

# **Relevance of medical birth registries in epidemiological research and surveillance**

- **Implications as illustrated by experience from the Medical Birth Registry of Norway**

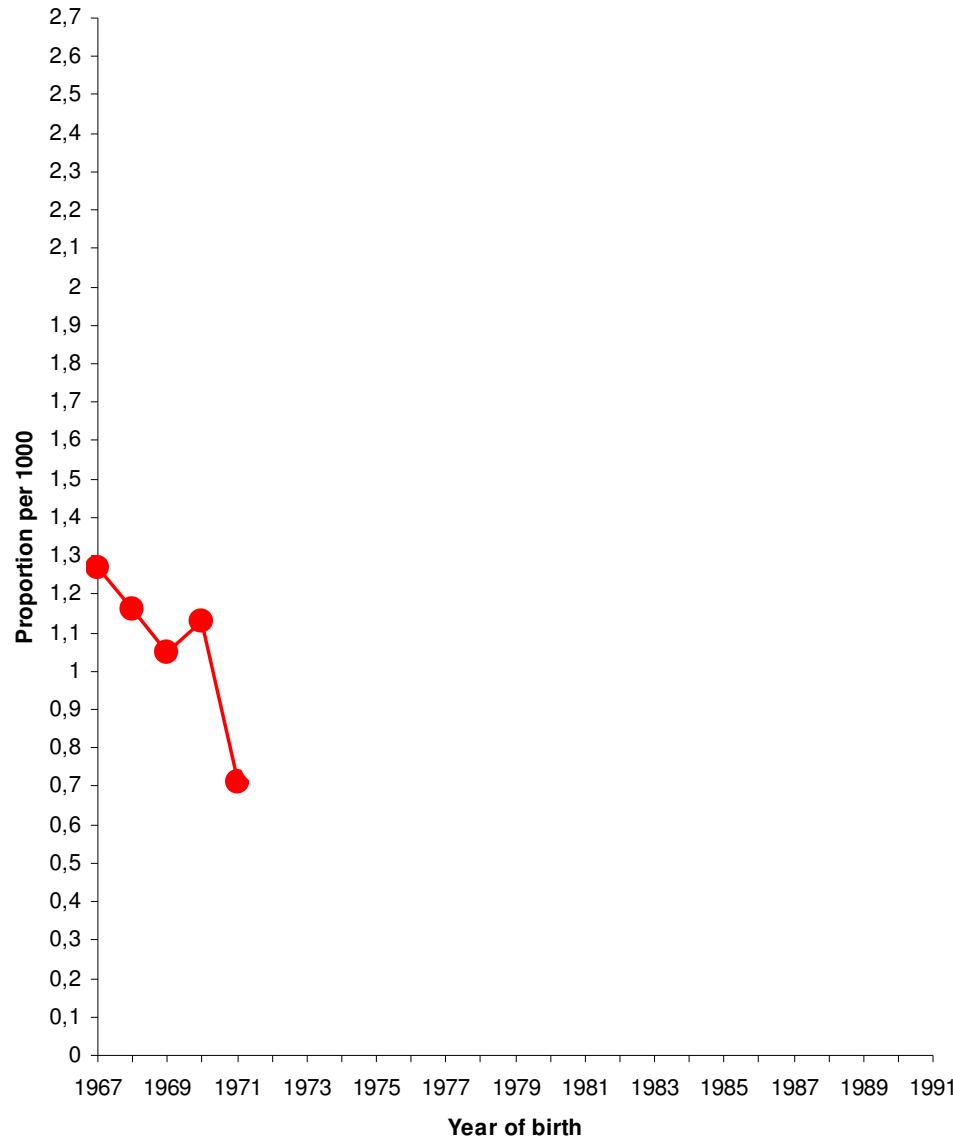
By

Lorentz M. Irgens MD, PhD

Professor of Preventive Medicine and Epidemiology.

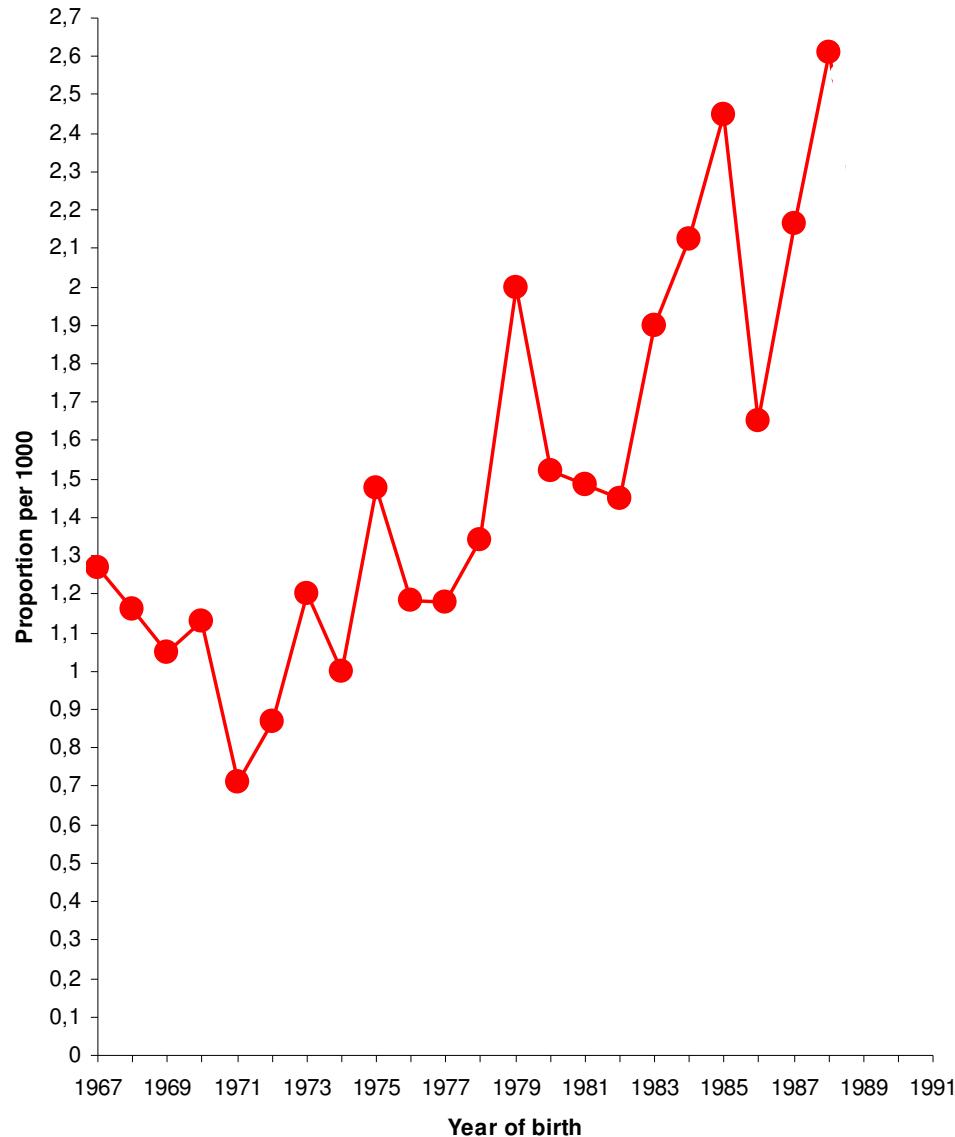
Institute of Public Health and Primary Health Care,  
University of Bergen  
and the Medical Birth Registry of Norway

XVIII IEA World Congress of Epidemiology  
Porto Alegre, Brazil, September 2008



## Cases of X by year of birth in Norway 1967-1971.

Irgens et al 1995.

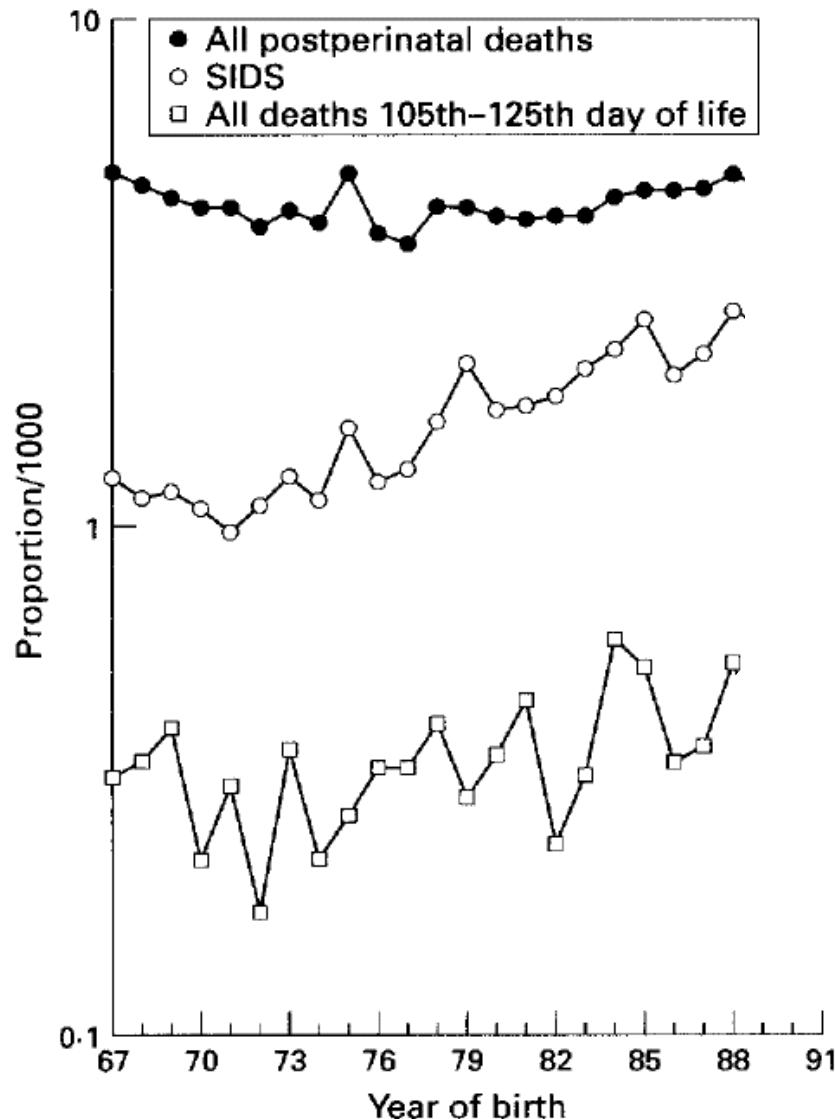


## Cases of X by year of birth in Norway 1967-1988.

Irgens et al 1995.

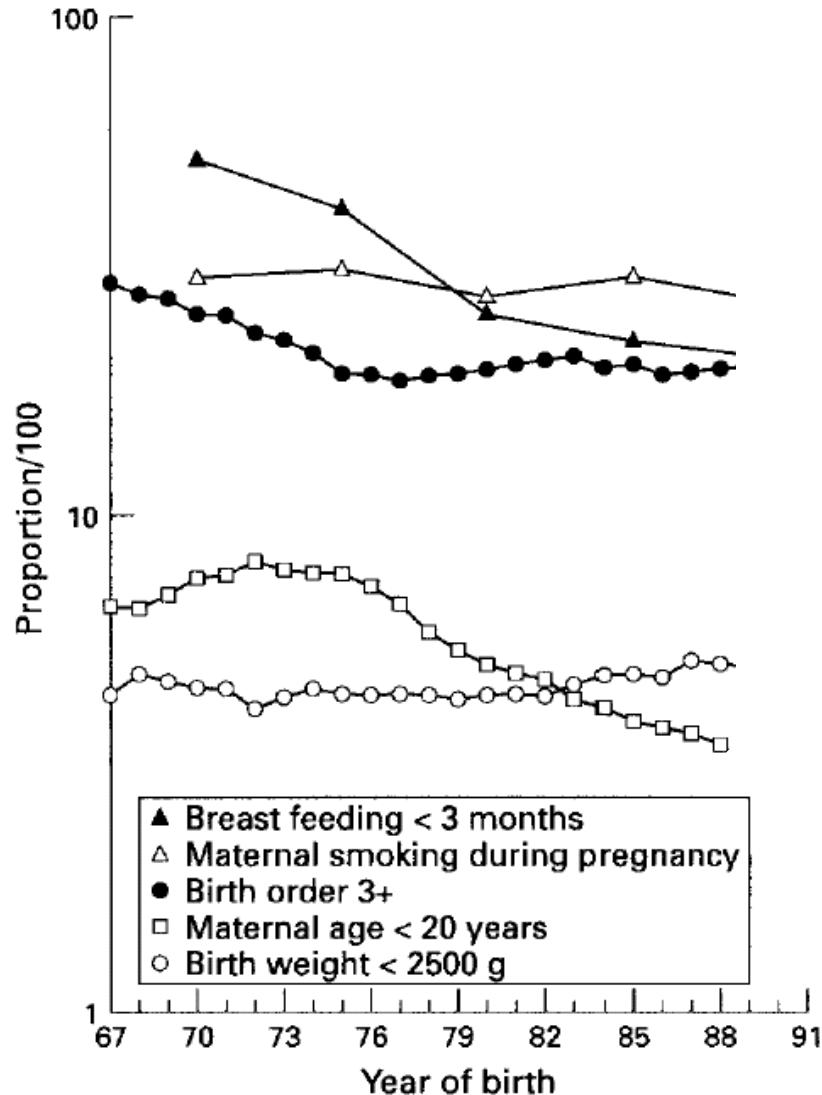
# X = Sudden Infant Death Syndrome

(But pathologists did not believe in the trend)



**Occurrence  
(proportion/1000 survivors  
of the perinatal period) of  
postperinatal death of  
SIDS, and of death from  
the 105th through the  
125th day of life by year of  
birth in Norway 1967-1988.**

