



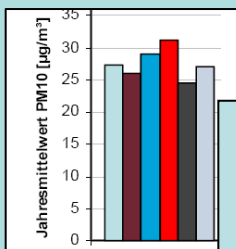
# Health Impact Assessment – Effects of Particulate Matter

Lorenz Moosmann

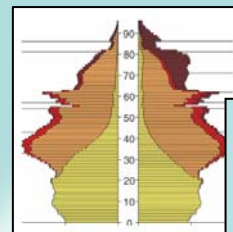


- Method of Health Impact Assessment
- Data and methods used in the Austrian study
- Resultats
- Conclusions

# Health Impact Assessment



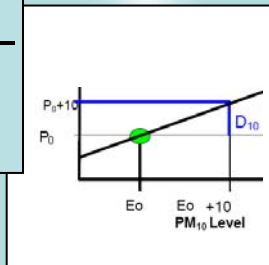
Air pollution data



Population data

Exposure

Relation of concentration and effect

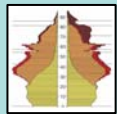


213728	418	78
177473	463	73
171915	660	12
169236	847	18
151608	1246	29
169811	2235	66
151832	3032	10
115858	3907	16
71001	4080	19
39929	4255	22
15019	2711	16
3373	1031	60
547	149	98

Additional data

Estimate of Effects

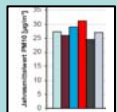
- „Exposure of the body to impacts from the environment“.
- In the present study:



How many persons



In which regions



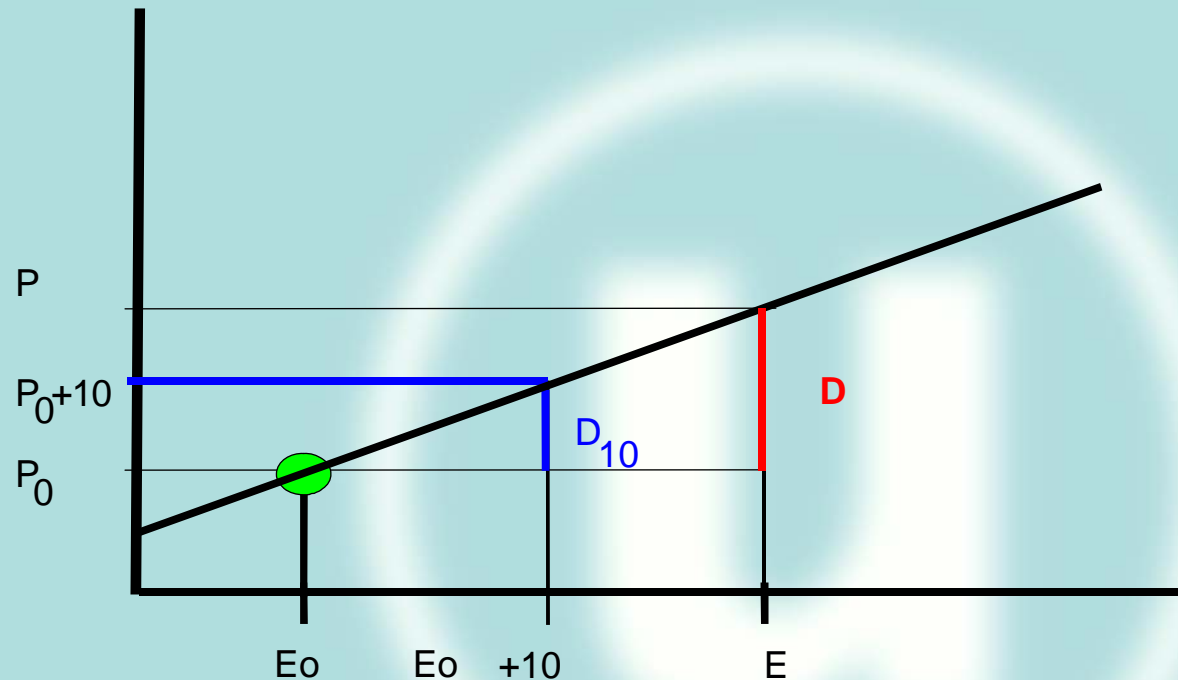
Are exposed to which concentration of particulate matter?

