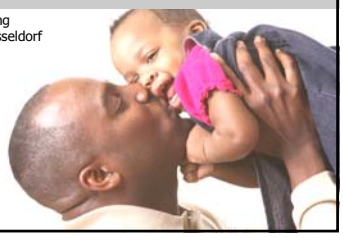
Environmental Health Risks in European Birth Cohorts (ENRIECO)

Mark J Nieuwenhuijsen PhD

German birth cohort meeting
25-26 November 2010, Dusseldorf



ENRIECO

Programme information:

SEVENTH FRAMEWORK PROGRAMME THEME 6 - ENVIRONMENT (INCLUDING CLIMATE CHANGE)

Grant agreement for: Coordination and support action (Coordinating)

1 March 2009-28 February 2011

Grant agreement no: 226285

Project co-ordinator: Mark J Nieuwenhuijsen (CREAL, Barcelona)

EC project officer: Tuomo Karjalainen

www.enrieco.org

ENRIECO

Background:

There are many pregnancy and birth cohorts in Europe, with sample sizes ranging from a few hundred to tens of thousands.

These cohorts are currently collecting a wealth of information on environmental exposures and child health outcomes, but data are often of fragmented nature and there is relatively little coordination to structure and consolidate scattered research.

ENRIECO

Aim:

To advance our knowledge on specific environment and health causal relationships in pregnancy and birth cohorts by providing support to exploitation of past or ongoing studies.

Objectives:

- Make inventories of birth cohorts: health data, environmental exposure data, biological samples, environmental exposure response functions, expertise, access
- Evaluate exposure, health and exposure-response data
- Attempt to combine data from various cohorts
- Make recommendations

Work Packages

WP1. Inventory of birth cohorts
WP leader: Martine Vrijheid

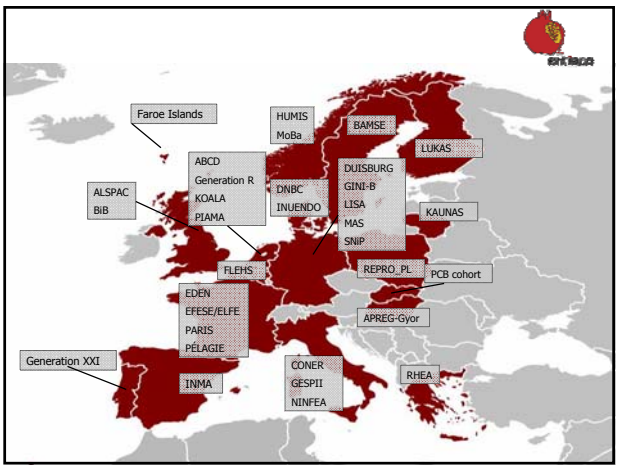
WP2. Evaluation of exposures
WP leader: Bert Brunekreef

WP3. Evaluation of health outcomes
WP leader: Remy Slama

WP4. Evaluation of exposure-response relationship
WP leader: Joachim Heinrich

WP5. Database building
WP leader: Thomas Keil

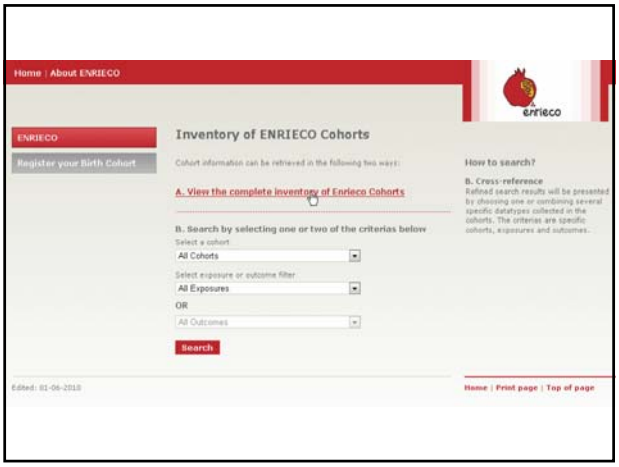
WP6. Dissemination
WP leader: Manolis Kogevinas

