**
		(80 - 213)	**(173 - 452)**	**(266 - 692)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A1-10 Annual monetary valuations for a 5 µg/m^3 decrease in Le Havre (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest

Le Havre	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	60.88	66 359	100 756	135 154
- Annual number of deaths	(21 - 108)	(22 890 – 117 720)	(34 755 – 178 740)	(46 620 – 239 760)
Total mortality (30+)*	1 178.11	47 124	102 024	156 924
-Annual number of life years saved	(399 – 2 119)	(15 960 – 84 760)	(34 553 – 183 505)	(53 146 – 282 250)
Cardiovascular mortality (30+)*	29.51	32 166	48 839	65 512
- Annual number of deaths	(20 - 36)	(21 800 – 39 240)	(33 100 – 59 580)	(44 400 – 79 920)
PM10 - Acute				
Total non-accidental mortality (All)	6.09	244	527	811
- Annual number of deaths	(4 - 8)	(160 - 320)	(346 - 693)	(533 – 1 066)
Cardiac hospitalizations (All)	7.55	19	29	38
- Annual number	(4 - 11)	(10 - 28)	(15 - 42)	(20 - 55)
Respiratory hospitalizations (All)	14.45	36	55	73
- Annual number	(8 - 21)	(20 - 53)	(30 - 79)	(40 - 106)
Sub-total PM10		**299**	**610**	**922**
		(190 - 401)	**(392 - 814)**	**(593 – 1 227)**
Ozone - Acute				
All non-accidental mortality (All)	3.16	126	274	421
- Annual number of deaths	(2 - 5)	(80 - 200)	(173 - 433)	(266 - 666)
Respiratory hospitalizations (15-64)	0.40	1	2	2
- Annual number	(0 - 5)	(0 - 13)	(0 - 19)	(0 - 25)
Respiratory hospitalizations (65+)	2.11	5	8	11
- Annual number	(0 - 5)	(0 - 13)	(0 - 19)	(0 - 25)
Sub-total Ozone		**132**	**284**	**434**
		(80 - 225)	**(173 - 471)**	**(266 - 716)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A1-11 Annual monetary valuations for a 5 µg/m^3 decrease in Lille (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest thousand).

Lille	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	228.85	249 447	378 747	508 047
- Annual number of deaths	(79 - 405)	(86 110 – 441 450)	(130 745 – 670 275)	(175 380 – 899 100)
Total mortality (30+)*	5 916.92	236 677	512 405	788 134
-Annual number of life years saved	(2 004 – 10 639)	(80 179 – 425 550)	(173 587 – 921 316)	(266 995 – 1 417 083)
Cardiovascular mortality (30+)*	117.39	127 955	194 280	260 606
- Annual number of deaths	(80 - 144)	(87 200 – 156 960)	(132 400 – 238 320)	(177 600 – 319 680)
PM10 - Acute				
Total non-accidental mortality (All)	22.70	908	1 966	3 024
- Annual number of deaths	(15 - 30)	(600 – 1 200)	(1 299 – 2 598)	(1 998 – 3 996)
Cardiac hospitalizations (All)	37.12	93	140	187
- Annual number	(19 - 56)	(48 - 141)	(72 - 212)	(96 - 282)
Respiratory hospitalizations (All)	76.90	194	290	387
- Annual number	(42 - 112)	(106 - 282)	(159 - 423)	(212 - 564)
Sub-total PM10		**1 195**	**2 396**	**3 598**
		(754 – 1 623)	**(1 529 – 3 233)**	**(2 305 – 4 842)**
Ozone - Acute				
All non-accidental mortality (All)	11.75	470	1 018	1 565
- Annual number of deaths	(6 - 20)	(240 - 800)	(520 – 1 732)	(799 – 2 664)
Respiratory hospitalizations (15-64)	2.00	5	8	10
- Annual number	(0 - 24)	(0 - 60)	(0 - 91)	(0 - 121)
Respiratory hospitalizations (65+)	9.54	24	36	48
- Annual number	(0 - 23)	(0 - 58)	(0 - 87)	(0 - 116)
Sub-total Ozone		**499**	**1 062**	**1 623**
		(240 - 918)	**(520 – 1 910)**	**(799 – 2 901)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A1-12 Annual monetary valuations for a 5 µg/m^3 decrease in Ljubljana (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest

Ljubljana	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	66.44	72 420	109 958	147 497
- Annual number of deaths	(23 - 118)	(25 070 – 128 620)	(38 065 – 195 290)	(51 060 – 261 960)
Total mortality (30+)*	1 205.82	48 233	104 424	160 615
-Annual number of life years saved	(409 – 2 166)	(16 355 – 86 627)	(35 408 – 187 547)	(54 462 – 288 468)
Cardiovascular mortality (30+)*	49.45	53 901	81 840	109 779
- Annual number of deaths	(34 - 61)	(37 060 – 66 490)	(56 270 – 100 955)	(75 480 – 135 420)
PM10 - Acute				
Total non-accidental mortality (All)	7.70	308	667	1 026
- Annual number of deaths	(5 - 10)	(200 - 400)	(433 - 866)	(666 – 1 332)
Cardiac hospitalizations (All)	6.78	12	18	24
- Annual number	(3 - 10)	(5 - 18)	(8 - 26)	(11 - 35)
Respiratory hospitalizations (All)	15.17	23	34	45
- Annual number	(8 - 22)	(12 - 33)	(18 - 49)	(24 - 66)
Sub-total PM10		**343**	**719**	**1 095**
		(217 - 451)	**(459 - 942)**	**(701 – 1 433)**
Ozone - Acute				
All non-accidental mortality (All)	3.99	160	346	531
- Annual number of deaths	(2 - 7)	(80 - 280)	(173 - 606)	(266 - 932)
Respiratory hospitalizations (15-64)	0.39	1	1	1
- Annual number	(0 - 5)	(0 - 7)	(0 - 11)	(0 - 15)
Respiratory hospitalizations (65+)	2.44	4	5	7
- Annual number	(0 - 6)	(0 - 9)	(0 - 13)	(0 - 18)
Sub-total Ozone		**165**	**352**	**539**
		(80 - 296)	**(173 - 631)**	**(266 - 965)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A1-13 Annual monetary valuations for a 5 µg/m^3 decrease in London (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest thousand).

London	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	1 420.29	1 548 116	2 350 580	3 153 044
- Annual number of deaths	(487 – 2 515)	(530 830 – 2 741 350)	(805 985 – 4 162 325)	(1 081 140 – 5 583 300)
Total mortality (30+)*	48 971.94	1 958 878	4 240 970	6 523 062
-Annual number of life years saved	(16 582 – 88 103)	(663 288 – 3 524 138)	(1 436 019 – 7 629 759)	(2 208 750 – 11 735 380)
Cardiovascular mortality (30+)*	982.44	1 070 860	1 625 938	2 181 017
- Annual number of deaths	(673 – 1 204)	(733 570 – 1 312 360)	(1 113 815 – 1 992 620)	(1 494 060 – 2 672 880)
PM10 - Acute				
Total non-accidental mortality (All)	150.42	6 017	13 026	20 036
- Annual number of deaths	(100 - 200)	(4 000 – 8 000)	(8 660 – 17 320)	(13 320 – 26 640)
Cardiac hospitalizations (All)	119.83	740	1 111	1 481
- Annual number	(60 - 179)	(371 – 1 106)	(556 – 1 659)	(741 – 2 212)
Respiratory hospitalizations (All)	345.59	1 498	2 248	2 997
- Annual number	(189 - 504)	(820 – 2 185)	(1 229 – 3 278)	(1 639 – 4 371)
Sub-total PM10		**8 255**	**16 385**	**24 514**
		(5 190 – 11 291)	**(10 445 – 22 257)**	**(15 700 – 33 223)**
Ozone - Acute				
All non-accidental mortality (All)	77.88	3 115	6 744	10 374
- Annual number of deaths	(43 - 130)	(1 720 – 5 200)	(3 724 – 11 258)	(5 728 – 17 316)
Respiratory hospitalizations (15-64)	9.61	42	63	83
- Annual number	(0 - 114)	(0 - 494)	(0 - 741)	(0 - 989)
Respiratory hospitalizations (65+)	70.46	305	458	611
- Annual number	(0 - 168)	(0 - 728)	(0 – 1 093)	(0 – 1 457)
Sub-total Ozone		**3 462**	**7 265**	**11 068**
		(1 720 – 6 423)	**(3 724 – 13 092)**	**(5 728 – 19 762)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A1-14 Annual monetary valuations for a 5 µg/m^3 decrease in Lyon (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest thousand).

Lyon	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	192.01	209 291	317 777	426 262
- Annual number of deaths	(66 - 340)	(71 940 – 370 600)	(109 230 – 562 700)	(146 520 – 754 800)
Total mortality (30+)*	5 770.37	230 815	499 714	768 613
-Annual number of life years saved	(1 953 – 10 387)	(78 121 – 415 474)	(169 131 – 899 502)	(260 142 – 1 383 529)
Cardiovascular mortality (30+)*	101.27	110 384	167 602	224 819
- Annual number of deaths	(69 - 124)	(75 210 – 135 160)	(114 195 – 205 220)	(153 180 – 275 280)
PM10 - Acute				
Total non-accidental mortality (All)	19.51	780	1 690	2 599
- Annual number of deaths	(13 - 26)	(520 – 1 040)	(1 126 – 2 252)	(1 732 – 3 463)
Cardiac hospitalizations (All)	25.69	65	97	129
- Annual number	(13 - 38)	(33 - 96)	(49 - 144)	(65 - 191)
Respiratory hospitalizations (All)	42.63	107	161	215
- Annual number	(23 - 62)	(58 - 156)	(87 - 234)	(116 - 312)
Sub-total PM10		**952**	**1 948**	**2 943**
		(611 – 1 292)	**(1 262 – 2 629)**	**(1 913 – 3 967)**
Ozone - Acute				
All non-accidental mortality (All)	10.10	404	875	1 345
- Annual number of deaths	(6 - 17)	(240 - 680)	(520 – 1 472)	(799 – 2 264)
Respiratory hospitalizations (15-64)	1.31	3	5	7
- Annual number	(0 - 16)	(0 - 40)	(0 - 60)	(0 - 81)
Respiratory hospitalizations (65+)	7.56	19	29	38
- Annual number	(0 - 18)	(0 - 45)	(0 - 68)	(0 - 91)
Sub-total Ozone		**426**	**909**	**1 390**
		(240 - 766)	**(520 – 1 601)**	**(799 – 2 436)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A1-15 Annual monetary valuations for a 5 µg/m^3 decrease in Malaga (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest thousand).