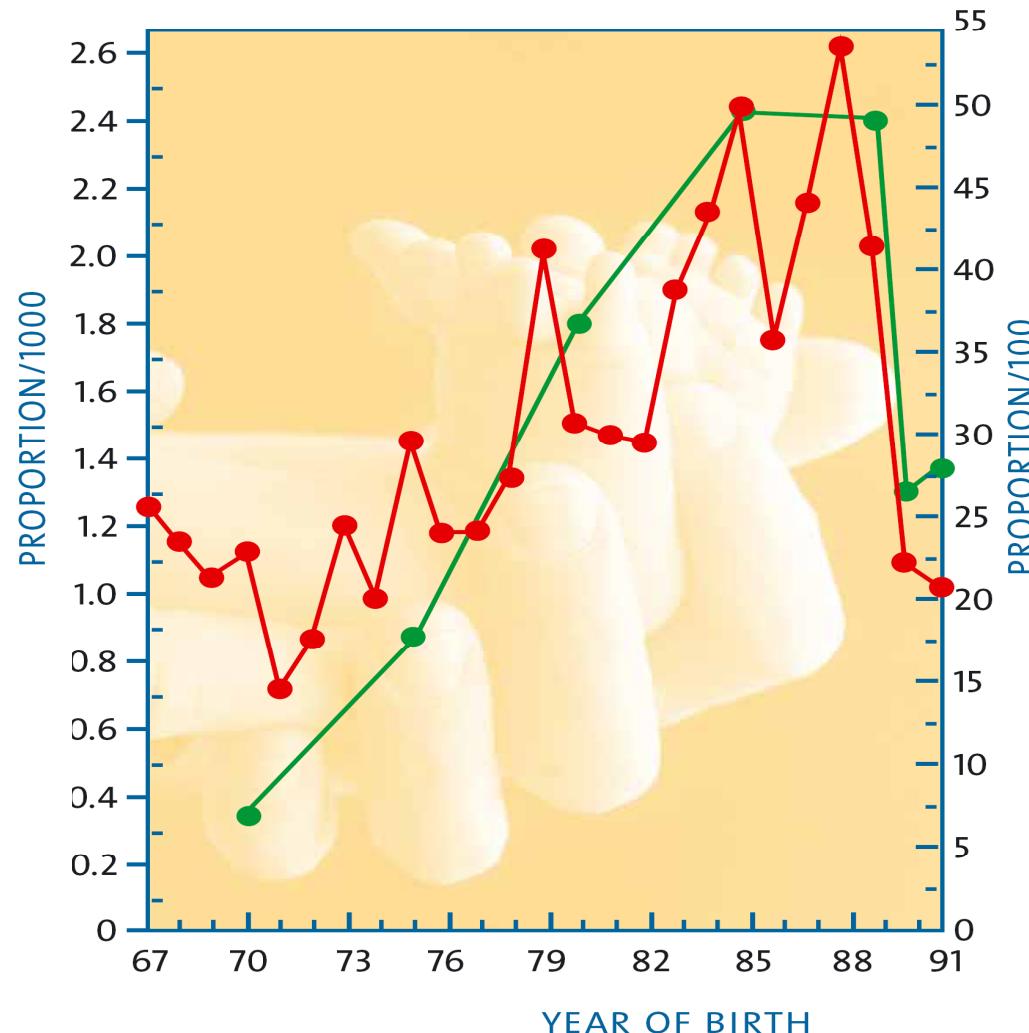
Irgens et al 1995.



**Occurrence (proportion/100) among infants born in the 20 largest maternity institutions in Norway of breast feeding <3 months and maternal smoking during pregnancy (data from questionnaire), and birth order 3+, maternal age <20 years, and birth weight <2500 g (Data from the Medical Birth Registry of Norway by year of birth).**

Irgens et al 1995.

 **SIDS PER 1000**  
 **PRONE SLEEPING PER 100**



*Irgens LM, Markestad T,  
 Baste V, Schreuder P,  
 Skjærven R, Øyen N.*  
 Sleeping position and  
 sudden infant death  
 syndrome in Norway  
 1967-91. Arch Dis Child  
 1995;72:478-82.

**During the period 1970-1989 more than 1000 healthy infants died unnecessarily in Norway due to lack of evidence based knowledge and improper counselling**

# Lack of evidence based knowledge:

## MORTALITY OF AMPUTATION.

*By BENJAMIN PHILLIPS, Esq., F.R.S., Surgeon to the Mary-le-bone Infirmary.*

In November, 1837, a paper was read before the Royal Medical and Chirurgical Society, by B. Phillips, Esq., F.R.S., Surgeon to the Mary-le-bone Infirmary, from which, at our request, the author has extracted a portion, which has great interest, because so few attempts have been made in this country to apply the statistical method of enquiry to the science of surgery. The object of the enquiry was to discover whether the opinion commonly entertained with respect to the mortality succeeding to amputation is correct; and the result is exhibited in a comparative table, prepared from statements obtained from authentic sources in France, Germany, the United States, and Great Britain.

"In the outset, I am bound to express my regret, that the riches of our great hospitals are rendered so little available for enquiries like the present, that these noble institutions, which should be storehouses of exact observation, made on a large scale, and from which accurate ideas should be disseminated throughout the land, are almost completely without the means of fulfilling this very important object.

"If any evidence were necessary to shew the fallacy of resting satisfied with vague impressions, it has been afforded in the progress of the present investigation. It has happened, on several occasions, that the medical men to whom I have applied for the results of their individual experience, have at once said, 'I rarely lose a case after amputation;' and when they have referred to their own notes, or to the hospital records (where

## World

BRITAIN

# Alarming rise in birth defects

Drugs and diet are possible causes of an increase in babies born with three abnormalities, including cleft palate.

by Jeremy Laurance

in London

The number of babies born in Britain with certain types of abnormality has increased by up to 50 per cent in five years, a medical charity says.

The Birth Defects Foundation calculates that 45,000 babies are born each year with defects ranging from spina bifida — an abnormality of the spine — to prominent birthmarks or minor malformations of the hands or feet.

The total is six times higher than the Government's own figures for neonatal abnormalities and amounts to one in 16 of all births.

However, the Office of National Statistics admits that its own figures do not reflect the scale of the problem.

No clear explanation has emerged, but drug use by young mothers and an increase in oestrogen-like substances in the diet

are possible factors.

While some types of abnormality are declining, the foundation's figures reveal a sharp rise in three specific defects — cleft lip or palate, gastroschisis (abnormality of the abdominal wall) and hypospadias (abnormality of the genitals).

It is campaigning with a five-point plan to alert mothers to take account of their family medical history, take folic acid supplements, reduce alcohol, stop smoking and eat a balanced diet.

Foundation medical director Professor Michael Patton, who is head of medical genetics at St George's Hospital in Tooting, said the figure of one in 16 babies born with a defect was "frequently used in genetic circles".

Research for the foundation showed that the incidence of cleft lip or palate, requiring several operations to repair, had risen from 5.9 cases per 10,000 births in 1995 to 9.2 cases in 1999.

Official figures seriously underestimate the true position  
Birth Defects Foundation

Hypospadias, a condition affecting boys in which the opening of the penis is situated on the underside of the shaft, had risen from 7.5 to 8.5 cases.

In severe cases, the opening is so far back that there is doubt about the gender of the child.

Professor Patton said: "Some substances in the diet, such as soya, contain phyto-oestrogens which it has been suggested could have a feminising effect on males."

The feminising effect of environ-

mental pollutants was further highlighted in the *Independent on Sunday*, which reported on how fish in British rivers were developing female characteristics.

Gastroschisis, a weakness in the abdominal wall that leaves the baby with its intestines protruding at birth, had risen from 1.3 to 1.9 cases, the professor said.

The condition has been rising in the US and Britain and is five times more common in teenage mothers.

Professor Patton said: "One idea has been that perhaps it is the use of recreational drugs by teenage mothers that is behind this rise.

"I believe that the majority of malformations are not caused by the environment but are dependent on genetic factors. Where we see fluctuations there may be an environmental factor."

He said the "great success story" had been with spina bifida. By noting the trends and relating them to diet, the link with folic acid had been

discovered, and the acid was now given to all pregnant women. The incidence of the condition has been reduced by 60 per cent.

Figures collected by the Office for National Statistics show there were 7284 children born in 2000 notified to the National Congenital Anomaly System.

Planning for schools, hospitals and other services is based on official figures, but the foundation said these "seriously underestimate the true position".

Foundation chief executive Sheila Brown said the statistics office relied on voluntary reporting by doctors and midwives of defects recognised at birth.

Many defects were not reported and others did not become apparent until the child was older.

A spokesman for the statistics office said: "It has long been recognised that there is under-reporting. Efforts are being made to improve the system." — INDEPENDENT

# **Mr. Dagfinn Høybråten, Minister of Health, Norway.**

## **Speech at EU Ministers of Health meeting on Environment and Child Health in Budapest, June 2004**

Continuous progress in the development of new chemical agents or processes, beneficial to mankind in many fields, may still represent a potential threat to public health. Such agents may even include medical drugs. The late 1950s saw the so called thalidomide catastrophe in which more than 7000 children were born without arms or legs due to a sleeping pill. Later, other drugs causing birth defects have been identified.

In 1986, the Chernobyl accident represented a similar threat. However it appeared that in most countries where statistics are available, the doses were too low to cause an increased occurrence of birth defects.

In recent years, the general public has, to an increasing extent, become aware that such threats may apply in the local community. Apparent clusters of health problems have been attributed to environmental pollution. In Norway, as in many other countries, the issue has been raised on an increasing number of occasions.

## Mr. Høybråten's speech (continued)

Birth defects and other perinatal health problems are important not only due to their immediate consequences to the newborn. Increasing evidence suggests that perinatal conditions are related to common health problems in adulthood such as cardiovascular disease and cancer.

**Thus, with the associations established between environmental factors as well as pollution and perinatal health problems and the bearing of such health problems on adult health, there is an urgent need for a country to carefully monitor the occurrence of birth defects and other perinatal health problems.**

Equally important is the need to sort out and acquit suspected factors that eventually don't represent any hazard. The aim is not only to provide a better start in life for the newborn, but also to identify and eliminate, as soon as possible, sources of environmental pollution that could represent a threat to children's health up to adulthood. **Initiatives should be taken to support ongoing monitoring functions and to set up new monitoring programmes in countries where such programmes are lacking.**

# **Perinatal Health, a Challenge of the Community (Why should we care?)**

- 1. Birth and infancy represent high risks**
  - Infant Mortality Rate = Mortality Rate at age 67 years
  - Perinatal Mortality Rate = Mortality Rate at age 100 years
  
- 2. Perinatal diseases and injuries can cause serious and long lasting disability (high number of DALYs)**
  - Neural tube defects
  - Cerebral palsy
  - Low birthweight/Prematurity related conditions

## Why should we care? (continued)

3. Intra uterine programming of adult diseases (a.m. Barker)
  - Diabetes
  - Cardiovascular diseases etc.
4. The community value of a newborn is increasing
  - Low fertility
  - Increasing population of elderly people
5. A birth may serve as an environmental indicator with a latency period of 9 months

# The Medical Birth Registry of Norway

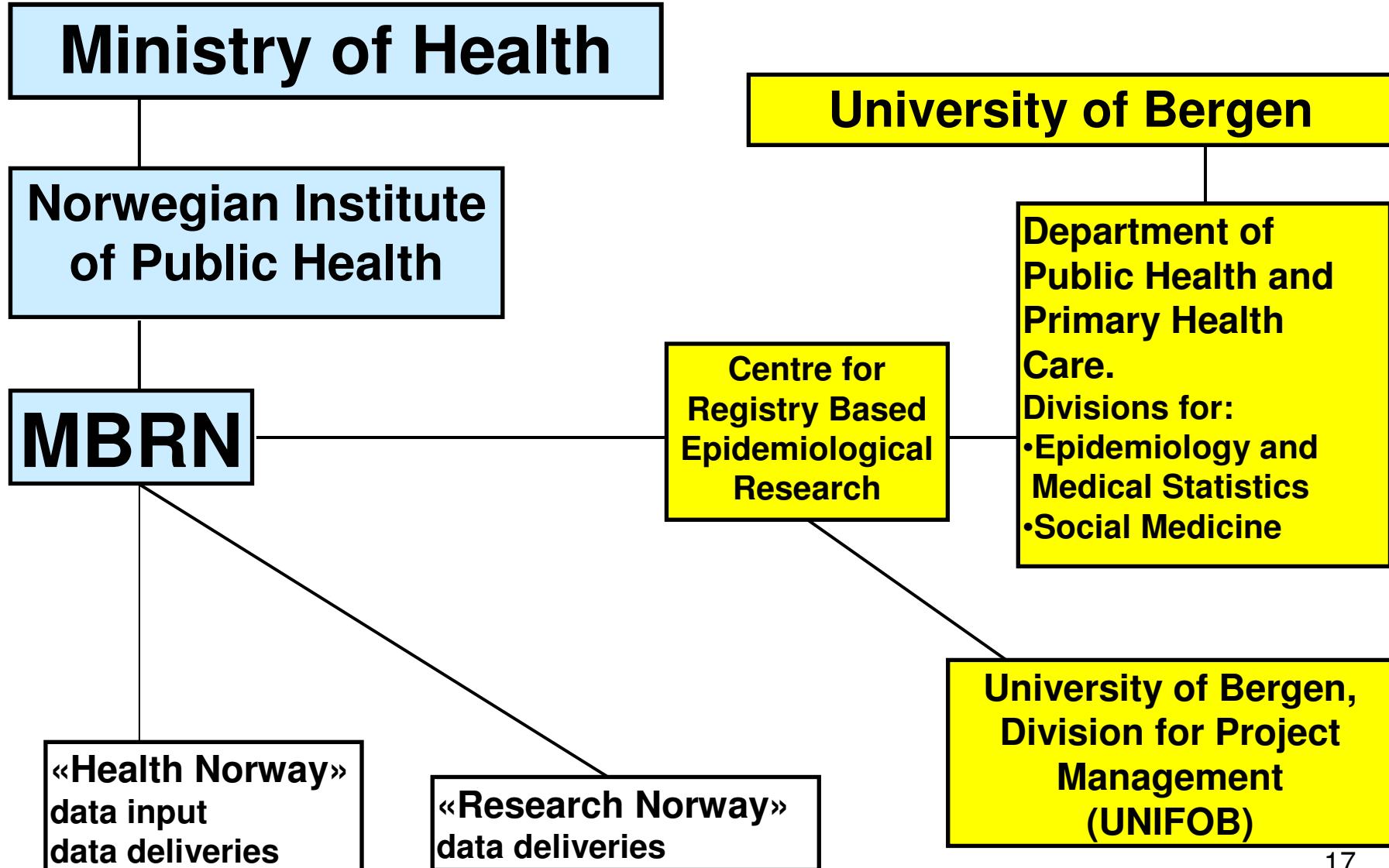
- The thalidomide catastrophe ≈ 1960
- Established at the University of Bergen: 1970
- Comprising all births in Norway: 1967 →
  - 2007: approx. 2.5 mill births
- Reorganized at the UoB in affiliation with the National Institute of Public Health 1985
- New notification form 1999
- Reorganized under the Norwegian Institute of Public Health in affiliation with UoB 2002

# **Statutes of the Medical Birth Registry of Norway (MBRN)**

(as given by the director General of Health 14 November 1984)

## **MBRN shall provide data for:**

- the clarification of causes of perinatal health problems aiming at prevention
- the epidemiological monitoring of birth defects and other perinatal health problems
- the monitoring and evaluation of health services during pregnancy and birth as well as the perinatal period
- development of norms, standards and recommendations for the health services.



