



Federal Environment Agency

Umwelt
Bundes
Amt 
Für Mensch und Umwelt

La Rochelle, June 2007

German Environmental Survey (GerES)

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GerES

La Rochelle, June 7, 2007



Overview

- **Survey design**
- **Human biomonitoring**
- **Exploring exposure pathways**
 - **Indoor air**
 - **House dust**
- **Environment and Health**



20 years of GerES

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

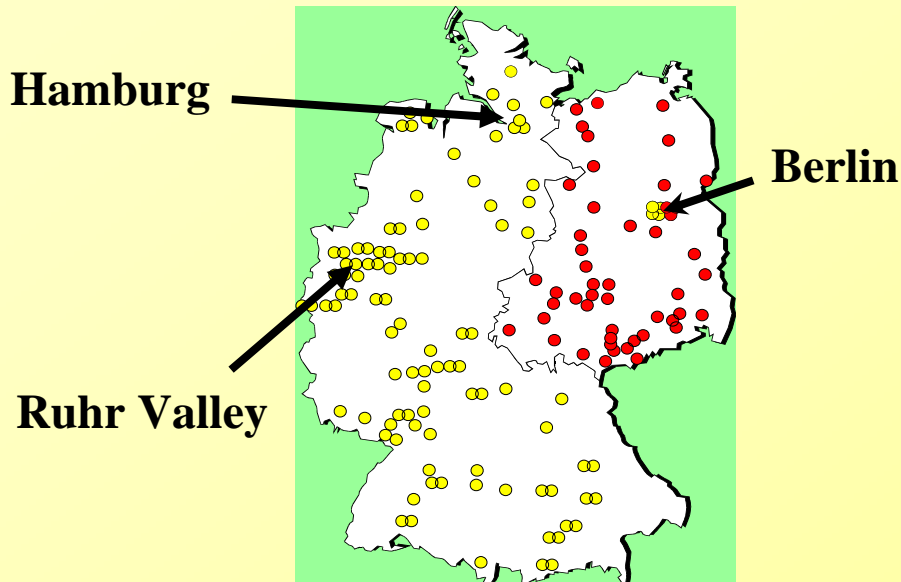


Survey design



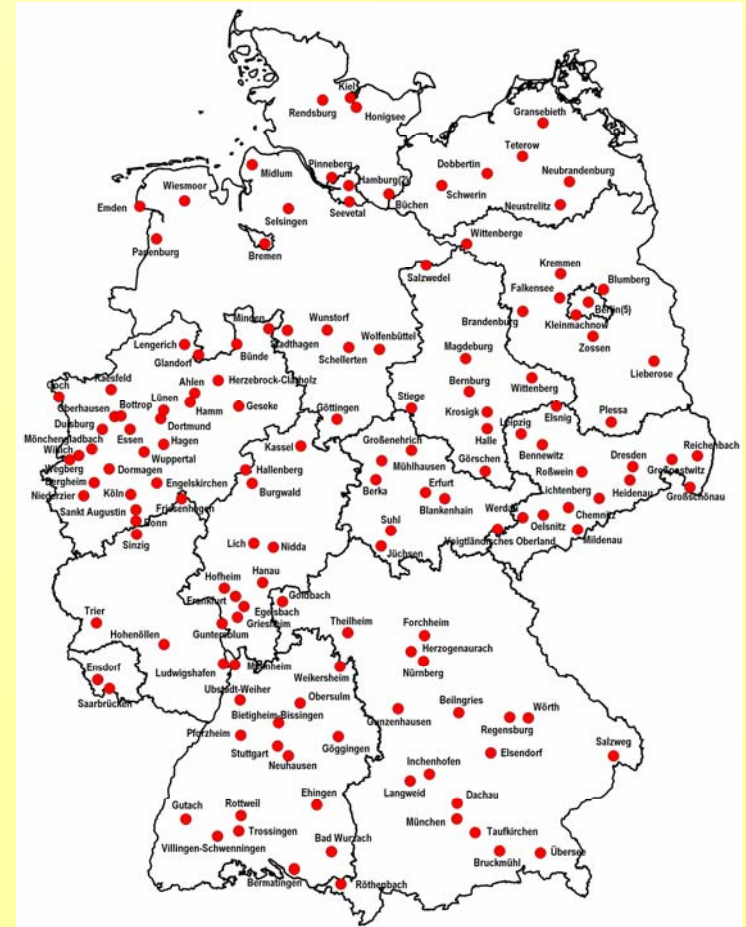
Sampling locations

GerES II (1990/92)



- West Germany
- East Germany

GerES IV (2003/06)





Response rates (RR)

Survey	Year	RR	Note
GerES I	1985/86	73%	adults
GerES II	1990/92	63%	adults
GerES III	1997/99	55%	adults
GerES IV	2003/06	53 %	Lowest with teenagers (14 and 17 years) Reduced RR goes along with <ul style="list-style-type: none">- lower level of education of mother- mother working full-time- mother being single



Human Biomonitoring





Analytes in GerES

Medium	Analyte	GerES I	GerES II	GerES III	GerES IV
urine	As, Hg, Cd	<input checked="" type="checkbox"/> (Cu, Cr)	<input checked="" type="checkbox"/> (Cu, Cr)	<input checked="" type="checkbox"/> ⁽¹⁾	<input checked="" type="checkbox"/> (Ni, U)
	PCP	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> ⁽²⁾	<input checked="" type="checkbox"/> ⁽²⁾
	Cotinine		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	PAH		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Pyrethroides			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Alkylphosphates				<input checked="" type="checkbox"/>
	Phthalates				<input checked="" type="checkbox"/>



Analytes in GerES

Medium	Analyte	GerES I	GerES II	GerES III	GerES IV
blood	Pb, Cd, Hg	<input checked="" type="checkbox"/> (Cu)	<input checked="" type="checkbox"/> (Cu)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	PCB, DDE, HCB, HCH			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
serum	mould specific IgE				<input checked="" type="checkbox"/>



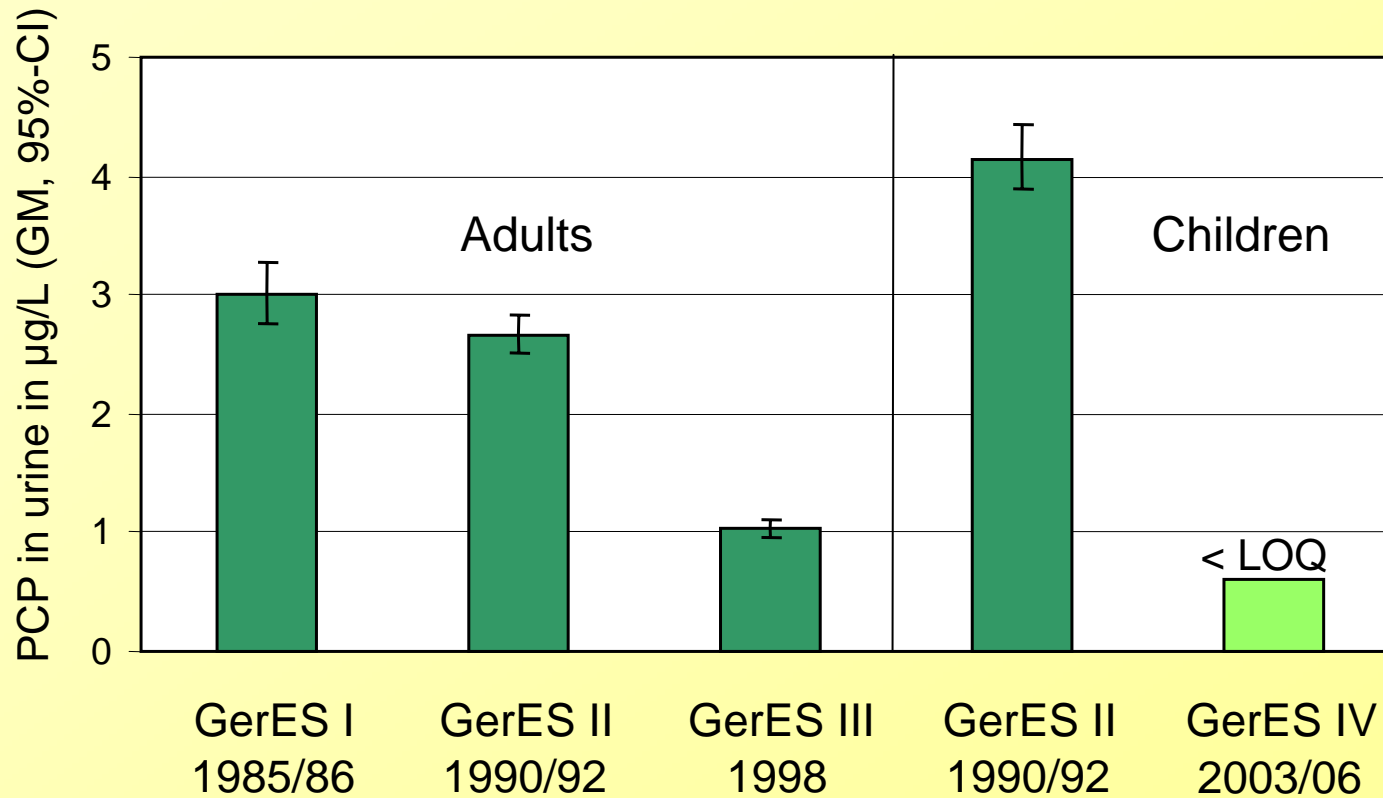
Descriptive statistical data

Tab. 4.12 **Lead in Blood ($\mu\text{g/l}$)**
(German Population, 3 to 14 years of age)
[Limit of quantification (LOQ) : 2,1 $\mu\text{g/l}$]

