den norske Mor & barn undersøkelsen





The Norwegian Mother and Child Cohort Study

www.fhi.no/morogbarn

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Norwegian Institute of Public Health

December 2008

Norwegian Institute of Public Health

Background

The limited success of

- Genetic family-based or population-based studies (linkage or association) being satisfied with phenotypes, genotypes and genealogy
- Epidemiological cohorts being satisfied with environmental exposures and no family structure

The assumption that gene-environment interactions actually plays a large role in explaining the liability to develop complex disorders

The notion that prenatal and early influence can determine later chronic disease

Main Goal

To prevent childhood and adult diseases

by understanding the interaction

between environment and genes

Objectives

- To estimate associations between environmental exposures and disease
- To estimate associations between genetic factors and disease
- To study interactions between genetic factors and environmental exposures

What do we want?

- To recruit 100,000 pregnancies by 2008.
  - One pregnancy may result in more than one child, and one mother may be included with more than one pregnancy
- To follow the parents and their children as MoBa families for as long as it makes sense
- To safeguard data and biological material with high standards of quality
- To participate in international research efforts in order to have high quality in analysis and publication

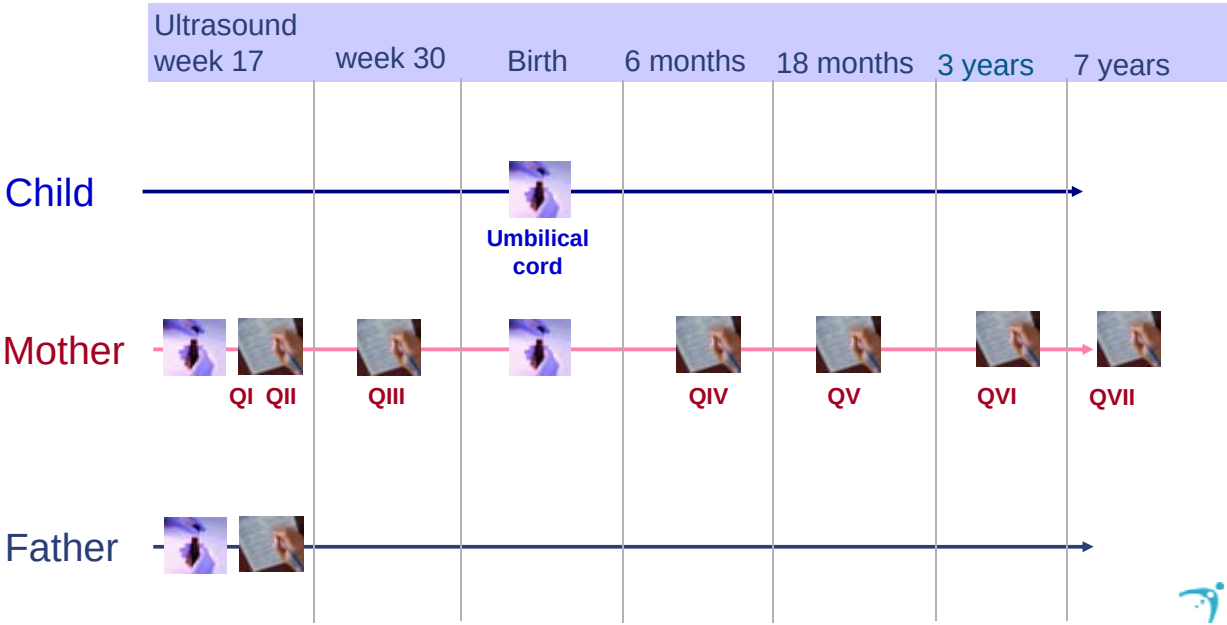
Project history

- 1992 - project planning started
- 1997 - pilot study: Two small communities
- 1999 - main project started (Hordaland County)
- 2002 - all Norwegian counties included
- 2007 - 50 hospitals,about 90 000 women

