CESAREAN DELIVERY:
WOMEN'S PREFERENCES AND DOCTORS' DECISIONS

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Til Christian, Henrik og Ida: Nå er boken ferdig!

LIST OF PAPERS

I. Fuglenes D, Øian P, Kristiansen IS: Obstetricians' choice of cesarean delivery in ambiguous cases: is it influenced by risk attitude or fear of complaints and litigation? Am J Obstet Gynecol 2009;200:48.e1-48e.8

II. Fuglenes D, Øian P, Gyrd-Hansen D, Olsen JA, Kristiansen IS. Norwegian obstetricians' opinions about cesarean section on maternal request: should women pay themselves? Acta Obstet Gynecol Scand 2010;89:1582-1588

III. Fuglenes D, Aas E, Øian P, Botten G, Kristiansen IS. Why do some pregnant women prefer cesarean? The influence of parity, delivery experiences and fear. Am J Obstet Gynecol, accepted for publication 2011

IV. Fuglenes D, Aas E, Øian P, Botten G, Kristiansen IS. Maternal preference for cesarean; Do they get what they want? Manuscript, submitted

ABBREVIATIONS

Abbreviation	Explanation
CDMR	Cesarean delivery on maternal request
CI	Confidence Interval
CS / CD	Cesarean section / cesarean delivery
CS on maternal request	Cesarean section on maternal request
CS-MR	Cesarean section on maternal request
CTG	Cardiotocography
EFM	Electronic fetal monitoring systems
ERCD	Elective Repeat Cesarean Delivery
EUT	Expected Utility Theory
"Fear Index"	Index of perceived risk of complaints and malpractice litigation
FHI	Det Norske Folkehelseinstituttet
IVF	In-Vitro Fertilisation
JPI-R	Jackson Personality Inventory-Revised
MBRN	Medical Birth Registry of Norway
MFR	Medisinsk Fødselsregister
MoBa	Den Norske Mor og Barn undersøkelsen (The Norwegian Mother and Child Cohort Study)
NIPH	The Norwegian Institute of Public Health
NMA	Norwegian Medical Association
NMI	Norsk Medisinsk Informasjon, Adresseregisterservice
NPE	Norsk Pasientskadeerstatning (The Norwegian system of Compensation to patients)
NSD	Norsk Samfunnsvitenskapelig Datatjeneste (The Norwegian Data Inspectorate)
OR	Odds ratio
P0 (Para 0)	Nulliparous
P1+ (Para 1+)	Multiparous
Q 1, Q3, Q4	Questionnaire 1, 3, 4
REK	Regional Etisk Komite (The Regional Committee for Medical research Ethics)
SD	Standard Deviation
TOL	Trial of labor
VBAC	Vaginal Birth After Cesarean
WHO	World Health Organization

SUMMARY

Background

Cesarean section rates have been rising steadily since the 1970s and are now between 15% and 35% in most industrialised countries. In Norway, the rate was approximately 2% in 1970, 12% in 1980, and 17% in 2008. The worldwide increase has caused concern in medical and wider communities. Changes in the pregnant population (*e.g*. higher age and BMI) and reduced operative risks resulting from technological improvements do not fully explain the increase. Other explanations may lie in changes in obstetricians' clinical management of cesareans or stronger preferences for cesareans among pregnant women. In this project we examined the impact of attitudes about cesareans among obstetricians and pregnant women on decisions about delivery mode.

Aims

The main research questions were:

- What are the opinions of Norwegian obstetricians regarding cesarean delivery in the presence of relative indications or no medical indication (cesarean delivery on maternal request, CDMR)?
- To what extent is an obstetrician's choice of delivery method influenced by their personal risk attitude and their perceived risk of complaints and malpractice litigation?
- How do obstetricians value the use of co-payment as one incentive to reduce the demand for CDMR?
- How widespread is a preference for cesarean delivery within a population of pregnant women in Norway?
- What are the predictors of a cesarean preference, and how do they influence preferences?
- To what extent will a request for cesarean during mid-pregnancy (week 30) be a predictor of the delivery mode?

Materials and methods

Information on obstetricians' attitudes was collected through a survey aimed at all Norwegian physicians working within the field of obstetrics and obstetrics (n=716), and had a response rate of 71%. Obstetricians' decisions about cesarean in ambiguous cases were explored by using clinical vignettes ("paper patients"), as well as direct questions eliciting attitudes and experiences. We used data from the Norwegian Mother and child Cohort (MoBa) Study

(n=66,351) and data from the Medical Birth Registry of Norway to study pregnant women's delivery preferences and their impact on the delivery mode.