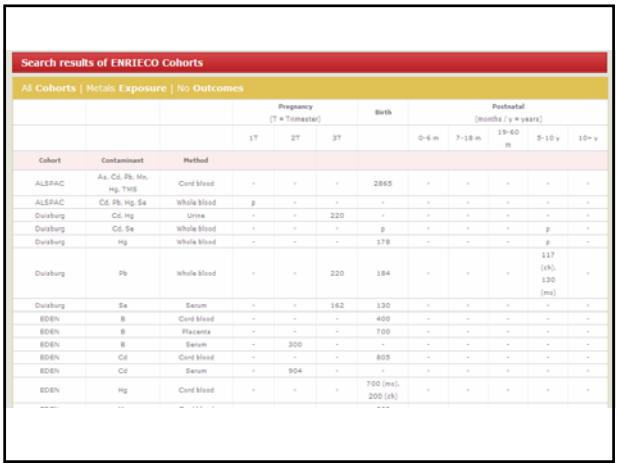


Birth Cohorts List

Cohort	Country	Start of enrolment	N participants
1. Aarhus Birth Cohort	Denmark	1990-ongoing	90000
2. ABCD	Netherlands	2003-2004	7863
3. ALSPAC	UK	1991-1992	14062
4. APREG	Hungary	2000-2006	2800
5. BAMSE	Sweden	1994-1996	4089
6. BIB	UK	2007-2010	13000
7. Cohort Faroe Islands			
Cohort I	Faroe Islands	1986-1987	1022
Cohort II		1994-1995	182
Cohort III		1997-2000	656
Cohort V		2007-2009	491
8. CONER	Italy	2004-2005	654
9. DNBC	Denmark	1996 - 2002	96986
10. Duisburg	Germany	2000-2001	234
11. EDEN	France	2003-2006	1873
12. EFESE/ELFE	France	2011-2012	20000
13. FLEHS	Belgium	2002-2004	1196
14. Generation R	Netherlands	2001-2005	9778
15. Generation XXI	Portugal	2004-2006	8654
16. GESPII	Italy	2003-2004	708
17. GINIplus	Germany	1995-1998	5991
18. HUMIS	Norway	2002-2009	2500

Cohort	Country	Start of enrolment	N participants
19. INMA	Spain		
Asturias		2004-2007	482
Gipuzkoa		2006-2008	600
Granada		2000-2002	668
Menorca		1997-1998	482
Ribera Ebre		1997-1999	102
Sabadell		2004-2007	749
Valencia		2004-2005	787
20. INUENDO	Denmark	2002-2004	1322
21. KANC	Lithuania	2007-2009	4000
22. KOALA	Netherlands	2000-2003	2834
23. LISA	Germany	1997-1998	3097
24. LUKAS	Finland	2002-2005	442
25. MAAS	UK	-	-
26. MAS	Germany	1990	1314
27. MoBa	Norway	1999-2008	107400
28. NFBC 1986	Finland	1985-1986	9479
29. NINFEA	Italy	2005+	7500
30. PCB cohort	Slovakia	2001-2003	1134
31. PÉLAGIE	France	2002-2006	3460
32. PIAMA	Netherlands	1996-1997	3963
33. REPRO_PL	Poland	2007-2011	1300
34. RHEA	Greece	2007-2008	1500
35. SNIP	Germany	2003-2008	4840

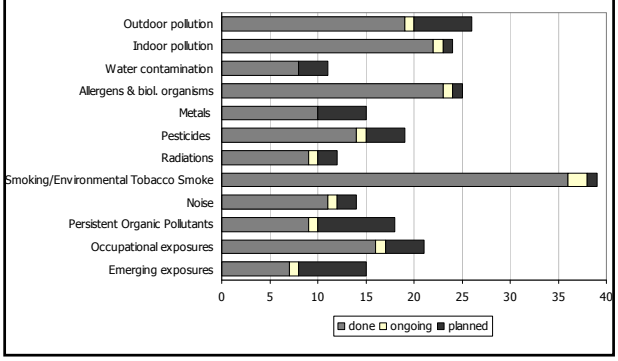




Exposures

Cohort	Air pollution	Water contamination	Heavy Metals	Pesticides	Radiations	POPs	Occupation	Environmental Tobacco Smoke
Aarhus Birth Cohort						√	√	√
ABCD	√		√	√	√		√	√
ALSPAC	√		√	√	√	√	√	√
APREG	√			√			√	√
BAMSE	√						√	√
BIB	√	√					√	√
Cohort Faroe Islands			√	√		√	√	√
CONER	√						√	√
DNBC	√			√	√	√	√	√
Duisburg	√	√	√			√	√	√
EDEN	√	√	√		√		√	√
EFESE/ELFE	√	√	√	√	√	√	√	√
FLEHS	√		√	√		√	√	√
Generation R	√	√		√		√	√	√
Generation XXI							√	√
GESPII	√							√
GINIplus	√							√
HUMIS	√		√	√	√	√	√	√
INMA	√	√	√	√	√	√	√	√
INUENDO			√	√		√	√	√
KANC	√	√					√	√
KOALA	√	√			√		√	√
LISA	√			√				√
LUKAS	√		√	√		√	√	√
MAS	√						√	√
MoBa	√	√	√	√	√	√	√	√
NINFEA	√		√	√	√		√	√
PCB cohort			√	√		√	√	√
PÉLAGIE		√	√	√		√	√	√
PIAMA	√							√
REPRO_PL	√		√			√	√	√
RHEA		√	√	√	√	√	√	√
SNIP	√						√	√