The prenatal period

- MoBa is a pregnancy cohort, not a birth cohort
- The unit of the data collection is the pregnancy
- The family structure is the father-mother-child trio, with the possibility of including twins and repeated pregnancies

Data Collection



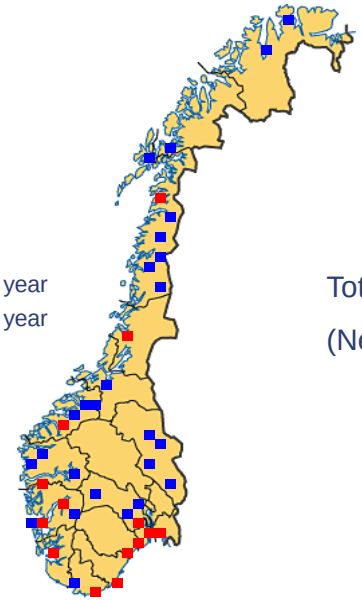
Recruitment procedures

- When pregnant women are invited to the hospitals for ultrasound investigation, MoBa receives a list of their names and addresses

- Invitation are sent to all listed women and their partners. A consent form and the first questionnaires are included

Recruitment

- Hospitals with < 1000 births per year
- Hospitals with > 1000 births per year



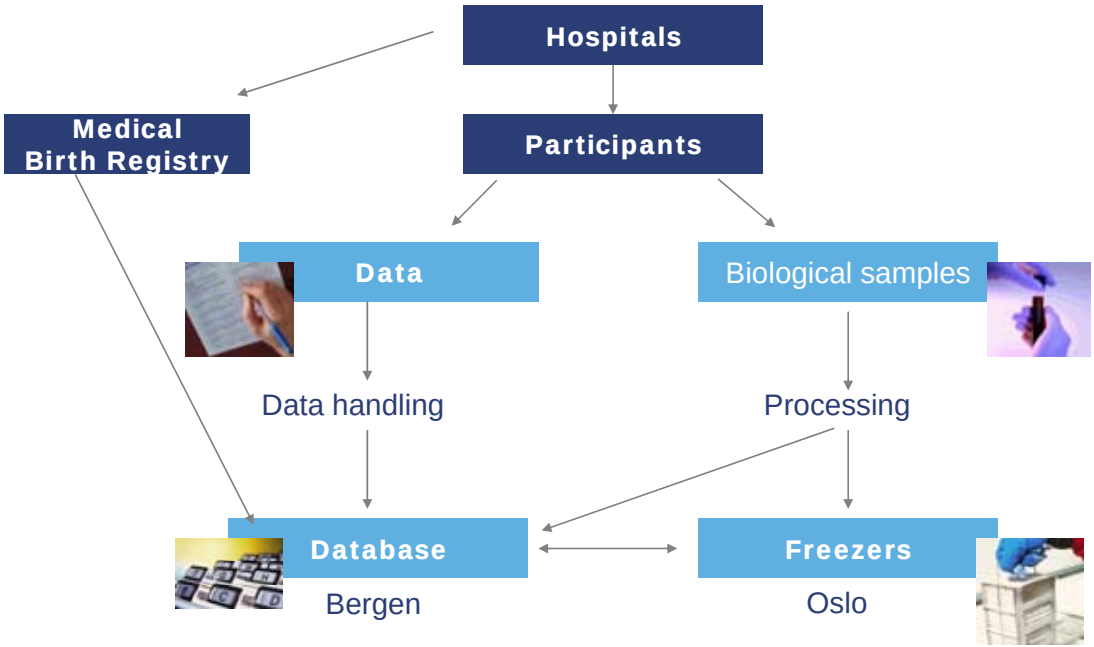
Total distance 2634 km

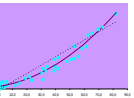
(New York - Houston)

Collaboration with hospitals

- Ultrasound departments
- Delivery wards
- Clinical laboratories
- IT - departments

