The Joint Research Centre

JRC

European Commission

Monitoring of VOC under EC directives
Activities of the Joint Research Centre

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Requirements of directive 2002/3/EC

Each Member State shall:

- ensure that in order to supply data on concentrations of the ozone precursors at least one measuring station is installed and operated in its territory

- choose the number and siting of the stations at which ozone precursor substances are to be measured, taking into account the Directive objectives, methods and recommendations

Monitoring objectives

- to analyse trends in ozone precursors
- to check efficiency of emission reduction strategies
- to check the consistency of emission inventories
- to attribute emission sources to pollution levels
- to understand the ozone formation and precursor dispersion processes
- to support the application of photochemical models

Ozone VOC precursors specified in DIR 2002/3/EC

- ethane, propane, n-, i- butane, n-, i- pentane, n-, i- hexane, n-heptane, n-, i- octane
- ethylene, acetylene, propene, 1-butene, t-2, c-2-butene, 1-, 2- pentene, 1.3-butadiene, isoprene
- benzene, toluene, ethyl benzene, o,m,p-Xylene 1,2,4-, 1,2,3-, 1,3,5 trimethylbenzene
- Total non-methane hydrocarbons
- Formaldehyde

Reference methods

Each Member State must:

- inform the Commission of the methods it uses to sample and measure VOC

The Commission must:

- carry out inter-comparison exercises asap
- investigate the potential for defining reference methods for precursor sampling and measurement in order to improve the comparability and precision of measurements for the review of this Directive

Working group on VOC precursor measurements

- Meeting 6 and 7 March 2003
- 15 invited experts on VOC monitoring
- Requirements of EC legislation
- Review of current measurement performances
- Existing standard measurement methods
- Experiences in Member States
- Measurement strategy

Review of experience in Member States

- Review of measurement methods: sampling, sample preparation, analysis, calibration, QA/QC
- Abandon of continuous on-line methods
- Majority of discontinuous monitoring methods
- Mainly canisters and pumped sampling on sorbent cartridges
- Development of diffusive sampling required

Review of standard measurement methods

- ISO/EN 16017: thermal desorption PS + DS

+ derived standards (VDI/DIN 2100, US EPA TO17, US ASTM D6169-97)

- ISO 16020: solvent extraction PS + DS
- CEN TC264 WG 15: Benzene PS + DS (end 2003)
- Problems: - C2 and C3
  - performances characteristics
  - uncertainty determination