Environmental Exposures



Outcomes

Cohort	Birth outcomes	Asthma and allergies	Neurodevelopment	Growth and obesity
Aarhus Birth Cohort	√			
ABCD	√	√	√	√
ALSPAC	√	√	√	√
APREG	√			
BAMSE	√	√		√
BIB	√		√	
Cohort Faroe Islands	√	√	√	√
CONER	√	√		√
DNBC	√	√	√	√
Duisburg	√	√	√	√
EDEN	√	√	√	√
EFESE/ELFE	√	√	√	√
FLEHS	√	√	√	√
Generation R	√	√	√	√
Generation XXI	√	√		√
GESPII	√	√	√	√
GINIplus	√	√	√	√
HUMIS	√	√	√	√
INMA	√	√	√	√
INUENDO	√		√	√
KANC	√			
KOALA	√	√	√	√
LISA	√	√	√	√
LUKAS	√	√		√
MAS	√	√	√	√
MoBa	√	√	√	√
NINFEA	√	√	√	√
PCB cohort	√	√	√	√
PÉLAGIE	√	√	√	√
PIAMA	√	√	√	√
REPRO_PL	√	√	√	√
RHEA	√	√	√	√
SNIP	√			

WP2: Exposure evaluation

WP leader: Bert Brunekreef

Working Group	Responsible person
Air pollution	Ulrike Gehring
Water Contamination	Mark Nieuwenhuijsen
Allergens/Biological organisms	Joachim Heinrich
Metals	Jordi Sunyer
Pesticides	Sylvaine Cordier
Emerging Exposures (phthalates, BPA, PFCs, BFR)	Martine Vrijheid
Radiations: EMF/UV/ionising	Martine Vrijheid
Second Hand Tobacco Smoke (SHS)	Magnus Wickman
Noise	Thomas Keil
Persistent organic pollutants (POPs)	Jens Peter Bonde

WP3: Outcome evaluation

WP leader: Remy Slama

Working Group	Responsible person
Birth Outcomes	Remy Slama
Allergies/Asthma/Respiratory Disease (RD)	Thomas Keil
Neurobehaviour	Jordi Sunyer
Cancer	Manolis Kogevinas
Child Growth / Endocrine & Metabolic Disorders	Marie Aline Charles

WP3: Outcome evaluation

European birth and mother-child cohorts provide a real potential for combined analyses on pregnancy-related outcomes and child health outcomes

WP3: Outcome evaluation

Key health outcomes could be used for further analyses, including

-time to pregnancy

-birth weight

-specific congenital malformations

-preterm births

- wheeze or asthma according to age

- IQ and attention deficit/hyperactivity disorders

-postnatal changes in body mass index

-waist circumference

-occurrence of obesity

-puberty.

Regarding childhood cancer, an issue is the lack of statistical power to evaluate the relation between specific cancer types and potentially relevant exposures in existing cohorts.

WP3: Outcome evaluation

-Encourage cohorts with a prenatal recruitment, as early as possible during or even before pregnancy, in order to efficiently characterize pregnancy-related events, time-varying confounders, but also in utero exposures which may impact birth outcomes and child health.

-Prospective assessment of fetal size by ultrasound, as well as Doppler measures of blood flow in uterine, umbilical or fetal arteries to assess maternal-foetal exchanges are advised.

-Allow collecting standardized and good quality information on little studied and relevant outcomes in terms of public health, such as specific congenital malformations, preterm and very preterm delivery.

-For respiratory health, the use of standard questionnaires already used in other large surveys (ISAAC) is strongly advised.

-Considering the large personal, technical and monetary input, only cohorts with a clear focus on asthma and allergy health outcomes should use pulmonary function tests, skin tests and IgE-tests as there is limited usefulness in clinical practise as well as in population based research for the rather poor predictive values

WP3: Outcome evaluation

-The study of neurodevelopment should be approached with extreme caution and the best tools to study this area are the neuropsychological tests assessed by psychologists

-If child neurodevelopment is a focus, at least one assessment of all the areas of neurodevelopment should be done, making several measures in different precise steps of neurodevelopment.