	N	n<LOQ	% \geq LOQ	P10	P50	P90	P95	P98	MAX	AM	GM	CI GM
total	1560	4	100	9,1	16,9	29,7	33,9	42,4	100	18,2	16,3	15,9 - 16,7
gender ^{***}												
male	813	1	100	9,9	18,2	30,9	37,0	44,1	100	19,4	17,5	16,9 - 18,1
female	747	2	100	8,3	15,4	26,2	31,9	39,4	90,1	16,9	15,1	14,6 - 15,6
age ^{***}												
3 - 5 years	315	1	100	10,1	19,6	34,2	39,9	46,0	90,1	21,4	19,1	18,1 - 20,2
6 - 8 years	377	0	100	10,1	17,9	30,5	33,4	43,5	61,0	19,0	17,3	16,5 - 18,1
9 - 11 years	407	2	100	8,7	15,6	27,0	31,4	41,3	68,8	17,4	15,6	14,9 - 16,4
12 - 14 years	460	1	100	7,6	14,6	25,1	30,5	39,1	100	16,1	14,5	13,9 - 15,2
social stratum ^{**}												
lower	357	0	100	10,1	17,1	30,4	37,1	48,4	61,0	19,3	17,4	16,6 - 18,2
middle	721	0	100	9,1	16,9	30,4	33,2	41,3	100	18,3	16,3	15,7 - 16,9
upper	469	4	99	8,5	16,5	26,5	31,1	43,3	71,8	17,4	15,5	14,8 - 16,3

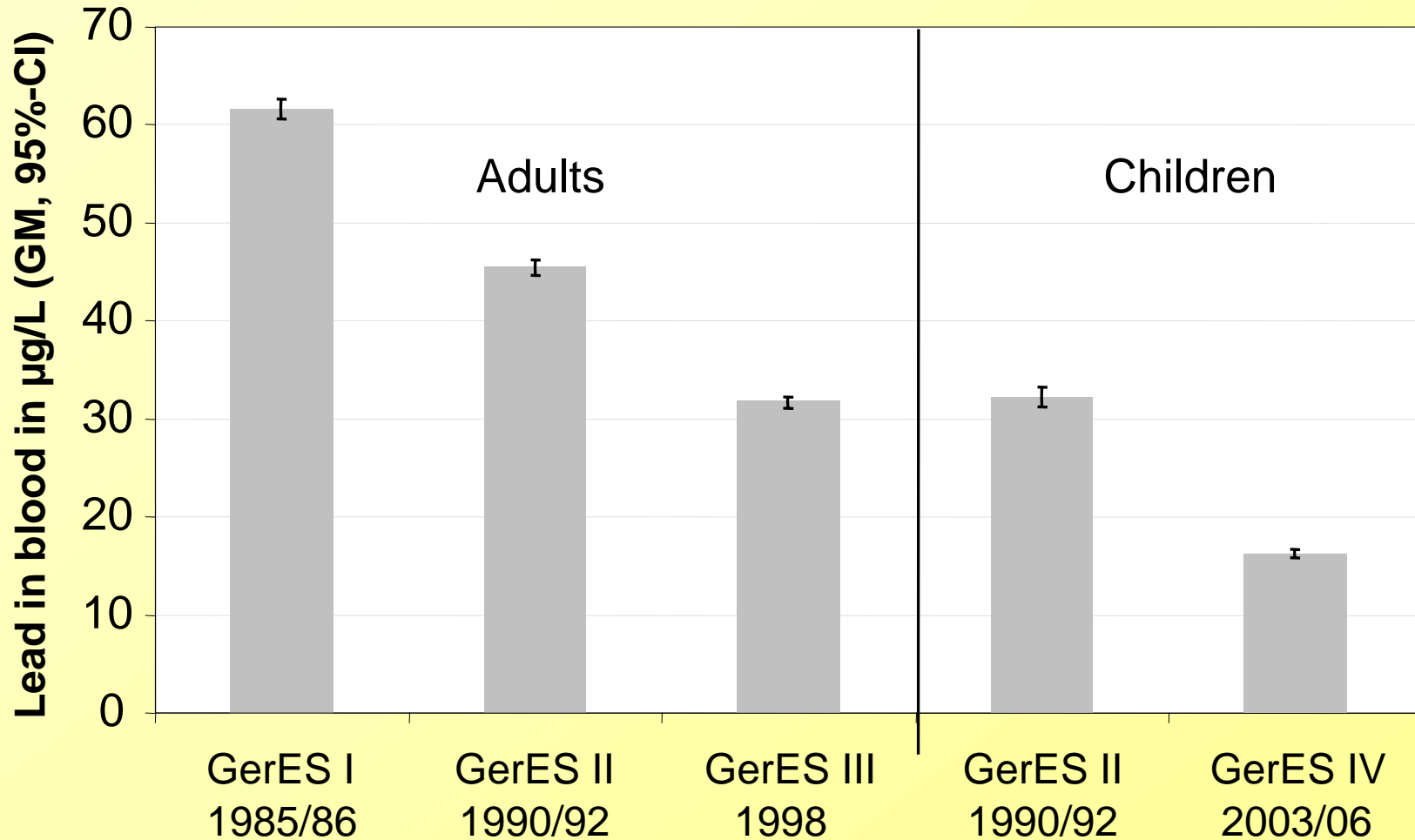


PCP in urine





Lead in blood





Exploring exposure pathways



Questionnaires

Stand 1.08.03

UMWELTBUNDESAMT



für Mensch und Umwelt

ROBERT KOCH INSTITUT



Studie zur Umweltbelastung von Kindern in Deutschland

Interviewgesteuerter Fragebogen an die Eltern

ID-Nr. Kind/Jugendliche(r)	<input type="text"/>
Datum der Erhebung	<input type="text"/> . <input type="text"/> . <input type="text"/> .200 <input type="text"/>
Begeher-Nr.	<input type="text"/>

Interviewer: Die folgenden Fragen werden allen Eltern gestellt. Die letzten Fragen sollen nur an die Eltern der 3- bis 10-Jährigen gestellt werden und sind als solche gekennzeichnet.

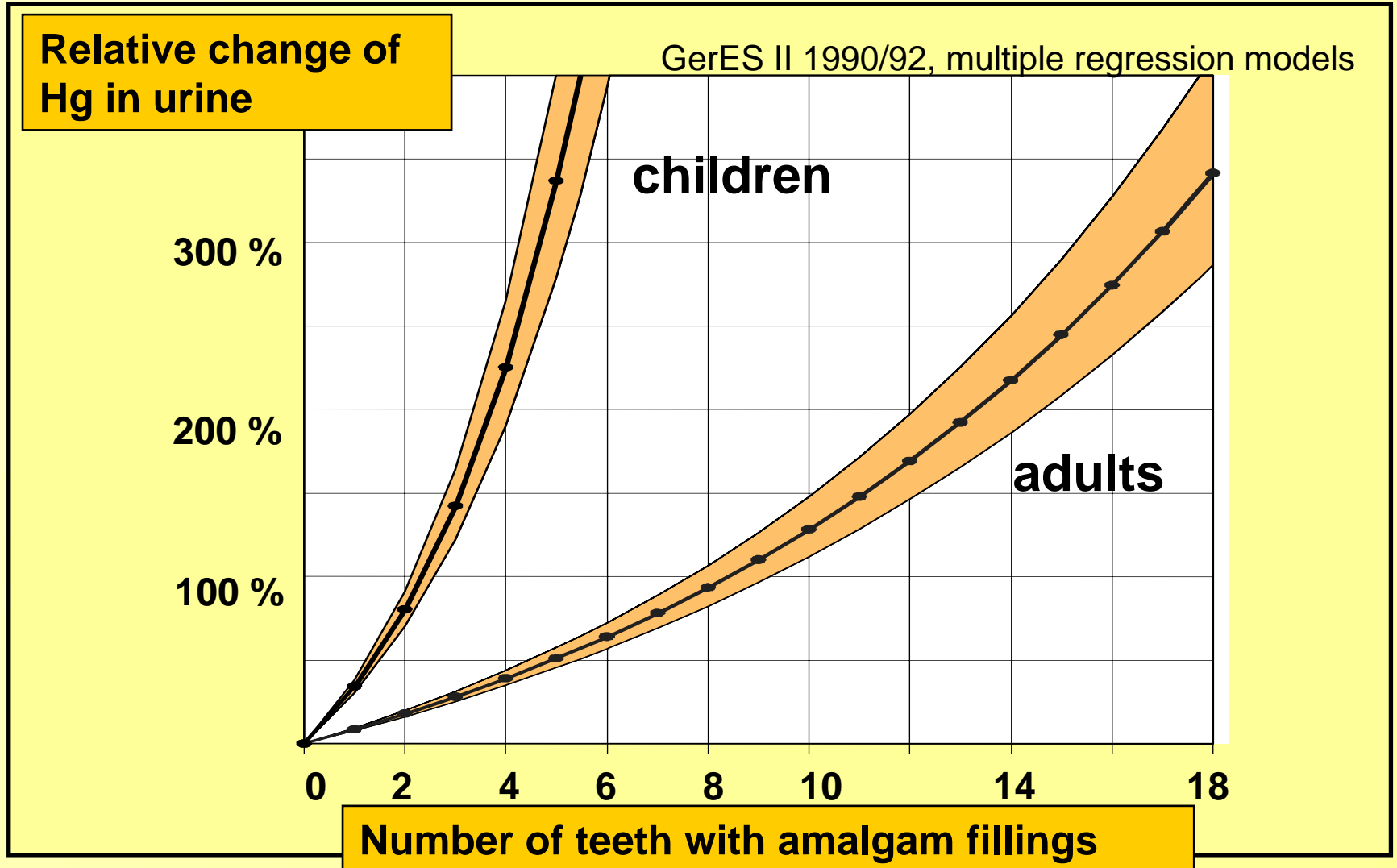
Wohnumfeld und Wohnung
Wir möchten uns zunächst mit dem Wohnumfeld Ihres Kindes beschäftigen.
1. Seit wann wohnt Ihr Kind in _____ ?
<i>Interviewer: Gemeinde / Stadt eintragen und vorlesen!</i>
seit seiner Geburt..... <input type="checkbox"/>
seit <input type="text"/> Monat <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> Jahr
2. Seit wann bewohnt Ihr Kind diese Wohnung/dieses Haus ?
seit seiner Geburt..... <input type="checkbox"/>
seit ... <input type="text"/> Monat <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> Jahr