# **Regulations for The Medical Birth Registry of Norway (2001) pursuant to the Act of Health Registries (2001)**

MBRN comprises data identified by the national identification number on:

- all births after 12 weeks of gestation
- all terminations of pregnancy after 12 weeks of gestation.

## **MBRN Regulations (continued):**

### **NOTIFICATION:**

Any midwife or physician, providing health services regarding a confinement or a newborn are obliged to notify data on the birth in a notification form to the MBRN.

STATENS HELSETILSYN  
Postboks 8128 Dep.  
0032 OSLO

**Medisinsk registrering av fødsel**

Sendes 9. dag etter fødselen til  
fylkeslegen (stadsfysikus) i det  
fylket der moren er bosatt.

Merk: Det skal fylles ut blankett for hvert barn (foster). Dør barnet etter fødselen, skal det også fylles ut legeerklæring om  
dødfall, og/eller dødsfallet meldes til skifterettet (lensmannen).

Barnet	Barnet var 1 <input type="checkbox"/> Levende 2 <input type="checkbox"/> Dødfødt feft	Født dag, mnd., år	Klokkeslett	Personnr.	Skriv ikke her
	1 <input type="checkbox"/> Enkel 2 <input type="checkbox"/> Twilling 3 <input type="checkbox"/> Trilling 4 <input type="checkbox"/> Firling		1 <input type="checkbox"/> Kjenn Gutt 2 <input type="checkbox"/> Pike		
	Etternavn, alle fornavn (bare for levendefødte)				
	Fødested. Navn og adresse på sykehuset/fødehjemmet			Kommune	
Faren	Etternavn, alle fornavn		Født dag, mnd., år	Bostedskommune	
Moren	Etternavn, alle fornavn. Pikenavn			Født dag, mnd., år	
	Bosted. Adresse			Kommune	
	Ekteskapelig status 1 <input type="checkbox"/> Ugift 6 <input type="checkbox"/> Samboende 2 <input type="checkbox"/> Gift 3 <input type="checkbox"/> Enke 4 <input type="checkbox"/> Separert 5 <input type="checkbox"/> Skilt	Ekteskapsår (gitt)			
	Antall tidligere føtde (for denne fødselen)	Levende føchte	Av disse i live	Dødføte	
Er moren i slekt med faren? 1 <input type="checkbox"/> Nei 2 <input type="checkbox"/> Ja. Hvilket slektskapsforhold:					
Morens helse før svanger- skapet	1 <input type="checkbox"/> Normal 2 <input type="checkbox"/> Sykdom (spesifiser):			Siste mondrutajons første bloddningsdag	
Morens helse under svanger- skapet	1 <input type="checkbox"/> Normal 2 <input type="checkbox"/> Komplikasjoner (spesifiser):				
Ble fødselen provosert	1 <input type="checkbox"/> Nei 2 <input type="checkbox"/> Ja				
Inngrep under fødselen	1 <input type="checkbox"/> Nei 2 <input type="checkbox"/> Ja (spesifiser): Inngrep utført av 1 <input type="checkbox"/> Lege 2 <input type="checkbox"/> Jordmor				
Komplika- sjoner fortbindelse med fødselen	1 <input type="checkbox"/> Nei 2 <input type="checkbox"/> Ja (spesifiser):				
Fostervann, placenta og navlevesnor	1 <input type="checkbox"/> Normalt 2 <input type="checkbox"/> Patologisk (spesifiser):				
Barnets tilstand	Bare for levende føchte. Tegn på asfyksi?		Apgarscore etter 1 min. etter 5 min.		
	1 <input type="checkbox"/> Nei 2 <input type="checkbox"/> Ja				
	For levende føchte og dødfølte. Tegn på medfødt anomalie, på skade eller sykdom?				
	1 <input type="checkbox"/> Nei 2 <input type="checkbox"/> Ja. Hvilke: Dødsårsak: Lengde (i cm) Hode-omkr. (i cm) Vekt (i g) For døde innen 24 timer Livet varte i Timer Min				
For dødføte. Deden inntrådte 1 <input type="checkbox"/> For fødselen 2 <input type="checkbox"/> Under fødselen					
Seksjon? 1 <input type="checkbox"/> Nei 2 <input type="checkbox"/> Ja					
Alvorlige arvelige lidelsjer i slekten	1 <input type="checkbox"/> Nei 2 <input type="checkbox"/> Ja. Sykdommens art og hos hvilke slektrninger:				
Sted (sykehusets stempel) Dato Jordmor Lege					
IK - 1002.					



Avdeling for medisinsk fødselsregister  
Department of Medical Birth Registry of Norway

# MBRN Notification form 1967-1998

**Melding om avsluttet svangerskap etter 12. uke – Fødsel, dødfødsel, spontanabort**

Se utlysningstriks for blanketten på baksiden

Institusjonens navn:	Fødsel utenfor institusjon:	Mors fullt navn og adresse
Gitt <input type="checkbox"/> Ugift/enlig <input type="checkbox"/> Annet	Hjemme, planlagt <input type="checkbox"/> Hjemme, ikke planlagt <input type="checkbox"/>	
Sivilstatus: Sambær <input type="checkbox"/> Skilt/separert/enke	Under transport <input type="checkbox"/> Annet sted <input type="checkbox"/>	
Stedskap mellom barnets føredøde: Nei <input type="checkbox"/> Ja <input type="checkbox"/> Hva ja, hvorledes:	Mors bokommune	
Fars fødselsdato		Fars fullt navn
		Mors fødselsdato:
Siste menstr. 1. bledn.dag: <input type="checkbox"/> Sikker <input type="checkbox"/> Usikker      Mors tidligere evengangssyføde: <input type="checkbox"/> Levende føte      Dødføte (24. uke og over)      Spontanabort/Dødfødsel (12–23. uke)      Spontanaborter (under 12. uke)		
Ultralyd utført? <input type="checkbox"/> Nei <input type="checkbox"/> Ja, ul. termin: <input type="checkbox"/> Speciell forhold for svangerskapet: - Intet spesielt <input type="checkbox"/> Astma <input type="checkbox"/> Allergi - Tidligere septic <input type="checkbox"/> Res. urinveisinfeksjon - Blodning < 13 uke <input type="checkbox"/> Blodning 13–28 uke - Blodning > 28 uke <input type="checkbox"/> Glukosur <input type="checkbox"/> Svangerskapsdiabetes		
Annen prenatal diagnostikk? <input type="checkbox"/> Ja, ang. type: <input type="checkbox"/> Regelmessig knottflikkende? <input type="checkbox"/> Nei <input type="checkbox"/> For svak. i svk. Spesiell forhold under svangerskapet: - Intet spesielt <input type="checkbox"/> Kronisk nyresykdom <input type="checkbox"/> Epilepsi - Tidligere septic <input type="checkbox"/> Kronisk hypertensjon <input type="checkbox"/> Diabetes type 1 - Res. urinveisinfeksjon <input type="checkbox"/> Reumatoid arthrit <input type="checkbox"/> Diabetes type 2 - Blodning < 13 uke <input type="checkbox"/> Hjertesykom <input type="checkbox"/> Annet, spesiell i +B - Blodning 13–28 uke <input type="checkbox"/> Hypertension alone <input type="checkbox"/> Elamps - Blodning > 28 uke <input type="checkbox"/> Preeklamps lett <input type="checkbox"/> Hb < 9,0 g/dl - Glukosur <input type="checkbox"/> Preeklamps alvorlig <input type="checkbox"/> Hb > 13,5 g/dl - Svangerskapsdiabetes <input type="checkbox"/> Trombose, beh. <input type="checkbox"/> Legemidler i svangerskapet: - Intet spesielt <input type="checkbox"/> HELLP syndrom <input type="checkbox"/> Infeksjon, spes. i +B - Samtykket ikke for relaycept. evaluering? <input type="checkbox"/> Ja <input type="checkbox"/> Ja – spesiell i +B		
Rekkevirke og yrke Forutsette mors symptomer – se rettlinning på baksiden Rekkevirke mors svak. begynnelse? <input type="checkbox"/> Nei <input type="checkbox"/> Daglig      Mors yrke: <input type="checkbox"/> Samtykket ikke for relaycept. <input type="checkbox"/> Ikke yrkesaktiv Skriftlig orientering gitt til mor ved svak. evaluering? <input type="checkbox"/> Nei <input type="checkbox"/> Daglig <input type="checkbox"/> Yrkesaktiv høstid Samtykket ikke for relaycept. evaluering? <input type="checkbox"/> Av og til <input type="checkbox"/> Ant. sig. dagl.: <input type="checkbox"/> Yrkesaktiv døttid		
Leile/presentasjon: <input type="checkbox"/> Sete <input type="checkbox"/> Fødselstart: Ev. Induksjons-metode: <input type="checkbox"/> Prostaglandin <input type="checkbox"/> Normal bakhode <input type="checkbox"/> Spontan <input type="checkbox"/> Oxytoxin <input type="checkbox"/> Twintele <input type="checkbox"/> Indusert <input type="checkbox"/> Annnotomi <input type="checkbox"/> Avvikende hodefødsel <input type="checkbox"/> Sectio <input type="checkbox"/> Annet, spesiell i +C+		
Innrep/tiltak: <input type="checkbox"/> Ingen <input type="checkbox"/> Fremhåvd ved fødselen: <input type="checkbox"/> Sectio: <input type="checkbox"/> Prostaglandin <input type="checkbox"/> Utslekkning <input type="checkbox"/> Venlig fremhåvd: <input type="checkbox"/> Var sectio planlagt for fødsel? <input type="checkbox"/> Nei <input type="checkbox"/> Ja <input type="checkbox"/> Vakuumevaktraktor <input type="checkbox"/> Annons tang, hodeleie <input type="checkbox"/> Utretning <input type="checkbox"/> Epistomi <input type="checkbox"/> Venlig fremhåvd <input type="checkbox"/> Utret som elektiv sectio <input type="checkbox"/> Tørring <input type="checkbox"/> Annons tang, hodeleie <input type="checkbox"/> Utret som akutt sectio <input type="checkbox"/> Komplikasjoner: <input type="checkbox"/> Ingen <input type="checkbox"/> Placenta previa <input type="checkbox"/> Blodn.: 1500 ml, transf. <input type="checkbox"/> Vannavv., 12–24 timer <input type="checkbox"/> Abruptio placenta <input type="checkbox"/> Blodning 500–1500 ml <input type="checkbox"/> Truende intrauterin astyki <input type="checkbox"/> Vannavv., > 24 timer <input type="checkbox"/> Perinealruptur (grad 1–2) <input type="checkbox"/> Eksempl. under fødsel <input type="checkbox"/> Risvekkelse, stimulert <input type="checkbox"/> Mekaniske misforhold <input type="checkbox"/> Perinealruptur (grad 1–2) <input type="checkbox"/> Langsom trempang <input type="checkbox"/> Vanstelig skaderføring <input type="checkbox"/> Spincterruptur (gr.3–4) <input type="checkbox"/> Utens atoni <input type="checkbox"/> Annet: <input type="checkbox"/> Anestesis/analgesci: <input type="checkbox"/> Lystgass <input type="checkbox"/> Epidural <input type="checkbox"/> Pancreatical blokk <input type="checkbox"/> Ingen <input type="checkbox"/> Petdin <input type="checkbox"/> Spinal <input type="checkbox"/> Infiltrasjon <input type="checkbox"/> Narkose <input type="checkbox"/> Annet: <input type="checkbox"/> Placenta: <input type="checkbox"/> Koagler <input type="checkbox"/> Navlesnor <input type="checkbox"/> Omstryng rundt hals <input type="checkbox"/> Normal <input type="checkbox"/> Utskrapning <input type="checkbox"/> Normal <input type="checkbox"/> Misfarget <input type="checkbox"/> Hinnerester <input type="checkbox"/> Manuell utrenting <input type="checkbox"/> Annos omslyng <input type="checkbox"/> Polyhydramnon <input type="checkbox"/> Utvistendig <input type="checkbox"/> Placenta- vekt <input type="checkbox"/> Venlamentest festa <input type="checkbox"/> Ekte knute <input type="checkbox"/> Stinkende, infisert <input type="checkbox"/> Infekter <input type="checkbox"/> Karanomaller lengde: <input type="checkbox"/> Marginalt teste <input type="checkbox"/> Oligohydramnon <input type="checkbox"/> Blodtblænder <input type="checkbox"/> Karanomaller		
Fødselsdato      Klokken      Pluralt: <input type="checkbox"/> Enkeltfødsel      For flerfødsel: <input type="checkbox"/> Kjenn: <input type="checkbox"/> Gutt      Barnets vekt: <input type="checkbox"/> Total lengde: <input type="checkbox"/> Apgar score: <input type="checkbox"/> 1 min <input type="checkbox"/> Flerfødsel      Nr. <input type="checkbox"/> Av totalt <input type="checkbox"/> Piken <input type="checkbox"/> Ved vi spesiell i +D+ <input type="checkbox"/> Barnet var: <input type="checkbox"/> Dad før fødel      For dadføde, oppgi også: <input type="checkbox"/> Levendefødt, dad innen 24 timer <input type="checkbox"/> For dadføde: <input type="checkbox"/> Usikert kjenn <input type="checkbox"/> Eventelt sot-sissemå: <input type="checkbox"/> 5 min <input type="checkbox"/> Levendefødt <input type="checkbox"/> Dødfødsel <input type="checkbox"/> Dødfødsel, abort <input type="checkbox"/> Dødfødsel, dødfødsel i +D+ <input type="checkbox"/> Dødfødsel <input type="checkbox"/> Dødfødsel <input type="checkbox"/> Dødfødsel senere (dato): <input type="checkbox"/> Klokken <input type="checkbox"/> Dødfødsel <input type="checkbox"/> Dødfødsel, abort <input type="checkbox"/> Dødfødsel, dødfødsel i +D+ <input type="checkbox"/> Dødfødsel <input type="checkbox"/> Dødfødsel <input type="checkbox"/> Dødfødsel senere (dato): <input type="checkbox"/> Klokken <input type="checkbox"/> Overfl. barnearvad: <input type="checkbox"/> Nei <input type="checkbox"/> Ja <input type="checkbox"/> Data: <input type="checkbox"/> Overfl. til: <input type="checkbox"/> Indikasjon for overførtning: <input type="checkbox"/> Respirasjonsproblem <input type="checkbox"/> Medfødt mid. <input type="checkbox"/> Annet, spesiell <input type="checkbox"/> Neoplasmer <input type="checkbox"/> Hypoglyk. (< 2 mmol/l) <input type="checkbox"/> Transit, tachypnoe <input type="checkbox"/> Cerebral infusjon <input type="checkbox"/> Konjunktivit beh. <input type="checkbox"/> Fract, clivituse <input type="checkbox"/> Behandlingskoder: <input type="checkbox"/> Icterus behandlet <input type="checkbox"/> Neoplasmer <input type="checkbox"/> Med. anemi (Hb < 13,5 g/dl) <input type="checkbox"/> Resp. distress synd. <input type="checkbox"/> Cerebral depreasjon <input type="checkbox"/> Navl./hudl. beh. <input type="checkbox"/> Ann. infektur <input type="checkbox"/> Systemisk antibiotika <input type="checkbox"/> Lysbehandlet <input type="checkbox"/> Neoplasmer <input type="checkbox"/> Høkhoddedøyde, beh. mupla <input type="checkbox"/> Aspirasjonssyndrom <input type="checkbox"/> Abdomens <input type="checkbox"/> Perinat. inf. bakteriell <input type="checkbox"/> Repparatorbeh. <input type="checkbox"/> Usikking <input type="checkbox"/> Neoplasmer <input type="checkbox"/> Intrakraniell blodning <input type="checkbox"/> Neonatal krampar <input type="checkbox"/> Perinat. inf. andre <input type="checkbox"/> Fasiklesprese <input type="checkbox"/> Årsak: <input type="checkbox"/> Neoplasmer <input type="checkbox"/> Kryss av hvile sjøsens er oppføringssjøsene      Jordmor viftekring: <input type="checkbox"/> Mor: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Mor: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type="checkbox"/> <input type="checkbox"/> Tegn til medføde: <input type="checkbox"/> misfølser: <input type="checkbox"/> Jordmor viftekring: <input type="checkbox"/> Legge: <input type="checkbox"/> Utskrivningsdato: <input type="checkbox"/> Barn: <input type		