- For child growth, serial measures covering the different periods of interest are needed to allow studying the effect of early exposures on critical periods of growth (e.g., adiposity rebound).

- For childhood cancer, it is recommended to continue promoting the initiative of the International Childhood Cancer Cohort Consortium (I4C), in which European cohorts are implied. The development of biomarker-based studies related to cancer biomarkers is crucial.

WP4: Exposure-Response evaluation

WP leader: Joachim Heinrich

Working Group	Responsible person
Air pollution and Birth outcomes	Manolis Kogevinas
Air pollution and Allergy/Asthma/RD	Bert Brunekreef
Allergens/biological organism and Allergy/Asthma	Joachim Heinrich
SHS and Birth outcomes	Constantine Vardavas
Pesticides and Birth outcomes	Sylvaine Cordier
Water contaminants and Birth outcomes	Mark Nieuwenhuijsen
Occupation and Birth outcomes	Martine Vrijheid
Metals and Birth outcomes	Jordi Sunyer
Metals and Neurobehaviour	Jordi Sunyer
POPs and Birth outcomes	Jens Peter Bonde
POPS and Neurobehaviour	Jordi Sunyer
Noise and Asthma/Birth outcomes	Thomas Keil

Case Studies combining studies

WP	Case study	Responsible person
WP2	Occupational Exposures during pregnancy	Sylvaine Cordier
WP3	POPs; PCB153/DDE and birth weight	Jens Peter Bonde
WP5	Case study on dampness and the association with asthma and allergy in European birth cohorts	Chen-Chih Mey Joachim Heinrich Christina Tischler
	Case study on foetal tobacco smoke exposure and asthma among 4-6 year olds	Magnus Wickmann
	Case study on foetal tobacco smoke exposure and wheezing among 0-2 year olds	Constantine Vardavas

Findings and Implications

There are many pregnancy and birth cohorts (N=35, >400000 children) in Europe with information on environmental exposures and health outcomes

There is fairly good cover of Europe, except Eastern Europe

There is considerable expertise and experience associated with the cohorts, and a great effort goes into them

The cohorts have provided important environmental exposure, health and environmental exposure-response data

The amount and detail of information provided by cohorts on environment and health differs considerably

Findings and Implications

Greater and more efficient use needs to be made of the existing cohort data at the European level to:

-Provide speedy response to key policy questions
-Provide speedy response to concerns about "new" environmental exposures
-Improve understanding of geographical and cultural inequalities in disease, exposure, and health related behaviours
-Replicate findings with important public health implications in different settings
-Link with routinely collected environmental and health data
-Improve methodological approaches, including protocols of biological and environmental sample collection and analysis.
-Improve statistical power through combined analyses

Findings and Implications

Cohorts tend to report individually, but recent initiatives have tried to combine data from various cohorts to increase e.g. power (overall and subgroups)

Combining information from different cohorts appears to be beneficial and increase the value of the cohorts and resulting information

Combining data from various cohorts requires careful consideration of the aims, protocols, data, ethical issues, analyses and management, and it is time and labour intensive but potential fruitful

There are currently limited resources to combine existing studies/data

Findings and Implications

Follow up of existing cohorts is essential to determine health effects in later life of pre natal and early childhood exposure, for which there is some but not conclusive evidence

New pregnancy and birth cohorts are needed to evaluate any potential health effects of new environmental exposures, or existing environmental exposures under new conditions

CHICOS - "Developing a Child Cohort Research Strategy for Europe"

- **"FP7 HEALTH-2009-3.3-4:** Birth/Mother-Child Cohorts co-ordination.
- **Project Coordinator:**
  - Martine Vrijheid (CREAL, Barcelona)
- **Cohorts, Partners:**
  - Danish National Birth Cohort
  - RHEA, Greece
  - NINFEA, Italy
  - Generation R, The Netherlands
  - MoBa, Norway
  - ALSPAC, Bristol, UK
  - INMA, Spain
- **Start:** Jan 2010, 3 years
- EC Project Officer: Kevin McCarthy

CHICOS

Outcome Themes

- Perinatal outcomes
- Asthma, respiratory health, allergies
- Obesity, vascular and metabolic health
- Neuro-cognitive and behavioural development
- Accidents and injuries
- Infectious diseases
- Childhood cancer

Determinant Themes

- Social/cultural inequalities
- Nutrition and physical activity
- Life-style exposures
- Environmental exposures
- Biobanks and genetics
- Multiple determinants (integrated risk assessment)

CHICOS

- Next meeting: 11 and 12 April Barcelona
- www.chicosproject.eu