

HEALTH IMPACTS AND DAMAGE COSTS OF AMBIENT PARTICLES – PM₁₀ EXTERNE (2005) CONCENTRATION RESPONSE FUNCTIONS (CRF) AND MONETARY UNIT COSTS (MUV)

(Source: CAFE project of the European Commission, <http://ec.europa.eu/environment/air/cafe/general/keydocs.htm>)

Health endpoint	Increased relative risk (IRR) % change per µg/m ³	Endpoint incidence rate (β) Annual cases per receptor at risk	CRF slope (IRR × β) Annual cases per receptor per µg/m ³	CRF slope (IRR × β × f _{pop}) Annual cases per person per µg/m ³	MUV € ₂₀₀₀ per case	Share of Total damage
New chronic bronchitis cases (CB) Receptor: adults 27 and over (f _{pop} = 70% of EU population)	0.7%	378 new cases per 100,000 receptors	0.265×10^{-4}	0.186×10^{-4}	200,000	15.3%
Respiratory Hospital Admin (RHA) Receptor: all population (f _{pop} = 100%)	0.114%	617 cases per 100,000 receptors	0.0703×10^{-4}	0.0703×10^{-4}	2,000	< 0.1%
Cardiac Hospital Admin (CHA) Receptor: all population (f _{pop} = 100%)	0.06%	723 cases per 100,000 receptors	0.0434×10^{-4}	0.0434×10^{-4}	2,000	< 0.1%
Restricted Activity Days (RAD) Receptor: adults 15-64 (f _{pop} = 67.2%)	0.475% (PM _{2.5}) 0.285% (PM ₁₀) [†]	19 cases per receptor	541×10^{-4}	slope based on PM ₁₀ 364×10^{-4}	130	see net RAD
Work Days Lost (WDL) Receptor: adults 15-64 (f _{pop} = 67.2%)	0.46% (PM _{2.5}) 0.276% (PM ₁₀) [†]	4.5 cases per receptor [‡]	124×10^{-4}	slope based on PM ₁₀ 83.5×10^{-4}	82	2.8%
Minor RAD (MRAD) Receptor: adults 18-64 (f _{pop} = 64%)	0.74% (PM _{2.5}) 0.444% (PM ₁₀) [†]	7.8 cases per receptor	346×10^{-4}	slope based on PM ₁₀ 222×10^{-4}	38	3.5%
Net Restricted Activity Days net RAD = RAD – WDL – MRAD				slope based on PM ₁₀ 58.78×10^{-4}	130	3.1%

† Assuming the ratio PM_{2.5} to PM₁₀ is 60%.

‡ Assuming EU25 employment rate of 63% for the age group 15 to 64 years old.

Other pollutants: PM₁₀ CRF = Sulfates CRF = Nitrates CRF = 60% × CRF PM_{2.5} = 40% × CRF PM from transport.

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Health endpoint	Increased relative risk (IRR) % change per µg/m ³	Endpoint incidence rate (β) Annual cases per receptor at risk	CRF slope (IRR × β) Annual cases per receptor per µg/m ³	CRF slope (IRR × β × f _{pop}) Annual cases per person per µg/m ³	MUV € ₂₀₀₀ per case	Share of Total damage
Days Lower Respiratory Symptoms (incl. cough) in children (LRS-C) Receptor: children 5-14 (f _{pop} = 11.2% of EU population)	0.4%	46.5 cases per receptor	1860 × 10 ⁻⁴	208 × 10 ⁻⁴	38	3.2%
Days of bronchodilator usage in children (DBU-C) Receptor: children satisfying PEACE study criteria (20% of children 5-14) (f _{pop} = 2.24% of EU population)	0.05%	36.5 cases per receptor	180 × 10 ⁻⁴	4.03 × 10 ⁻⁴	1	≈ 0
Days Lower Respiratory Symptoms (incl. cough) in adults (LRS-A) Receptor: symptomatic adults (30% of adults) aged 15+ (f _{pop} = 24.9% of EU population)	0.117%	111.1 cases per receptor	1300 × 10 ⁻⁴	324 × 10 ⁻⁴	38	5.0%
Days of bronchodilator usage in adults (DBU-A) Receptor: adults with asthma (4.5% of adults 15+) (f _{pop} = 3.74% of EU population)	0.1%	91.3 cases per receptor	912 × 10 ⁻⁴	34.1 × 10 ⁻⁴	1	≈ 0
Mortality (Years of Life Lost, YOLL) Receptor: adults 30 and over Receptor: infants (0-1 years old)	0.6% (PM _{2.5}) 0.4% (PM ₁₀)			PM ₁₀ [†] based slopes 3.9 × 10 ⁻⁴ 0.18 × 10 ⁻⁴	40,000 [§]	64% 3%

† Assuming the ratio PM_{2.5} to PM₁₀ is 60%.

§ Latest estimate of the Value Of Life Year (VOLY) from the NEEDS project of the European Commission (<http://www.needs-project.org/>).

Other pollutants: PM₁₀ CRF = Sulfates CRF = Nitrates CRF = 60% × CRF PM_{2.5} = 40% × CRF PM from transport.