Data Flow


Hospitals
Medical Birth Registry
Participants
Data
Biological samples
Data handling
Processing
Database
Bergen
Freezers
Oslo



Variables

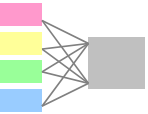
- Exposure variables
  - from registries (e.g. air pollution, waterworks)
  - from questionnaires (e.g. life style factors, nutrition)
  - from biological samples (nested case-control studies)
- Health variables
  - from disease registries and hospitals
  - from clinical examinations in sub cohorts
  - from questionnaires
- Other variables (confounders or effect modifiers)
  - from questionnaires
  - from registries (e.g. educational attainment)

Registries

- The medical birth registry of Norway
- The prescription registry
- Cause of death registry
- Cancer registry
- Vaccination registry, infectious disease registry
- Hospital discharge registry
- Socioeconomic and demographic factors

Biological Samples

- EDTA full blood and plasma, frozen at -86º C
  - aliquoted and stored on matrix plates
- DNA extracted from full blood, frozen at -20º C
  - standard concentration, aliquoted and stored on matrix plates
- Urine, frozen at -20º C
- RNA from the umbilical cord, frozen directly at -80



Design

- Cohort studies
- Nested case-control studies
- Sub-cohorts
- Family studies

Ethical considerations

- **License from The Data Inspectorate**

  Given in 1996 for the main project. Additional licenses might be necessary for later studies not taken into consideration in the main project
- **Approval by The Regional Ethical Committee**

  Main project approved. New applications for subprojects necessary
- **Informed consent**

  Mother and father, child after age 18 years

Considerations

- Low budget
- Built around the existing routines in the health care system
- No interventions
- Endpoints taken from disease registries
- Largest investment: the biobank
- Not suited for prevalence studies or health monitoring

Limitations

- Different hospitals with different recruitment strategies
- Relatively low participation rate (45%)
- Participants differ from non-participants

Strengths

- Depth and breadth of information from *in utero* and through childhood
- Biological samples from mid-pregnancy, delivery and umbilical cord appropriately stored and archived
- Due to population based registries, easy to trace participants
- Sophisticated data management and tracking system
- Ability to merge data with population-based medical birth registry and other national disease registries

Women with >1 pregnancy

No. of pregnancies	
1	74 504
2	13 720
3	875
4	32
5	1

Questionnaire response

	Total no.	Response
Q1 (17 wks)	98 840	95.2 %
Q2 (22 wks)	93 793	92.3 %
Q3 (30 wks)	89 976	91.0 %
Q4 (6 mths)	75 711	85.0 %
Q5 (18 mths)	53 907	73.7 %
Q6 (36 mths)	26 516	61.1 %
Q7 (7 yrs) *(pilot)*	2 001	60.0 %
Q father	76 005	94.4 %

Biological samples

	Total no.
K1	91 640
K2	77 876
Child	84 441
Father	65 357
ABC	405

Participants 2008

	No.		No.
Women	89 132	Pregnancies	104 702
Men	70 100	Pregnancies	80 472
Single child	98 314	Pairs of twins	1 764
		Sets of triplets	20

Challenges

- Financing
- Ethical issues
- Participation rate
- Participation from health personnel in recruiting the women
- Collaboration between research groups

Research strategy

- Data collection only partly hypothesis-driven
- International cooperation
- Open, national meetings on specific items
- Nobody has exclusive rights to variables
- Exclusive rights are given to people to answer certain, specific research questions within a certain period of time
- Agree on division of rights to specific research questions
- Seek funding from national and international funding agencies

Guidelines for access to data

A researcher can write a contract with MoBa which will give a right to analyse and publish on a specific topic within a certain limited period of time

More details on www.fhi.no

Publications

- Protocols, questionnaires on website: www.fhi.no/tema/morogbarn

- Four main publications
  - Aims, methods, participation
  - Recruitment bias
  - Loss to follow up
  - Biobank

- Several publications based on sub projects

Thank you!

www.fhi.no/tema/morogbarn