- 1 -

- exposure relevant habits
- food consumption
- living environment
-



Exposure pathway amalgam fillings





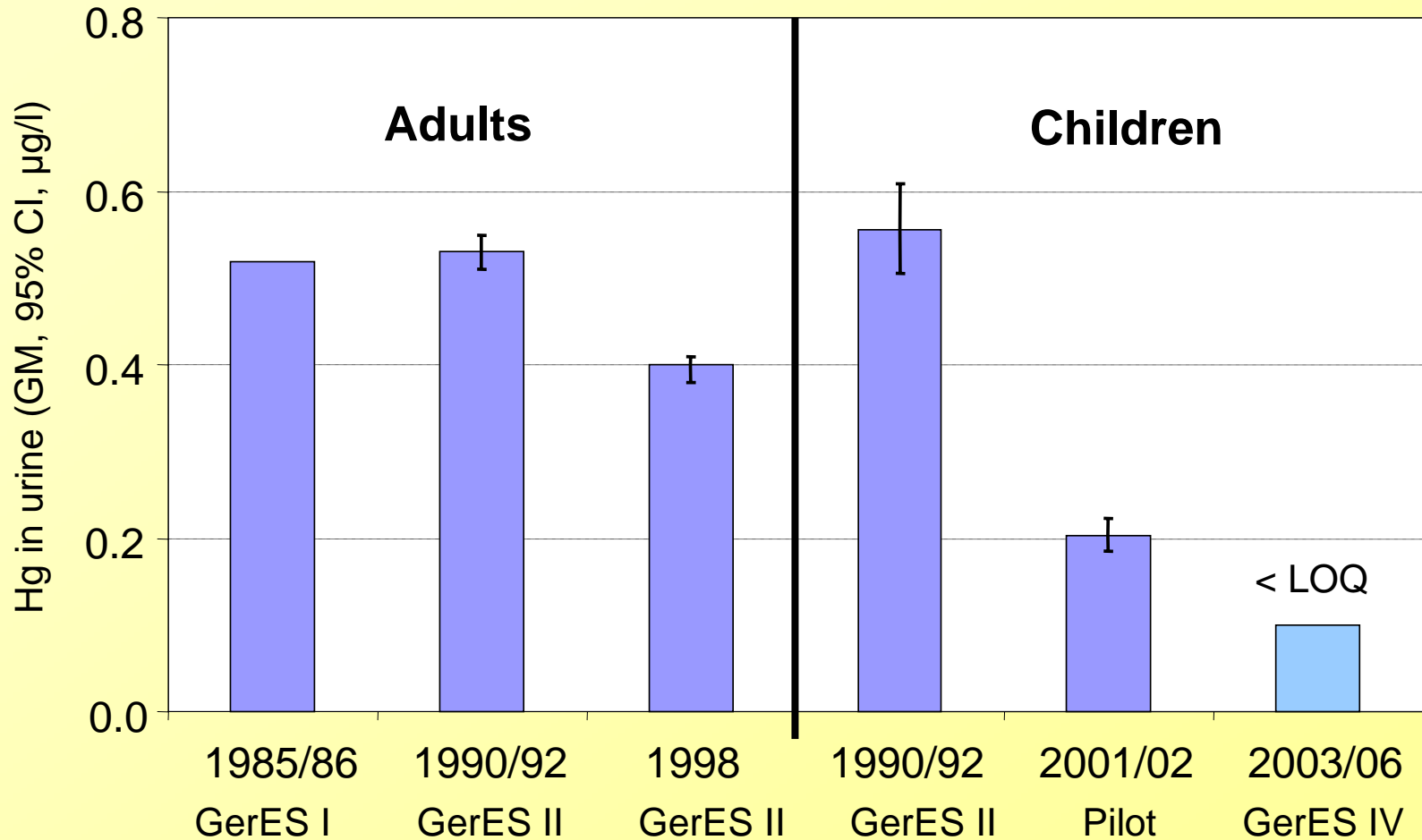
Amalgam fillings

Recommendation of the Federal Health Office, 1992:

The use of amalgams should be considered very cautiously for children under the age of 6.



Mercury in urine





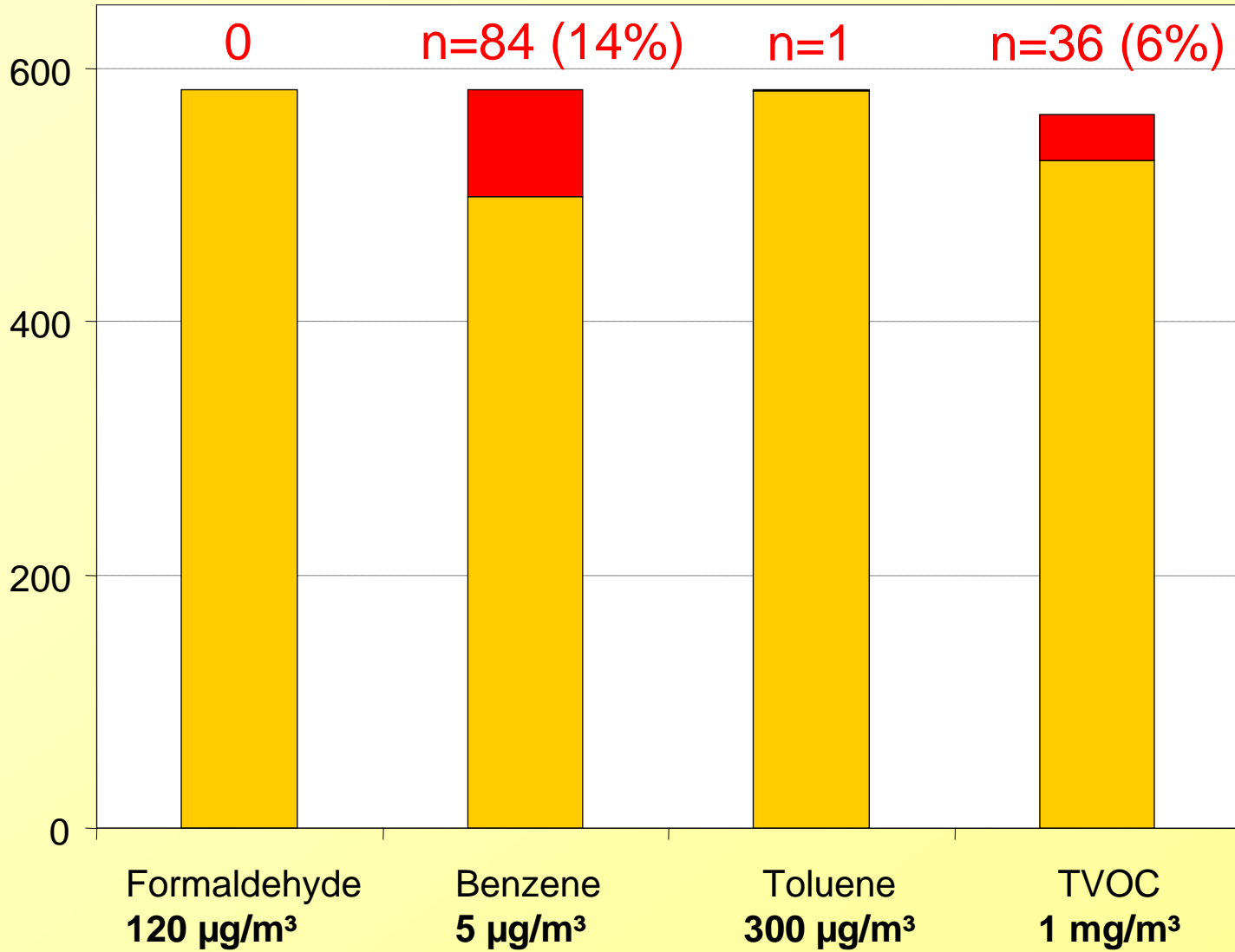
Exposure pathway indoor air

Analyte	GerES I	GerES II	GerES III	GerES IV
VOC in indoor air	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>
VOC in personal air		<input checked="" type="checkbox"/>		
HCHO in indoor air	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>





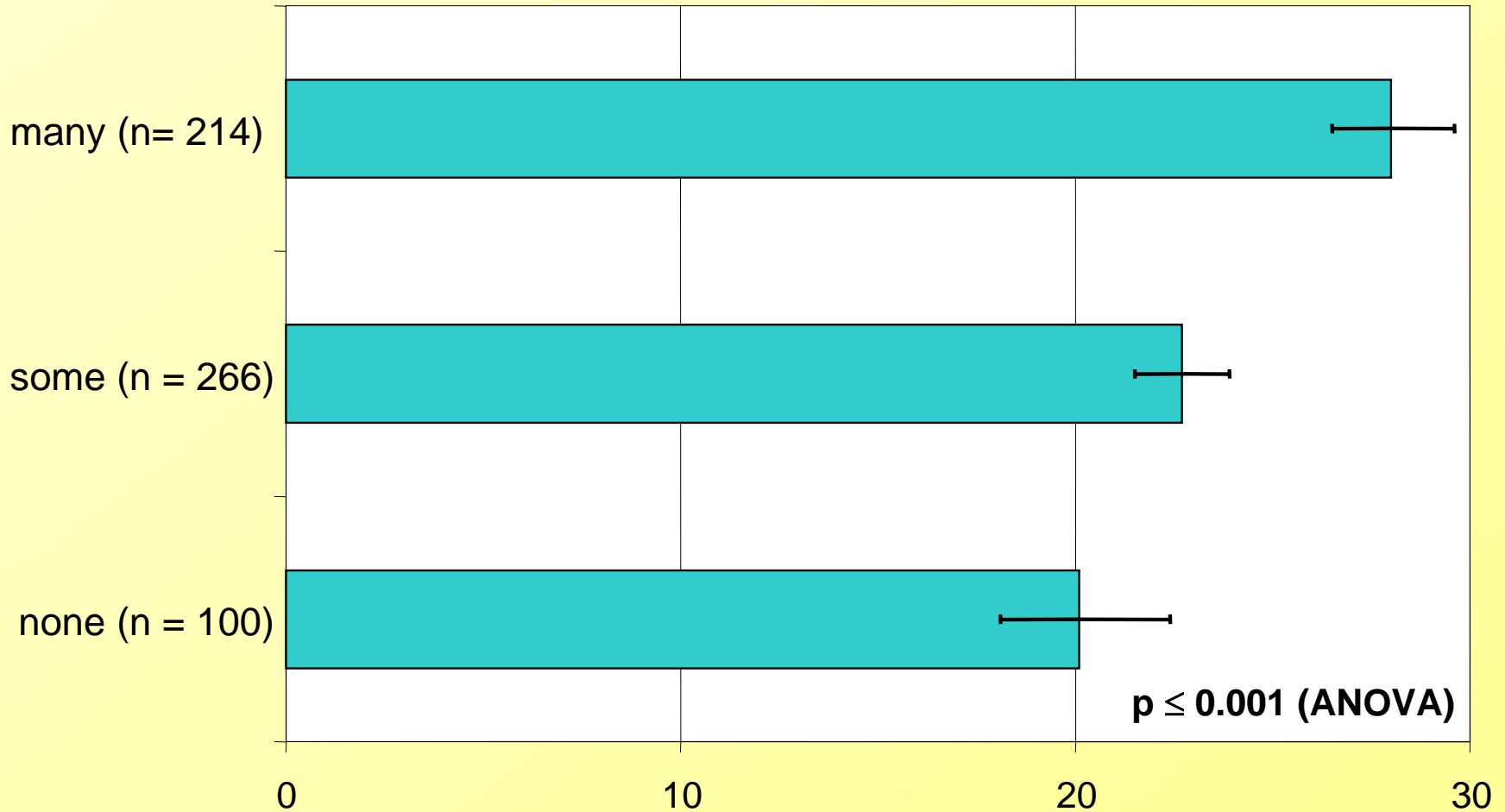
Assessment of VOC concentrations GerES IV 2003/06





