

Japan Environment and Children's Study (JECS)
International Symposium in Kitakyushu, Japan

Concept of a birth cohort study as contribution to the health related environmental monitoring in Germany

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Trend: Sperm Density in Germany

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Increase of a hormon dependent cancer

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Health related environmental monitoring: aims

1. Collect **data on exposure** to pollutants, noise, and biological factors,
2. identify and quantify **sources of exposure**,
3. illustrate temporal and spatial **trends**,
4. identify, prioritize, and measure **"new"/ emerging substances** with high prevalence in the human body,
5. investigate the influence of **socio-economic status**,
6. **assess the toxicological and health related risks**,
7. **analyze the impact of exposure on public health and susceptible groups**,
8. assess the success of **prevention and risk reduction** measures within health and environmental policy programmes.

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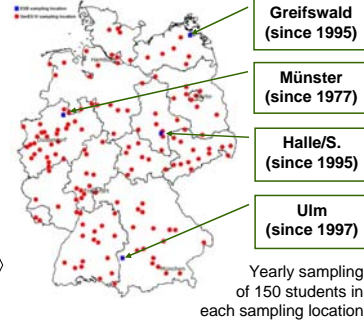
Experiences from two complementary approaches

German Environmental Survey (GerES)

Survey	Period	Sample size
GerES I	1985 - 1986	2,700 adults
GerES II	1990 - 1992	4,000 adults 730 children
GerES III	1997 - 1999	4,800 adults
GerES IV	2003 - 2006	1,790 children

150 sampling locations of GerES IV

Environmental Specimen Bank (ESB)

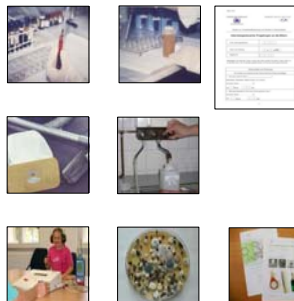


Instruments (II): Questionnaires

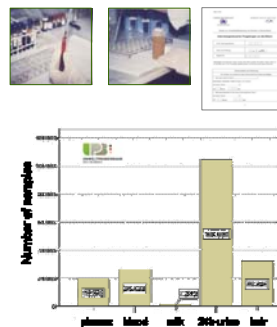
- indoor and outdoor environment
- health information
- socio-economic status
- food consumption
- environment and health
- habits ...

Instruments I

GerES



ESB



Why a Birth Cohort Study?

A Birth Cohort "... shares the same year or period of birth"
(Rothman et al. 1986)

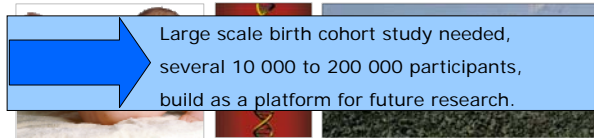
Important aspects of a birth cohort study:

1. Enrollment **at birth, during pregnancy** or **prior to conception**
 2. **Follow-up** of child development into adulthood
- Evidence that environmental and other factors **operating prenatally and in early childhood** determine health **in later childhood and in adulthood** is increasing
 - Takes **special vulnerability of children** during particular periods of development into account

Intentions

Developing a concept for a German Environmental Health Birth Cohort

- Focus on **environmental health problems**
- With regard to **socioeconomic aspects** and **migration**
- **Interaction** between **genes** and **environmental** risk factors
- Current German birth cohorts are **medium-sized** and focus on **special aspects of child health**
- Existing research **too limited** in size and scope to answer the questions



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Approach



Review of existing birth cohort studies

First draft for conceptual design and framework

Collecting possible research questions

1. expert meeting

Developing possible scenarios

developing the exposure and outcome assessment for addressing the research questions

2. expert meeting

elaboration of the overall concept

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Impact of (low) socio-economic status

- Residential Environment:**
- live at busy roads (x 3),
 - more industrial sources nearby,
 - higher noise exposure
- ➔ **Stress, blood pressure, sleep disturbance, respiratory diseases, accidents** ↑
- Toxic substances:**
- e. g. lead
- ➔ **IQ ↓, neurotoxic, carcinogenic**
- Indoor air:**
- more second- hand smoke,
 - use of more dubious household chemicals,
 - aromatic solvents, glykoles...
- ➔ **Irritation of eyes/ respiratory tract, allergies, respiratory diseases, accidents, susceptibility to infections** ↑



Source: GerES IV

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International Birth Cohorts

Name	Start	Sample Size	Participants	Response	Methods	Main Issues
US National Children's Study (NCS)	2009	100.000 planned	pregnant women (+ preconception) fathers, newborns	n/a	interviews, examinations, environmental + biol. samples	...to discover environmental risk factors and individual susceptibility for disease in children
Danish National Birth Cohort (DNBC)	1996	100.000	pregnant women and newborns	60%	interviews, biol. samples, population-based registers	...disease causation at the beginning of life
The Norwegian Mother and Child Cohort Study (MoBa)	1998	108.000	pregnant woman, fathers, newborns	43,8%	interviews, biol. samples, population-based registers	...to find causes of serious diseases in mothers and children.
The Avon Longitudinal Study of Parents and Children (ALSPAC)	1991	14.541	pregnant women, fathers, newborns	85%	interviews, examinations, environmental + biol. samples	...to assess factors (genotype + environment), which influence child health and development.
Japanese Environment and Children's Study (JECS)	2011	100.000	pregnant woman, fathers, newborns	n/a	interviews, examinations, biol. samples	...to examine environmental, psychological, genetic factors that impact on development
Dutch Generation R Study	2002	9.778	pregnant women and newborns	61%	interviews, examinations, biol. samples	...early environmental and genetic causes of growth, development and health.