Monitoring strategy

Trends

Reduction strategy
Policy support

Chronological monitoring

Limited number of pollutants

Emission characterisation

Emission inventory
Source attribution

Modelling

Ozone formation
Precursor dispersion

Short term campaigns

Wide range of pollutants or specific pollutants

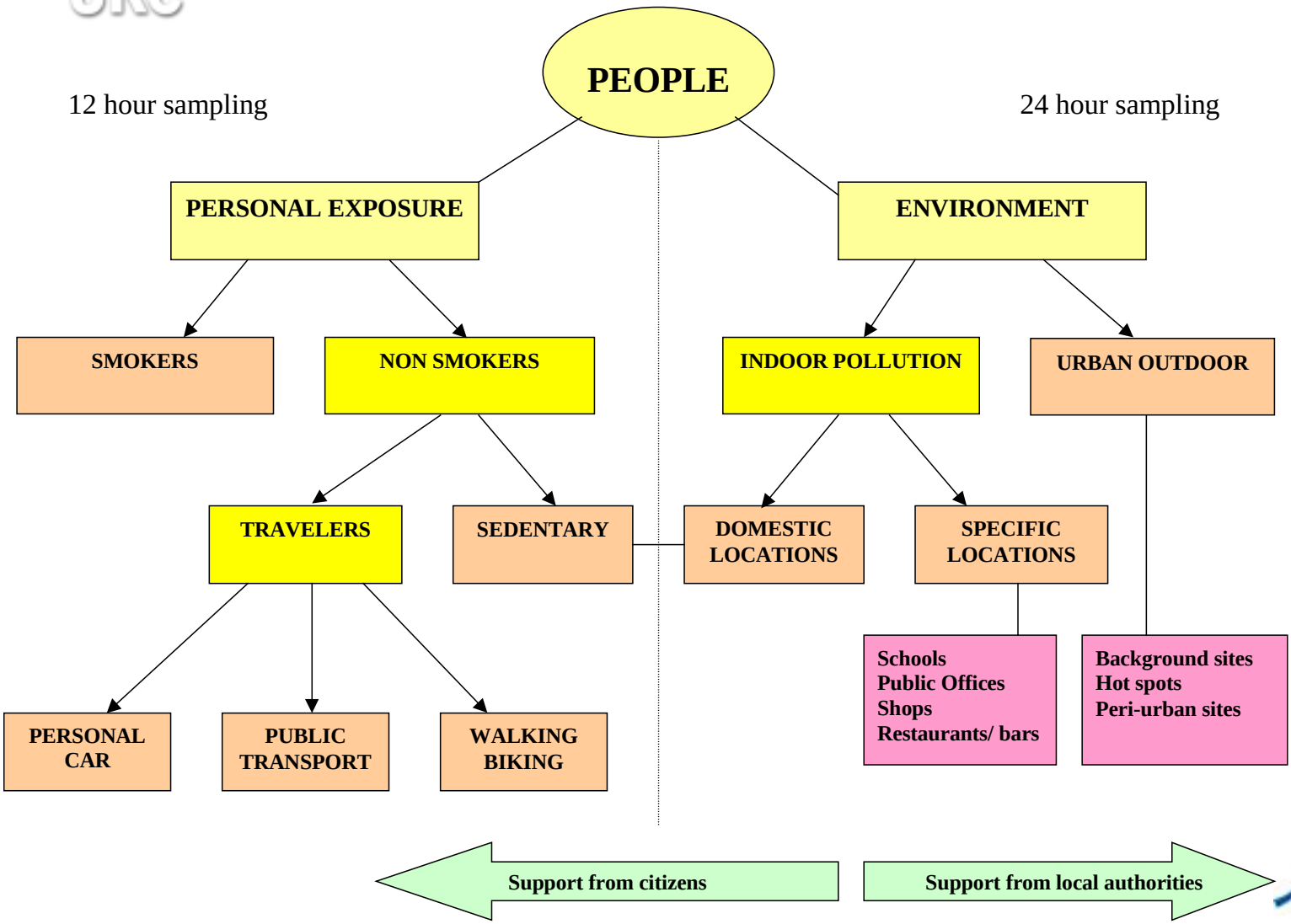
Source oriented monitoring

Cities	Industrial	Rural
Traffic	Petrochemical	Biogenic emissions
Domestic (solvent)	Natural gas	(isoprene, terpenes,..)

- Continuous or discontinuous monitoring
- Sampling frequency or short term campaigns
- Pollutants to be measured