Results

For five paper patients, the proportion of obstetricians consenting to the cesarean request varied from 8% to 60% across the five clinical scenarios with considerable variation within each scenario. Obstetricians' perceived risk of complaints and malpractice litigation was a clear determinant of their choice of delivery mode in all paper patients, whereas no impact was observed for obstetricians' risk attitude (Paper I).Women's requests for cesarean were considered problematic from a professional viewpoint among 62% of the obstetricians, and 35% would consider financing of cesarean to be a public responsibility. Forty percent deemed that women should face a co-payment for cesarean, and proposed payments ranging from €188 to €7,500. Male obstetricians less frequently considered cesarean on maternal request to be problematic. Female obstetricians favored co-payments more often than males, and suggested higher amounts (Paper II).

Six percent of pregnant women preferred cesarean over vaginal delivery, when asked during pregnancy. While 2.4% of nulliparous women had a strong preference for cesarean, the proportion among multiparous was 5.1%. The probability that a woman, absent of potential predictors, would have a cesarean preference was low (<2%) and fairly similar for both nulli- or multiparous. If a single predictor such as previous cesarean, negative delivery experience or fear of birth was present, the predicted probability of a cesarean request would range from 4% to 14%. In the presence of two or more predictors, the probability of a cesarean request would range from 20% to75% (Paper III). In the study sample 15% had cesarean, of which 62% were acute. Among those with a cesarean preference 49% subsequently had a cesarean (13% acute and 36% elective), while 12% (9% acute and 3% elective) had a cesarean among those with a vaginal preference. Among nulliparous with a cesarean preference, the odds for an acute cesarean were almost two times higher, and for an elective cesarean 12 times higher, than for women with a vaginal preference. For multiparous, the odds were 3 and 9 times greater, respectively. Multivariate logistic regressions revealed a significant association between a maternal preference for cesarean and having a CDMR. Adjusted for medical and maternal determinants, the predicted probability of an elective cesarean judged as a CDMR was 16% for nulliparous and 25% for multiparous women with a cesarean preference, compared to less than 1% given a vaginal preference (Paper IV).

Conclusion

There seems to be considerable variation in obstetricians' management of requests for cesarean and perceived risk of complaints and litigation is associated with compliance with the requested cesarean. The results indicate that a substantial proportion of obstetricians welcome some form of constraint concerning cesarean section requests in the absence of a medical indication. The proportion of women with a strong preference for cesarean was higher among multiparous than nulliparous women, but the difference was attributable to factors such as previous cesarean or fear of delivery and not to parity *per se*. Women's preferences have a strong impact on the probability of a cesarean, and the influence seems to go beyond CSMR.

SAMMENDRAG (NORWEGIAN SUMMARY)

Bakgrunn

I den industrialiserte del av verden har keisersnittraten steget siden 1970 tallet. I dag forløses mellom 15% og 35% av fødende kvinner med keisersnitt i mange vestlige land. I Norge var andelen keisersnitt 2% i 1970, 12% i 1980 og 17% i 2008. Den globale økningen i bruken av keisersnitt har skapt både debatt og bekymring. Det er mange mulige forklaringer på økningen. Mindre risiko ved operasjoner, mer bruk av IVF, høyere alder ved fødsel og høyere kroppsmasseindeks er alle faktorer som kan ha bidratt. Så vel gravide kvinner som leger kan ha endret sine holdninger vedrørende keisersnitt. I denne avhandlingen har vi undersøkt noen aspekter ved fødselslegers og gravide kvinners holdning til keisersnitt.

Mål

Hensikten med avhandlingen er å søke svar på følgende forskningsspørsmål:

- Hvordan forholder norske fødselsleger seg til ønsket om keisersnitt når det foreligger relative eller ingen medisinske indikasjoner (keisersnitt på mors ønske; CDMR)?
- Er det en sammenheng mellom legens risikoholdning eller frykt for kritikk og søksmål og valg av keisersnitt som forløsningsmetode?
- Hvordan vurderer legene egenandel som et mulig virkemiddel for å redusere etterspørselen etter keisersnitt uten medisinsk indikasjon?
- Hvor utbredt er ønsket om keisersnitt i en gravid populasjon?
- Hvilke faktorer kan forklare kvinners ønske om keisersnitt?
- I hvilken grad vil kvinnens ønsker om forløsningsmetode (preferanse for keisersnitt) under svangerskapet predikere den endelige forløsningsmetode.