Malaga	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	128.96	140 566	213 429	286 291
- Annual number of deaths	(44 - 228)	(47 960 – 248 520)	(72 820 – 377 340)	(97 680 – 506 160)
Total mortality (30+)*	3 211.90	128 476	278 151	427 825
-Annual number of life years saved	(1088 - 5779)	(43 502 – 231 141)	(94 182 – 500 421)	(144 862 – 769 700)
Cardiovascular mortality (30+)*	92.57	100 901	153 203	205 505
- Annual number of deaths	(63 - 113)	(68 670 – 123 170)	(104 265 – 187 015)	(139 860 – 250 860)
PM10 - Acute				
Total non-accidental mortality (All)	13.13	525	1 137	1 749
- Annual number of deaths	(9 - 17)	(360 - 680)	(779 – 1 472)	(1 199 – 2 264)
Cardiac hospitalizations (All)	6.88	17	25	34
- Annual number	(3 - 10)	(7 - 24)	(11 - 37)	(15 - 49)
Respiratory hospitalizations (All)	14.71	31	47	63
- Annual number	(8 - 21)	(17 - 45)	(26 - 67)	(34 - 89)
Sub-total PM10		**573**	**1 209**	**1 845**
		(384 - 749)	**(816 – 1 576)**	**(1 247 – 2 403)**
Ozone - Acute				
All non-accidental mortality (All)	6.93	277	600	923
- Annual number of deaths	(4 - 12)	(160 - 480)	(346 – 1 039)	(533 – 1 598)
Respiratory hospitalizations (15-64)	0.59	1	2	3
- Annual number	(0 - 7)	(0 - 15)	(0 - 22)	(0 - 30)
Respiratory hospitalizations (65+)	2.44	5	8	10
- Annual number	(0 - 6)	(0 - 13)	(0 - 19)	(0 - 26)
Sub-total Ozone		**283**	**610**	**936**
		(160 - 508)	**(346 – 1 081)**	**(533 – 1 654)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A1-16 Annual monetary valuations for a 5 µg/m^3 decrease in Marseille (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest

Marseille	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	236.21	257 469	390 928	524 386
- Annual number of deaths	(81 - 418)	(88 290 – 455 620)	(134 055 – 691 790)	(179 820 – 927 960)
Total mortality (30+)*	4 683.98	187 359	405 633	623 906
-Annual number of life years saved	(1 586 – 8 428)	(63 436 – 337 107)	(137 338 – 729 837)	(211 241 – 1 122 567)
Cardiovascular mortality (30+)*	132.56	144 490	219 387	294 283
- Annual number of deaths	(91 - 162)	(99 190 – 176 580)	(150 605 – 268 110)	(202 020 – 359 640)
PM10 - Acute				
Total non-accidental mortality (All)	23.67	947	2 050	3 153
- Annual number of deaths	(16 - 32)	(640 – 1 280)	(1 386 – 2 771)	(2 131 – 4 262)
Cardiac hospitalizations (All)	38.86	98	147	196
- Annual number	(19 - 58)	(48 - 146)	(72 - 219)	(96 - 292)
Respiratory hospitalizations (All)	55.52	140	210	280
- Annual number	(30 - 81)	(76 - 204)	(113 - 306)	(151 - 408)
Sub-total PM10		**1 184**	**2 406**	**3 628**
		(763 – 1 630)	**(1 571 – 3 296)**	**(2 378 – 4 962)**
Ozone - Acute				
All non-accidental mortality (All)	12.26	490	1 062	1 633
- Annual number of deaths	(7 - 21)	(280 - 840)	(606 – 1 819)	(932 – 2 797)
Respiratory hospitalizations (15-64)	1.78	4	7	9
- Annual number	(0 - 21)	(0 - 53)	(0 - 79)	(0 - 106)
Respiratory hospitalizations (65+)	8.63	22	33	43
- Annual number	(0 - 21)	(0 - 53)	(0 - 79)	(0 - 106)
Sub-total Ozone		**516**	**1 102**	**1 685**
		(280 - 946)	**(606 – 1 977)**	**(932 – 3 009)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A1-17 Annual monetary valuations for a 5 µg/m^3 decrease in Paris (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest thousand).

Paris	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	1 116.43	1 216 909	1 847 692	2 478 475
- Annual number of deaths	(383 – 1 977)	(417 470 – 2 154 930)	(633 865 – 3 271 935)	(850 260 – 4 388 940)
Total mortality (30+)*	41 838.99	1 673 560	3 623 257	5 572 953
-Annual number of life years saved	(14 160 – 75 317)	(566 390 – 3 012 691)	(1 226 233 – 6 522 477)	(1 886 077 – 10 032 262)
Cardiovascular mortality (30+)*	534.73	582 856	884 978	1 187 101
- Annual number of deaths	(366 - 655)	(398 940 – 713 950)	(605 730 – 1 084 025)	(812 520 – 1 454 100)
PM10 - Acute				
Total non-accidental mortality (All)	113.10	4 524	9 794	15 065
- Annual number of deaths	(76 - 151)	(3 040 – 6 040)	(6 582 – 13 077)	(10 123 – 20 113)
Cardiac hospitalizations (All)	158.39	399	598	798
- Annual number	(79 - 237)	(199 - 597)	(298 - 895)	(398 – 1 194)
Respiratory hospitalizations (All)	321.19	809	1 213	1 617
- Annual number	(175 - 469)	(441 – 1 181)	(661 – 1 771)	(881 – 2 362)
Sub-total PM10		**5 731**	**11 606**	**17 480**
		(3 680 – 7 818)	**(7 541 – 15 743)**	**(11 402 – 23 669)**
Ozone - Acute				
All non-accidental mortality (All)	58.56	2 342	5 071	7 800
- Annual number of deaths	(32 - 98)	(1 280 – 3 920)	(2 771 – 8 487)	(4 262 – 13 054)
Respiratory hospitalizations (15-64)	9.71	24	37	49
- Annual number	(0 - 116)	(0 - 292)	(0 - 438)	(0 - 584)
Respiratory hospitalizations (65+)	42.06	106	159	212
- Annual number	(0 - 100)	(0 - 252)	(0 - 378)	(0 - 504)
Sub-total Ozone		**2 472**	**5 267**	**8 061**
		(1 280 – 4 464)	**(2 771 – 9 303)**	**(4 262 – 14 141)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A1-18 Annual monetary valuations for a 5 µg/m^3 decrease in Rome (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest thousand).

Rome	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	594.28	647 765	983 533	1 319 302
- Annual number of deaths	(204 – 1 052)	(222 360 – 1 146 680)	(337 620 – 1 741 060)	(452880 – 2 335 440)
Total mortality (30+)*	17 016.84	680 674	1 473 658	2 266 643
-Annual number of life years saved	(5 747 – 30 712)	(229 868 – 1 228 474)	(497 665 – 2 659 647)	(765 461 – 4 090 820)
Cardiovascular mortality (30+)*	470.90	513 281	779 340	1 045 398
- Annual number of deaths	(323 - 577)	(352 070 – 628 930)	(534 565 – 954 935)	(717 060 – 1 280 940)
PM10 - Acute				
Total non-accidental mortality (All)	61.45	2 458	5 322	8 185
- Annual number of deaths	(41 - 82)	(1 640 – 3 280)	(3 551 – 7 101)	(5 461 – 10 922)
Cardiac hospitalizations (All)	117.63	304	456	607
- Annual number	(59 - 176)	(152 - 454)	(229 - 682)	(305 - 909)
Respiratory hospitalizations (All)	157.74	423	635	846
- Annual number	(86 - 230)	(231 - 617)	(346 - 926)	(461 – 1 234)
Sub-total PM10		**3 185**	**6 412**	**9 639**
		(2 023 – 4 351)	**(4 125 – 8 708)**	**(6 227 – 13 065)**
Ozone - Acute				
All non-accidental mortality (All)	31.99	1 280	2 770	4 261
- Annual number of deaths	(18 - 54)	(720 – 2 160)	(1 559 – 4 676)	(2 398 – 7 193)
Respiratory hospitalizations (15-64)	4.90	13	20	26
- Annual number	(0 - 58)	(0 - 156)	(0 - 233)	(0 - 311)
Respiratory hospitalizations (65+)	31.45	84	127	169
- Annual number	(0 - 75)	(0 - 201)	(0 - 302)	(0 - 402)
Sub-total Ozone		**1 377**	**2 917**	**4 456**
		(720 – 2 517)	**(1 559 – 5 212)**	**(2 398 – 7 906)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A1-19 Annual monetary valuations for a 5 µg/m^3 decrease in Rouen (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest thousand).

Rouen	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	105.96	115 496	175 364	235 231
- Annual number of deaths	(36 - 188)	(3 240 – 204 920)	(59 580 – 311 140)	(79 920 – 417 360)
Total mortality (30+)*	2 164.50	86 580	187 446	288 311
-Annual number of life years saved	(733 – 3 891)	(29 334 – 155 651)	(63 509 – 336 985)	(97 683 – 518 319)
Cardiovascular mortality (30+)*	56.69	61 792	93 822	125 852
- Annual number of deaths	(39 - 69)	(42 510 – 75 210)	(64 545 – 114 195)	(86 580 – 153 180)
PM10 - Acute				
Total non-accidental mortality (All)	10.49	420	908	1 397
- Annual number of deaths	(7 - 14)	(280 - 560)	(606 – 1 212)	(932 – 1 865)
Cardiac hospitalizations (All)	15.45	39	58	78
- Annual number	(8 - 23)	(20 - 58)	(30 - 87)	(40 - 116)
Respiratory hospitalizations (All)	24.47	62	92	123
- Annual number	(13 - 36)	(33 - 91)	(49 - 136)	(65 - 181)
Sub-total PM10		**520**	**1 059**	**1 598**
		(333 - 709)	**(686 – 1 435)**	**(1 038 – 2 162)**
Ozone - Acute				
All non-accidental mortality (All)	5.43	217	470	723
- Annual number of deaths	(3 - 9)	(120 - 360)	(260 - 779)	(400 – 1 199)
Respiratory hospitalizations (15-64)	0.63	2	2	3
- Annual number	(0 - 7)	(0 - 18)	(0 - 26)	(0 - 35)
Respiratory hospitalizations (65+)	3.94	10	15	20
- Annual number	(0 - 9)	(0 - 23)	(0 - 34)	(0 - 45)
Sub-total Ozone		**229**	**487**	**746**
		(120 - 400)	**(260 - 840)**	**(400 – 1 279)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A1-20 Annual monetary valuations for 5 µg/m^3 decrease in Sevilla (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest thousand).