# Relation of concentration and effect

## Effect

Morbidity (e.g. number of asthma cases)

Mortality (number of attributed fatalities)



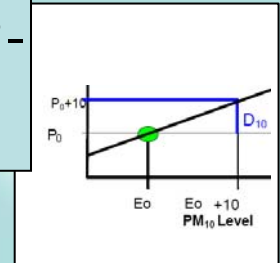
## Concentration

e.g. average particulate matter concentration

# Additional data

Exposure

Relation of concentration and effect



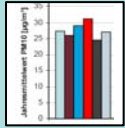
Additional data

213728	418	78
177473	463	73
171915	660	12
169236	847	18
151608	1246	29
169811	2235	66
151832	3032	10
115858	3907	16
71001	4080	19
39929	4255	22
15019	2711	1612
3373	1031	600
547	149	98

Estimate of effects

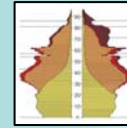
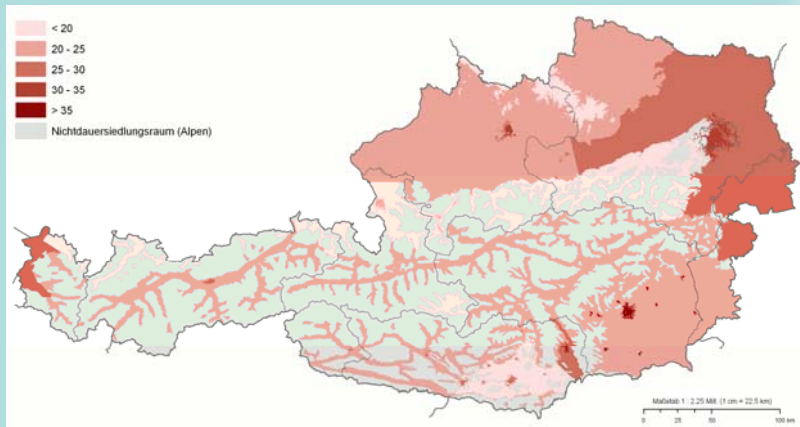
Additional population data is needed to calculate the effect on life expectancy instead of mortality.

# Data for Austria



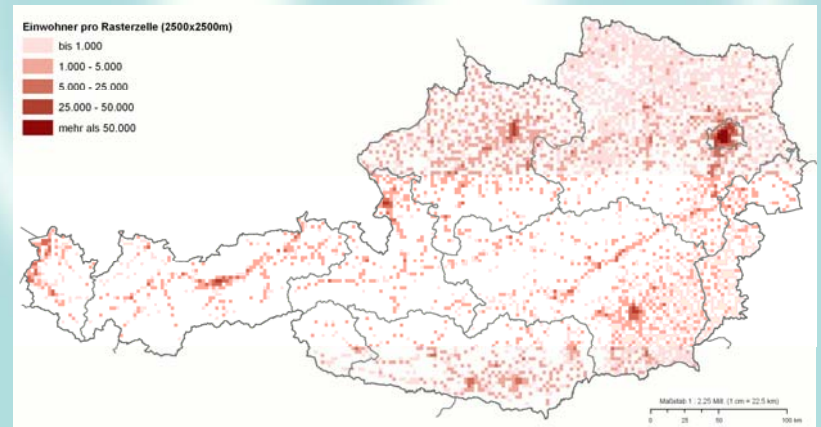
## Air quality data:

- PM10 concentration averages of 2003-2004.
- Extrapolated to the area of Austria, taking into account topography.



## Population data

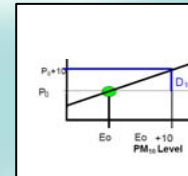
- Population distribution
- Additional data: Age distribution and mortalities



02.03.2007 | Folie 7

# Relation of concentration and effect

- „American Cancer Society“ study\*.
- Linear relation between PM<sub>2,5</sub> concentration and mortality.



\*Pope C.A. 3rd, Burnett T.R., Thun M.J., Calle E.E., Krewski D., Kazuhiko I. & Thurston G.D. (2002): Lung cancer, cardiopulmonary mortality, and long-term exposure to fine particulate air pollution. JAMA, 287:1132–1141.