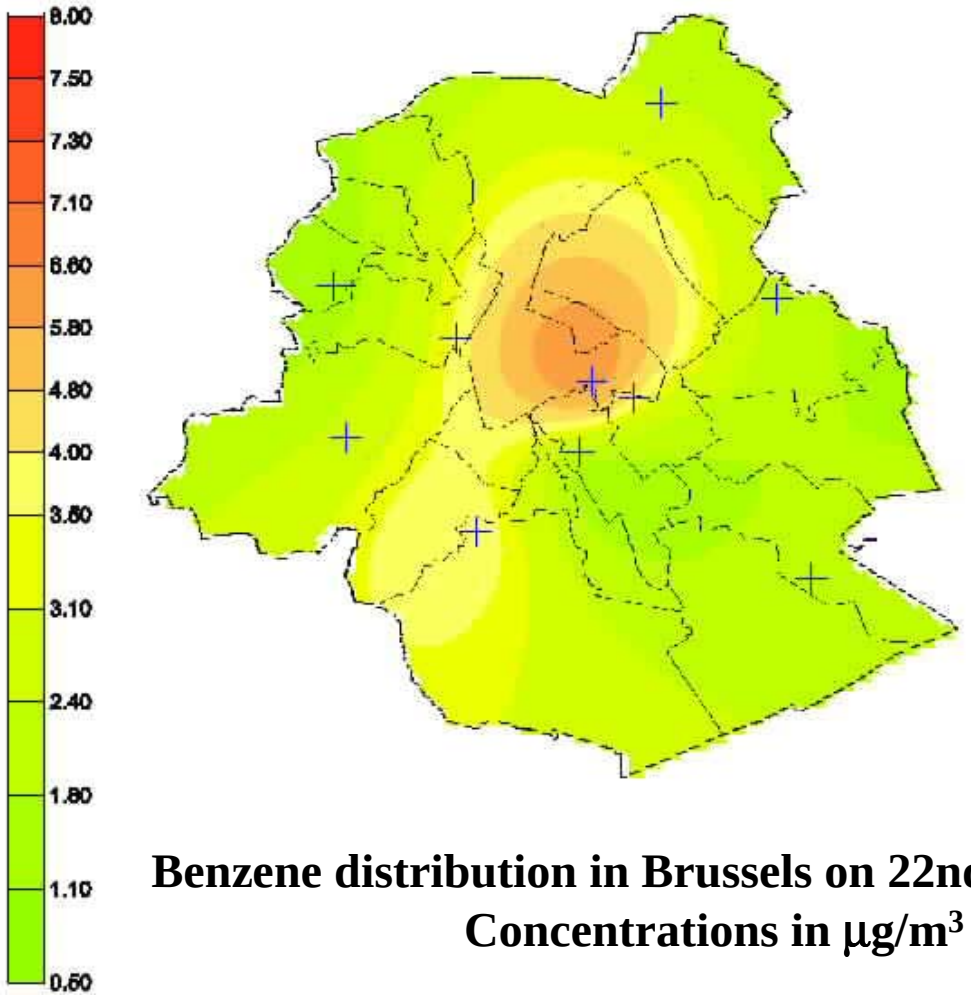
PEOPLE: Population Exposure to Air Pollutants in Europe

- Outdoor, indoor and personal exposure to Benzene
- Study focused on emissions from transport and smoking
- Participation of citizens in each city, exposed to
- Different transport modes, smokers, passive smokers
- Full involvement of media (press, radio and TV)
- Collaboration between local authorities and JRC
- Foreseen extension to other pollutants


12 hour sampling
PEOPLE
24 hour sampling
PERSONAL EXPOSURE
ENVIRONMENT
SMOKERS
NON SMOKERS
INDOOR POLLUTION
URBAN OUTDOOR
TRAVELERS
SEDENTARY
DOMESTIC LOCATIONS
SPECIFIC LOCATIONS
PERSONAL CAR
PUBLIC TRANSPORT
WALKING BIKING
Schools
Public Offices
Shops
Restaurants/ bars
Background sites
Hot spots
Peri-urban sites
Support from citizens
Support from local authorities

PEOPLE: Objectives

- Support to implementation of Benzene directive (assessment regimes, network design)
- Impact of emission sources (including smoking) on indoor and personal exposure levels; validation of exposure models
- Comparative assessment of benzene levels in European cites, in function of local mobility policies and abatement measures
- Support to local, national and European decision making
- Raising the awareness of citizens (air quality in general, impact of personal behaviour)