Sevilla	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	167.47	182 542	277 163	371 783
- Annual number of deaths	(57 - 297)	(62 130 – 323 730)	(94 335 – 491 535)	(126 540 – 659 340)
Total mortality (30+)*	3 981.13	159 245	344 766	530 287
-Annual number of life years saved	(1 349 – 7 158)	(53 946 – 286 338)	(116 792 – 619 923)	(179 639 – 953 507)
Cardiovascular mortality (30+)*	138.92	151 423	229 913	308 402
- Annual number of deaths	(95 - 170)	(103 550 – 185 300)	(157 225 – 281 350)	(210 900 – 377 400)
PM10 - Acute				
Total non-accidental mortality (All)	16.88	675	1 462	2 248
- Annual number of deaths	(11 - 22)	(440 - 880)	(953 – 1 905)	(1 465 – 2 930)
Cardiac hospitalizations (All)	12.98	32	48	63
- Annual number	(7 - 19)	(17 - 46)	(26 - 70)	(34 - 93)
Respiratory hospitalizations (All)	20.91	44	67	89
- Annual number	(11 - 31)	(23 - 66)	(35 - 99)	(47 - 132)
Sub-total PM10		**751**	**1 576**	**2 401**
		(480 - 992)	**(1 013 – 2 074)**	**(1 546 – 3 155)**
Ozone - Acute				
All non-accidental mortality (All)	8.87	355	768	1 181
- Annual number of deaths	(5 - 15)	(200 - 600)	(433 – 1 299)	(666 – 1 998)
Respiratory hospitalizations (15-64)	0.72	2	2	3
- Annual number	(0 - 9)	(0 - 19)	(0 - 29)	(0 - 38)
Respiratory hospitalizations (65+)	3.20	7	10	14
- Annual number	(0 - 8)	(0 - 17)	(0 - 26)	(0 - 34)
Sub-total Ozone		**364**	**780**	**1 198**
		(200 - 636)	**(433 – 1 353)**	**(666 – 2 070)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A1-21 Annual monetary valuations for a 5 µg/m^3 decrease in Stockholm (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest

Stockholm	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	317.24	345 792	525 032	704 273
- Annual number of deaths	(109 - 562)	(118 810 – 612 580)	(180 395 – 930 110)	(241 980 – 1 247 640)
Total mortality (30+)*	7 159.41	286 376	620 005	953 633
-Annual number of life years saved	(2 425 – 12 876)	(96 994 – 515 048)	(209 992 – 1 115 080)	(322 991 – 1 715 111)
Cardiovascular mortality (30+)*	240.32	261 949	397 730	533 510
- Annual number of deaths	(165 - 294)	(179 850 – 320 460)	(273 075 – 486 570)	(366 300 – 652 680)
PM10 - Acute				
Total non-accidental mortality (All)	31.43	1 257	2 722	4 186
- Annual number of deaths	(21 - 42)	(840 – 1 680)	(1 819 – 3 637)	(2 797 – 5 594)
Cardiac hospitalizations (All)	41.79	102	153	204
- Annual number	(21 - 63)	(51 - 154)	(77 - 231)	(103 - 308)
Respiratory hospitalizations (All)	49.61	105	158	210
- Annual number	(27 - 72)	(57 - 152)	(86 - 229)	(114 - 305)
Sub-total PM10		**1 464**	**3 033**	**4 601**
		(949 – 1 986)	**(1 981 – 4 097)**	**(3 014 – 6 207)**
Ozone - Acute				
All non-accidental mortality (All)	16.27	651	1 409	2 167
- Annual number of deaths	(9 - 27)	(360 – 1 080)	(779 – 2 338)	(1 199 – 3 596)
Respiratory hospitalizations (15-64)	1.14	2	4	5
- Annual number	(0 - 14)	(0 - 30)	(0 - 44)	(0 - 59)
Respiratory hospitalizations (65+)	11.85	25	38	50
- Annual number	(0 - 28)	(0 - 59)	(0 - 89)	(0 - 119)
Sub-total Ozone		**678**	**1 451**	**2 222**
		(360 – 1 169)	**(779 – 2 472)**	**(1 199 – 3 774)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A1-22 Annual monetary valuations for a 5 µg/m^3 decrease in Strasbourg (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest

Strasbourg	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	85.47	93 162	141 453	189 743
- Annual number of deaths	(29 - 151)	(31 610 – 164 590)	(47 995 – 249 905)	(64 380 – 335 220)
Total mortality (30+)*	2 320.60	92 824	200 964	309 104
-Annual number of life years saved	(786 – 4 175)	(31 428 – 167 013)	(68 042 – 361 584)	(104 656 – 556 154)
Cardiovascular mortality (30+)*	49.38	53 824	81 724	109 624
- Annual number of deaths	(34 - 60)	(37 060 – 65 400)	(56 270 – 99 300)	(75 480 – 133 200)
PM10 - Acute				
Total non-accidental mortality (All)	8.67	347	751	1 155
- Annual number of deaths	(6 - 12)	(240 - 480)	(520 – 1 039)	(799 – 1 598)
Cardiac hospitalizations (All)	9.74	25	37	49
- Annual number	(5 - 15)	(13 - 38)	(19 - 57)	(25 - 76)
Respiratory hospitalizations (All)	24.08	61	91	121
- Annual number	(13 - 35)	(33 - 88)	(49 - 132)	(65 - 176)
Sub-total PM10		**432**	**879**	**1 325**
		(285 - 606)	**(588 – 1 228)**	**(890 – 1 850)**
Ozone - Acute				
All non-accidental mortality (All)	4.49	180	389	598
- Annual number of deaths	(2 - 8)	(80 - 320)	(173 - 693)	(266 – 1 066)
Respiratory hospitalizations (15-64)	0.82	2	3	4
- Annual number	(0 - 10)	(0 - 25)	(0 - 38)	(0 - 50)
Respiratory hospitalizations (65+)	3.68	9	14	19
- Annual number	(0 - 9)	(0 - 23)	(0 - 34)	(0 - 45)
Sub-total Ozone		**191**	**406**	**621**
		(80 - 368)	**(173 - 765)**	**(266 – 1 161)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A1-23 Annual monetary valuations for a 5 µg/m^3 decrease in Toulouse (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest

Toulouse	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	124.92	136 163	206 743	277 322
- Annual number of deaths	(43 - 221)	(46 870 – 240 890)	(71 165 – 365 755)	(95 460 – 490 620)
Total mortality (30+)*	3 934.57	157 383	340 734	524 085
-Annual number of life years saved	(1 332 – 7 082)	(53 268 – 283 290)	(115 325 – 613 323)	(177 382 – 943 355)
Cardiovascular mortality (30+)*	70.90	77 281	117 340	157 398
- Annual number of deaths	(49 - 87)	(53 410 – 94 830)	(81 095 – 143 985)	(108 780 – 193 140)
PM10 - Acute				
Total non-accidental mortality (All)	12.48	499	1 081	1 662
- Annual number of deaths	(8 - 17)	(320 - 680)	(693 - 1472)	(1 066 – 2 264)
Cardiac hospitalizations (All)	20.54	52	78	103
- Annual number	(10 - 31)	(25 - 78)	(38 - 117)	(50 - 156)
Respiratory hospitalizations (All)	42.86	108	162	216
- Annual number	(23 - 63)	(58 - 159)	(87 - 238)	(116 - 317)
Sub-total PM10		**659**	**1 320**	**1 982**
		(403 - 917)	**(817 – 1 827)**	**(1 232 – 2 738)**
Ozone - Acute				
All non-accidental mortality (All)	6.46	258	559	860
- Annual number of deaths	(4 - 11)	(160 - 440)	(346 - 953)	(533 – 1 465)
Respiratory hospitalizations (15-64)	1.49	4	6	8
- Annual number	(0 - 18)	(0 - 45)	(0 - 68)	(0 - 91)
Respiratory hospitalizations (65+)	6.22	16	23	31
- Annual number	(0 - 15)	(0 - 38)	(0 - 57)	(0 - 76)
Sub-total Ozone		**278**	**588**	**899**
		(160 - 523)	**(346 – 1 077)**	**(533 – 1 631)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A1-24 Annual monetary valuations for a 5 µg/m^3 decrease in Valencia (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest thousand).

Valencia	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	180.35	196 582	298 479	400 377
- Annual number of deaths	(62 - 319)	(67 580 – 347 710)	(102 610 – 527 945)	(137 640 – 708 180)
Total mortality (30+)*	3 895.43	155 817	337 344	518 871
-Annual number of life years saved	(1 320 – 7 003)	(52 792 – 280 127)	(114 295 – 606 474)	(175 798 – 932 822)
Cardiovascular mortality (30+)*	116.31	126 778	192 493	258 208
- Annual number of deaths	(80 - 143)	(87 200 – 155 870)	(132 400 – 236 665)	(177 600 – 317 460)
PM10 - Acute				
Total non-accidental mortality (All)	16.64	666	1 441	2 216
- Annual number of deaths	(11 - 22)	(440 - 880)	(953 – 1 905)	(1 465 – 2 930)
Cardiac hospitalizations (All)	12.74	31	47	62
- Annual number	(6 - 19)	(15 - 46)	(22 - 70)	(29 - 93)
Respiratory hospitalizations (All)	30.67	65	98	130
- Annual number	(17 - 45)	(36 - 96)	(54 - 144)	(72 - 191)
Sub-total PM10		**762**	**1 586**	**2 409**
		(491 – 1 022)	**(1 029 – 2 118)**	**(1567 – 3 215)**
Ozone - Acute				
All non-accidental mortality (All)	8.62	345	746	1 148
- Annual number of deaths	(5 - 14)	(200 - 560)	(433 – 1 212)	(666 – 1 865)
Respiratory hospitalizations (15-64)	0.69	1	2	3
- Annual number	(0 - 8)	(0 - 17)	(0 - 26)	(0 - 34)
Respiratory hospitalizations (65+)	8.25	18	26	35
- Annual number	(0 - 20)	(0 - 43)	(0 - 64)	(0 - 85)
Sub-total Ozone		**364**	**774**	**1 186**
		(200 - 620)	**(433 – 1 302)**	**(666 – 1 984)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A1-25 Annual monetary valuations for a 5 µg/m^3 decrease in Vienna (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest thousand).