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German Birth Cohorts

Name	Start	Sample Size	Participants	Response	Methods	Main Issues
The German Multicenter Atopy Study (MAS-90)	1990	1.314	newborns + parents	n/a	interviews, examinations, biol. samples	...environmental exposures to allergens and atopic diseases
The GINI Study + The LISA Study	1995	9.128	newborns	55%	interviews, examinations, biol. samples	...impact of environmental exposures and life-style on the immune system.
The Duisburg Cohort Study	2000	234	pregnant women and newborns	n/a	interviews, examinations, biol. samples	...influence of dioxins on the early development.
Survey of Neonates in Pomerania (SNIP)	2002	7.000	newborns	80%	interviews, biol. samples	...impact of environment, genetics, life-style on health.
The German KIGGS Survey	2003	17.641	children (Age 0-17)	67%	interviews, examinations, biol. samples	...representative information about health
The Environmental Determinants of Diabetes in the Young (TEDDY)	2004	7.801	newborns	~45%	interviews, examinations, environmental + biol. samples	...impact of genetic factors and environmental exposures on developing diabetes
German Neonatal Network (GNN)	2009	20.000 planned	preterm newborns	n/a	interviews, examinations, biol. samples	...long-term effects of genetic, clinical, social risk factors, and specific treatment

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Study Locations



Selection of study locations should be based on:

- socioeconomic status
- metropolitan status
- geography
- birth per year

Also needed:

- Study centers with **experience in recruitment**

→ taking *The German National Cohort* into account

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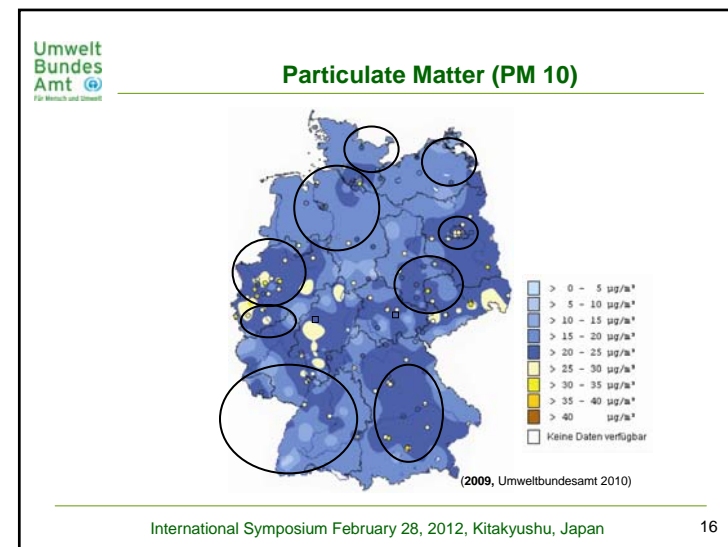
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Recruitment

- Recruitment as **early in pregnancy** (→ 1st trimester) as possible
- But: **Broad approach** to enroll at different stages of pregnancy and even shortly after delivery
- Therefore: **Multimodal approach** via gynecologists, private midwives, prenatal care providers, maternity wards...
...but also pharmacies and other public institutions
- **Incentives** and professional **PR-Tools** needed to make the participant's benefit clear



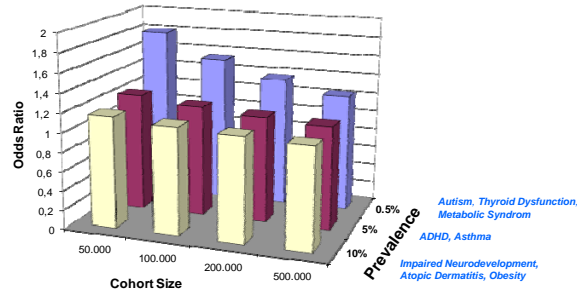

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Sample Size

Minimal Detectable OR for Environmental Factor

Design: embedded case-control study (case:controls = 1:4)
Frequency of environmental exposure: 10%



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Perspectives

- Work still **in progress !**
- **Feasibility studies** in the near future
- Significance of the longitudinal database as a **platform for future studies**
- A national resource to **answer important questions**



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Main Research Issues

1. The Impact of Environmental Pollutants and Noise on **Neurodevelopment** and **Cognitive Abilities**
2. The Impact of Endocrine Disruptors on **Reproductive Development**
3. The Impact of Environmental Pollutants on **Pregnancy and Birth Outcomes**
4. The Impact of Indoor/Outdoor Air Pollution and Inhalation Allergens on **Asthma**, **Allergy** and **Wheezing**
5. The Impact of Environmental Pollutants on **Obesity**, **Insulin Resistance** and **Diabetes**

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