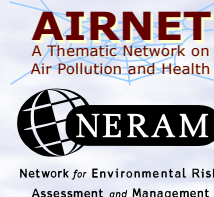


# FACTORS INFLUENCING INDIVIDUAL NITROGEN DIOXIDE EXPOSURE IN STOCKHOLM

Tom Bellander and Martin Kruså

National Institute of Environmental Medicine, Karolinska Institutet, Stockholm and Department of Environmental Health, Stockholm County Council, Stockholm, Sweden



## AIM OF THE STUDY



Individual exposure to NO<sub>2</sub>



Personal exposure - Ambient air level



Residence - Workplace



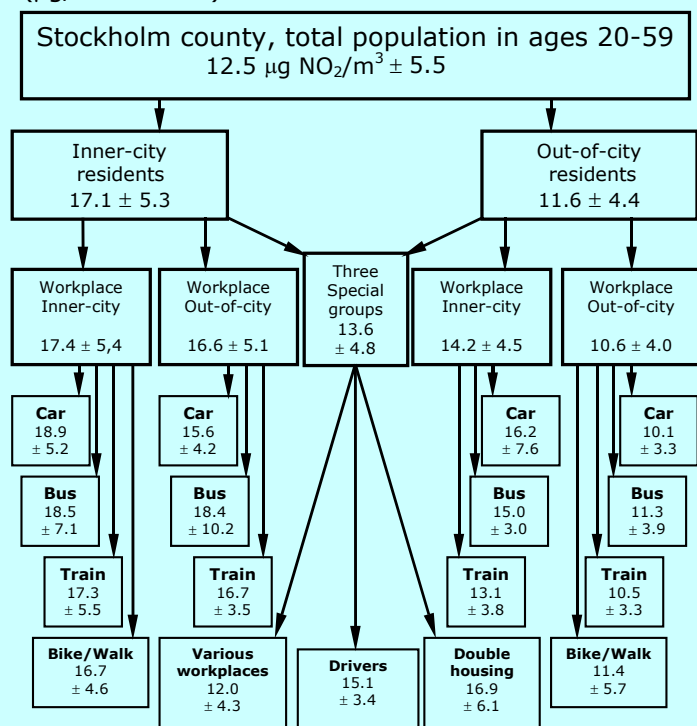
Mode of transportation

## MATERIALS & METHODS

- Random population sample of 240 persons
  - aged 20 - 59 years
  - non-smokers
  - permanent work within Stockholm County
  - no gas appliances at home
- Stratification by location of home, work and mode of transport to work
- Individual NO<sub>2</sub> exposure by small diffusion monitors carried for a week at two occasions, in the period May 1999 - May 2000. Daily activity patterns recorded in diary
- Air levels of NO<sub>2</sub> at workplace and home from dispersion modeling
- Urban street and background levels from at three fixed monitoring stations

## RESULTS

Stockholm County inhabitants' exposure to NO<sub>2</sub> (µg/m<sup>3</sup> ± stdev)



- Inner-city residents were more exposed than out-of-city residents.
- For out-of-city residents, place of work was important.
- Mode of transport did not seem important.

Factors influencing personal NO<sub>2</sub> exposure  
Multiple regression model, r<sup>2</sup>=0.46

Factor	IQR	Coef. µg/m <sup>3</sup>	95 % C.I.
NO <sub>2</sub> at residential address	12.3	0.26	0.19 0.33
NO <sub>2</sub> at workplace	11.9	0.22	0.16 0.28
NO <sub>2</sub> at street level	8.2	0.27	0.17 0.35
NO <sub>2</sub> at roof level	4.6	0.15	0.03 0.27
Bedroom facing large street (prop.)	7.3%	2.6	1.4 3.8
Hours in room with gas. appl.	0.0*	0.44	0.34 0.55
Hours in smoky room/free flames	5	0.26	0.18 0.35
Hours in traffic/garage	6.5	0.15	0.05 0.25

- Individual one week exposure levels were strongly correlated to the estimated annual average levels at home and work
- Bedroom facing a large street increased the exposure level
- Individual exposure levels were correlated to the current street (more) and urban background (less) levels
- Time spent in certain environments influenced the individual exposure level:
  - in a room with gas appliance
  - in a room with free flames or smoke
  - in traffic or a garage

\*Only 33 out of 383 weeks of measurement had times greater than 0, up to 24 hours

## CONCLUSIONS

- Individual NO<sub>2</sub> exposure varied mainly due to estimated NO<sub>2</sub> levels at home address and work
- Variation in NO<sub>2</sub> at street level was correlated to individual NO<sub>2</sub> exposure. Roof level variation was less influential.
  - Time spent in traffic was only weakly related to individual NO<sub>2</sub> exposure
  - Mode of transport had no significant influence on individual NO<sub>2</sub> exposure.
  - Indoor sources may give significant contributions