Vienna	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	449.26	489 693	743 525	997 357
- Annual number of deaths	(154 - 795)	(167 860 – 866 550)	(254 870 – 1 315 725)	(341 880 – 1 764 900)
Total mortality (30+)*	8 448.60	337 944	731 649	1 125 354
-Annual number of life years saved	(2 863 – 15 187)	(114 506 – 607 494)	(247 907 – 1 315 223)	(381 307 – 2 022 953)
Cardiovascular mortality (30+)*	403.89	440 240	668 438	896 636
- Annual number of deaths	(277 - 495)	(301 930 – 539 550)	(458 435 – 819 225)	(614 940 – 1 098 900)
PM10 - Acute				
Total non-accidental mortality (All)	45.25	1 810	3 919	6 027
- Annual number of deaths	(30 - 60)	(1 200 – 2 400)	(2 598 – 5 196)	(3 996 – 7 992)
Cardiac hospitalizations (All)	111.41	295	443	591
- Annual number	(56 - 167)	(148 - 443)	(223 - 664)	(297 - 886)
Respiratory hospitalizations (All)	174.05	371	557	743
- Annual number	(95 - 254)	(203 - 542)	(304 - 813)	(405 – 1 084)
Sub-total PM10		**2 477**	**4 919**	**7 361**
		(1 551 – 3 385)	**(3 125 – 6 673)**	**(4 698 – 9 962)**
Ozone - Acute				
All non-accidental mortality (All)	23.43	937	2 029	3 121
- Annual number of deaths	(13 - 39)	(520 – 1 560)	(1 126 – 3 377)	(1 732 – 5 195)
Respiratory hospitalizations (15-64)	6.57	14	21	28
- Annual number	(0 - 78)	(0 - 166)	(0 - 250)	(0 - 333)
Respiratory hospitalizations (65+)	23.15	49	74	99
- Annual number	(0 - 55)	(0 - 117)	(0 - 176)	(0 - 235)
Sub-total Ozone		**1 000**	**2 124**	**3 248**
		(520 – 1 844)	**(1 126 – 3 803)**	**(1 732 – 5 762)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Appendix 2

Scenario of compliance with WHO-AQG: Results by city

Table A2-1 Annual monetary valuations for compliance with WHO AQG in Athens (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest thousand).

Athens	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	3 099.60	3 378 564	5 129 838	6 881 112
- Annual number of deaths	(1 093 – 5 315)	(1 191 370 – 5 793 350)	(1 808 915 – 8 796 325)	(2 426 460 – 11 799 300)
Total mortality (30+)*	61 433.95	2 457 358	5 320 180	8 183 002
-Annual number of life years saved	(20 758 – 111 288)	(830 333 – 4 451 506)	(1 797 671 – 9 637 511)	(2 765 008 – 14 823 516)
Cardiovascular mortality (30+)*	2 696.48	2 939 163	4 462 674	5 986 186
- Annual number of deaths	(1 895 – 3 245)	(2 065 550 – 3 537 050)	(3 136 225 – 5 370 475)	(4 206 900 – 7 203 900)
PM10 - Acute				
Total non-accidental mortality (All)	371.39	14 856	32 162	49 469
- Annual number of deaths	(248 - 494)	(9 920 – 19 760)	(21 477 – 42 780)	(33 034 – 65 801)
Cardiac hospitalizations (All)	N/A	N/A	N/A	N/A
- Annual number				
Respiratory hospitalizations (All)	N/A	N/A	N/A	N/A
- Annual number				
Sub-total PM10		**14 856**	**32 162**	**49 469**
		(9 920 – 19 760)	**(21 477 – 42 780)**	**(33 034 – 65 801)**
Ozone - Acute				
All non-accidental mortality (All)	46.66	1 866	4 041	6 215
- Annual number of deaths	(26 - 78)	(1 040 – 3 120)	(2 252 – 6 755)	(3 463 – 10 390)
Respiratory hospitalizations (15-64)	N/A	N/A	N/A	N/A
- Annual number				
Respiratory hospitalizations (65+)	N/A	N/A	N/A	N/A
- Annual number				
Sub-total Ozone		**1 866**	**4 041**	**6 215**
		(1 040 – 3 120)	**(2 252 – 6 755)**	**(3 463 – 10 390)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A2-2 Annual monetary valuations for compliance with WHO AQG in Barcelona (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest thousand).

Barcelona	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	1 437.08	1 566 417	2 378 367	3 190 318
- Annual number of deaths	(504 – 2 477)	(549 360 – 2 699 930)	(834 120 – 4 099 435)	(1 118 880 – 5 498 940)
Total mortality (30+)*	32 365.24	1 294 610	2 802 830	4 311 050
-Annual number of life years saved	(10 738 – 59 060)	(429 528 – 2 362 402)	(929 927 – 5 114 601)	(1 430 327 – 7 866 799)
Cardiovascular mortality (30+)*	873.42	952 028	1 445 510	1 938 992
- Annual number of deaths	(611 – 1 054)	(665 990 – 1 148 860)	(1 011 205 – 1 744 370)	(1 356 420 – 2 339 880)
PM10 - Acute				
Total non-accidental mortality (All)	156.70	6 268	13 570	20 872
- Annual number of deaths	(105 - 208)	(4 200 – 8 320)	(9 093 – 18 013)	(13 986 – 27 706)
Cardiac hospitalizations (All)	145.36	355	533	710
- Annual number	(73 - 217)	(178 - 530)	(267 - 795)	(357 – 1 060)
Respiratory hospitalizations (All)	353.21	751	1 126	1 502
- Annual number	(193 - 514)	(410 – 1 093)	(615 – 1 639)	(821 – 2 186)
Sub-total PM10		**7 374**	**15 229**	**23 084**
		(4 789 – 9 943)	**(9 976 – 20 447)**	**(15 163 – 30 951)**
Ozone - Acute				
All non-accidental mortality (All)	3.80	152	329	506
- Annual number of deaths	(2 - 6)	(80 - 240)	(173 - 520)	(266 - 799)
Respiratory hospitalizations (15-64)	0.40	1	1	2
- Annual number	(0 - 5)	(0 - 11)	(0 - 16)	(0 - 21)
Respiratory hospitalizations (65+)	4.51	10	14	19
- Annual number	(0 - 11)	(0 - 23)	(0 - 35)	(0 - 47)
Sub-total Ozone		**163**	**344**	**527**
		(80 - 274)	**(173 - 571)**	**(266 - 867)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A2-3 Annual monetary valuations for compliance with WHO AQG in Bilbao (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest thousand).

Bilbao	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	195.15	212 714	322 973	433 233
- Annual number of deaths	(67 - 345)	(73 030 – 376 050)	(110 885 – 570 975)	(148 740 – 765 900)
Total mortality (30+)*	4 776.70	191 068	413 662	636 256
-Annual number of life years saved	(1 635 – 8 642)	(65 400 – 345 687)	(141 591 – 748 411)	(217 783 – 1 151 136)
Cardiovascular mortality (30+)*	117.40	127 966	194 297	260 628
- Annual number of deaths	(81 - 144)	(88 290 – 156 960)	(134 055 – 238 320)	(179 820 – 319 680)
PM10 - Acute				
Total non-accidental mortality (All)	56.04	2 242	4 853	7 465
- Annual number of deaths	(37 - 75)	(1 480 – 3 000)	(3 204 – 6 495)	(4 928 – 9 990)
Cardiac hospitalizations (All)	62.77	153	230	307
- Annual number	(32 - 94)	(78 - 230)	(117 - 344)	(156 - 459)
Respiratory hospitalizations (All)	153.25	326	489	652
- Annual number	(84 - 223)	(179 - 474)	(268 - 711)	(357 - 948)
Sub-total PM10		**2 721**	**5 572**	**8 423**
		(1 737 – 3 704)	**(3 589 – 7 551)**	**(5 442 – 11 397)**
Ozone - Acute				
All non-accidental mortality (All)	0.46	18	40	61
- Annual number of deaths	(0 - 1)	(0 - 40)	(0 - 87)	(0 - 133)
Respiratory hospitalizations (15-64)	0.07	0	0	0
- Annual number	(0 - 1)	(0 - 2)	(0 - 3)	(0 - 4)
Respiratory hospitalizations (65+)	0.60	1	2	3
- Annual number	(0 - 1)	(0 - 2)	(0 - 3)	(0 - 4)
Sub-total Ozone		**19**	**42**	**64**
		(0 - 44)	**(0 - 93)**	**(0 - 142)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A2-4 Annual monetary valuations for compliance with WHO AQG in Bordeaux (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest thousand).

Bordeaux	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	152.57	166 301	252 503	338 705
- Annual number of deaths	(52 - 270)	(56 680 – 294 300)	(86 060 – 446 850)	(115 440 – 599 400)
Total mortality (30+)*	3 957.85	158 314	342 750	527 186
-Annual number of life years saved	(1 327 – 7 110)	(53 088 – 284 401)	(114 936 – 615 727)	(176 783 – 947 054)
Cardiovascular mortality (30+)*	86.06	93 805	142 429	191 053
- Annual number of deaths	(59 - 105)	(64 310 – 114 450)	(97 645 – 173 775)	(130 980 – 233 100)
PM10 - Acute				
Total non-accidental mortality (All)	12.81	512	1 109	1 706
- Annual number of deaths	(9 - 17)	(360 - 680)	(779 – 1 472)	(1 199 – 2 264)
Cardiac hospitalizations (All)	16.25	41	61	82
- Annual number	(8 - 24)	(20 - 60)	(30 - 91)	(40 - 121)
Respiratory hospitalizations (All)	27.56	69	104	139
- Annual number	(15 - 40)	(38 - 101)	(57 - 151)	(76 - 201)
Sub-total PM10		**623**	**1 275**	**1 927**
		(418 - 841)	**(866 – 1 714)**	**(1 315 – 2 587)**
Ozone - Acute				
All non-accidental mortality (All)	3.21	128	278	428
- Annual number of deaths	(2 - 5)	(80 - 200)	(173 - 433)	(266 - 666)
Respiratory hospitalizations (15-64)	0.44	1	2	2
- Annual number	(0 - 5)	(0 - 13)	(0 - 19)	(0 - 25)
Respiratory hospitalizations (65+)	1.91	5	7	10
- Annual number	(0 - 5)	(0 - 13)	(0 - 19)	(0 - 25)
Sub-total Ozone		**134**	**287**	**440**
		(80 - 225)	**(173 - 471)**	**(266 - 716)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A2-5 Annual monetary valuations for compliance with WHO AQG in Brussels (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest thousand).