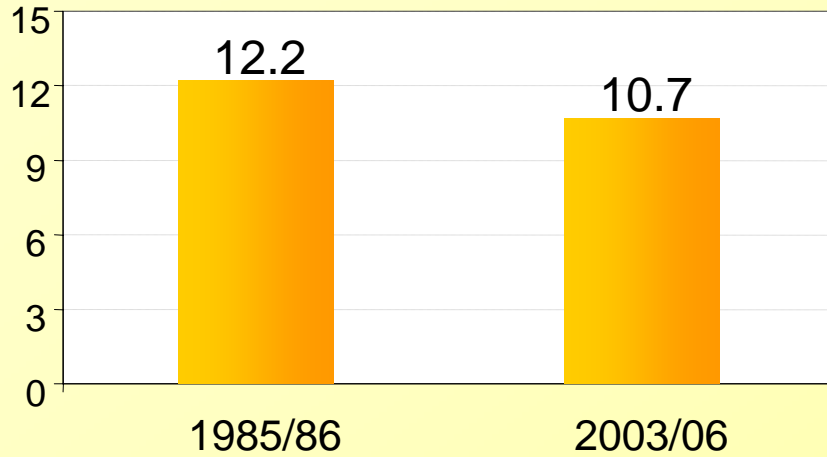
Formaldehyde in indoor air (GM in $\mu\text{g}/\text{m}^3$)

Furniture made from particle board, GerES IV (2003/06)

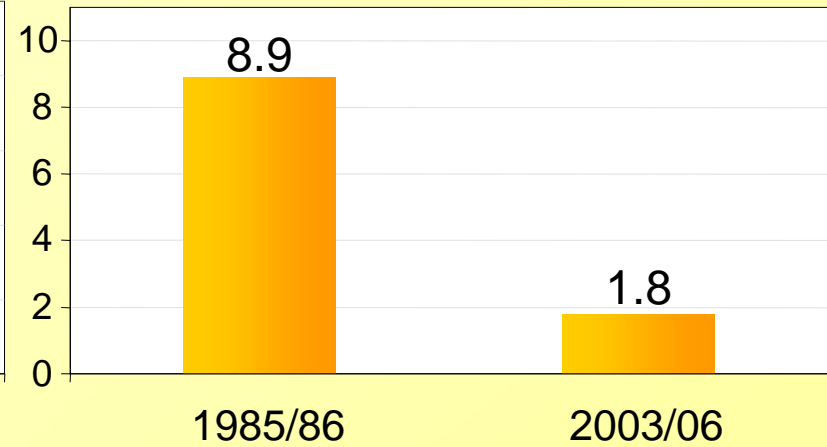




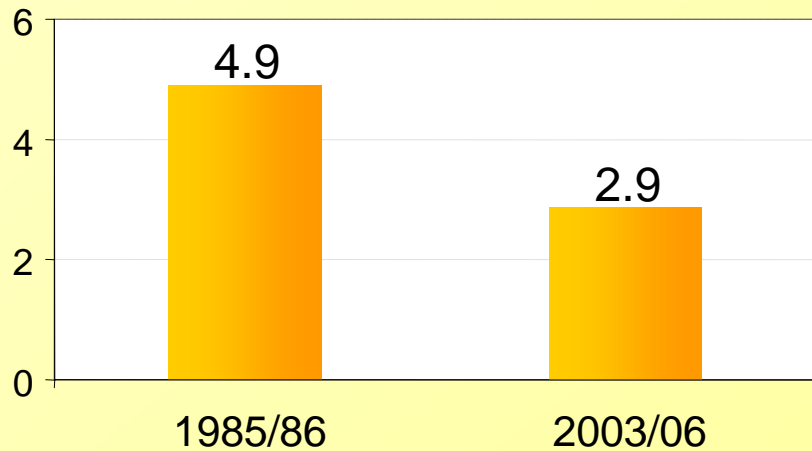
VOC in indoor air, time trend (1)



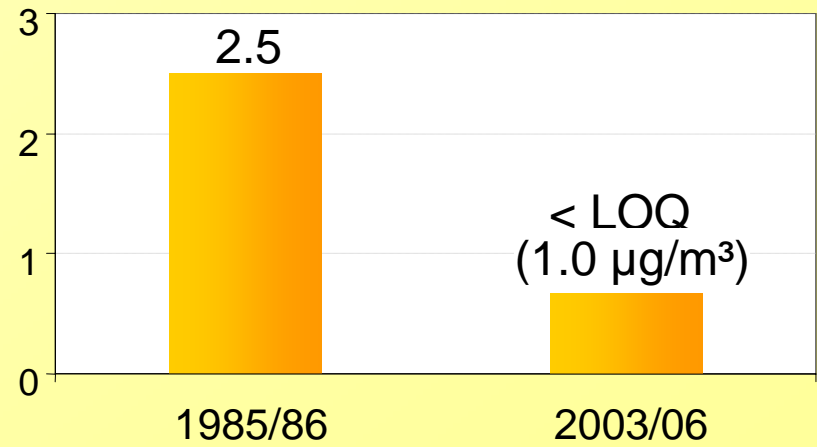
Limonene



n-Decane



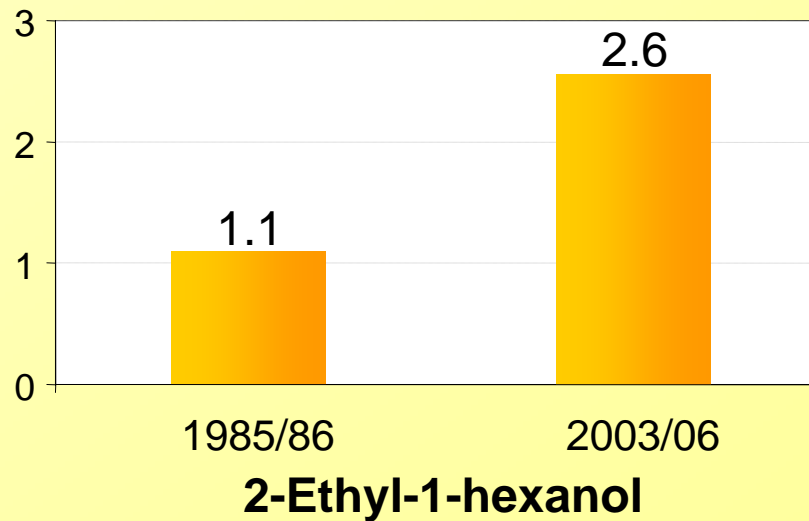
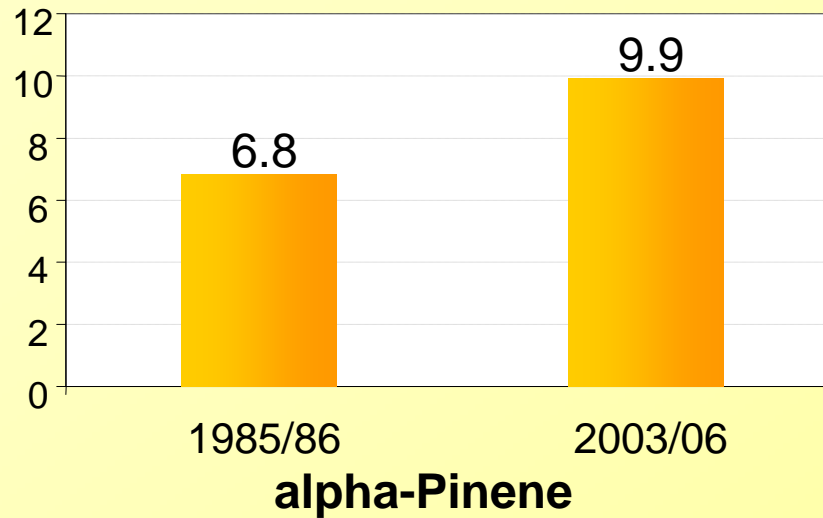
Cyclohexane