Benzene distribution in Brussels on 22nd October 2002
Concentrations in µg/m^3

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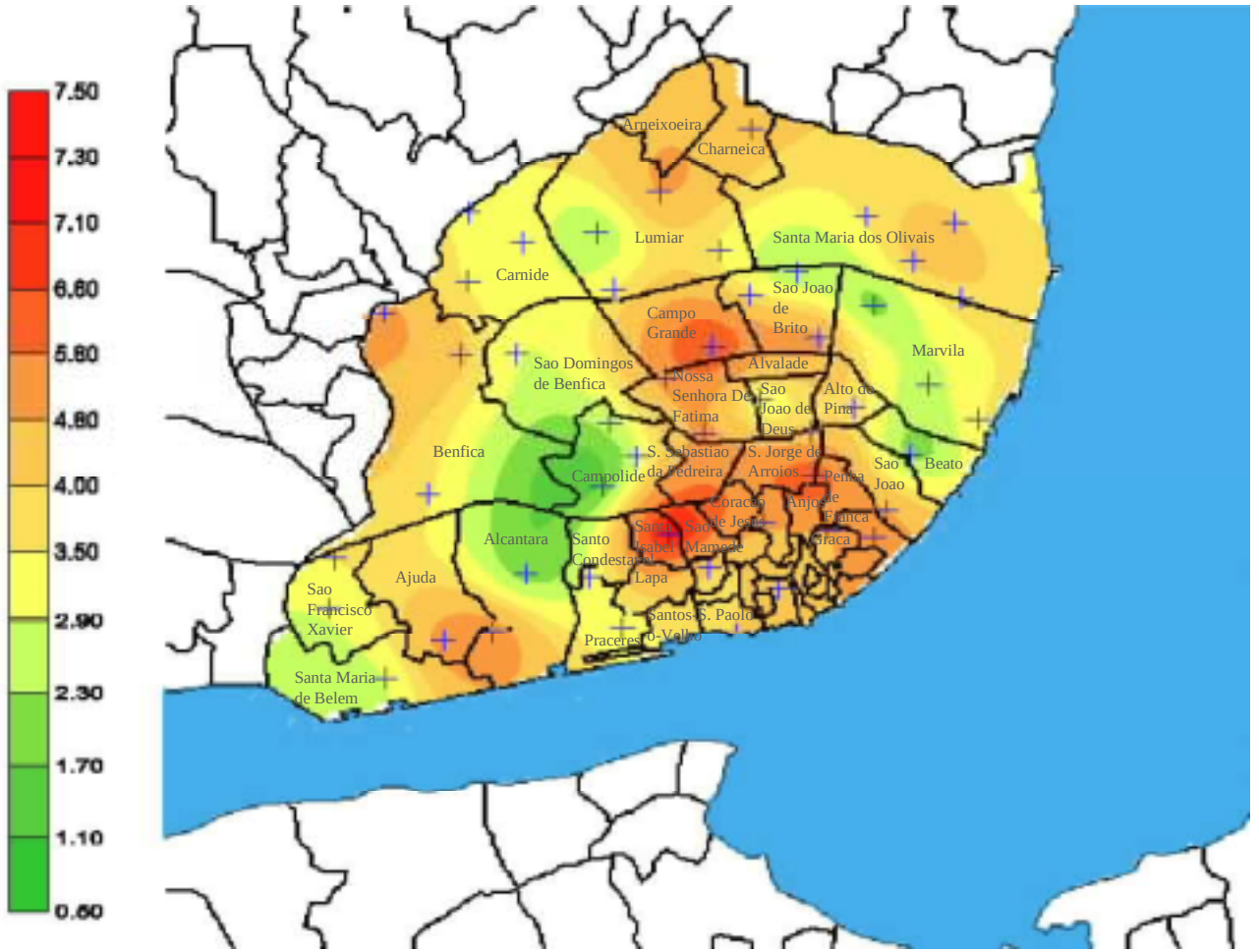