Brussels	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	470.94	513 325	779 406	1 045 487
- Annual number of deaths	(163 - 826)	(177 670 – 900 340)	(269 765 – 1 367 030)	(361 860 – 1 833 720)
Total mortality (30+)*	10 279.45	411 178	890 200	1 369 223
-Annual number of life years saved	(3 501 – 18 555)	(140 040 – 742 212)	(303 187 – 1 606 889)	(466 333 – 2 471 566)
Cardiovascular mortality (30+)*	305.27	332 744	505 222	677 699
- Annual number of deaths	(211 - 372)	(229 990 – 405 480)	(349 205 – 615 660)	(468 420 – 825 840)
PM10 - Acute				
Total non-accidental mortality (All)	30.55	1 222	2 646	4 069
- Annual number of deaths	(20 - 41)	(800 – 1 640)	(1 732 – 3 551)	(2 664 – 5 461)
Cardiac hospitalizations (All)	22.66	76	114	152
- Annual number	(11 - 34)	(37 - 114)	(55 - 171)	(74 - 228)
Respiratory hospitalizations (All)	63.44	204	305	407
- Annual number	(35 - 93)	(112 - 298)	(168 - 448)	(225 - 597)
Sub-total PM10		**1 502**	**3 065**	**4 628**
		(949 – 2 053)	**(1 956 – 4 169)**	**(2 962 – 6 286)**
Ozone - Acute				
All non-accidental mortality (All)	7.52	301	651	1 002
- Annual number of deaths	(4 - 13)	(160 - 520)	(346 – 1 126)	(533 – 1 732)
Respiratory hospitalizations (15-64)	0.73	2	4	5
- Annual number	(0 - 9)	(0 - 29)	(0 - 43)	(0 - 58)
Respiratory hospitalizations (65+)	5.18	17	25	33
- Annual number	(0 - 12)	(0 - 39)	(0 - 58)	(0 - 77)
Sub-total Ozone		**320**	**680**	**1 040**
		(160 - 587)	**(346 – 1 227)**	**(533 – 1 866)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A2-6 Annual monetary valuations for compliance with WHO AQG in Bucharest (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest thousand).

Bucharest	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	3 210.72	3 499 685	5 313 742	7 127 798
- Annual number of deaths	(1 151 – 5 402)	(1 254 590 – 5 888 180)	(1 904 905 – 8 940 310)	(2 555 220 – 11 992 440)
Total mortality (30+)*	56 350.56	2 254 022	4 879 958	7 505 895
-Annual number of life years saved	(18 991 – 102 306)	(759 639 – 4 092 248)	(1 644 618 – 8 859 717)	(2 529 597 – 13 627 186)
Cardiovascular mortality (30+)*	3 352.58	3 654 312	5 548 520	7 442 728
- Annual number of deaths	(2 391 – 3 992)	(2 606 190 – 4 351 280)	(3 957 105 – 6 606 760)	(5 308 020 – 8 862 240)
PM10 - Acute				
Total non-accidental mortality (All)	433.84	17 354	37 571	57 787
- Annual number of deaths	(291 - 576)	(11 640 – 23 040)	(25 201 – 49 882)	(38 761 – 76 723)
Cardiac hospitalizations (All)	1 206.71	472	708	944
- Annual number	(607 – 1 798)	(238 - 704)	(356 – 1 055)	(475 – 1 407)
Respiratory hospitalizations (All)	2 649.46	902	1 354	1 805
- Annual number	(1 458 – 3 836)	(497 – 1 307)	(745 – 1 960)	(993 – 2 614)
Sub-total PM10		**18 728**	**39 633**	**60 537**
		(12 374 – 25 050)	**(26 302 – 52 897)**	**(40 230 – 80 744)**
Ozone - Acute				
All non-accidental mortality (All)	8.72	349	755	1 162
- Annual number of deaths	(5 - 15)	(200 - 600)	(433 – 1 299)	(666 – 1 998)
Respiratory hospitalizations (15-64)	3.88	1	2	3
- Annual number	(0 - 46)	(0 - 16)	(0 - 24)	(0 - 31)
Respiratory hospitalizations (65+)	5.93	2	3	4
- Annual number	(0 - 14)	(0 - 5)	(0 - 7)	(0 - 10)
Sub-total Ozone		**352**	**760**	**1 169**
		(200 - 620)	**(433 – 1 330)**	**(666 – 2 039)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A2-7 Annual monetary valuations for compliance with WHO AQG in Budapest (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest thousand).

Budapest	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	2 954.12	3 219 991	4 889 069	6 558 146
- Annual number of deaths	(1 050 – 5 018)	(1 144 500 – 5 469 620)	(1 737 750 – 8 304 790)	(2 331 000 – 11 139 960)
Total mortality (30+)*	47 484.32	1 899 373	4 112 142	6 324 911
-Annual number of life years saved	(15 903 – 86 287)	(636 111 – 3 451 493)	(1 377 181 – 7 472 483)	(2 118 251 – 11 493 472)
Cardiovascular mortality (30+)*	2 713.19	2 957 377	4 490 329	6 023 282
- Annual number of deaths	(1 921 – 3 248)	(2 093 890 – 3 540 320)	(3 179 255 – 5 375 440)	(4 264 620 – 7 210 560)
PM10 - Acute				
Total non-accidental mortality (All)	365.86	14 634	31 683	48 733
- Annual number of deaths	(245 - 486)	(9 800 – 19 440)	(21 217 – 42 088)	(32 634 – 64 735)
Cardiac hospitalizations (All)	N/A	N/A	N/A	N/A
- Annual number				
Respiratory hospitalizations (All)	N/A	N/A	N/A	N/A
- Annual number				
Sub-total PM10		**14 634**	**31 683**	**48 733**
		(9 800 – 19 440)	**(21 217 – 42 088)**	**(32 634 – 64 735)**
Ozone - Acute				
All non-accidental mortality (All)	8.54	342	740	1 138
- Annual number of deaths	(5 - 14)	(200 - 560)	(433 – 1 212)	(666 – 1 865)
Respiratory hospitalizations (15-64)	N/A	N/A	N/A	N/A
- Annual number				
Respiratory hospitalizations (65+)	N/A	N/A	N/A	N/A
- Annual number				
Sub-total Ozone		**342**	**740**	**1 138**
		(200 - 560)	**(433 – 1 212)**	**(666 – 1 865)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A2-8 Annual monetary valuations for compliance with WHO AQG in Dublin (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest thousand).

Dublin	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	12.13	13 222	20 075	26 929
- Annual number of deaths	(4 - 22)	(4 360 – 23 980)	(6 620 – 36 410)	(8 880 – 48 840)
Total mortality (30+)*	305.14	12 206	26 425	40 645
-Annual number of life years saved	(94 - 564)	(3 761 – 22 566)	(8 143 – 48 856)	(12 524 – 75 146)
Cardiovascular mortality (30+)*	8.23	8 971	13 621	18 271
- Annual number of deaths	(6 - 10)	(6 540 – 10 900)	(9 930 – 16 550)	(13 320 – 22 200)
PM10 - Acute				
Total non-accidental mortality (All)	0.00	0	0	0
- Annual number of deaths	(0 - 0)	(0 - 0)	(0 - 0)	(0 - 0)
Cardiac hospitalizations (All)	N/A	N/A	N/A	N/A
- Annual number				
Respiratory hospitalizations (All)	N/A	N/A	N/A	N/A
- Annual number				
Sub-total PM10		**0**	**0**	**0**
		(0 - 0)	**(0 - 0)**	**(0 - 0)**
Ozone - Acute				
All non-accidental mortality (All)	0.09	4	8	12
- Annual number of deaths	(0 - 0)	(2 -6)	(4 - 13)	(6 - 19)
Respiratory hospitalizations (15-64)	N/A	N/A	N/A	N/A
- Annual number				
Respiratory hospitalizations (65+)	N/A	N/A	N/A	N/A
- Annual number				
Sub-total Ozone		**4**	**8**	**12**
		(2 -6)	**(4 - 13)**	**(6 - 19)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A2-9 Annual monetary valuations for compliance with WHO AQG in Granada (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest thousand).

Granada	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	136.42	148 698	225 775	302 852
- Annual number of deaths	(47 - 238)	(51 230 – 259 420)	(77 785 – 393 890)	(104 340 – 528 360)
Total mortality (30+)*	2 744.05	109 762	237 635	365 507
-Annual number of life years saved	(917 – 4 971)	(36 668 – 198 855)	(79 387 – 430 521)	(122 106 – 662 188)
Cardiovascular mortality (30+)*	95.27	103 844	157 672	211 499
- Annual number of deaths	(66 - 116)	(71 940 – 126 440)	(109 230 – 191 980)	(146 520 – 257 520)
PM10 - Acute				
Total non-accidental mortality (All)	13.31	532	1 153	1 773
- Annual number of deaths	(9 - 18)	(360 - 720)	(779 – 1 559)	(1 199 – 2 398)
Cardiac hospitalizations (All)	9.35	23	34	46
- Annual number	(5 - 14)	(12 - 34)	(18 - 51)	(24 - 68)
Respiratory hospitalizations (All)	18.80	40	60	80
- Annual number	(10 - 27)	(21 - 57)	(32 - 86)	(43 - 115)
Sub-total PM10		**595**	**1 247**	**1 899**
		(393 - 812)	**(830 – 1 696)**	**(1 266 – 2 581)**
Ozone - Acute				
All non-accidental mortality (All)	0.26	10	23	35
- Annual number of deaths	(0 - 0)	(6 - 17)	(12 - 37)	(19 - 57)
Respiratory hospitalizations (15-64)	0.02	0	0	0
- Annual number	(0 - 0)	(0 - 0)	(0 - 0)	(0 - 0)
Respiratory hospitalizations (65+)	0.11	0	0	0
- Annual number	(0 - 0)	(0 - 0)	(0 - 0)	(0 - 0)
Sub-total Ozone		**10**	**23**	**35**
		(6 - 17)	**(12 - 37)**	**(19 - 57)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A2-10 Annual monetary valuations for compliance with WHO AQG in Le Havre (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest thousand).

Le Havre	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	54.34	59 231	89 933	120 635
- Annual number of deaths	(19 - 96)	(20 710 – 104 640)	(31 445 – 158 880)	(42 180 – 213 120)
Total mortality (30+)*	1 049.25	41 970	90 865	139 760
-Annual number of life years saved	(360 – 1 892)	(14 415 – 75 679)	(31 209 – 163 845)	(48 002 – 252 011)
Cardiovascular mortality (30+)*	26.38	28 754	43 659	58 564
- Annual number of deaths	(18 - 32)	(196 20 – 34 880)	(29 790 – 52 960)	(39 960 – 71 040)
PM10 - Acute				
Total non-accidental mortality (All)	3.09	124	268	412
- Annual number of deaths	(2 - 4)	(80 - 160)	(173 - 346)	(266 - 533)
Cardiac hospitalizations (All)	3.82	10	14	19
- Annual number	(2 - 6)	(5 - 15)	(8 - 23)	(10 - 30)
Respiratory hospitalizations (All)	7.33	18	28	37
- Annual number	(4 - 11)	(10 - 28)	(15 - 42)	(20 - 55)
Sub-total PM10		**152 (95 - 203)**	**310 (196 - 411)**	**468 (297 - 618)**
Ozone - Acute				
All non-accidental mortality (All)	1.03	41	89	137
- Annual number of deaths	(1 - 2)	(40 - 80)	(87 - 173)	(133 - 266)
Respiratory hospitalizations (15-64)	0.13	0	0	1
- Annual number	(0 - 2)	(0 - 5)	(0 - 8)	(0 - 10)
Respiratory hospitalizations (65+)	0.69	2	3	3
- Annual number	(0 - 2)	(0 - 5)	(0 - 8)	(0 - 10)
Sub-total Ozone		**43 (40 - 90)**	**92 (87 - 188)**	**141 (133 - 287)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A2-11 Annual monetary valuations for compliance with WHO AQG in Lille (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest thousand).