1,4-Dichlorobenzene

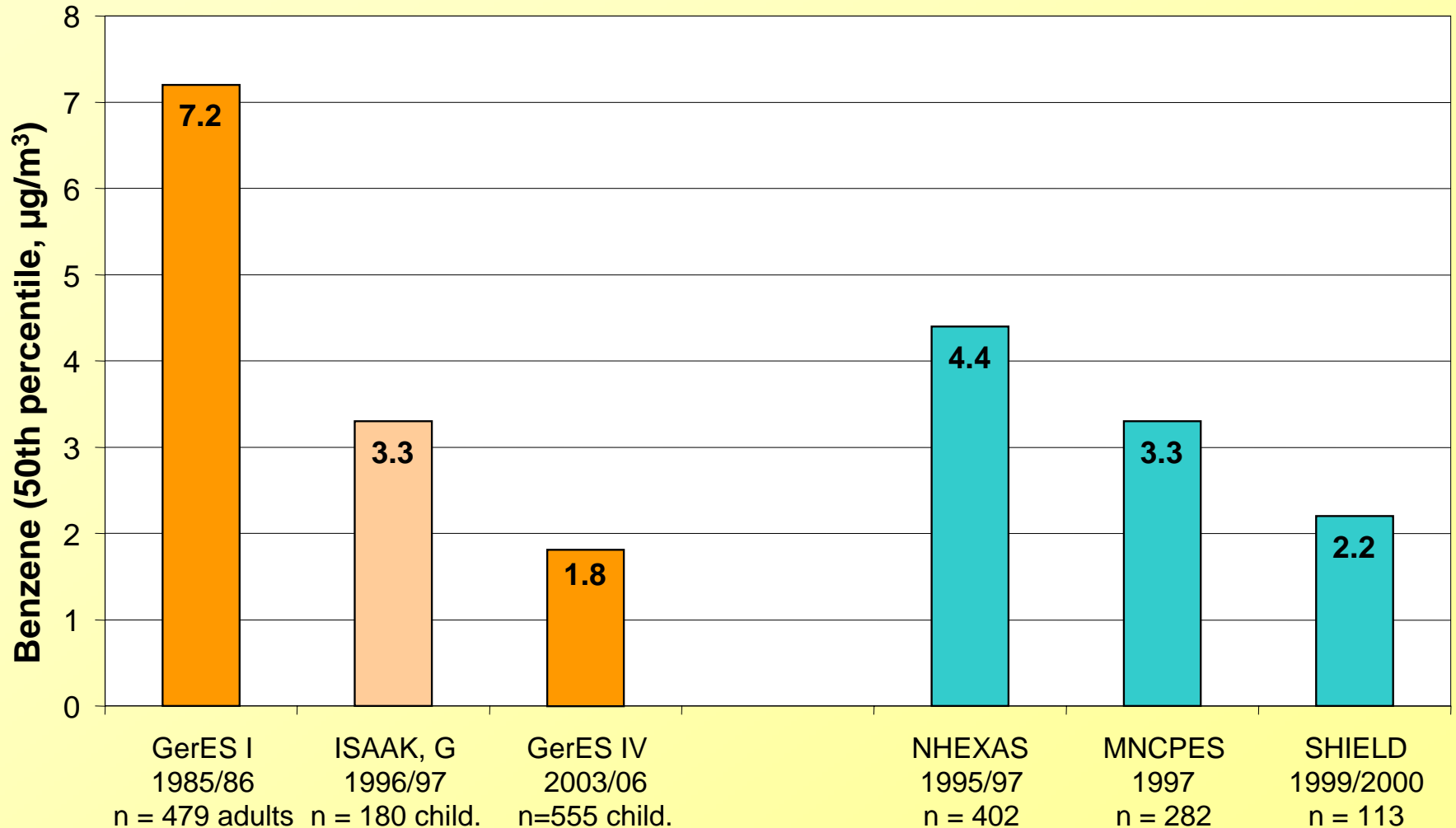


VOC in indoor air, time trend (2)



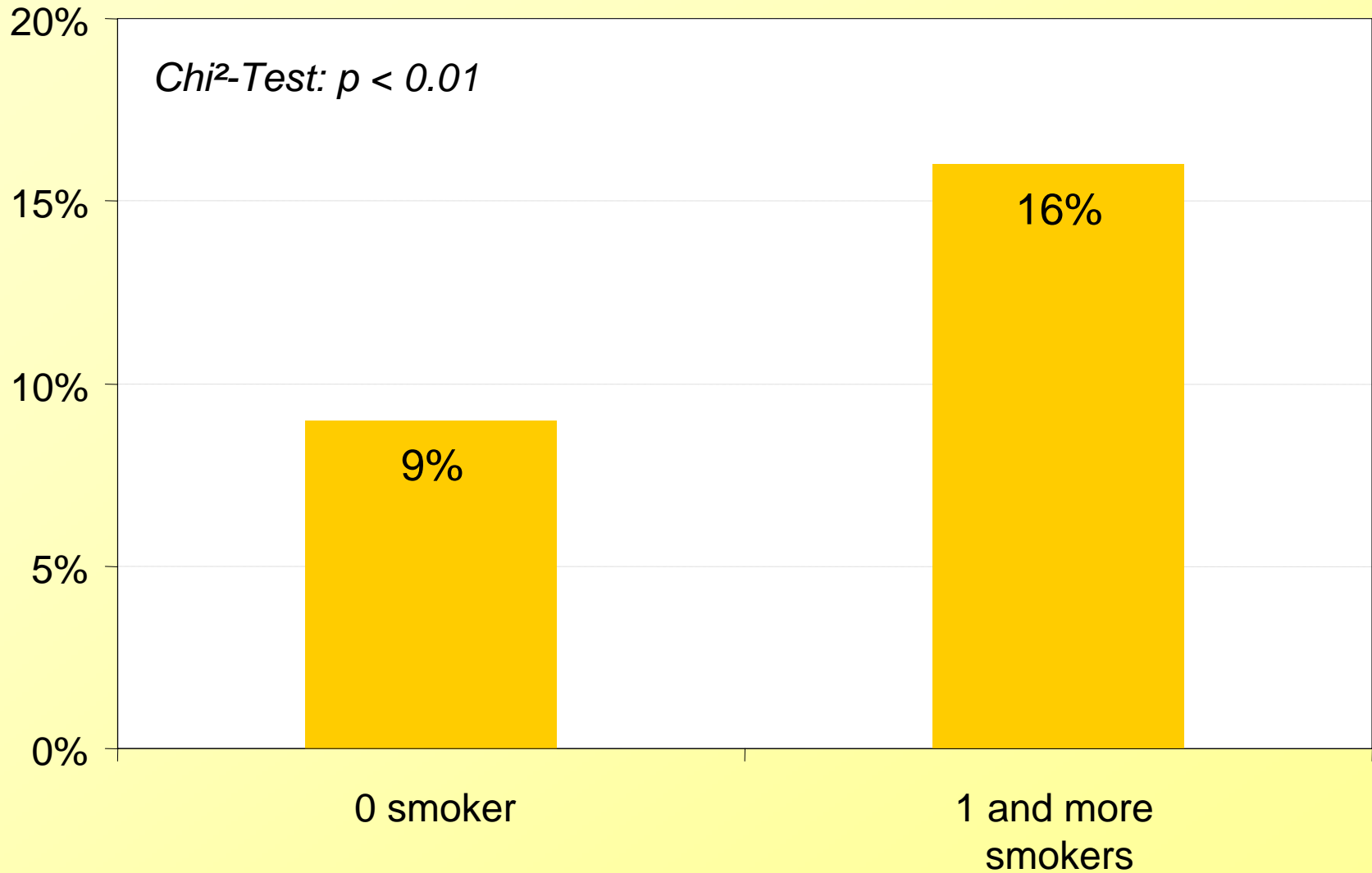


Benzene in indoor air, time trends





Benzene in indoor air exceeding $5 \mu\text{g}/\text{m}^3$





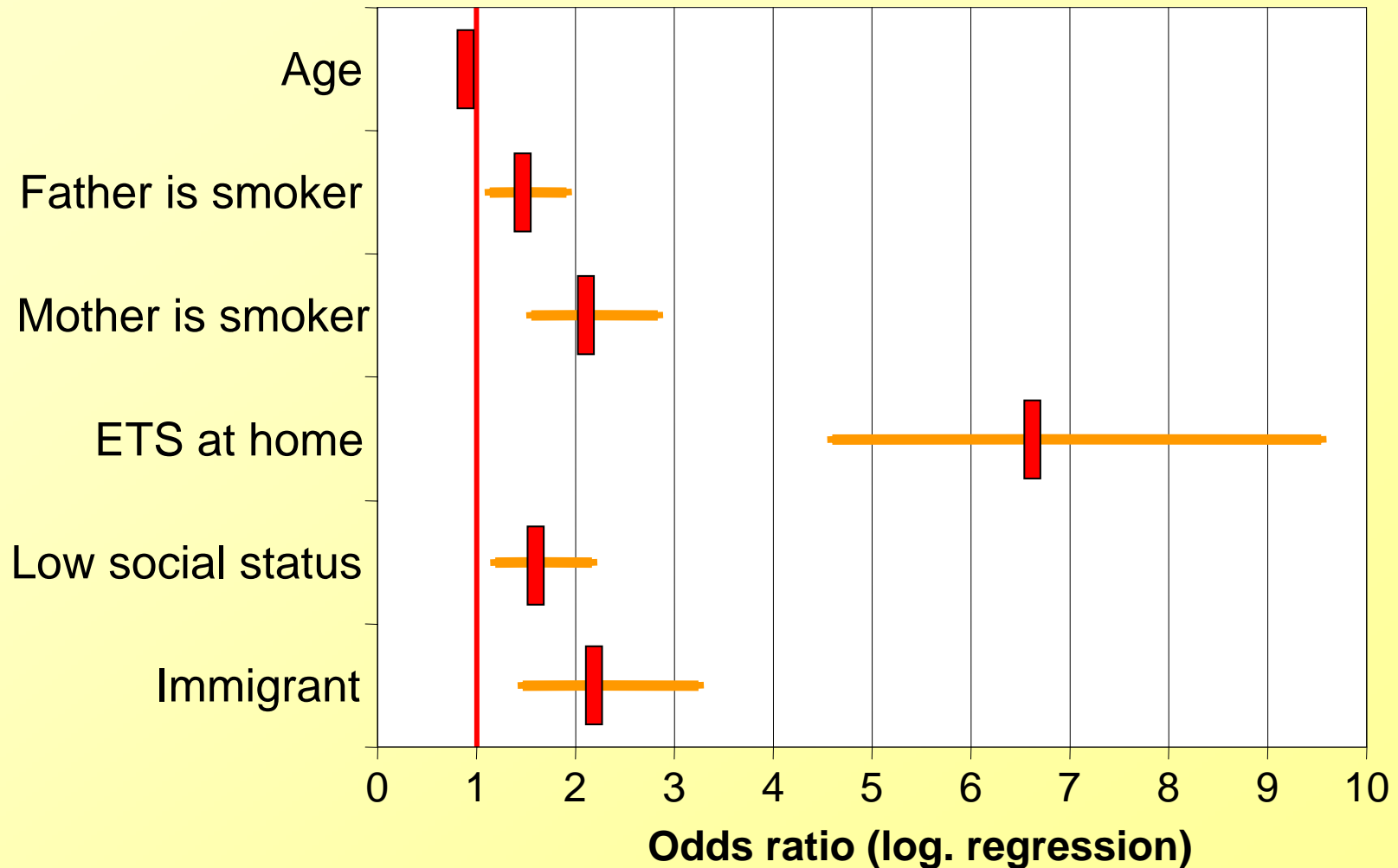
ETS exposure

Around **50 %** of children live in households with at least one smoker (GerES II and IV, 1990/92 and 2003/06).





