

## Indoor air pollution

A UK perspective  
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## A neglected area Why?

- Focus on outdoor air pollution
- Epidemiological studies suggest effects of outdoor air pollutants
- Difficulties of “indoor epidemiology”
- Difficulties of monitoring on a large scale
- “An Englishman’s home is his castle”

Pollutant (24 hr average)	N	Outcome measure	Assessment	Random effects (95% CI) (% Change per 10µg/m <sup>3</sup> )
PM <sub>10</sub>	40	CV mortality	+	0.9 (0.7, 1.2)
PM <sub>10</sub>	6	CV admissions	+	0.3 (-0.4, 0.9)
PM <sub>10</sub>	51	Cardiac admissions	+	0.9 (0.7, 1.0)
PM <sub>10</sub>	19	IHD admissions	+	0.8 (0.6, 1.1)
PM <sub>10</sub>	7	Dysrhythmias	+	0.8 (0.1, 1.4)
PM <sub>10</sub>	7	Heart failure	+	1.4 (0.5, 2.4)
PM <sub>10</sub>	9	Cerebrovascular	+	0.4 (0.0, 0.8)
PM <sub>2.5</sub>	9	CV mortality	+	1.4 (0.7, 2.2)
TSP	21	CV mortality	+	0.5 (0.3, 0.8)
BS	29	CV mortality	+	0.6 (0.4, 0.7)
BS	5	CV admissions	+	1.0 (0.4, 1.5)
BS	6	Cardiac admissions	+	0.8 (0.2, 1.4)
BS	8	IHD admissions	+	1.1 (0.4, 1.7)
NO <sub>2</sub>	44	CV mortality	+	1.0 (0.8, 1.3)
NO <sub>2</sub>	17	Cardiac admissions	+	1.3 (1.0, 1.7)
NO <sub>2</sub>	9	IHD admissions	+	0.6 (-0.1, 1.4)
NO <sub>2</sub>	6	Heart failure admissions	+	1.3 (0.4, 2.3)
NO <sub>2</sub>	8	Cerebrovascular admissions	+	0.4 (0.0, 0.8)
O <sub>3</sub> 8 hr average	26	CV mortality	+	0.4 (0.3, 0.5)
O <sub>3</sub> 8 hr average	8	CV admissions	+	0.1 (-0.5, 0.4)
O <sub>3</sub> 8 hr average	6	IHD admissions	+	-0.1 (-0.7, 0.4)
SO <sub>2</sub>	67	CV mortality	+	0.6 (0.6, 1.0)
SO <sub>2</sub>	7	CV admissions	+	0.6 (0.1, 1.2)
SO <sub>2</sub>	18	Cardiac admissions	+	2.4 (1.6, 3.3)
SO <sub>2</sub>	10	IHD admissions	+	1.2 (0.5, 1.9)
SO <sub>2</sub>	5	Heart failure admissions	+	0.9 (-0.1, 1.8)
SO <sub>2</sub>	7	Cerebrovascular admissions	+	0.3 (-0.5, 1.1)
CO	12	CV mortality	+	1.1 (0.2, 2.1)
CO	8	Cardiac admissions	+	2.5 (1.8, 3.3)
CO	7	IHD admissions	+	2.4 (0.2, 4.6)
CO	5	Cerebrovascular admissions	+	0.8 (-0.1, 1.8)

## Cohort study coefficients

All per 10µg/m<sup>3</sup> PM<sub>2.5</sub> (95% confidence intervals)

- Harvard six cities: 13% (4.2-23)
- ACS original: 6.6% (3.5-9.8)
- ACS (HEI reanalysis): 6.2% (1.6-11)
- ACS (sub group: Los Angeles): 17% (5-30)
- Netherlands study (near roads) BS: 17% (-24-78)
- ACS (update Pope 2002): 4% (1-8)
- ACS (update Pope + adjustment for auto-correlation): 2% (-0.02-5)
- HEI ACS (reanalysis adjusted for SO<sub>2</sub>): 1% (-0.02-5)

## A wrongly neglected area

- >80% lives spent indoors
- High percentage of exposure to all air pollutants occurs indoors
- Air pollution causes deaths indoors: carbon monoxide
- Common pollutants such as nitrogen dioxide reach higher levels indoors than outdoors

## The problems

- Chemical: CO, NO<sub>2</sub>, PM, organic pollutants
- Biological: mites, moulds, spores
- Radiological: radon and radon daughters

### Whose responsibility is it?

- The householder
- The landlord
  
- Building regulations
- Ventilation standards
- Planning authorities: proximity to roads
- Product standards

### Who should advise?

- Department of Health/Health Protection Agency
- COMEAP Guidance on Indoor Air Quality
- WHO: Indoor Air Quality Guidelines
- DTI: Product safety
- HSE: Gas safety
- Gas engineers

### Problems with IAQ Guidelines

- Extrapolating from the outdoor air pollution evidence base
- Different pollutant mixtures
- Different exposures
- Lack of an indoor air pollution evidence base for some pollutants

### Way forward

- Research on effects of indoor air pollutants (current exposures) on health
- DH research programme on carbon monoxide
- Advice: reaching the public
- Engaging with special interest groups
- Monitoring
- Regular testing and servicing

Thank you