Lille	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	302.25	329 453	500 224	670 995
- Annual number of deaths	(104 - 533)	(113 360 – 580 970)	(172 120 – 882 115)	(230 880 – 1 183 260)
Total mortality (30+)*	7 864.44	314 578	681 061	1 047 543
-Annual number of life years saved	(2 593 – 14 101)	(103 735 – 564 059)	(224 586 – 1 221 187)	(345 437 – 1 878 315)
Cardiovascular mortality (30+)*	154.36	168 252	255 466	342 679
- Annual number of deaths	(106 - 189)	(115 540 – 206 010)	(175 430 – 312 795)	(235 320 – 419 580)
PM10 - Acute				
Total non-accidental mortality (All)	34.51	1 380	2 989	4 597
- Annual number of deaths	(23 - 46)	(920 – 1 840)	(1 992 – 3 984)	(3 064 – 6 127)
Cardiac hospitalizations (All)	56.44	142	213	284
- Annual number	(28 - 84)	(71 - 212)	(106 - 317)	(141 - 423)
Respiratory hospitalizations (All)	116.86	294	441	588
- Annual number	(64 - 170)	(161 - 428)	(242 - 642)	(322 - 856)
Sub-total PM10		**1 817**	**3 643**	**5 469**
		(1 152 – 2 480)	**(2 339 – 4 943)**	**(3 527 – 7 406)**
Ozone - Acute				
All non-accidental mortality (All)	5.69	228	493	758
- Annual number of deaths	(3 - 10)	(120 - 400)	(260 - 866)	(400 – 1 332)
Respiratory hospitalizations (15-64)	0.97	2	4	5
- Annual number	(0 - 12)	(0 - 30)	(0 - 45)	(0 - 60)
Respiratory hospitalizations (65+)	4.62	12	17	23
- Annual number	(0 - 11)	(0 - 28)	(0 - 42)	(0 - 55)
Sub-total Ozone		**242**	**514**	**786**
		(120 - 458)	**(260 - 953)**	**(400 – 1 448)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A2-12 Annual monetary valuations for compliance with WHO AQG in Ljubljana (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest thousand).

Ljubljana	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	247.38	269 644	409 414	549 184
- Annual number of deaths	(87 - 424)	(94 830 – 462 160)	(143 985 – 701 720)	(19 3140 – 941 280)
Total mortality (30+)*	4 729.72	189 189	409 594	629 999
-Annual number of life years saved	(1 602 – 8 598)	(64 094 – 343 922)	(138 765 – 744 590)	(213 435 – 1 145 259)
Cardiovascular mortality (30+)*	177.20	193 148	293 266	393 384
- Annual number of deaths	(125 - 213)	(136 250 – 232 170)	(206 875 – 352 515)	(277 500 – 472 860)
PM10 - Acute				
Total non-accidental mortality (All)	20.72	829	1 794	2 760
- Annual number of deaths	(14 - 28)	(560 – 1 120)	(1 212 – 2 425)	(1 865 – 3 730)
Cardiac hospitalizations (All)	18.24	32	48	64
- Annual number	(9 - 27)	(16 - 48)	(24 - 72)	(32 - 95)
Respiratory hospitalizations (All)	40.73	61	92	122
- Annual number	(22 - 59)	(33 - 88)	(49 - 133)	(66 - 177)
Sub-total PM10		**922**	**1 934**	**2 946**
		(609 – 1 256)	**(1 286 – 2 629)**	**(1 963 – 4 002)**
Ozone - Acute				
All non-accidental mortality (All)	2.95	118	255	393
- Annual number of deaths	(2 - 5)	(80 - 200)	(173 - 433)	(266 - 666)
Respiratory hospitalizations (15-64)	0.29	0	1	1
- Annual number	(0 - 3)	(0 - 4)	(0 - 7)	(0 - 9)
Respiratory hospitalizations (65+)	1.81	3	4	5
- Annual number	(0 - 4)	(0 - 6)	(0 - 9)	(0 - 12)
Sub-total Ozone		**121**	**260**	**399**
		(80 - 210)	**(173 - 449)**	**(266 - 687)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A2-13 Annual monetary valuations for compliance with WHO AQG in London (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest thousand).

London	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	879.82	959 004	1 456 102	1 953 200
- Annual number of deaths	(301 – 1 565)	(32 8090 – 1 705 850)	(498 155 – 2 590 075)	(668 220 – 3 474 300)
Total mortality (30+)*	30 103.44	1 204 138	2 606 958	4 009 778
-Annual number of life years saved	(10 298 – 54 434)	(411 936 – 2 177 376)	(891 841 – 4 714 019)	(137 1747 – 7 250 662)
Cardiovascular mortality (30+)*	611.77	666 829	1 012 479	1 358 129
- Annual number of deaths	(418 - 751)	(455 620 – 818 590)	(691 790 – 1 242 905)	(927 960 – 1 667 220)
PM10 - Acute				
Total non-accidental mortality (All)	150.52	6 021	13 035	20 049
- Annual number of deaths	(100 - 200)	(4 000 – 8 000)	(8 660 – 17 320)	(13 320 – 26 640)
Cardiac hospitalizations (All)	119.91	741	1 111	1 482
- Annual number	(60 - 179)	(371 – 1 106)	(556 – 1 659)	(741 – 2 212)
Respiratory hospitalizations (All)	345.83	1 499	2 249	2 999
- Annual number	(189 - 505)	(820 – 2 190)	(1 229 – 3 285)	(1 639 – 4 379)
Sub-total PM10		**8 261**	**16 396**	**24 530**
		(5 190 – 11 296)	**(10 445 – 22 263)**	**(15 700 – 33 231)**
Ozone - Acute				
All non-accidental mortality (All)	9.79	392	848	1 304
- Annual number of deaths	(5 - 16)	(200 - 640)	(433 – 1 386)	(666 – 2 131)
Respiratory hospitalizations (15-64)	1.21	5	8	10
- Annual number	(0 - 14)	(0 - 61)	(0 - 91)	(0 - 121)
Respiratory hospitalizations (65+)	8.86	38	58	77
- Annual number	(0 - 21)	(0 - 91)	(0 - 137)	(0 - 182)
Sub-total Ozone		**435**	**914**	**1 391**
		(200 - 792)	**(433 – 1 613)**	**(666 – 2 435)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A2-14 Annual monetary valuations for compliance with WHO AQG in Lyon (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest thousand).

Lyon	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	246.72	268 925	408 322	547 718
- Annual number of deaths	(85 - 435)	(92 650 – 474 150)	(140 675 – 719 925)	(188 700 – 965 700)
Total mortality (30+)*	7 459.50	298 380	645 993	993 605
-Annual number of life years saved	(2 501 – 13 444)	(100 048 – 537 759)	(216 604 – 1 164 248)	(333 160 – 1 790 736)
Cardiovascular mortality (30+)*	129.62	141 286	214 521	287 756
- Annual number of deaths	(89 - 159)	(97 010 – 173 310)	(147 295 – 263 145)	(197 580 – 352 980)
PM10 - Acute				
Total non-accidental mortality (All)	18.48	739	1 600	2 462
- Annual number of deaths	(12 - 25)	(480 – 1 000)	(1 039 – 2 165)	(1 598 – 3 330)
Cardiac hospitalizations (All)	24.33	61	92	123
- Annual number	(12 - 36)	(30 - 91)	(45 - 136)	(60 - 181)
Respiratory hospitalizations (All)	40.37	102	152	203
- Annual number	(22 - 59)	(55 - 149)	(83 - 223)	(111 - 297)
Sub-total PM10		**902**	**1 845**	**2 787**
		(566 – 1 239)	**(1 168 – 2 524)**	**(1 770 – 3 808)**
Ozone - Acute				
All non-accidental mortality (All)	7.76	310	672	1 034
- Annual number of deaths	(4 - 13)	(160 - 520)	(346 – 1 126)	(533 – 1 732)
Respiratory hospitalizations (15-64)	1.01	3	4	5
- Annual number	(0 - 12)	(0 - 30)	(0 - 45)	(0 - 60)
Respiratory hospitalizations (65+)	5.81	15	22	29
- Annual number	(0 - 14)	(0 - 35)	(0 - 53)	(0 - 71)
Sub-total Ozone		**328**	**698**	**1 068**
		(160 - 585)	**(346 – 1 224)**	**(533 – 1 863)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A2-15 Annual monetary valuations for compliance with WHO AQG in Malaga (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest thousand).

Malaga	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	72.22	78 720	119 524	160 328
- Annual number of deaths	(25 - 129)	(27 250 – 140 610)	(41 375 – 213 495)	(55 500 – 286 380)
Total mortality (30+)*	1 782.57	71 303	154 371	237 438
-Annual number of life years saved	(572 – 3 243)	(22 895 – 129 739)	(49 568 – 280 884)	(76 240 – 432 029)
Cardiovascular mortality (30+)*	52.15	56 844	86 308	115 773
- Annual number of deaths	(36 - 64)	(39 240 – 69 760)	(59 580 – 105 920)	(79 920 – 142 080)
PM10 - Acute				
Total non-accidental mortality (All)	0.00	0	0	0
- Annual number of deaths	(0 - 0)	(0 - 0)	(0 - 0)	(0 - 0)
Cardiac hospitalizations (All)	0.00	0	0	0
- Annual number	(0 - 0)	(0 - 0)	(0 - 0)	(0 - 0)
Respiratory hospitalizations (All)	0.00	0	0	0
- Annual number	(0 - 0)	(0 - 0)	(0 - 0)	(0 - 0)
Sub-total PM10		**0**	**0**	**0**
		(0 - 0)	**(0 - 0)**	**(0 - 0)**
Ozone - Acute				
All non-accidental mortality (All)	0.44	18	38	59
- Annual number of deaths	(0 - 1)	(0 - 40)	(0 - 87)	(0 - 133)
Respiratory hospitalizations (15-64)	0.04	0	0	0
- Annual number	(0 - 0)	(0 - 0)	(0 - 0)	(0 - 0)
Respiratory hospitalizations (65+)	0.15	0	0	1
- Annual number	(0 - 0)	(0 - 0)	(0 - 0)	(0 - 0)
Sub-total Ozone		**18**	**38**	**60**
		(0 - 40)	**(0 - 87)**	**(0 - 133)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A2-16 Annual monetary valuations for compliance with WHO AQG in Marseille (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest thousand).