Cotinine in urine, multivariate evaluation GerES IV (2003/06)





Exposure pathway house dust

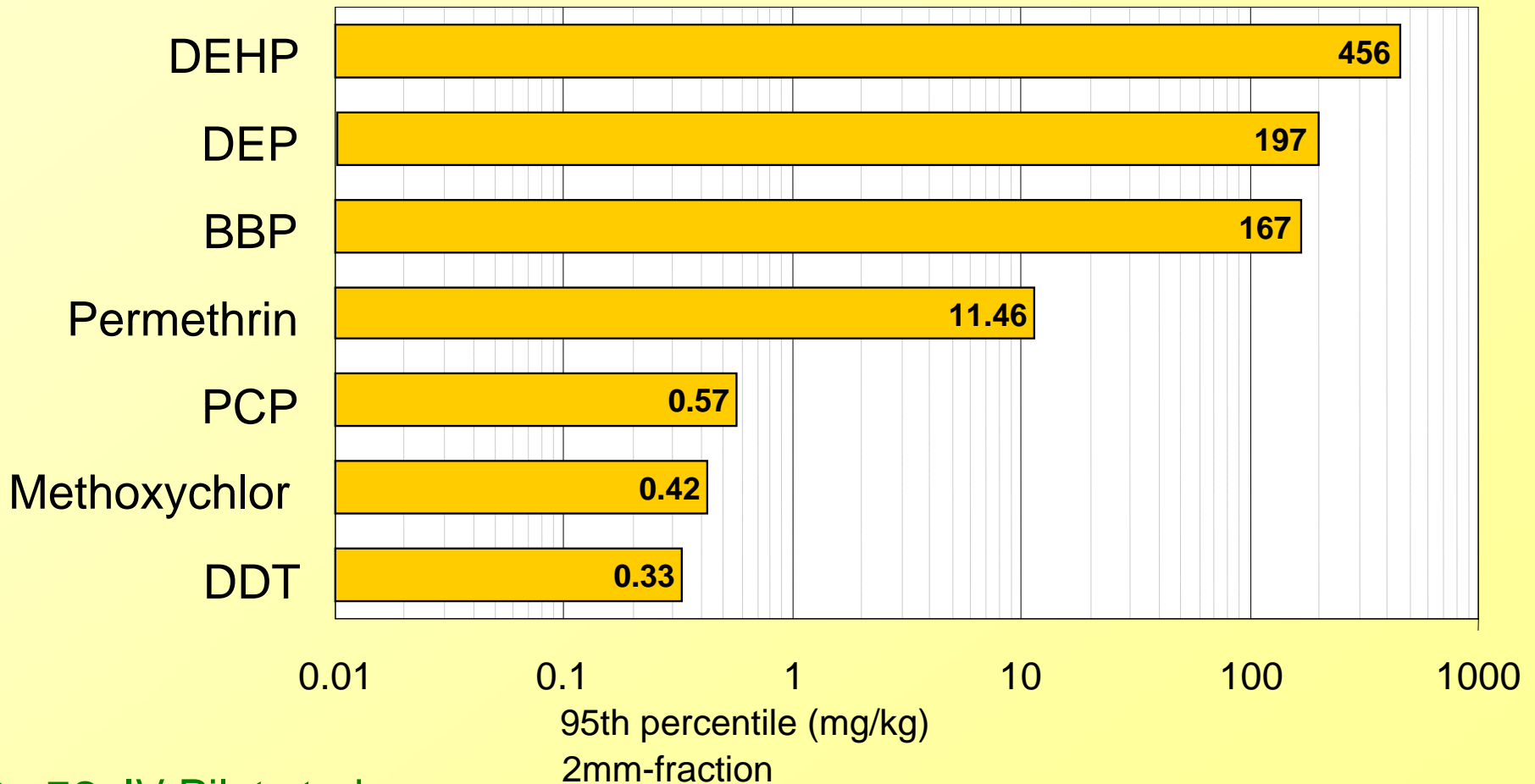
Medium	GerES I	GerES II	GerES III	GerES IV
Dustfall indoors	<input checked="" type="checkbox"/> 1)	<input checked="" type="checkbox"/> 1)		
Content of vacuum cleaner bags	<input checked="" type="checkbox"/> 1,2)	<input checked="" type="checkbox"/> 1,2,3)	<input checked="" type="checkbox"/> 2,3,4)	<input checked="" type="checkbox"/> 2,4)



- 1) Metals and trace elements
- 2) PCP, lindane
- 3) Pyrethroids
- 4) DDT, HCB, PCBs, chlorpyrifos, methoxychlor, propoxur, phthalates

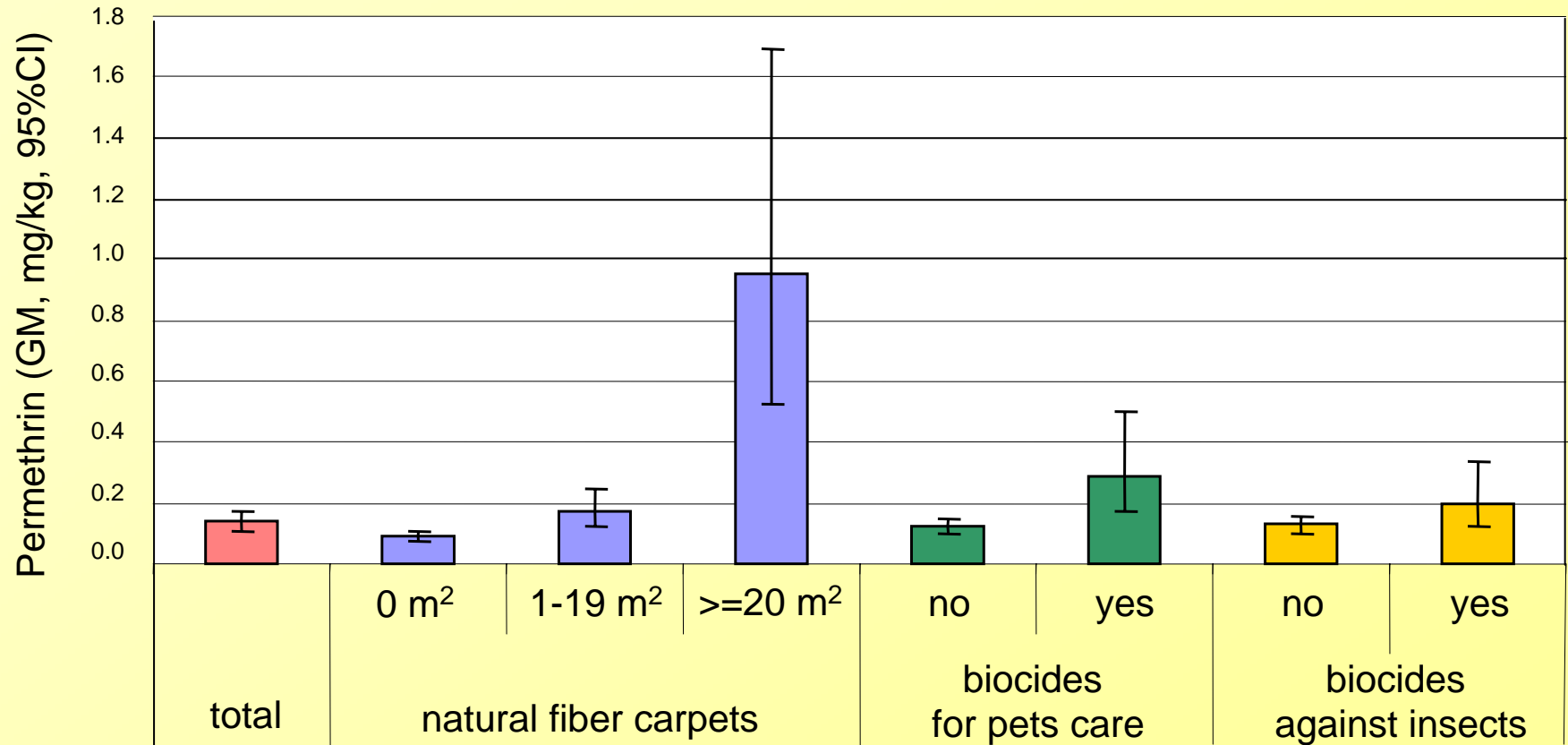


Pollutants in house dust (N = 503)





Permethrin in house dust (N=396)





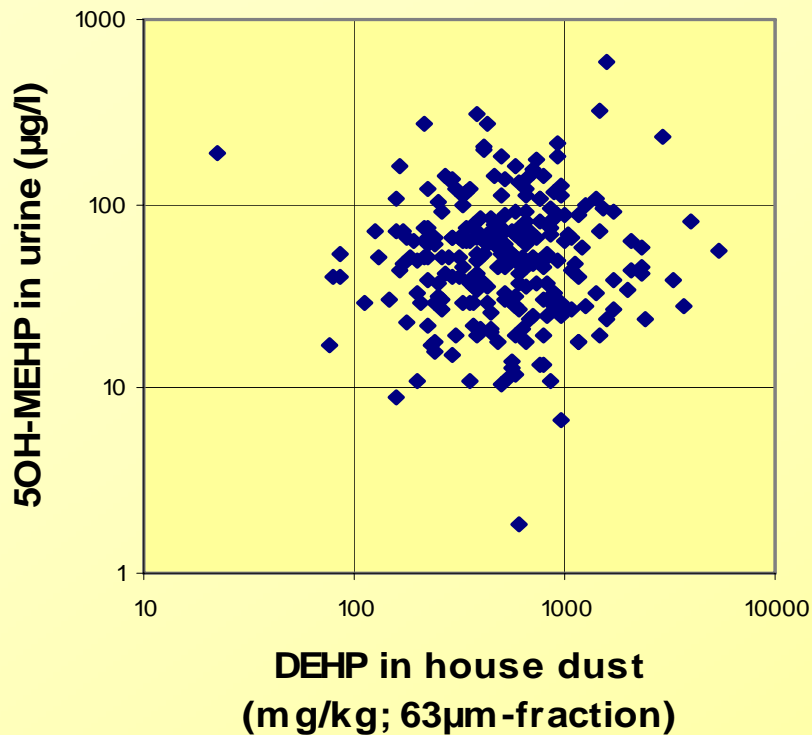
Pyrethroid metabolite levels in urine

Multiple regression models (N=337)