# MBRN Regulations, continued:

## Items of personal data in the MBRN

### ➤ Mother:

- ✓ National identification number
- ✓ Marital status
- ✓ Parental consanguinity
- ✓ Maternity institution
- ✓ Previous births
- ✓ Last menstrual period
- ✓ Ultra sound based estimated date of confinement
- ✓ Other ultra sound findings
- ✓ Use of medicine during pregnancy including multivitamins and folic acid
- ✓ Smoking habits\*
- ✓ Occupation\*
- ✓ In vitro fertilization
- ✓ Maternal health prior to pregnancy
- ✓ Maternal health during pregnancy
- ✓ Complications and interventions during birth
- ✓ Weight of placenta and length of umbilical cord

22

\* Based on maternal consent

# MBRN Regulations, continued:

## Items of personal data in the MBRN

### ➤ Child:

- ✓ National identification number
- ✓ Sex
- ✓ Live birth, stillbirth, cause of death
- ✓ Birthweight, length, head circumference
- ✓ Plurality (singleton, twin etc.)
- ✓ Neonatal diagnoses including birth defects and injuries
- ✓ Medication and medical interventions
- ✓ During the first year of life:  
all diagnoses and medical interventions regarding conditions present at birth

## MBRN Regulations, continued:

### Items of personal data in the MBRN

➤ **Father:**

- ✓ National identification number
- ✓ Occupation\*
- ✓ Smoking habits\*

\* Based on paternal consent

# Data linkage

**MBRN data may be linked with data from the other Central Health Registries:**

- The Cancer Registry of Norway
- The Cause of Death Registry of Norway
- The National Notification System for Infectious Diseases
- The Tuberculosis Registry of Norway and
- The National System for Immunization Control

in order to establish anonymized research files.

## Requirements:

- ✓ notification to the Data Inspectorate of Norway

# Objectives and tasks of the MBRN

- Epidemiological management
  - ✓ as part of the public health services
- Epidemiological basic research
  - ✓ as part of the scientific community

# Epidemiological management

## ➤ Routine functions

### 1. Routine surveillance of health

- ✓ Annual statistics
- ✓ Epidemiologic surveillance of birth defects in order to detect clusters

### 2. Routine surveillance of clinical services

- ✓ Clinical quality indicators

# Epidemiological management (continued)

## ➤ Ad hoc functions

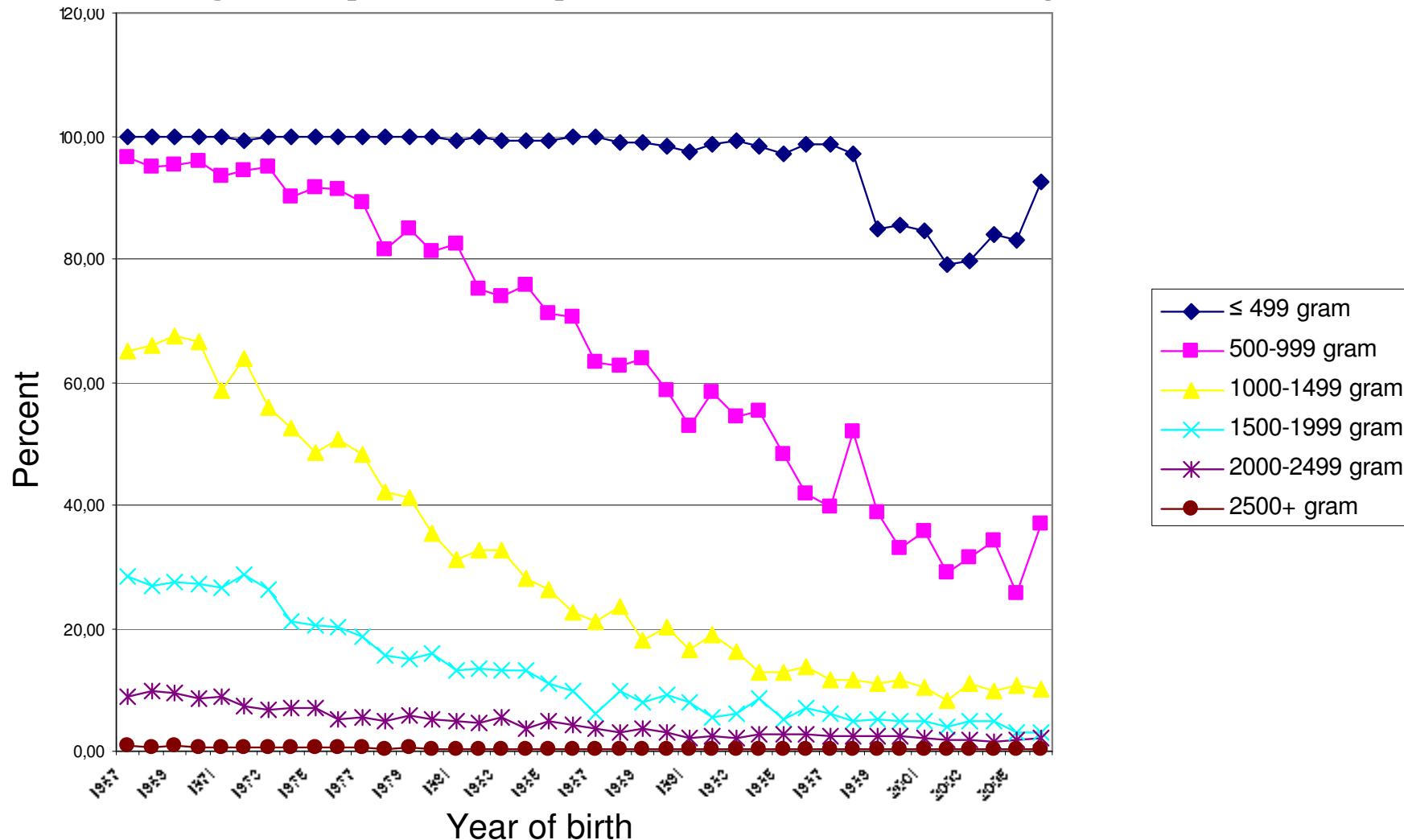
1. Monitoring of clusters suspected by others
2. Monitoring of suspected exposure
3. Production of health statistics or data files by request