Marseille	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	397.97	433 787	658 640	883 493
- Annual number of deaths	(137 - 699)	(149 330 – 761 910)	(226 735 – 1 156 845)	(304 140 – 1 551 780)
Total mortality (30+)*	8 004.61	320 184	693 199	1 066 214
-Annual number of life years saved	(2 677 – 14 406)	(107 085 – 576 220)	(231 839 – 1 247 517)	(356 594 – 1 918 814)
Cardiovascular mortality (30+)*	221.23	241 141	366 136	491 131
- Annual number of deaths	(153 - 270)	(166 770 – 294 300)	(253215 – 446 850)	(339 660 – 599 400)
PM10 - Acute				
Total non-accidental mortality (All)	46.86	1 874	4 058	6 242
- Annual number of deaths	(31 - 62)	(1 240 – 2 480)	(2 685 – 5 369)	(4 129 – 8 258)
Cardiac hospitalizations (All)	76.94	194	291	387
- Annual number	(39 - 115)	(98 - 290)	(147 - 434)	(196 - 579)
Respiratory hospitalizations (All)	109.77	276	415	553
- Annual number	(60 - 160)	(151 - 403)	(227 - 604)	(302 - 806)
Sub-total PM10		**2 344**	**4 763**	**7 182**
		(1 489 – 3 172)	**(3 059 – 6 408)**	**(4 628 – 9 643)**
Ozone - Acute				
All non-accidental mortality (All)	12.96	518	1 122	1 726
- Annual number of deaths	(7 - 22)	(280 - 880)	(606 – 1 905)	(932 – 2 930)
Respiratory hospitalizations (15-64)	1.89	5	7	10
- Annual number	(0 - 22)	(0 - 55)	(0 - 83)	(0 - 111)
Respiratory hospitalizations (65+)	9.13	23	34	46
- Annual number	(0 - 22)	(0 - 55)	(0 - 83)	(0 - 111)
Sub-total Ozone		**546**	**1 163**	**1 782**
		(280 - 991)	**(606 – 2 071)**	**(932 – 3 152)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A2-17 Annual monetary valuations for compliance with WHO AQG in Paris (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest thousand).

Paris	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	1 422.48	1 550 503	2 354 204	3 157 906
- Annual number of deaths	(489 – 2 511)	(533 010 – 2 736 990)	(809 295 – 4 155 705)	(1 085 580 – 5 574 420)
Total mortality (30+)*	53 620.19	2 144 808	4 643 508	7 142 209
-Annual number of life years saved	(17 823 – 96 912)	(712 918 – 3 876 494)	(1 5434 68 – 8 392 609)	(2 374 018 – 12 908 725)
Cardiovascular mortality (30+)*	678.74	739 827	1 123 315	1 506 803
- Annual number of deaths	(466 - 830)	(507 940 – 904 700)	(771 230 – 1 373 650)	(1 034 520 – 1 842 600)
PM10 - Acute				
Total non-accidental mortality (All)	112.34	4 494	9 729	14 964
- Annual number of deaths	(75 - 150)	(3 000 – 6 000)	(6 495 – 12 990)	(9 990 – 19 980)
Cardiac hospitalizations (All)	157.33	396	594	792
- Annual number	(79 - 235)	(199 - 592)	(298 - 888)	(398 – 1 183)
Respiratory hospitalizations (All)	319.05	803	1 205	1 607
- Annual number	(174 - 466)	(438 – 1 173)	(657 – 1 760)	(876 – 2 347)
Sub-total PM10		**5 693**	**11 528**	**17 363**
		(3 637 – 7 765)	**(7 451 – 15 638)**	**(11 264 – 23 510)**
Ozone - Acute				
All non-accidental mortality (All)	28.59	1 144	2 476	3 808
- Annual number of deaths	(16 - 48)	(640 – 1 920)	(1 386 – 4 157)	(2 131 – 6 394)
Respiratory hospitalizations (15-64)	4.74	12	18	24
- Annual number	(0 - 56)	(0 - 141)	(0 - 212)	(0 - 282)
Respiratory hospitalizations (65+)	20.54	52	78	103
- Annual number	(0 - 49)	(0 - 123)	(0 - 185)	(0 - 247)
Sub-total Ozone		**1 208**	**2 572**	**3 935**
		(640 – 2 184)	**(1 386 – 4 553)**	**(2 131 – 6 922)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A2-18 Annual monetary valuations for compliance with WHO AQG in Rome (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest thousand).

Rome	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	1 277.46	1 392 431	2 114 196	2 835 961
- Annual number of deaths	(443 – 2 232)	(482 870 – 2 432 880)	(733 165 – 3 693 960)	(983 460 – 4 955 040)
Total mortality (30+)*	37 644.37	1 505 775	3 260 002	5 014 230
-Annual number of life years saved	(12 467 – 68 570)	(498 688 – 2 742 784)	(1 079 660 – 5 9381 27)	(1 660 631 – 9 133 471)
Cardiovascular mortality (30+)*	996.22	1 085 880	1 648 744	2 211 608
- Annual number of deaths	(690 – 1 211)	(752 100 – 1 319 990)	(1 141 950 – 2 004 205)	(1 531 800 – 2 688 420)
PM10 - Acute				
Total non-accidental mortality (All)	226.53	9 061	19 617	30 174
- Annual number of deaths	(151 - 301)	(6 040 – 12 040)	(13 077 – 26 067)	(20 113 – 40 093)
Cardiac hospitalizations (All)	433.65	1 120	1 680	2 239
- Annual number	(218 - 648)	(563 – 1 673)	(844 – 2 510)	(1 126 – 3 346)
Respiratory hospitalizations (All)	579.45	1 554	2 332	3 109
- Annual number	(317 - 843)	(850 – 2 261)	(1 276 – 3 392)	(1 701 – 4 523)
Sub-total PM10		**11 735**	**23 629**	**35 522**
		(7 453 – 15 975)	**(15 197 – 31 969)**	**(22 940 – 47 962)**
Ozone - Acute				
All non-accidental mortality (All)	36.70	1 468	3 178	4 888
- Annual number of deaths	(20 - 61)	(800 – 2 440)	(1 732 – 5 283)	(2 664 – 8 125)
Respiratory hospitalizations (15-64)	5.62	15	23	30
- Annual number	(0 - 67)	(0 - 180)	(0 - 270)	(0 - 359)
Respiratory hospitalizations (65+)	36.08	97	145	194
- Annual number	(0 - 86)	(0 - 231)	(0 - 346)	(0 - 461)
Sub-total Ozone		**1 580**	**3 346**	**5 112**
		(800 – 2 850)	**(1 732 – 5 898)**	**(2 664 – 8 946)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A2-19 Annual monetary valuations for compliance with WHO AQG in Rouen (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest thousand).

Rouen	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	111.48	121 513	184 499	247 486
- Annual number of deaths	(38 - 197)	(41 420 – 214 730)	(62 890 – 326 035)	(84 360 – 437 340)
Total mortality (30+)*	2 279.53	91 181	197 407	303 633
-Annual number of life years saved	(775 – 4 115)	(31 010 – 164 592)	(67 137 – 356 342)	(103 264 – 548 092)
Cardiovascular mortality (30+)*	59.60	64 964	98 638	132 312
- Annual number of deaths	(41 - 73)	(44 690 – 79 570)	(67 855 – 120 815)	(91 020 – 162 060)
PM10 - Acute				
Total non-accidental mortality (All)	5.38	215	466	717
- Annual number of deaths	(4 - 7)	(160 - 280)	(346 - 606)	(533 - 932)
Cardiac hospitalizations (All)	7.93	20	30	40
- Annual number	(4 - 12)	(10 - 30)	(15 - 45)	(20 - 60)
Respiratory hospitalizations (All)	12.57	32	47	63
- Annual number	(7 - 18)	(18 - 45)	(26 - 68)	(35 - 91)
Sub-total PM10		**267**	**543**	**820**
		(188 - 356)	**(388 - 720)**	**(588 – 1 083)**
Ozone - Acute				
All non-accidental mortality (All)	1.75	70	152	233
- Annual number of deaths	(1 - 3)	(40 - 120)	(87 - 260)	(133 - 400)
Respiratory hospitalizations (15-64)	0.20	1	1	1
- Annual number	(0 - 2)	(0 - 5)	(0 - 8)	(0 - 10)
Respiratory hospitalizations (65+)	1.27	3	5	6
- Annual number	(0 - 3)	(0 - 8)	(0 - 11)	(0 - 15)
Sub-total Ozone		**74**	**158**	**240**
		(40 - 133)	**(87 - 279)**	**(133 - 425)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A2-20 Annual monetary valuations for compliance with WHO AQG in Sevilla (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest thousand).

Sevilla	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	421.52	459 457	697 616	935 774
- Annual number of deaths	(147 - 733)	(160 230 – 798 970)	(243 285 – 1 213 115)	(326 340 – 1 627 260)
Total mortality (30+)*	10 333.10	413 324	894 846	1 376 369
-Annual number of life years saved	(3 512 – 18 650)	(140 483 – 746 013)	(304 146 – 1 615 118)	(467 808 – 2 484 223)
Cardiovascular mortality (30+)*	342.34	373 151	566 573	759 995
- Annual number of deaths	(238 - 415)	(259 420 – 452 350)	(393 890 – 686 825)	(528 360 – 921 300)
PM10 - Acute				
Total non-accidental mortality (All)	42.70	1 708	3 698	5 688
- Annual number of deaths	(29 - 57)	(1 160 – 2 280)	(2 511 – 4 936)	(3 863 – 7 592)
Cardiac hospitalizations (All)	32.82	80	120	160
- Annual number	(16 - 49)	(39 - 120)	(59 - 180)	(78 - 239)
Respiratory hospitalizations (All)	52.79	112	168	224
- Annual number	(29 - 77)	(62 - 164)	(92 - 246)	(123 - 327)
Sub-total PM10		**1 900**	**3 986**	**6 072**
		(1 261 – 2 563)	**(2 663 – 5 361)**	**(4 064 – 8 159)**
Ozone - Acute				
All non-accidental mortality (All)	0.10	4	9	13
- Annual number of deaths	(0 - 0)	(2 - 7)	(5 - 14)	(7 - 22)
Respiratory hospitalizations (15-64)	0.01	0	0	0
- Annual number	(0 - 0)	(0 - 0)	(0 - 0)	(0 - 0)
Respiratory hospitalizations (65+)	0.04	0	0	0
- Annual number	(0 - 0)	(0 - 0)	(0 - 0)	(0 - 0)
Sub-total Ozone		**4**	**9**	**13**
		(2 - 7)	**(5 - 14)**	**(7 - 22)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A2-21 Annual monetary valuations for compliance with WHO AQG in Stockholm (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest thousand).