Benzene distribution in Lisboa on 22nd October 2002
Concentrations in µg/m³

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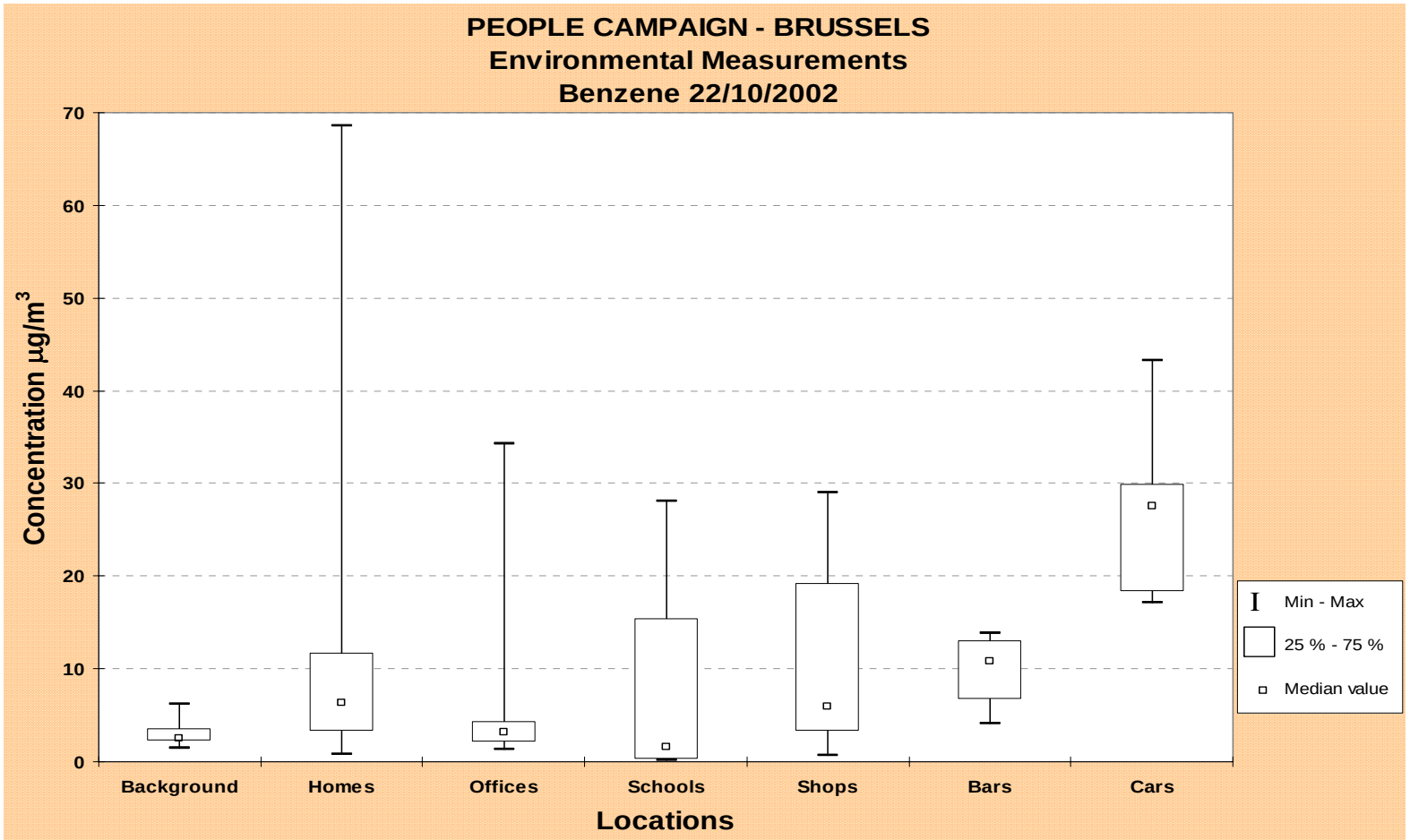