## ➤ Routine functions

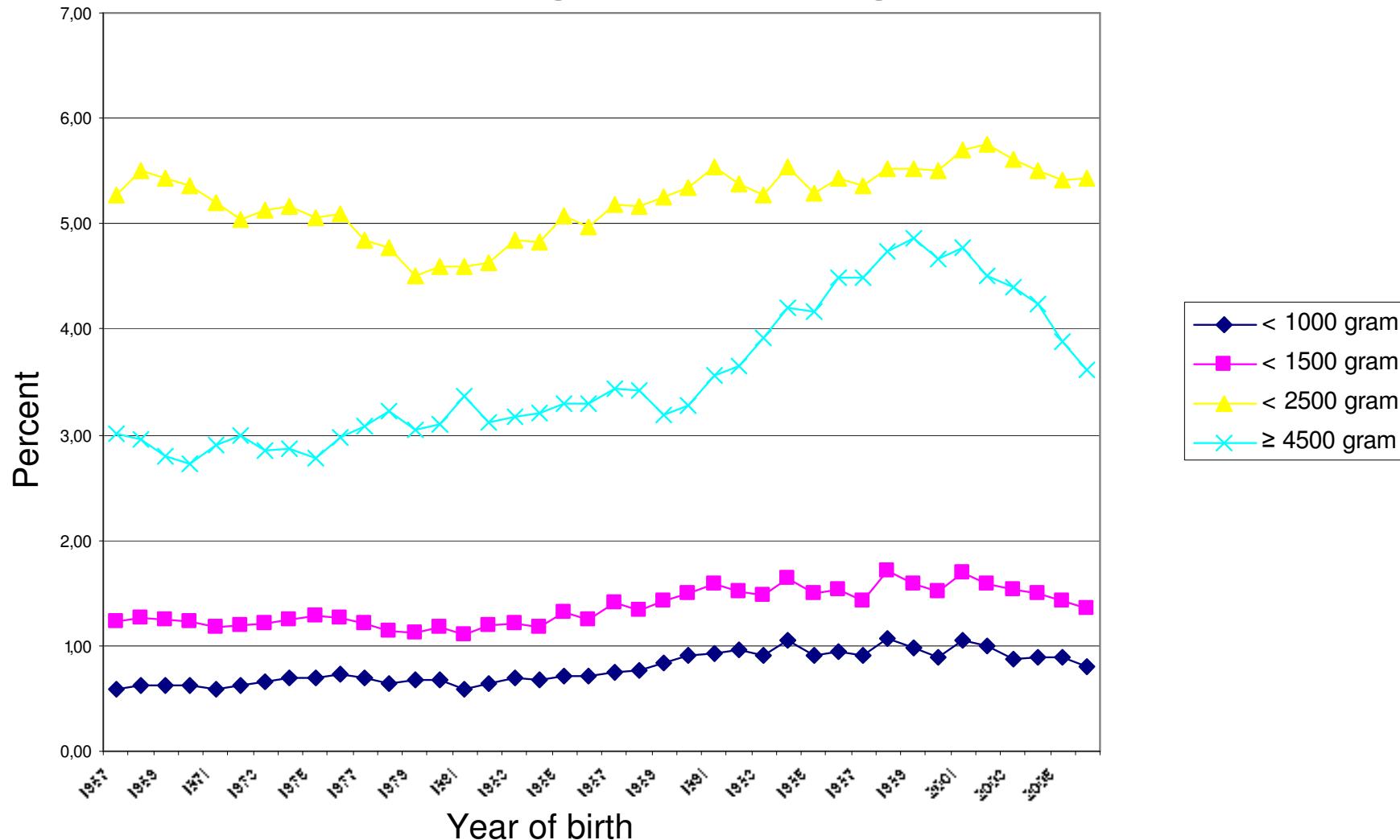
### 1. Routine surveillance of health

- ✓ Annual statistics

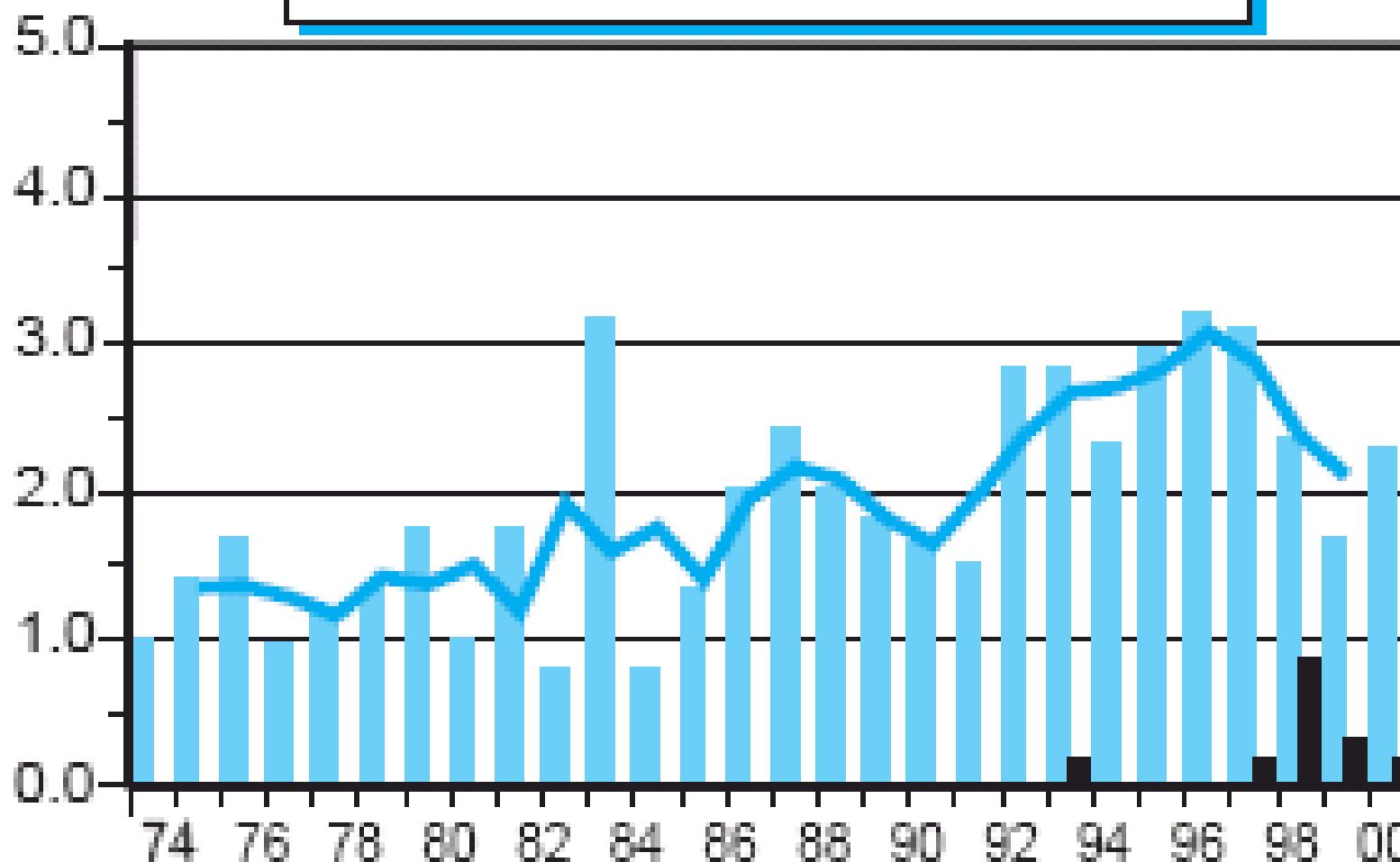
# Weight specific perinatal mortality



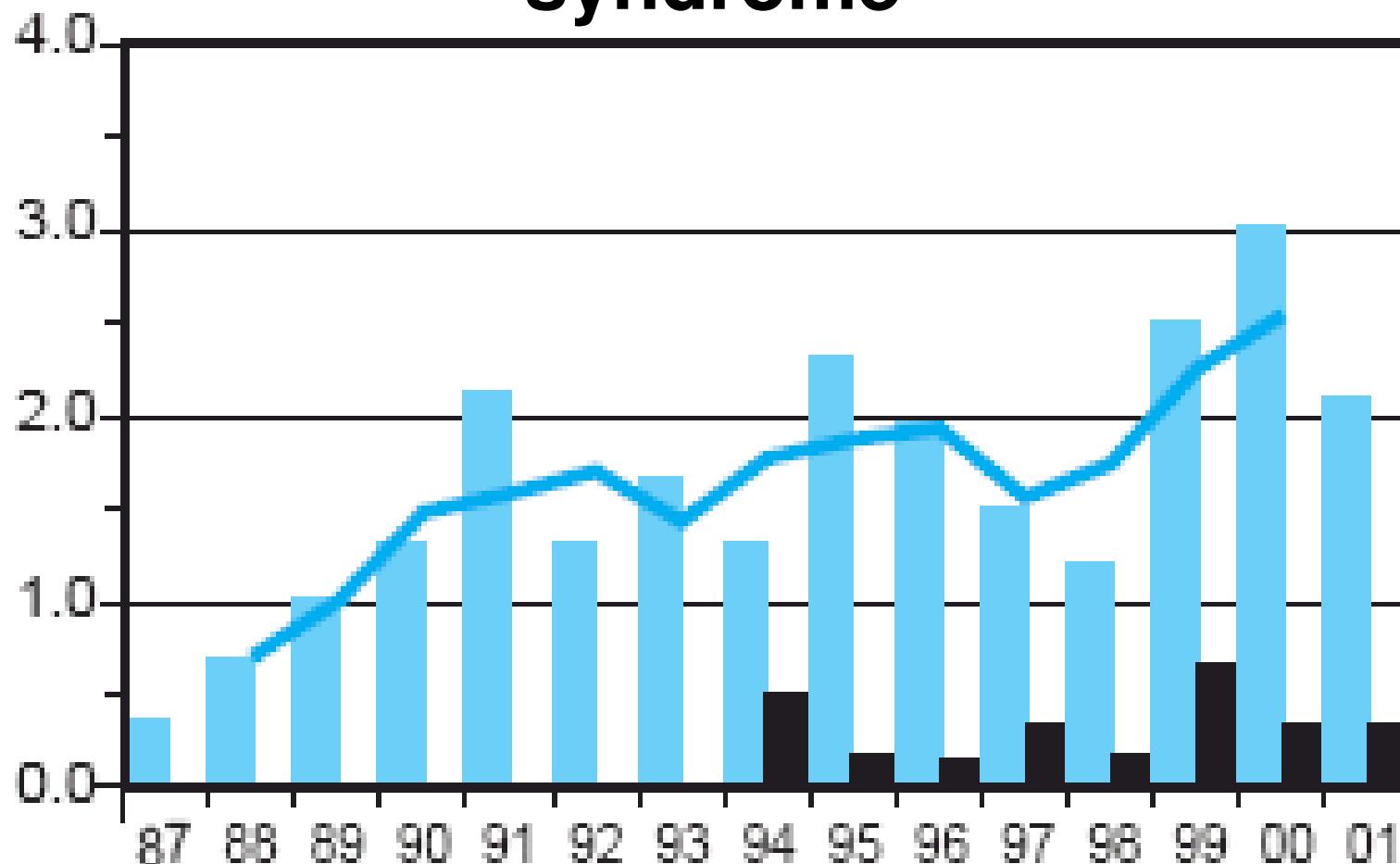
## Low and high birthweight



# Gastroschisis



# Hypoplastic left heart syndrome

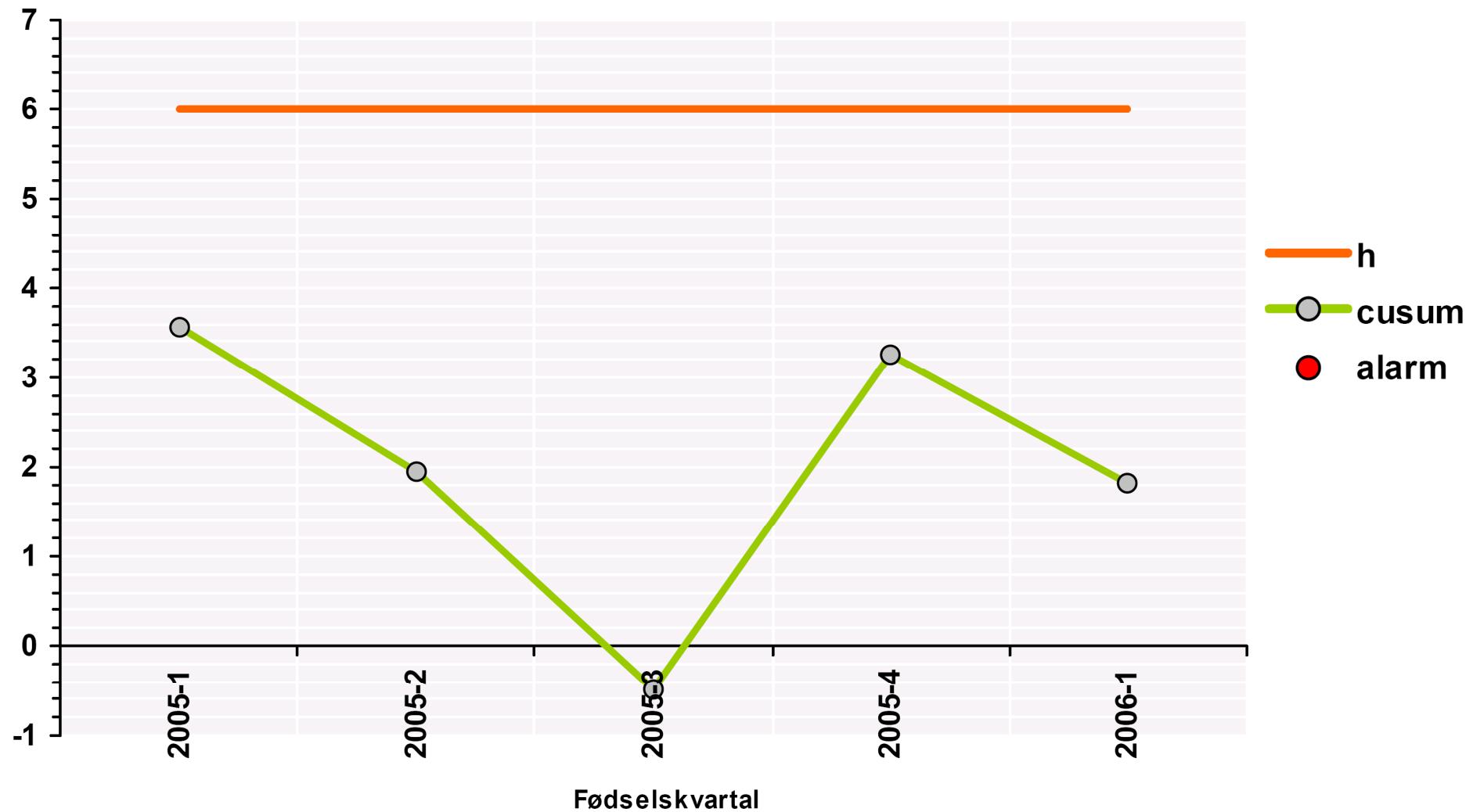


## ➤ Routine functions

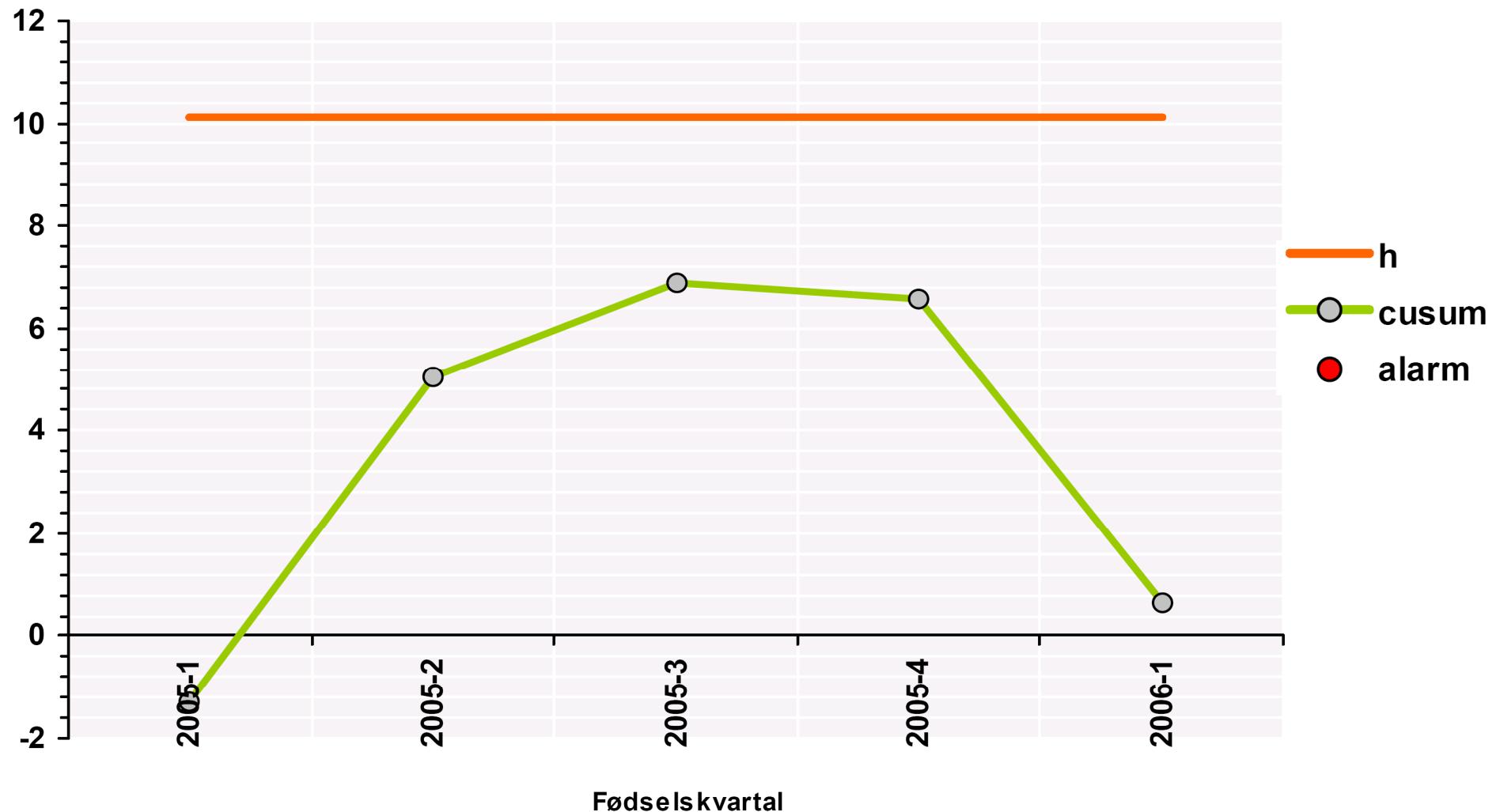
### 1. Routine surveillance of health

- ✓ Epidemiologic surveillance of birth defects in order to detect clusters

## Cusumplot: GASTROS



## Cusumplot: SPINAB

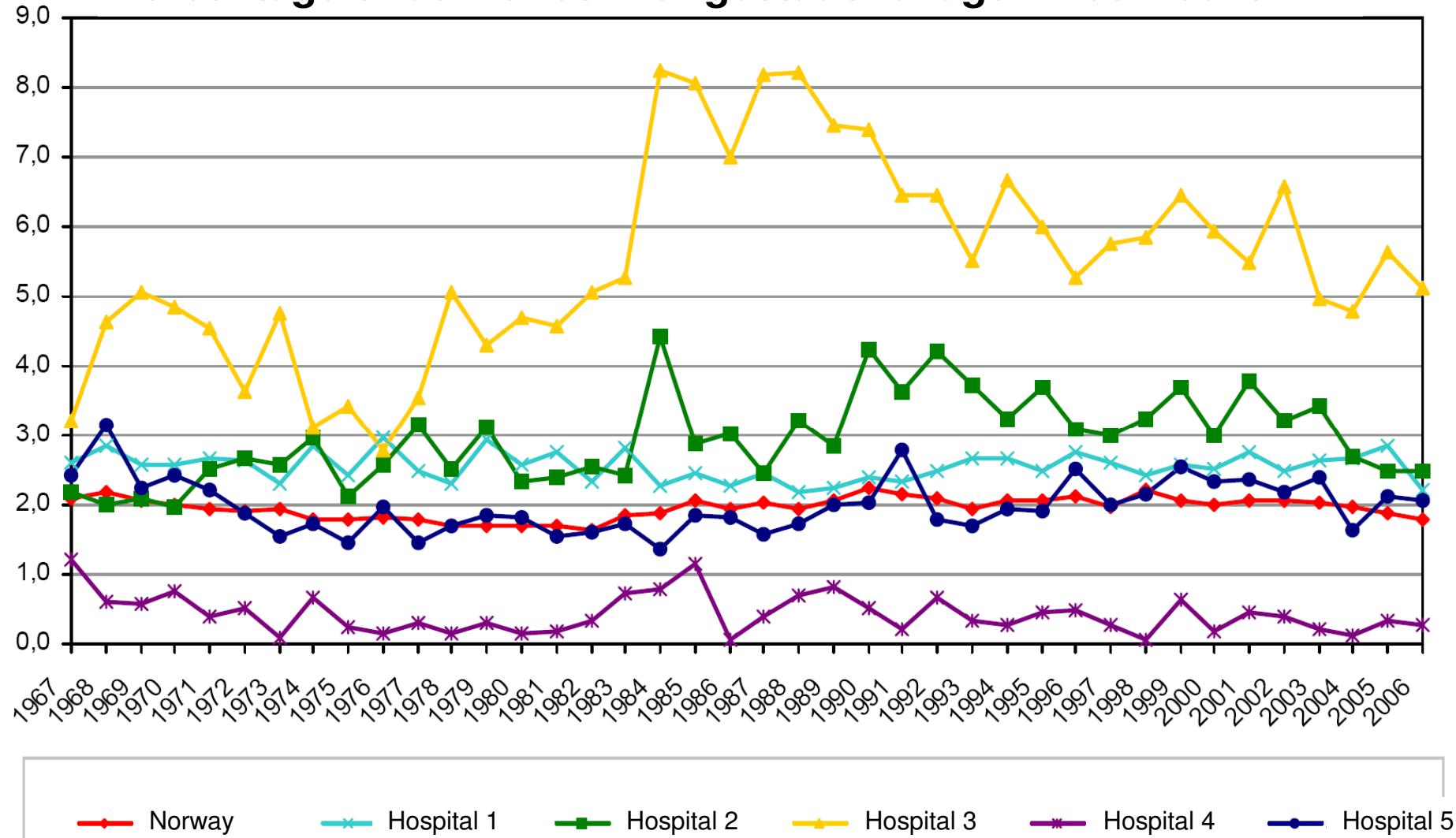


## ➤ Routine functions

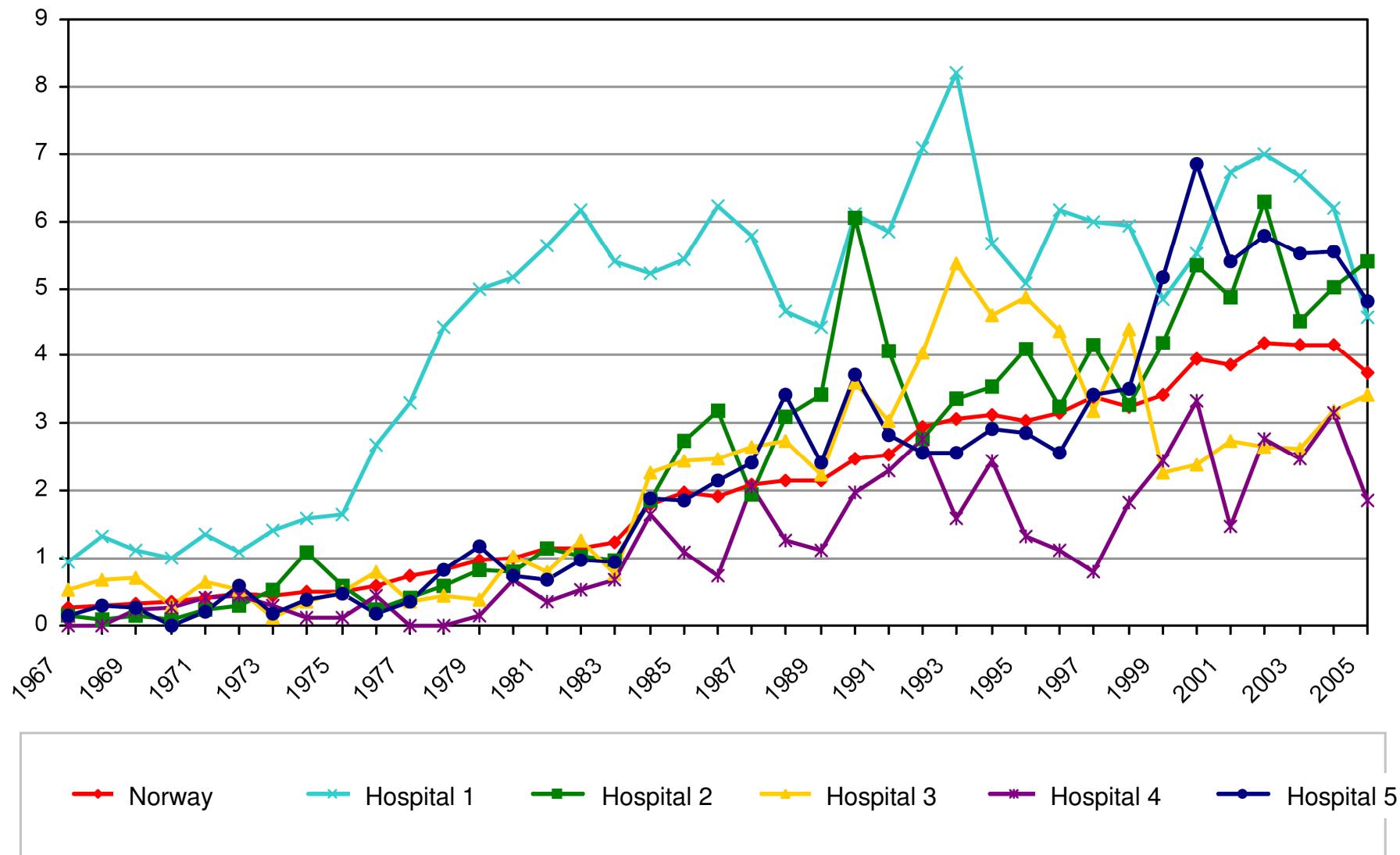
### 2. Routine surveillance of clinical services

- ✓ Clinical quality indicators

## Percentage of deliveries with gestational age 22-33 weeks



## Percentage of deliveries with perinatal tear degree III or IV (among all vaginal deliveries $\geq 22$ weeks)



## ➤ Ad hoc functions

1. Monitoring of clusters suspected by others

e.g Royal Norwegian Navy

# Clubfoot in Navy personnel's offspring born during or after the service period by category of exposure, Norway 1967-1996.

Category of exposure	Year of birth	Birth defects		Odds ratio	95 % conf. interval
		No.	%		
MTB Kvikk	1987-96	2	2.4	16.00	3.93-65.18
Navy, fathers	1967-96	8	0.1	0.62	0.31-1.25
Navy, mothers	1967-96	1	0.9	6.21	0.87-44.53
Norway, total	1987-96	896	0.2	1	

# Birth defects<sup>1</sup> in Navy personnel's offspring born during or after the service period by category of exposure, Norway 1967-1996.

Category of exposure	Year of birth	Birth defects		Odds ratio	95 % conf. interval
		No.	%		
MTB Kvikk	1987-96	5	5.9	2.06	0.83-5.10
Navy, fathers	1967-96	236	2.8	0.94	0.82-1.07
Navy, mothers	1967-96	1	0.9	0.32	0.04-2.21
Norway, total	1995	1784	2.9	1	

1: Birth defects notified to MBRN

# Birth defects<sup>1</sup> in Navy personnel's offspring born during or after the service period by category of exposure, Norway 1967-1996.