Stockholm	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	0.00	0	0	0
- Annual number of deaths	(0 - 0)	(0 - 0)	(0 - 0)	(0 - 0)
Total mortality (30+)*	0.00	0	0	0
-Annual number of life years saved	(0 - 0)	(0 - 0)	(0 - 0)	(0 - 0)
Cardiovascular mortality (30+)*	0.00	0	0	0
- Annual number of deaths	(0 - 0)	(0 - 0)	(0 - 0)	(0 - 0)
PM10 - Acute				
Total non-accidental mortality (All)	0.00	0	0	0
- Annual number of deaths	(0 - 0)	(0 - 0)	(0 - 0)	(0 - 0)
Cardiac hospitalizations (All)	0.00	0	0	0
- Annual number	(0 - 0)	(0 - 0)	(0 - 0)	(0 - 0)
Respiratory hospitalizations (All)	0.00	0	0	0
- Annual number	(0 - 0)	(0 - 0)	(0 - 0)	(0 - 0)
Sub-total PM10		**0**	**0**	**0**
		(0 - 0)	**(0 - 0)**	**(0 - 0)**
Ozone - Acute				
All non-accidental mortality (All)	2.24	90	194	298
- Annual number of deaths	(1 - 4)	(40 - 160)	(87 - 346)	(133 - 533)
Respiratory hospitalizations (15-64)	0.16	0	1	1
- Annual number	(0 - 2)	(0 - 4)	(0 - 6)	(0 - 8)
Respiratory hospitalizations (65+)	1.63	3	5	7
- Annual number	(0 - 4)	(0 - 8)	(0 - 13)	(0 - 17)
Sub-total Ozone		**93**	**200**	**306**
		(40 - 173)	**(87 - 365)**	**(133 - 558)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A2-22 Annual monetary valuations for compliance with WHO AQG in Strasbourg (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest thousand).

Strasbourg	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	112.93	123 094	186 899	250 705
- Annual number of deaths	(39 - 199)	(42 510 – 216 910)	(64 545 – 329 345)	(86 580 – 441 780)
Total mortality (30+)*	3 086.54	123 462	267 294	411 127
-Annual number of life years saved	(1 048 – 5 565)	(41 904 – 222 613)	(90 721 – 481 957)	(139 539 – 741 301)
Cardiovascular mortality (30+)*	64.95	70 796	107 492	144 189
- Annual number of deaths	(45 - 79)	(49 050 – 86 110)	(74 475 – 130 745)	(99 900 – 175 380)
PM10 - Acute				
Total non-accidental mortality (All)	8.34	334	722	1 111
- Annual number of deaths	(6 - 11)	(240 - 440)	(520 - 953)	(799 – 1 465)
Cardiac hospitalizations (All)	9.37	24	35	47
- Annual number	(5 - 14)	(13 - 35)	(19 - 53)	(25 - 71)
Respiratory hospitalizations (All)	23.18	58	88	117
- Annual number	(13 - 34)	(33 - 86)	(49 - 128)	(65 - 171)
Sub-total PM10		**416**	**845**	**1 275**
		(285 - 561)	**(588 – 1 134)**	**(890 – 1 707)**
Ozone - Acute				
All non-accidental mortality (All)	3.63	145	314	484
- Annual number of deaths	(2 - 6)	(80 - 240)	(173 - 520)	(266 - 799)
Respiratory hospitalizations (15-64)	0.67	2	3	3
- Annual number	(0 - 8)	(0 - 20)	(0 - 30)	(0 - 40)
Respiratory hospitalizations (65+)	2.98	8	11	15
- Annual number	(0 - 7)	(0 - 18)	(0 - 26)	(0 - 35)
Sub-total Ozone		**155**	**328**	**502**
		(80 - 278)	**(173 - 576)**	**(266 - 875)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A2-23 Annual monetary valuations for compliance with WHO AQG in Toulouse (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest thousand).

Toulouse	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	105.53	115 028	174 652	234 277
- Annual number of deaths	(36 - 187)	(39 240 – 203 830)	(59 580 – 309 485)	(79 920 – 415 140)
Total mortality (30+)*	3 321.08	132 843	287 606	442 368
-Annual number of life years saved	(1 121 – 5 942)	(44 844 – 237 672)	(97 087 – 514 560)	(149 330 – 791 448)
Cardiovascular mortality (30+)*	60.16	65 574	99 565	133 555
- Annual number of deaths	(41 - 74)	(44 690 – 80 660)	(67 855 – 122 470)	(91 020 – 164 280)
PM10 - Acute				
Total non-accidental mortality (All)	4.69	188	406	625
- Annual number of deaths	(3 - 6)	(120 - 240)	(260 - 520)	(400 - 799)
Cardiac hospitalizations (All)	7.71	19	29	39
- Annual number	(4 - 12)	(10 - 30)	(15 - 45)	(20 - 60)
Respiratory hospitalizations (All)	16.11	41	61	81
- Annual number	(9 - 24)	(23 - 60)	(34 - 91)	(45 - 121)
Sub-total PM10		**248**	**496**	**745**
		(153 - 331)	**(309 - 656)**	**(465 - 980)**
Ozone - Acute				
All non-accidental mortality (All)	4.41	176	382	587
- Annual number of deaths	(2 - 7)	(80 - 280)	(173 - 606)	(266 - 932)
Respiratory hospitalizations (15-64)	1.02	3	4	5
- Annual number	(0 - 12)	(0 - 30)	(0 - 45)	(0 - 60)
Respiratory hospitalizations (65+)	4.24	11	16	21
- Annual number	(0 - 10)	(0 - 25)	(0 - 38)	(0 - 50)
Sub-total Ozone		**190**	**402**	**613**
		(80 - 335)	**(173 - 689)**	**(266 – 1 043)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A2-24 Annual monetary valuations for compliance with WHO AQG in Valencia (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest thousand).

Valencia	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	457.00	498 130	756 335	1 014 540
- Annual number of deaths	(159 - 795)	(173 310 – 866 550)	(263 145 – 1 315 725)	(352 980 – 1 764 900)
Total mortality (30+)*	10 178.74	407 150	881 479	1 355 808
-Annual number of life years saved	(3 463 – 18 427)	(138 513 – 737 085)	(299 880 – 1 595 789)	(461 247 – 2 454 493)
Cardiovascular mortality (30+)*	288.49	314 454	477 451	640 448
- Annual number of deaths	(200 - 350)	(218 000 – 381 500)	(331 000 – 579 250)	(444 000 – 777 000)
PM10 - Acute				
Total non-accidental mortality (All)	42.53	1 701	3 683	5 665
- Annual number of deaths	(28 - 57)	(1 120 – 2 280)	(2 425 – 4 936)	(3 730 – 7 592)
Cardiac hospitalizations (All)	32.55	80	119	159
- Annual number	(16 - 49)	(39 - 120)	(59 - 180)	(78 - 239)
Respiratory hospitalizations (All)	78.22	166	249	333
- Annual number	(43 - 114)	(91 - 242)	(137 - 364)	(183 - 485)
Sub-total PM10		**1 947**	**4 052**	**6 157**
		(1 251 – 2 642)	**(2621 – 5 479)**	**(3 991 – 8 317)**
Ozone - Acute				
All non-accidental mortality (All)	0.34	14	29	45
- Annual number of deaths	(0 - 1)	(0 - 40)	(0 - 87)	(0 - 133)
Respiratory hospitalizations (15-64)	0.03	0	0	0
- Annual number	(0 - 0)	(0 - 0)	(0 - 0)	(0 - 0)
Respiratory hospitalizations (65+)	0.32	1	1	1
- Annual number	(0 - 1)	(0 - 2)	(0 - 3)	(0 - 4)
Sub-total Ozone		**15**	**30**	**46**
		(0 - 42)	**(0 - 90)**	**(0 - 137)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.

Table A2-25 Annual monetary valuations for compliance with WHO AQG in Vienna (Low, Central and High monetary estimates of mean, upper 95%CI and lower 95%CI number of cases. Costs rounded to the nearest thousand).

Vienna	Number of cases	Monetary valuation (thousand € 2005)		
	Mean (95% CI)	Low estimate Mean (95% CI)	Central estimate Mean (95% CI)	High estimate Mean (95% CI)
PM2.5 - Chronic				
Total mortality (30+)*	1 023.51	1 115 626	1 693 909	2 272 192
- Annual number of deaths	(356 – 1 785)	(388 040 – 1 945 650)	(589 180 – 2 954 175)	(790 320 – 3 962 700)
Total mortality (30+)*	19 741.24	789 650	1 709 591	2 629 533
-Annual number of life years saved	(6 627 – 35 684)	(265 084 – 1 427 373)	(573 906 – 3 090 262)	(882 728 – 4 753 151)
Cardiovascular mortality (30+)*	903.95	985 306	1 496 037	2 006 769
- Annual number of deaths	(627 – 1 098)	(683 430 – 1 196 820)	(1 037 685 – 1 817 190)	(1 391 940 – 2 437 560)
PM10 - Acute				
Total non-accidental mortality (All)	82.62	3 305	7 155	11 005
- Annual number of deaths	(55 - 110)	(2 200 – 4 400)	(4 763 – 95 26)	(7 326 – 14 652)
Cardiac hospitalizations (All)	203.42	539	809	1 079
- Annual number	(102 - 304)	(270 - 806)	(406 – 1 209)	(541 – 1 612)
Respiratory hospitalizations (All)	317.44	677	1 016	1 355
- Annual number	(173 - 463)	(369 - 988)	(554 – 1 482)	(738 – 1 976)
Sub-total PM10		**4 521**	**8 980**	**13 438**
		(2 840 – 6 194)	**(5 722 – 122 17)**	**(8 605 – 18 240)**
Ozone - Acute				
All non-accidental mortality (All)	13.22	529	1 145	1 761
- Annual number of deaths	(7 - 22)	(280 - 880)	(606 – 1 905)	(932 – 2 930)
Respiratory hospitalizations (15-64)	3.71	8	12	16
- Annual number	(0 - 44)	(0 - 94)	(0 - 141)	(0 - 188)
Respiratory hospitalizations (65+)	13.06	28	42	56
- Annual number	(0 - 31)	(0 - 66)	(0 - 99)	(0 - 132)
Sub-total Ozone		**565**	**1 199**	**1 833**
		(280 – 1 040)	**(606 – 2 145)**	**(932 – 3 251)**

* These alternative valuations of chronic mortality are not additive. N/A = Non Available.