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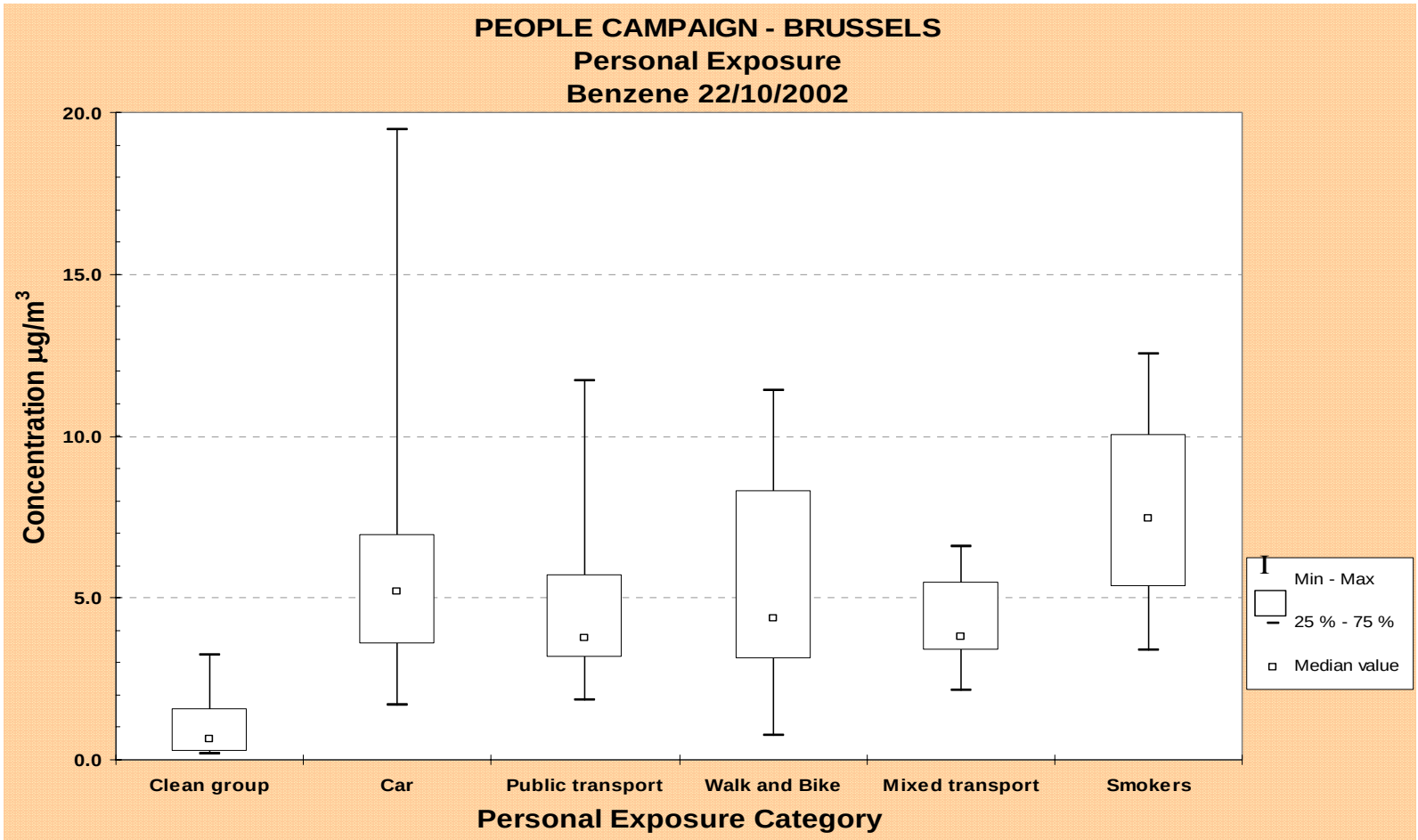
PEOPLE CAMPAIGN - BRUSSELS
Personal Exposure
Benzene 22/10/2002
Concentration µg/m3
20.0
15.0
10.0
5.0
0.0
Clean group
Car
Public transport
Walk and Bike
Mixed transport
Smokers
Personal Exposure Category
Min - Max
25 % - 75 %
Median value

Factors affecting the personal exposure in BRUSSELS