The German Environmental Survey (GerES)

Marike Kolossa-Gehring, Kerstin Becker, André Conrad, Margarete Seiwert, Christine Schulz

European Conference on Human Biomonitoring, Paris, November 2008

Objectives of GerES

- Generate representative data on exposure to environmental pollutants
- Identify relevant exposure pathways
- Propose strategies on prevention and reduction of exposure
- Evaluate environmental policy measures
## 20 Years of GerES

<table>
<thead>
<tr>
<th>Survey</th>
<th>Period</th>
<th>Age in years</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>GerES I</td>
<td>1985 - 1986</td>
<td>25 - 69</td>
<td>2,700</td>
</tr>
<tr>
<td>GerES II</td>
<td>1990 – 1992</td>
<td>25 - 69</td>
<td>4,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6 - 14</td>
<td>730</td>
</tr>
<tr>
<td>GerES III</td>
<td>1997 – 1999</td>
<td>18 - 69</td>
<td>4,800</td>
</tr>
<tr>
<td>GerES IV - Pilot</td>
<td>2001 – 2002</td>
<td>0 - 17</td>
<td>500</td>
</tr>
<tr>
<td>GerES IV</td>
<td>2003 – 2006</td>
<td>3 - 14</td>
<td>1,790</td>
</tr>
</tbody>
</table>

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### Study design

1,790 children (3 to 14 years) at 150 sampling locations (representative with regard to age, gender, community size and region)

Subsample of the German Health Interview and Examination Survey for Children and Adolescents (KiGGS)
GerES: partners involved

German Health Survey for Children and Adolescents (KiGGS)
N = 18,000, 0 to 17 years
Robert Koch Institute

German Environmental Survey
N = 1,800, 3 to 14 years
Federal Environment Agency

Scientific advisory board

ESBIO

universities

laboratories

federal agencies

The study I: Human biomonitoring

Blood:
Cd, Pb, Hg
persistent organochlorines
mould specific IgE

Urine:
As, Cd, Hg, Ni, U

nicotine, cotinine
PCP and other chlorophenols
PAH metabolites
pyrethroid metabolites
metabolites of phthalates
bisphenol A
trialkylphosphates
creatinine
stress hormones
The study II: Ambient monitoring

House dust: DDT, HCH, HCB, PCBs; PCP, Chlorpyrifos, PCP Chlorpyrifos, Propoxur, Metals, Plasticiser (vacuum cleaner bags)

Drinking water: lead, cadmium, copper, nickel, uranium

Indoor air: VOC and formaldehyde (passive sampling)

The study III: Questionnaires

• indoor and vicinity environment
• health information
• socio-economic status
• food consumption
• habits …
The Study IV: biological factors and noise

Exposure to mould fungi,
sensitization against biological factors, IgE

Screening audiometry/
measurement of noise level

Linking health and environmental data:
KIGGS and GerES:
2000 pieces of information per child

Human biomonitoring and ambient monitoring:

Phthalates
**Pollutants in house dust**

![Graph showing concentrations of various pollutants in house dust](image)

- DEHP
- DINP
- BBzP
- DiBP
- DnBP
- PCSD
- Sum of PCB
- PCP

95\(^{th}\) percentile of concentration [mg/kg]

**Phthalates in urine and in house dust**

<table>
<thead>
<tr>
<th></th>
<th>MnBP</th>
<th>MiBP</th>
<th>MBzP</th>
<th>DEHP-metabolites</th>
<th>DINP-metabolites</th>
</tr>
</thead>
<tbody>
<tr>
<td>DnBP</td>
<td>0.26 **</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>DiBP</td>
<td></td>
<td>0.19 **</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>BBzP</td>
<td></td>
<td></td>
<td>0.33 **</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>DEHP</td>
<td></td>
<td></td>
<td></td>
<td>n.s.</td>
<td>--</td>
</tr>
<tr>
<td>DINP</td>
<td></td>
<td></td>
<td></td>
<td>n.s.</td>
<td>n.s.</td>
</tr>
</tbody>
</table>

N=598, Spearman rank correlation, ** p<0.01, n.s. = not significant

**Reasons?**
Exceedance of the HBM value for DEHP (500 µg/L)

Children with a not tolerable daily intake of more than one phthalate

<table>
<thead>
<tr>
<th>1 phthalate</th>
<th>2 phthalates</th>
<th>3 phthalates</th>
</tr>
</thead>
<tbody>
<tr>
<td>73,8 %</td>
<td>21,3%</td>
<td>4,8%</td>
</tr>
</tbody>
</table>

compared to TDI and RFD values, respectively
Risk assessment of single substances?

Endocrine disruptors measured in GerES IV

Values above loq [%]


VOC, health effects and information from questionnaires

**Limonen and indoor use of fragrance**

![Graph showing limonene levels in indoor air with and without indoor fragrance use.](image)

- **Indoor fragrance use:**
  - Yes: GM with 95% CI: [10.0, 15.0] µg/m³
  - No: GM with 95% CI: [5.0, 10.0] µg/m³

  - Significance: \( p \leq 0.01 \) (t-test)

**Influence of socio-economic status**

![Graph showing cotinine in urine levels with different socio-economic status.](image)

- **Socio-economic status (SES):**
  - Low
  - Medium
  - High

- **Cotinine in urine (GM in µg/L):**
  - No smoker: [3.6, 7.2]
  - One smoker: [2.4, 4.9]
  - Two smokers: [<3, <3]

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**European HBM Conference, Paris, 4./5. November 2008**
GerES website

http://www.umweltbundesamt.de/survey-e

marike.kolossa@uba.de

Thank you for your attention!

We are grateful for the financial support of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety and the Federal Ministry of Education and Research.