Category of exposure	Year of birth	Birth defects		Odds ratio	95 % conf. interval
		No.	%		
MTB Kvikk	1987-96	9	10.6	3.91	1.95-7.81
Navy, fathers	1967-96	236	2.8	0.94	0.82-1.07
Navy, mothers	1967-96	1	0.9	0.32	0.04-2.21
Norway, total	1995	1784	2.9	1	

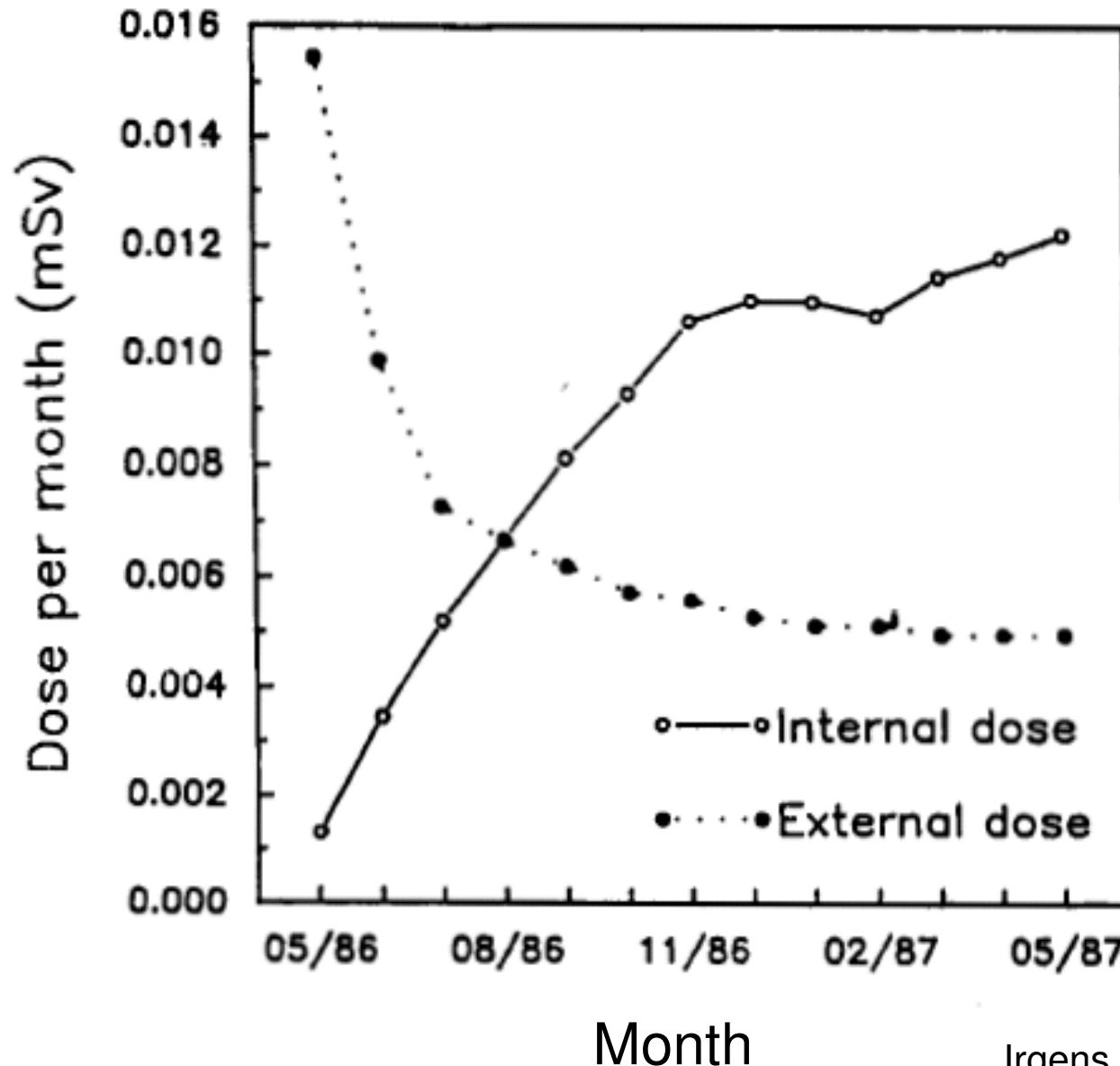
1: Birth defects:

MTB Kvikk: those reported by parents and verified clinically as well as those reported to MBRN.  
For the other categories: those reported to MBRN

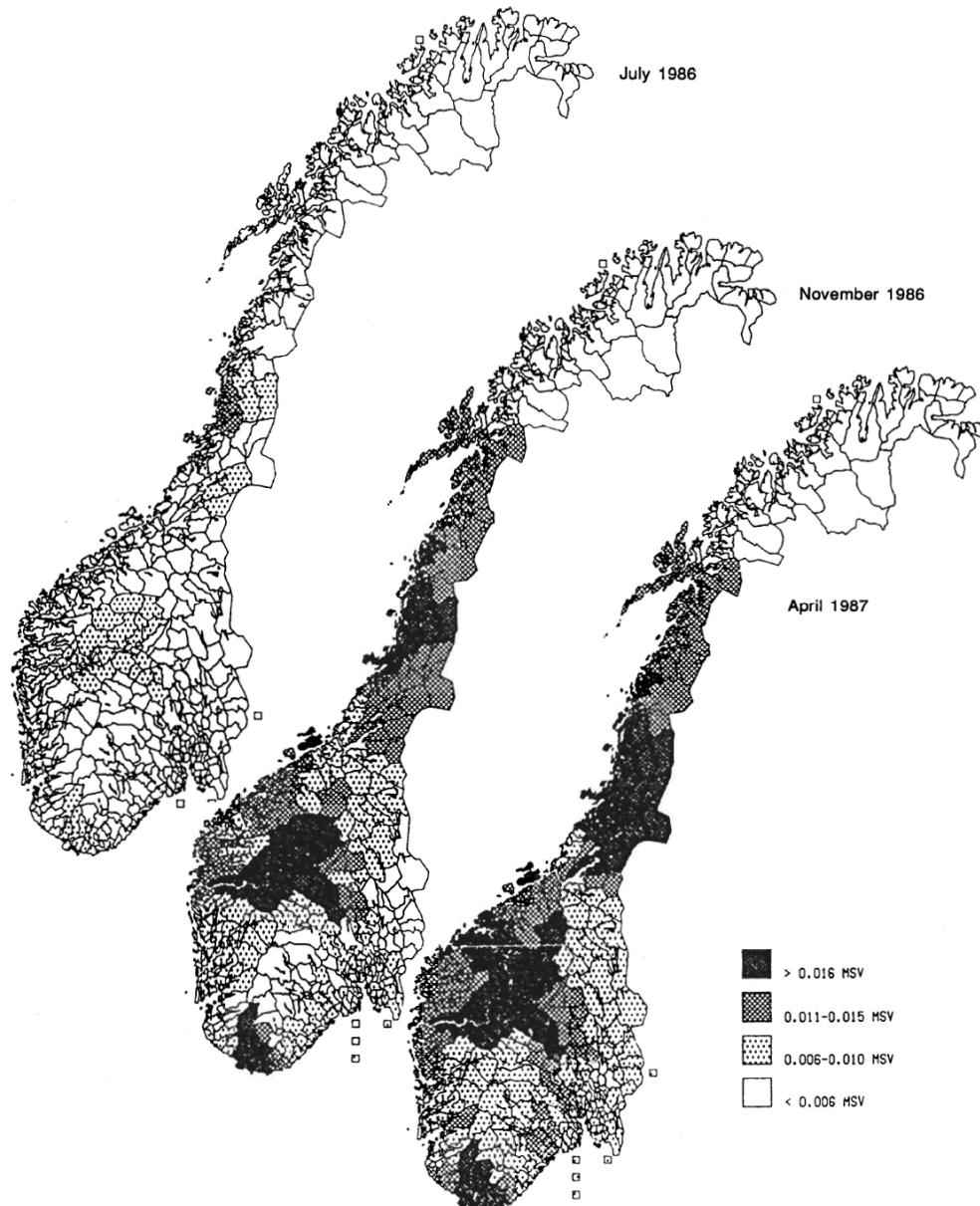
## ➤ Ad hoc functions

2. Monitoring of suspected exposure

e.g. Chernobyl accident



Average external and food based doses of radiation in Norway for the whole country by calendar month over a 1-year period after the Chernobyl accident.



Average food based doses of radiation in the Norwegian municipalities, July 1986, November 1986 and April 1987.

Irgens et al Biomed Pharmacother 1991

## Surveillance of adverse pregnancy outcome after the Chernobyl accident. Total number of births in 6 counties

Date of birth	One year prior to <u>May</u> <u>1986</u>	One year subsequent to <u>May 1986</u>	<u>Difference</u>
	No.	No.	No. (%)
May-July	5310	5502	+192 (+3.6 )
August-October	5009	5272	+263 (+5.3)
November-January	4967	4926	- 41 (- 0.8)
February- April	5455	5192	- 263 (- 4.8)
Total	20741	20892	+151 (+0.7)

## Surveillance of adverse pregnancy outcome after the Chernobyl accident. Early spontaneous abortions (-16 weeks) in 6 counties

Date of birth	One year prior to <u>May 1986</u>	One year subsequent to <u>May 1986</u>	<u>Difference</u>
	No. / %	No. / %	
May-July	376 / 7.1	413 / 7.5	+0.4
August-October	385 / 7.7	470 / 8.9	+1.2
November-January	395 / 8.0	453 / 9.3	+1.3
February- April	386 / 7.1	398 / 7.7	+0.6
Total	1542 / 7.4	1734 / 8.3	+0.9 (p=0.001)

## Surveillance of adverse pregnancy outcome after the Chernobyl accident. Induced abortions in 6 county's

Date of birth	One year prior to <u>May</u> <u>1986</u>	One year subsequent to <u>May 1986</u>	<u>Difference</u>
	No. / %	No. / %	
May-July	1019 / 19.2	1053 / 19.1	- 0.1
August-October	999 / 19.2	989 / 18.8	- 0.4
November-January	970 / 19.9	1010 / 20.5	+0.6
February- April	1032 / 18.9	1031 / 19.9	+1.0
Total	19.4	19.5	+0.1

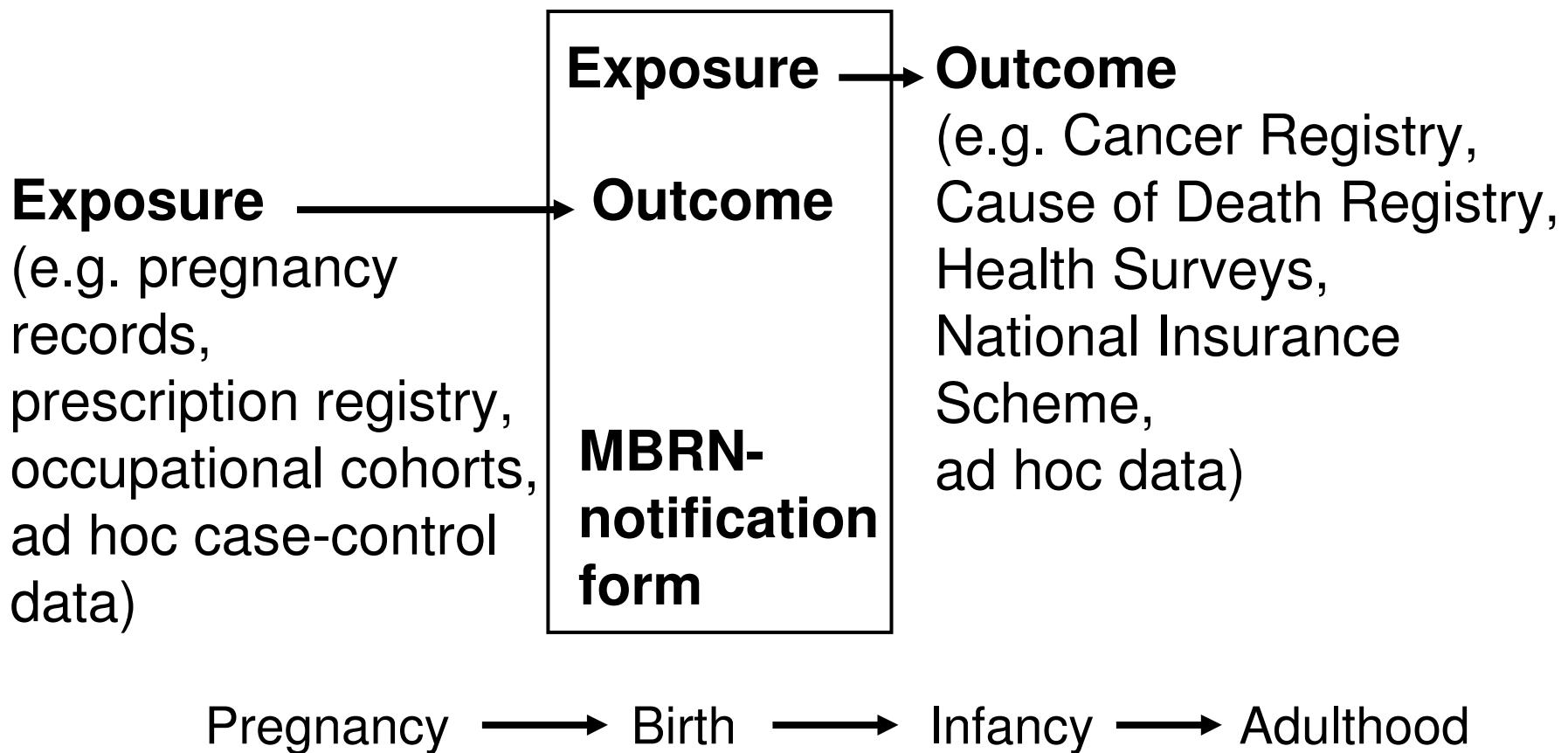
## Prevalence at birth in Norway of selected conditions 3 years prior and 3 years subsequent to the Chernobyl accident with O-E ratios according to levels of total doses and food based doses registered during the second month of gestation in mother's residential municipality

Condition	Rate per 10,000		Observed-Expected Ratio				P-Value
	3 years before	3 years after	Total	1 / Foodbased doses	2	3	
Anencephaly	3.54	2.76	0.81	0.85	0.80	0.38	0.57
			0.73	0.73	1.23	0.48	0.67
Spina Bifida	4.96	5.23	0.88	1.09	1.96	0.95	0.25
			0.87	1.24	1.25	0.00	0.15
Hydrocephaly	4.39	3.29	0.53	0.71	1.32	2.85	0.01
			0.65	0.69	1.18	0.95	0.26
Perinatal Death	131.9	123.4	0.99	0.93	0.82	0.84	0.05
			0.98	0.91	0.88	0.80	0.13
Total doses:		<u>uSv</u>		Foodbased doses:		<u>uSv</u>	
1:	<10					1:	<8
2:	10-15					2:	8-9
3:	16-23					3:	10-15
4:	≥24					4:	≥16

# Epidemiological Basic Research

- Aetiological research
  - Main objective: to clarify causes
    - e.g. to identify the causes of the rapidly increasing rates of gastroschisis
- Prognostic/follow up research
  - Main objective: to assess consequences
    - e.g. to assess the consequences to the foetus/newborn of maternal diabetes

# Analytical Strategies Relevant to MBRN-based Research



# Epidemiological Aetiological Research

Main objective:

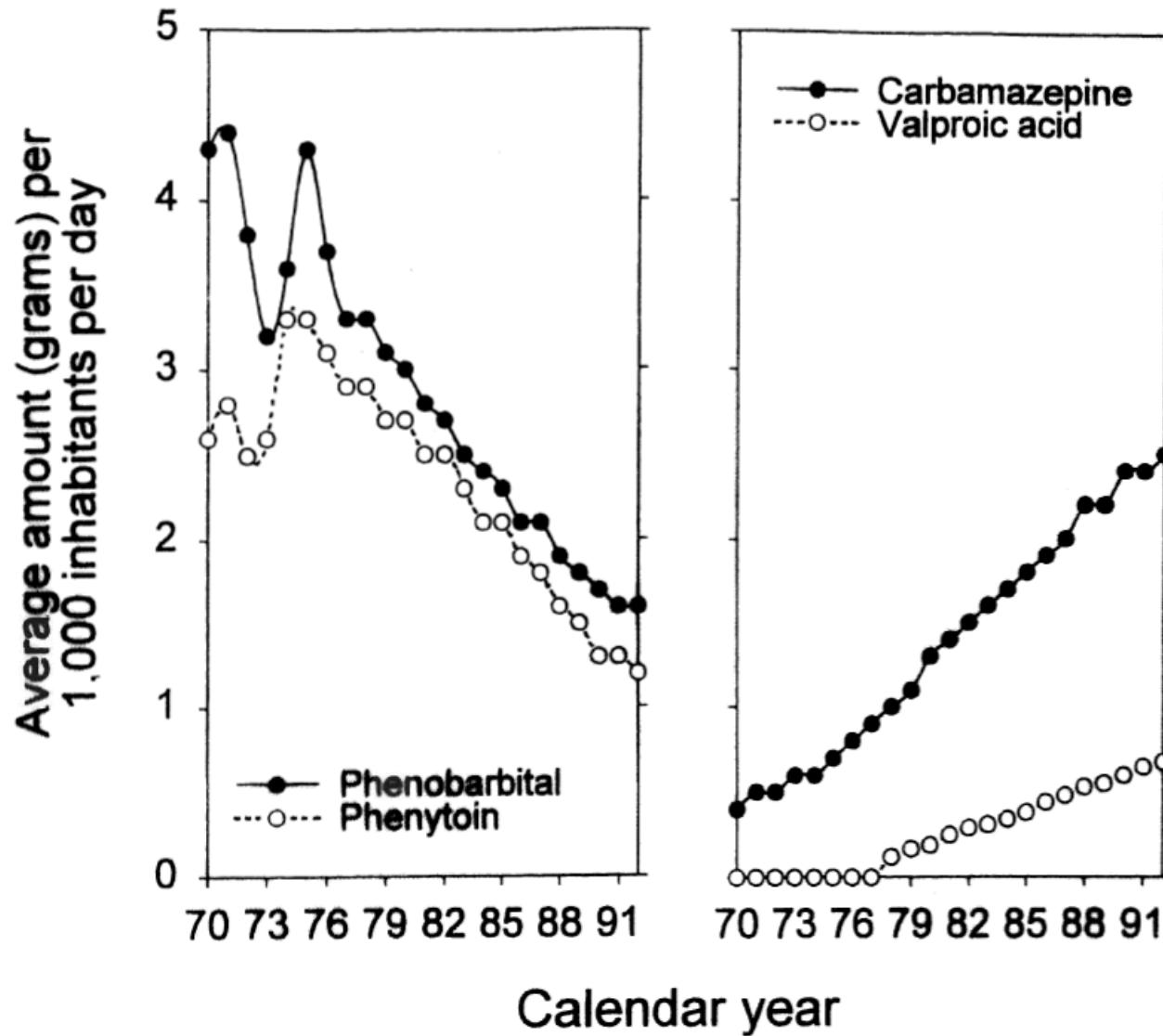
- to clarify causes of perinatal (and postperinatal) health problems

## The occurrence of spina bifida and cleft lip in children of mothers with and without epilepsy by year of birth, Medical Birth Registry of Norway, 1967 through 1992

Year of Birth	Maternal Epilepsy	Cases		Total No. of Newborns
		Spina Bifida	Cleft Lip <sup>1</sup>	
1967-1980	Yes	3	14	3 659
	No	449	1071	839 653
	OR (95% CI)	1.5 (0.3, 4.5)	3.0 (1.6, 5.1)	---
1981-1992	Yes	9	6	3 899
	No	344	953	659 640
	OR (95% CI)	4.4 (2.0, 8.5)	1.1 (0.4, 2.3)	---

1: Cleft lip with or without cleft palate

Bolton King et al Am J Pub Health 1996



The average amount used, per 1000 inhabitants per day of Phenobarbital and phenytoin and of Carbamazepine and Valproic acid in Norway from 1970 to 1992.

# Epidemiological Follow-up Research

Main objective:

- to assess consequences of perinatal health problems

## Perinatal mortality and birth defects in babies born to mothers with and without pregestational diabetes type 1, 1 July 1994 to 30 June 1997 in Northeast England and Norway

	No affected	No not affected	Rate per 1000	Odds ratio (95% CI)*
<b>Perinatal mortality†</b>				
Northeast England:				
Maternal diabetes (n=304)	13	291	42.8	4.4 (2.3 to 7.6)
No maternal diabetes (n=181 132)	1014	100 502	10.0	
Norway:				
Maternal diabetes (n=704)	11	693	15.6	2.2 (1.1 to 3.9)
No maternal diabetes (n=181 132)	1312	179 820	7.2	
<b>Birth defects†</b>				
Northeast England:				
Maternal diabetes (n=309)	17	292	56.0	2.3 (1.3 to 3.8)
No maternal diabetes (n=101 755)	2472	99 285	24.3	
Norway:				
Maternal diabetes (n=704)	19	685	27.0	1.3 (0.8 to 2.1)
No maternal diabetes (n=181 132)	3633	177 499	20.0	

Hawthorne et al BMJ 2003

57

\*Adjusted for maternal age with exact 95% confidence intervals.

†Difference between odds ratios adjusted for maternal age in northeast England and Norway was not significant ( $P=0.10$ ).

# Perinatal mortality and birth defects in babies born to mothers with and without pregestational diabetes type 1, 1999 to 2002 Norway

	No affected	No not affected	Per 1000	Odds ratio (95% CI)
Perinatal mortality				
Maternal diabetes (n=988)	14	974	14.2	2.6 (1.5 to 4.3)
No maternal diabetes (n=232 899)	1303	231 596	5.6	
Birth defects				
Maternal diabetes (n=988)	46	942	46.6	2.0 (1.5 to 2.7)
No maternal diabetes (n=232 899)	5589	227 310	24.6	

Unpublished

## Long term maternal mortality according to occurrence of pre-eclampsia and prematurity in her first birth, Norway 1967-92

---

Pre-eclampsia	Pre term	Number	Deaths	Per 1000
-	-	576 099	3 882	6.7
-	+	26 018	284	10.9
+	-	21 506	143	6.6
+	+	2 649	41	15.5
<b>Total</b>		626 272	4 350	6.9

## Long term paternal mortality according to occurrence of pre-eclampsia and prematurity in the first birth he fathered, Norway 1967-92

Pre-eclampsia	Pre term	Number	Deaths	Per 1000
-	-	497 341	8 491	17.1
-	+	20 861	418	20.0
+	-	18 840	313	16.6
+	+	2 274	26	11.4
<b>Total</b>		539 316	9 248	17.1

# Relative risk<sup>1</sup> of selected causes of death in mothers according to occurrence of pre-eclampsia and prematurity in their first birth, Norway 1967-92

Pre-eclampsia	Pre term	Total	Cardiovasc.	Stroke	Cancer
-	-	1	1	1	1
-	+	1.56 (1.38-1.76)	2.95 (2.12-4.11)	1.91 (1.26-2.91)	1.32 (1.10-1.58)
+	-	1.04 (0.88-1.23)	1.65 (1.9-2.70)	0.98 (0.50-1.91)	0.90 (0.29-2.78)
+	+	2.71 (1.99-3.68)	8.12 (4.31-15.33)	5.08 (2.09-12.35)	0.36 (0.12-1.11)

<sup>1</sup> RR adjusted for maternal age at birth and the childs' year of birth.

## Relative risk of selected causes of death in fathers according to occurrence of pre-eclampsia and prematurity in the first birth they fathered, Norway 1967-92

Pre-eclampsia	Pre term	Total	Cardiovasc.	Stroke	Cancer
-	-	1	1	1	1
-	+	1.10 (1.00-1.21)	0.97 (0.79-1.20)	1.39 (0.95-2.04)	1.08 (0.88-1.32)
+	-	1.01 (0.90-1.13)	1.01 (0.81-1.27)	1.03 (0.64-1.68)	0.98 (0.77-1.23)
+	+	0.75 (0.51-1.10)	1.03 (0.55-1.92)	-	0.66 (0.30-1.47)

# Relative risk of end-stage renal disease in mothers according to the occurrence of pre-eclampsia and low birthweight in their first pregnancy, Norway 1980-2005

Variable	Total No. of women	No. with ESRD	No./100,000 Person-Yr (95% CI)	Unadjusted Relative Risk (95% CI)	Adjusted Relative Risk (95% CI)	
					Model 1*	Model 2†
<b>No preeclampsia</b>						
No low-birthweight infant	524,489	344	2.9 (2.6-3.2)	1.0	1.0	1.0
Low-birthweight infant	23,831	64	11.7 (9.0-14.8)	4.0 (3.0-5.2)	3.4 (2.5-4.5)	2.7 (1.8-3.8)
<b>Preeclampsia</b>						
No low-birthweight infant	16,952	39	10.3 (7.4-13.8)	3.8 (2.8-5.3)	3.8 (2.7-5.2)	2.7 (1.8-4.3)
Low-birthweight infant	3,933	28	32.6 (21.7-45.8)	12.0 (8.2-17.6)	9.9 (6.6-14.8)	6.8 (3.9-12.0)

\* The relative risks are adjusted for year of delivery, maternal age at delivery, maternal marital status, stillbirth, and congenital malformation of the infant in all included pregnancies.

† Women with a diagnosis of essential hypertension, kidney disease, rheumatic disease, or diabetes mellitus before the pregnancy were excluded; relative risks are adjusted for year of delivery, maternal age at delivery, maternal marital status, stillbirth, and congenital malformation of the infant in all included pregnancies.

# Relative risk of end-stage renal disease in mothers according to the occurrence of pre-eclampsia and low birthweight in their first and second pregnancies, Norway 1980-2005

Variable	Total No. of women	No. with ESRD	No./100,000 Person-Yr (95% CI)	Unadjusted Relative Risk (95% CI)	Adjusted Relative Risk (95% CI)	
					Model 1*	Model 2†
No preeclampsia						
No low-birthweight infant	426,964	220	2.5 (2.2-2.8)	1.0	1.0	1.0
≥1 Low-birthweight infants	28,316	45	7.6 (5.5-10.0)	2.9 (2.1-4.0)	2.5 (1.8-3.5)	2.1 (1.4-3.3)
1 Pregnancy with preeclampsia						
No low-birthweight infant	16,699	31	9.4 (6.4-13.0)	4.0 (2.8-5.9)	3.8 (2.6-5.5)	2.8 (1.7-4.6)
≥1 Low-birthweight infants	3,951	13	17.0 (9.0-27.5)	7.1 (4.1-12.5)	5.6 (3.1-10.1)	4.4 (1.9-10.0)
2 Pregnancies with preeclampsia						
	2411	7	15.4 (6.1-29.0)	7.2 (3.4-15.2)	5.5 (2.4-12.5)	2.9 (0.7-11.5)

\* The relative risks are adjusted for year of delivery, maternal age at delivery, maternal marital status, stillbirth, and congenital malformation of the infant in all included pregnancies.

† Women with a diagnosis of essential hypertension, kidney disease, rheumatic disease, or diabetes mellitus before the first or second pregnancies were excluded; relative risks are adjusted for year of delivery, maternal age at delivery, maternal marital status, stillbirth, and congenital malformation of the infant in all included pregnancies.

# Relative risk of end-stage renal disease in mothers according to the occurrence of pre-eclampsia and low birthweight in their first, second and third pregnancies, Norway 1980-2005

Variable	Total No. of women	No. with ESRD	No./100,000 Person-Yr (95% CI)	Unadjusted	Adjusted Relative Risk (95% CI)	
				Relative Risk (95% CI)	Model 1*	Model 2†
<b>No preeclampsia</b>						
No low-birthweight infant	178,595	66	2.1 (1.6-2.6)	1.0	1.0	1.0
1 Low-birthweight infant	15,845	12	4.1 (2.1-6.7)	1.8 (1.0-3.4)	1.6 (0.8-3.0)	1.3 (0.6-3.2)
≥2 Low-birthweight infants	2,521	6	12.5 (4.5-24.6)	5.1 (2.2-12.0)	4.2 (1.7-10.4)	2.8 (0.7-11.7)
<b>1 Pregnancy with preeclampsia</b>						
No low-birthweight infant	8,337	17	12.2 (7.1-18.7)	6.2 (3.6-10.5)	6.0 (3.5-10.3)	5.5 (2.9-10.7)
≥1 Low-birthweight infants	2,329	9	22.6 (10.2-39.8)	10.8 (5.4-21.6)	8.3 (3.9-17.9)	5.7 (1.8-18.7)
≥2 pregnancies with preeclampsia	1,733	9	33.1 (15.0-58.2)	17.5 (8.7-35.1)	12.7 (5.7-27.8)	3.2 (0.4-23.1)

\* The relative risks are adjusted for year of delivery, maternal age at delivery, maternal marital status, stillbirth, and congenital malformation of the infant in all included pregnancies.

† Women with a diagnosis of essential hypertension, kidney disease, rheumatic disease, or diabetes mellitus before the first, second or third pregnancies were excluded; relative risks are adjusted for year of delivery, maternal age at delivery, maternal marital status, stillbirth, and congenital malformation of the infant in all included pregnancies.