

Children's Environmental Health in Germany

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**Representative data on
environmental health in Germany**

for adults ? → GerES

for children ? → *GerES IV*

- (1) **What is GerES ?**
- (2) **Adults and Children in GerES**
- (3) **Pilot Study**
- (4) **GerES IV**
- (5) **Are children different to adults ?**

What is GerES ?

German Environmental Survey,

a large scale population study

repeatedly carried out by the Federal
Environmental Agency

with support of the German Federal Ministry for
the Environment, Nature Conservation and
Nuclear Safety

Objectives of GerES (1)

- to generate representative data on the concentration distribution of environmental pollutants in human specimens (blood and urine; indicating **internal exposure**) and in indoor air, tap water, house dust, and food

Objectives of GerES (2)

- to establish **reference values** based on these distributions
- to document **spatial and temporal differences** in population exposure

Objectives of GerES (3)

- to improve information on the **influence** of environmental pollutants in indoor air, tap water, house dust, and food on the **body burden** of the general population and their contribution to it

Objectives of GerES (4)

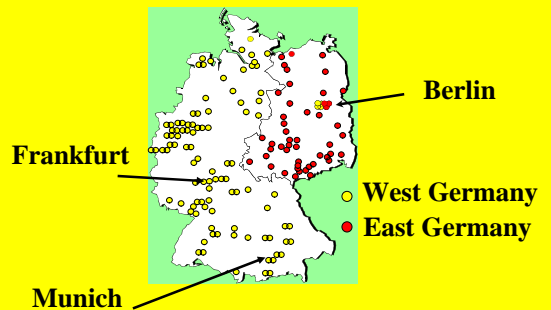
- to provide **policy makers** with adequate information on the necessity of **measures to reduce environmental contamination**

Overview of GerES

Survey	Year	N (%)	Age	N SP
GerES I	1985/86	2731 (73)	25-69	100 W
GerES IIa	1990/91	2524 (63) 453	25-69 6-14	100 W
GerES IIb	1991/92	1763 (69) 359	18-79 6-17	50 E
GerES III	1998	4822 (55)	18-69	120
GerES IV	2003/06	1800 (?)	3-14	150

N SP: No of Sampling points; W = West Germany, E = East Germany

GerES II Sampling Points



Environment and Health

National Health Survey

Robert Koch Institute, Berlin

➔ **Health**

German Environmental Survey

Federal Environmental Agency, Berlin

➔ **Environmental Health (and Environment)**

Environment and Health

Cooperation

National Health Survey

German Environmental Survey

➔ **Possibility of Joint Analyses**

Adults and Children in GerES

GerES II:

Children included, **but**

- not fully representative
- young children missing
- need for representative and up-to-date information

Adults and Children in GerES

Pilot Study for a Survey focussed on children and adolescents

March 2001 – March 2002

Age 0 – 17 years

N = 550

4 Sampling Locations

(urban and rural; East and West)

Pilot Study

- Access via schools or registration offices ?
- Participation rate ?
 - Can it be increased by incentives ?
- Minimal age for
 - getting blood and urine samples ?
 - reliable hearing tests ?
- Logistical aspects and feasibility ?

Pilot Study

- Access via schools or **registration offices**
- Participation rate **50 %**
 - Can it be increased by incentives **Yes**
- Minimal age for
 - getting blood and urine samples **3 Years**
 - reliable hearing tests **8 Years**
- Logistical aspects and feasibility **o.k.**

GerES IV, General objectives (1)

- to generate **representative data** on the distribution of environmental pollutants in blood and urine
- to derive **reference values** (95th percentiles of distributions, upper bound of 'usual' internal exposure)
- to get insight into **contribution** to body burden by indoor air, tap water, house dust, ...)

GerES IV, General objectives (2)

- to document spatial and temporal **differences** in exposure of children
- to get more insight into **relationships** between health and environment
- to provide policy makers with information on the necessity of abatement **measures** to reduce children's exposure to environmental contaminants

GerES IV Sampling Points



GerES IV, participants (1)

National Health Interview and Examination Survey for Children and Adolescents

N = 18.000	Age 0 – 17 years
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N = 1.800	Age 3 – 14 years
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GerES IV

GerES IV, participants (2)

3 – 14 years = 12 Age Groups,

150 Sampling Points

**1 Participant per Age Group
per Sampling Point**

12 x 150 = 1.800

GerES IV, Samples and Tools (1)

Interviews and data sheets:

- Basic interview (parents)
- Basic interview (Children 8-10 ys / 11-14 ys)
- Data sheets for documenting home and immediate surroundings (exposure sources)

GerES IV, Samples and Tools (2)

Chemical and biological analyses:

- 2 ml **whole blood**, 3-6 years
Pb, Cd, Hg
- 6 ml **whole blood**, 7-14 years
Pb, Cd, Hg, organochlorine compounds (PCBs, DDE, HCB, HCH)

GerES IV, Samples and Tools (3)