02.03.2007 | Folie 8



# Reduction of life expectancy

City	Average PM10 background concentration ( $\mu\text{g}/\text{m}^3$ )	Reduction of life expectancy (months)*
Graz	41	17
Linz	35	14
Wien	31	12
St. Pölten	30	11
Innsbruck	28	10
Klagenfurt	27	9
Salzburg	24	7

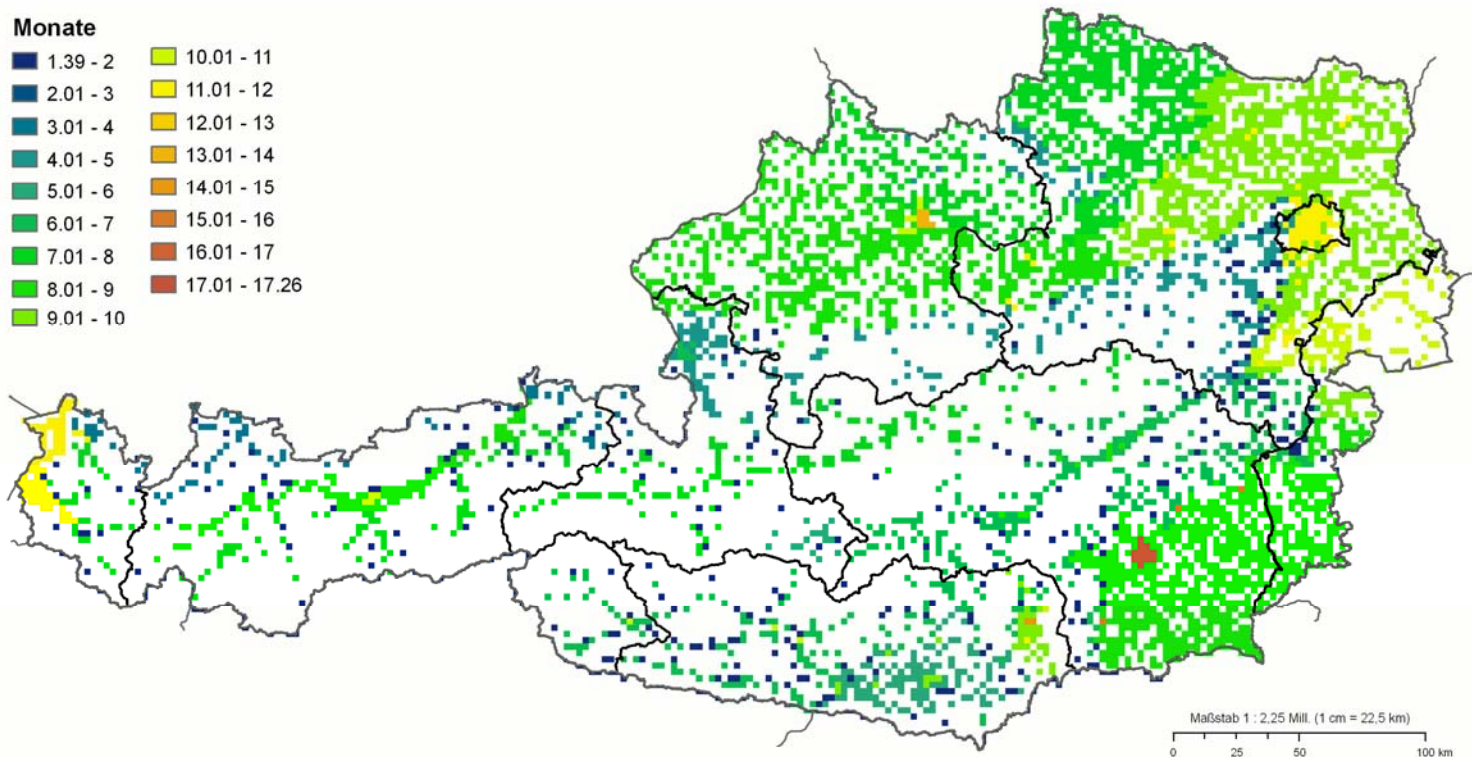
\*compared to a PM<sub>2,5</sub> reference level of 8  $\mu\text{g}/\text{m}^3$ .

# 2-dimensional distribution

## Verminderung der Lebenserwartung

### Monate

1.39 - 2	10.01 - 11
2.01 - 3	11.01 - 12
3.01 - 4	12.01 - 13
4.01 - 5	13.01 - 14
5.01 - 6	14.01 - 15
6.01 - 7	15.01 - 16
7.01 - 8	16.01 - 17
8.01 - 9	17.01 - 17.26
9.01 - 10	



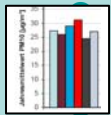
Raumeinheiten: Bundesländer (Gebietsstand 1.1.2005)

Quelle: Bundesamt für Eich- und Vermessungswesen (BEV), Statistik Austria  
Bearbeitung: Kompetenzzentrum Geografische Informationssysteme; Dez. 2005