Materiale og metode

Informasjon om legenes holdinger og erfaring ble innhentet gjennom et spørreskjema til alle leger innen obstetrikk og gynekologi i Norge (n=716), hvorav 71 % svarte. For å kartlegge holdning til keisersnitt ble det både brukt kliniske kasuistikker (”papirpasienter”) i tillegg til en rekke direkte spørsmål omkring legens erfaring og holdning. For å belyse gravide kvinners preferanse ble det brukt data (n=66,351) fra den Norske Mor og Barn studien (MoBa), utført i regi av Folkehelseinstituttet, samt relevante data fra Medisinsk Fødselsregister.

Resultater

Andelen leger som ville samtykke til ønsket om keisersnitt varierte fra 8% til 60% i kasuistikkene, og det var stor spredning innen den enkelte kasuistikk. Frykt for klager og

søksmål var en faktor som var assosiert med beslutning om keisersnitt, men det ble ikke funnet noen assosiasjon mellom legens risikoholdning og beslutninger om forløsningsmetode (Paper I). Majoriteten (62%) av legene syntes at kvinners ønsker om keisersnitt uten medisinsk indikasjon er faglig vanskelig, og andelen var noe lavere blant mannlige enn kvinnelige leger. Mens 35 % av legene mente at kostnadene knyttet til keisersnitt på eget ønske er det offentliges ansvar, var 40% positive til at kvinner skal betale en egenandel for dette. Forslagene om egenandel varierte fra NOK 1 500 til NOK 60 000. Kvinnelige leger var noe mer positive til egenandel enn mannlige, og de foreslo noe høyere egenandel (Paper II).

Blant de gravide kvinnene som ble spurt i svangerskapsuke 30, var det 6% som hadde en preferanse for keisersnitt. Blant førstegangsfødende hadde 2,4% en sterk preferanse for keisersnitt, mens andelen var 5,1% blant flergangsfødende. Sannsynligheten for at en kvinne vil ha en keisersnittspreferanse når det ikke foreligger risikofaktorer og kjente prediktorer er lavere enn 2% og omtrent den samme både hos førstegangsfødende og flergangsfødende. Hvis faktorer som tidligere gjennomgått keisersnitt, tidligere negative fødselserfaringer eller fødselsangst er tilstede, vil andelen som ønsker keisersnitt være fra 4% til14%. Gitt at to eller flere faktorer er tilstede samtidig vil andelen øke helt opp til 75% (Paper III). Blant de 66.351 kvinnene i studiepopulasjonen fikk 15% keisersnitt, hvorav 62% var registrert som akutte. Blant kvinnene med en keisersnittspreferanse under svangerskapet ble 49% forløst med keisersnitt (13% akutt og 36% elektive), respektivt 12% keisersnittsrate (9% akutte og 3% elektive) blant de med vaginale preferanser. For førstegangsfødende var det nesten dobbelt så høye odds for akutt og 12 ganger så høye for elektivt keisersnitt, sammenlignet med kvinner med vaginal preferanse. For flergangsfødende, var tilsvarende odds 3 og 9 ganger høyere. I multivariate logistiske regresjoner var det en signifikant sammenheng mellom en preferanse for keisersnitt og faktisk forløsing ved keisersnitt på eget ønske. Justert for medisinske og maternelle faktorer var den predikerte sannsynligheten for elektivt keisersnitt utført etter ønske fra kvinnen, 16% for førstegangsfødende og 25% for flergangsfødende, gitt en keisersnittspreferanse, sammenlignet med mindre enn 1% gitt en vaginal preferanse (Paper IV).

Konklusjon

Norske gynekologer synes å være tilbakeholdne med å akseptere keisersnitt på mors ønske. Frykt for klager og rettssaker synes å påvirke legenes vurderinger, men det gjør ikke risikoholdning. Få kvinner har preferanse for keisersnitt når det ikke foreligger en rimelig

grunn. Andelen kvinner med en sterk preferanse for keisersnitt var høyere hos flergangfødende enn førstegangsfødende, men forskjellen har sammenheng med å ha gjennomgått keisersnitt tidligere, dårlig fødselserfaring eller frykt for fødsel. Kvinner som under svangerskapet ønsker keisersnitt, har større sannsynlighet for å bli forløst med keisersnitt enn dem som ønsker vaginal forløsning.