Chemical and biological analyses:

- **blood serum**, 3-14 years
Mould-specific IgE

GerES IV, Samples and Tools (4)

Chemical and biological analyses:

- **morning urine**, 3-14 years
As, Cd, Hg, Ni;
nicotine, cotinine; creatinine
- **morning urine**, 3-14 years, N = 600
PCP and other chlorophenols, metabolites
of pyrethroids, organophosphates, PAHs

GerES IV, Samples and Tools (5)

Chemical and biological analyses:

- **morning urine**, 3-14 ys (noise programme)
cortisol, adrenaline, noradrenaline
- **drinking water**, 3-14 years
Pb, Cd, Cu, Ni, U

GerES IV, Samples and Tools (6)

Chemical and biological analyses, N = 600:

- **house dust**, 3-14 years
biocides, PCBs, plasticisers (e.g., DEHP),
flame retardants
- **indoor air**, 3-14 years
VOC, aldehydes
- **indoor air / dust**, 3-14 years
mould spores, allergens (house dust mites,
cat)

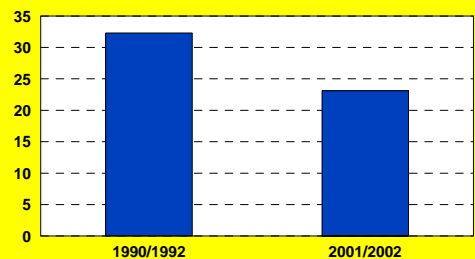
GerES IV, Samples and Tools (7)

Special programme on noise, 8-14 years:

- measurement of **hearing capacity**
- measurement of **outdoor traffic noise**
- **stress markers** in morning urine

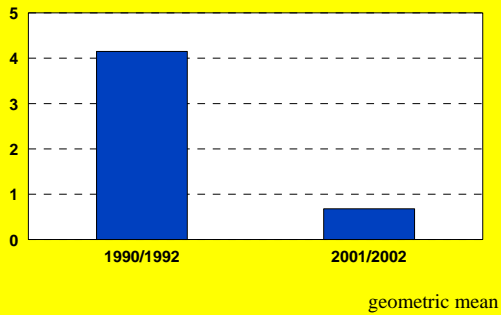
Some Pilot Study Results

Blood Lead [$\mu\text{g/L}$]

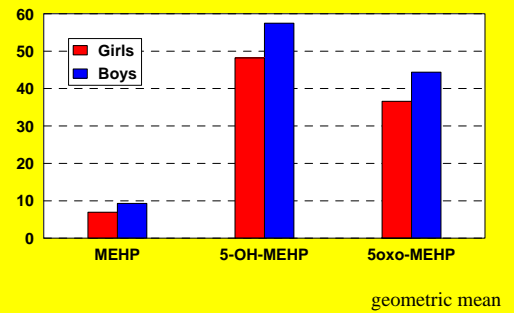


geometric mean

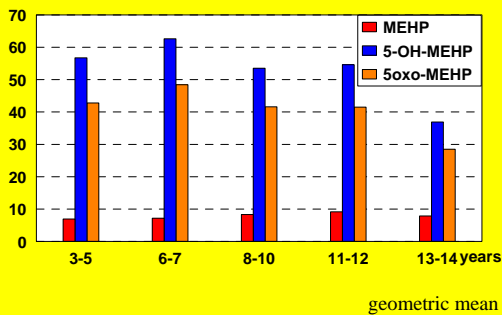
PCP in urine [$\mu\text{g/L}$]



DEHP metabolites in urine [$\mu\text{g/L}$]



DEHP metabolites in urine [$\mu\text{g/L}$]



Are children different to adults ?

Are children different to adults ? (1)

Children \neq Small Adults

Differences in
Exposure ?
Metabolism ?
Vulnerability ?

Are children different to adults ? (2)

Exposure is higher
via air, food and drinking water

Metabolic toxification/detoxification

Age-dependent
windows of vulnerability

Are children different to adults ? (3)

German Action Programme on Environment and Health (APUG)

Brochure

Environmental health risks - what are the differences between children and adults?

Part I: What are the differences between children and adults?

Part II: The use of child-specific safety factors when deriving limit values

Are children different to adults ? (4)

Conclusions (1)

Different developmental stages of specific exposure and vulnerability to environmental influences

Higher exposure than adults during particular phases of development

Intraspecies factor of 10 in most cases appropriate to protect the most vulnerable group

Are children different to adults ? (5)

Conclusions (2)

If toxicants have been shown to be particularly harmful to children, additional precautions may be necessary

Further research needed into age-dependent immunological, endocrinological and neuro-endocrinological effects of environmental pollutants

Are children different to adults ? (6)

Conclusions (3)

To protect children's health is important for our society

However, it should not be generally assumed that children are more at risk than adults

The aim is to protect the most vulnerable group, be it in a particular case children or another subgroup of the population

Thank you for your attention!