Variable	3-PBA	cis-DCCA	trans-DCCA
	significance levels		
Creatinine in urine	< 0.001	< 0.001	< 0.001
Age	< 0.001	0.007	< 0.001
Permethrin in house dust	< 0.001	0.003	< 0.001
Consumption of boiled vegetables	0.023	0.043	0.004
Sampling location	0.048	< 0.001	0.004
Use of biocides indoors	n.s.	0.049	0.040



DEHP in house dust and metabolites in urine (N=254)



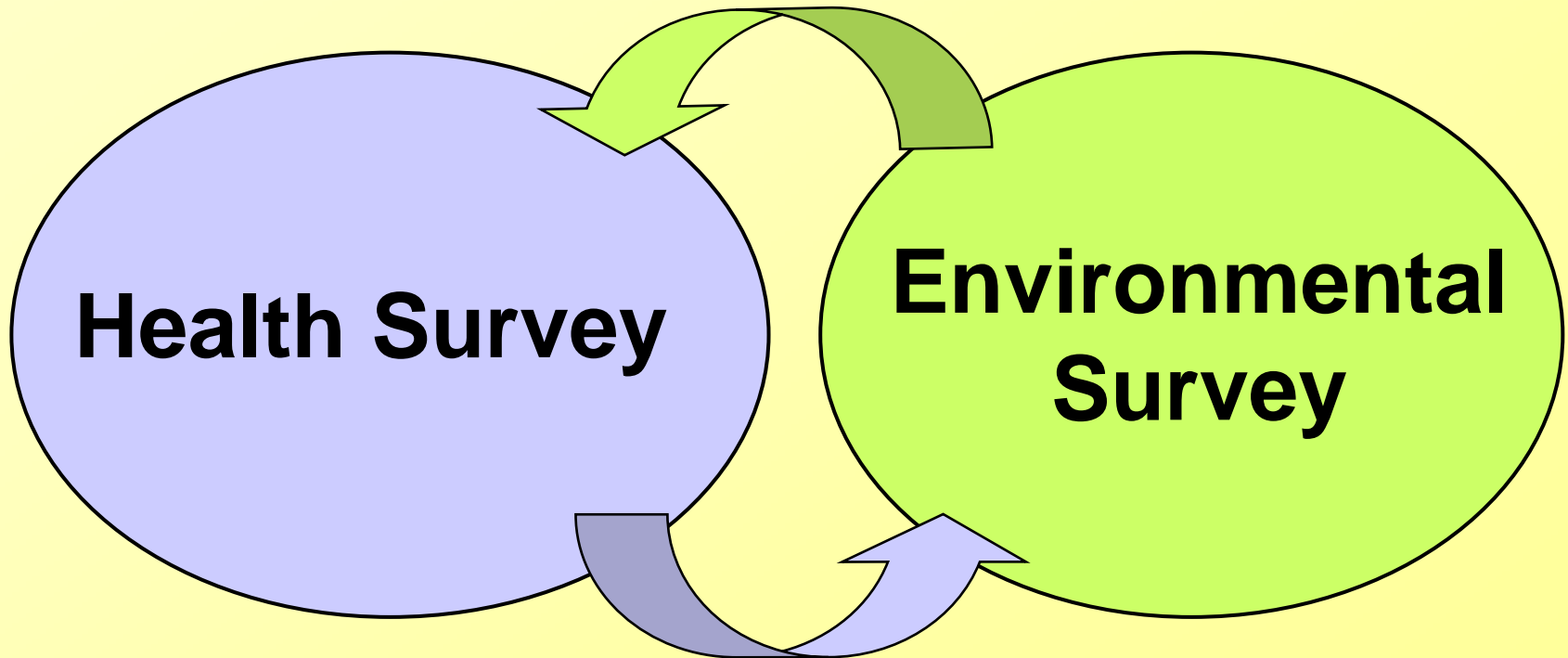
**No significant correlation for
subgroups, inter alia**

- for children up to 7 years (N=106)



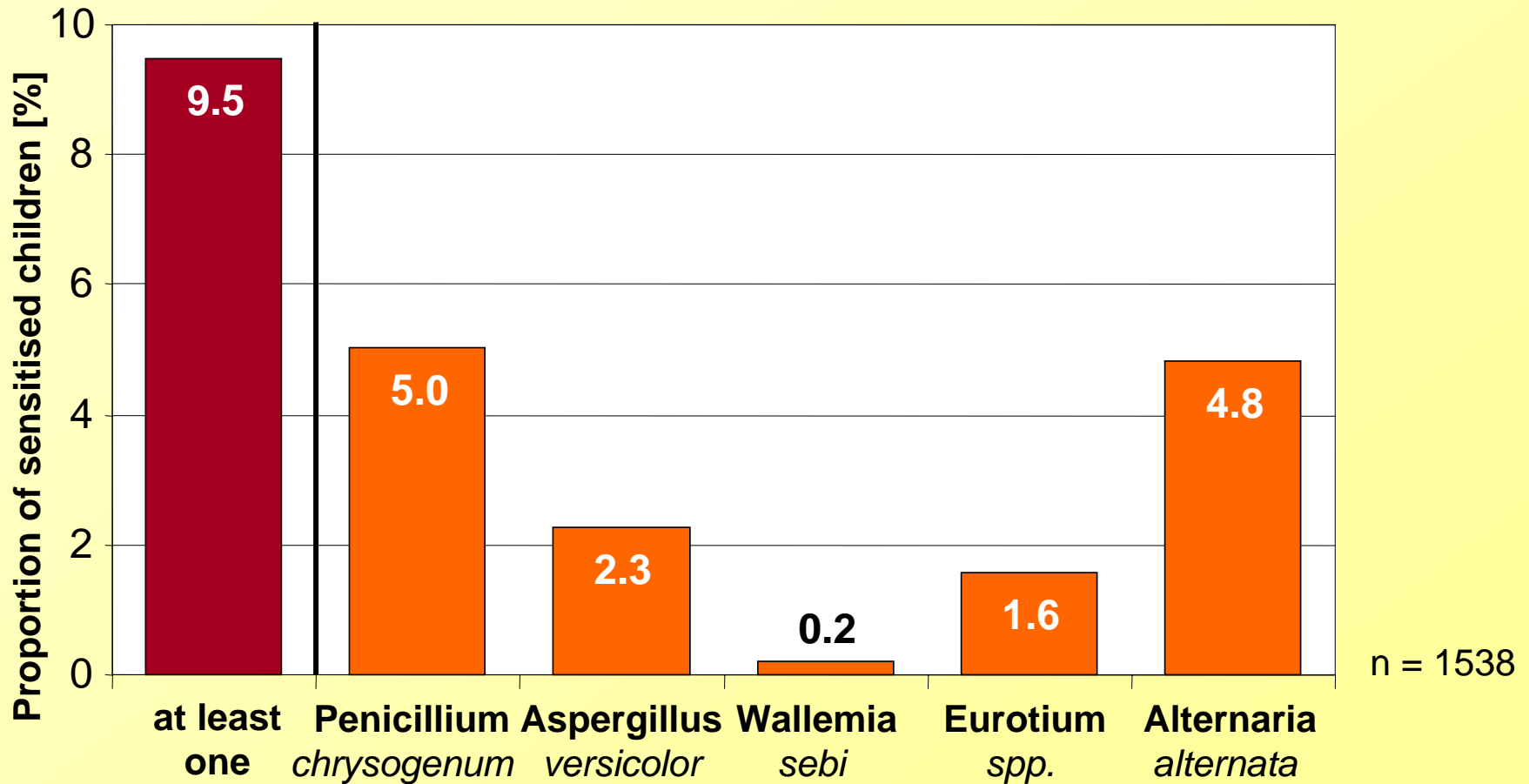
Environment and Health

German Environmental and Health Surveys





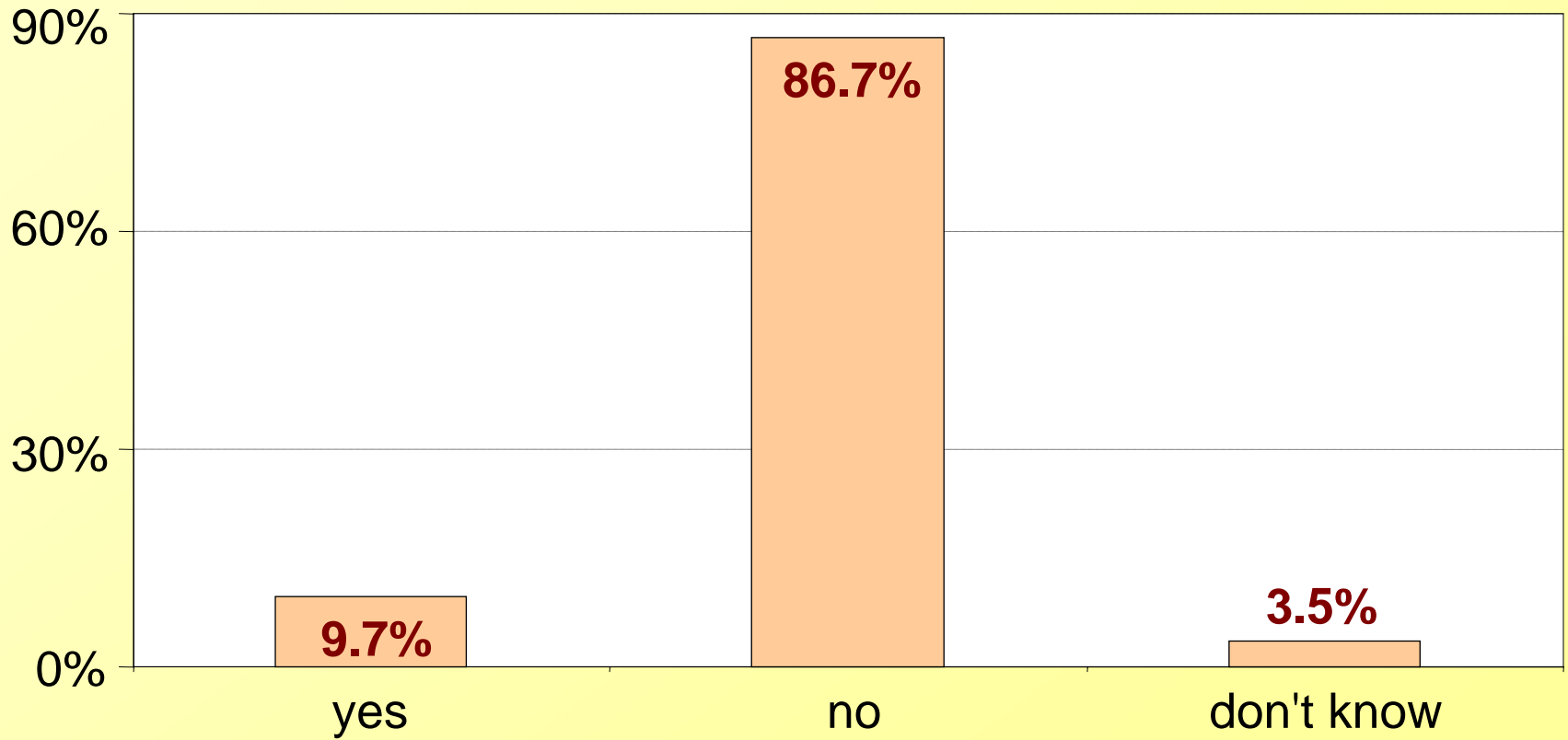
Focus Allergies: Allergic sensitisation against moulds (GerES IV, 2003/06)