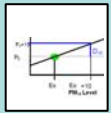
umweltbundesamt<sup>U</sup>

02.03.2007 | Folie 10

- Uncertainties



Measured data (number of stations, extrapolation)  
Referring from PM10 to PM2,5



Uncertainty of the relation of concentration and effect

177476	410	76
177473	463	73
172645	660	126
169236	847	184
151608	1246	269
169811	2235	663
153832	3032	1072
115818	3907	1648
23004	4089	1566
39929	4255	2252
15019	7711	1832
3173	1031	600
547	149	98

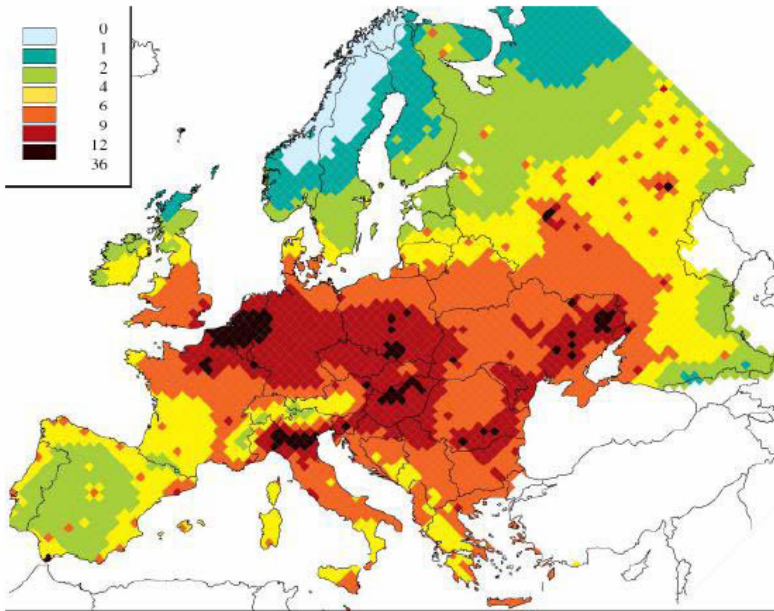
Uncertainties of the population data

- Advantages of the method

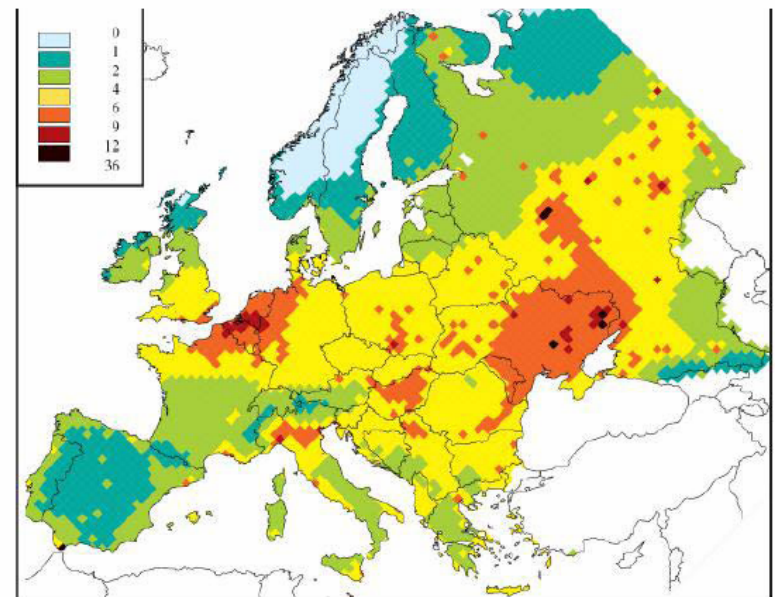
- Linear relation of concentration and effect
- Based on a large long-term epidemiological study
- Mortality is clearly defined

# „Clean Air for Europe“ Study

Figure 3: Loss in life expectancy attributable to anthropogenic PM<sub>2.5</sub> in 2000 and 2020



2000



Baseline 2020

European Commission (2005). Impact Assessment of the Thematic Strategy and the CAFE Directive (SEC(2005) 133) [http://europa.eu.int/comm/environment/air/cafe/pdf/ia\\_report\\_en050921\\_final.pdf](http://europa.eu.int/comm/environment/air/cafe/pdf/ia_report_en050921_final.pdf) 02.03.2007 | Folie 12