Focus Allergies: contact allergies

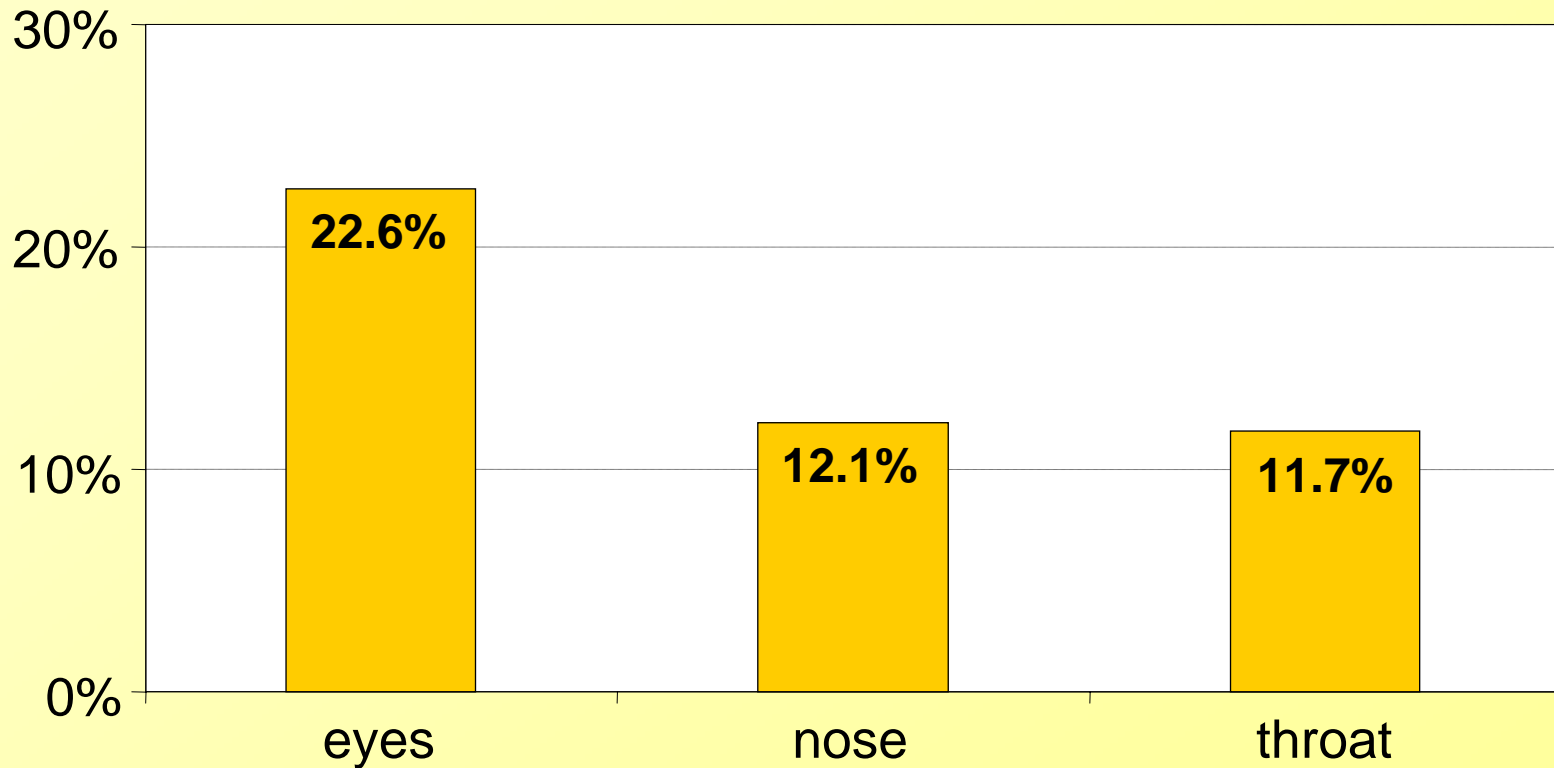
Questionnaires: Observed at least once (GerES IV, 2003/06)

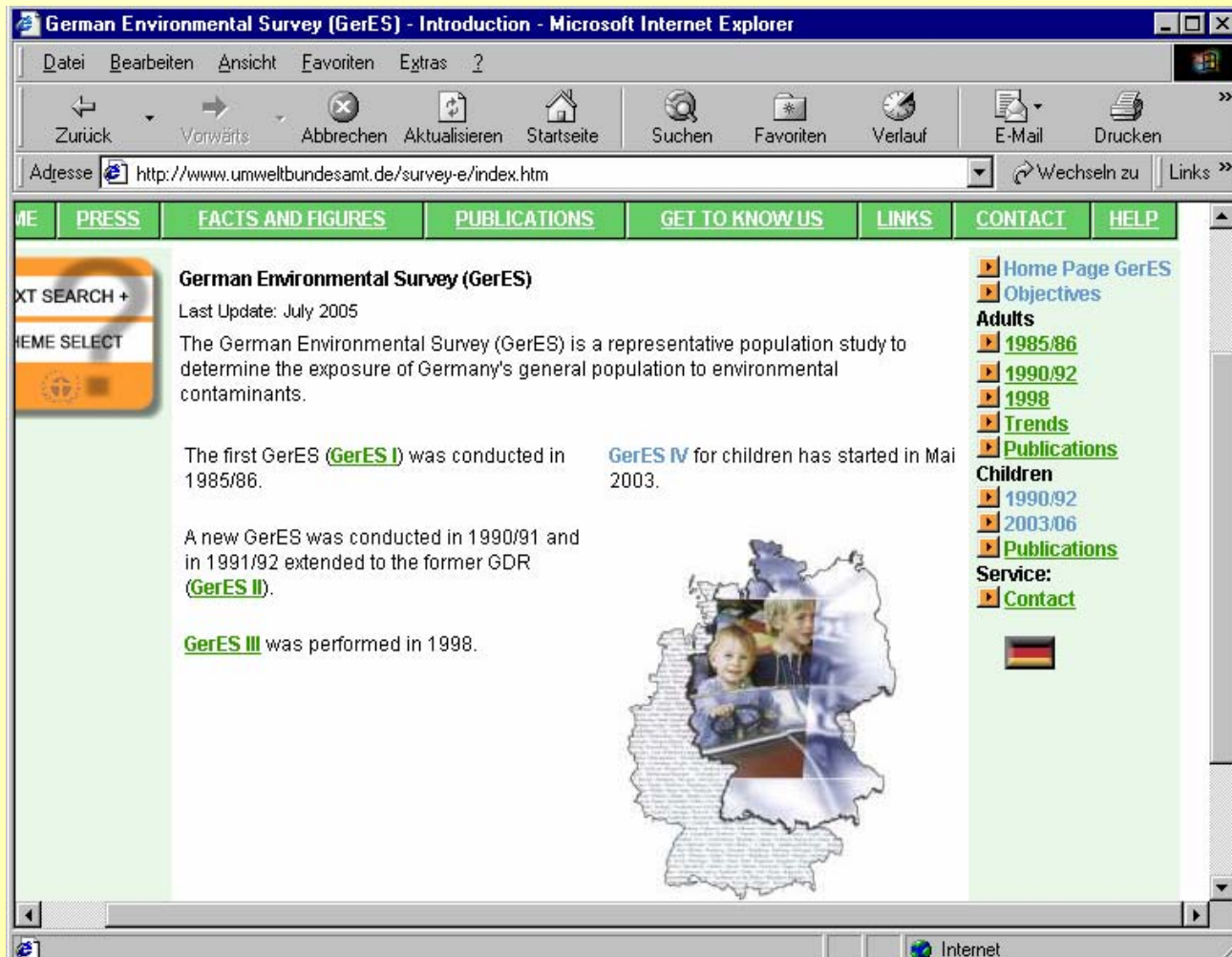




Focus indoor air: irritation of eyes and respiratory system

Questionnaires: Observed at least once (GerES IV, 2003/06)





German Environmental Survey (GerES)
Last Update: July 2005


The German Environmental Survey (GerES) is a representative population study to determine the exposure of Germany's general population to environmental contaminants.

The first GerES (**GerES I**) was conducted in 1985/86. **GerES IV** for children has started in Mai 2003.

A new GerES was conducted in 1990/91 and in 1991/92 extended to the former GDR (**GerES II**).

GerES III was performed in 1998.

Home Page GerES
Objectives
Adults
▶ [1985/86](#)
▶ [1990/92](#)
▶ [1998](#)
▶ [Trends](#)
▶ [Publications](#)
Children
▶ [1990/92](#)
▶ [2003/06](#)
▶ [Publications](#)
Service:
▶ [Contact](#)





**Thank you for your
attention !**

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