1 INTRODUCTION

1.1 Cesarean Delivery

History and performance

A cesarean is the delivery of a fetus by incision through the abdominal wall and uterus. It is assumed that the emperor Julius Caesar was born by surgical delivery and hence the name. However, when Julius Caesar was born (born 100 b.c., died 44 b.c.) cesarean was performed only on dead or dying women as a part of a burial custom. There are few, if any, historical notes on maternal survival after a cesarean at this point in time. Caesars mother, Aurelia, survived childbirth and even outlived her son, which makes a birth by cesarean unlikely. A more robust explanation to the name 'cesarean' can be found in an ancient law named Lex Regis (Lex Regia). In year 715 B.c, the king of Rome issued a law saying that if a pregnant woman died, the fetus should be separated from the uterus, even though the baby would not survive, in order to bury the women (and the fetus) separately. This law was later named Lex Cesara, probably associated with the latin werb 'caedere', meaning 'to cut'. Children born by post-mortem operations were often referred to a 'caesons'.[1-4]

Figure 1

One of the earliest printed illustrations of Cesarean section, a live infant being surgically removed from a dead woman. From Suetonius' Lives of the Twelve Caesars, 1506 woodcut. Retrieved from the US National Library of Medicine, medical history, http://www.nlm.nih.gov/exhibition/cesarean/part1.html

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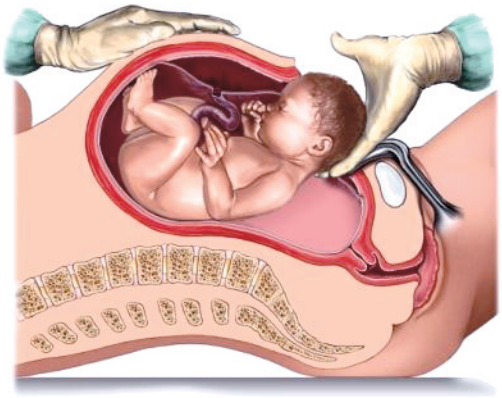
In ancient time, cesarean was a cultural rather than a medical event (Figure 1). As a medical procedure, cesarean was not performed in Europe before around 1300th, then as a post mortem procedure to rescue the child. One assumes that the first cesarean on a living mother was performed in 1500th century.[5;6] In Norway, the first registered cesarean was performed in

1843, with poor outcome for both mother and child. Around 1890's one succeeded in surviving of both mother and child.[2;5;6] Though cesarean was considered the last option to keep the mother or fetus alive, the concept of cesarean gradually become medically explained, and progressions were made in terms of operative techniques. In the 1800s, it was generally believed that suturing the uterine wall was not necessary because uterine contraction would reduce the wound to a minimum. In late 1800s it was advocated that suturing was essential, and that a low transverse incision rather than the longitudinal one would reduce morbidity. In the 1920-1940s the transverse incision gained wide acceptance due to less hemorrhage and reduced risk of uterine rupture during subsequent trials of vaginal delivery.[4]

Figure 2



In Norway most cesarean are performed according to procedures of lower segment cesarean,[7] with a transverse suprapubic incision into the uterus, going through skin, fascia, peritoneum and uterus. The incision is usually digitally extended and the baby evacuated (Figure 2). The uterus is closed in one or two layers, as well as suturing the fascia and skin. Most cesareans are performed with spinal or epidural anesthetics', entailing the mother to be awake during the operation and thereby take part in the delivery. Complete sedation is associated with higher risk of complications and generally avoided. In case of an acute or long lasting operation antibiotic is given prophylactic to prevent infections, though some advocate a practice of infection prophylaxis for all cesarean operations. Thrombosis prophylaxis (low molecular heparin) should be given preoperative and the immediate post-operative days, and early mobilization is recommended.[8] The stay in the delivery ward is usually 3 to 5 days.

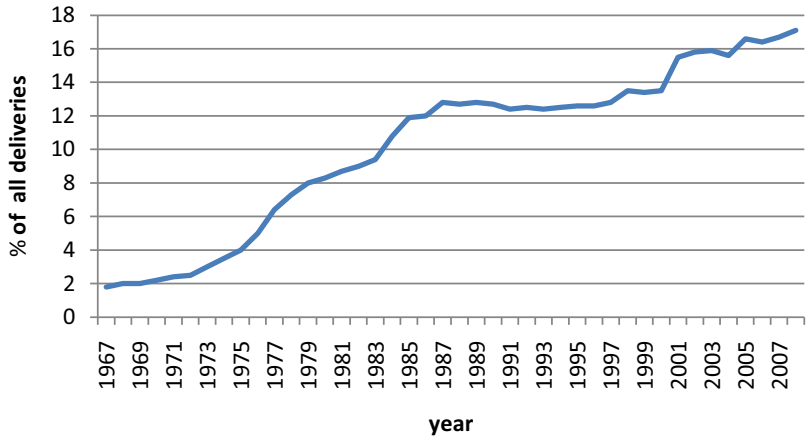
Increasing frequency of cesarean delivery

In the following, we will use the term cesarean rate even though, according to epidemiologic definitions, it is a proportion because the term has no time dimension.

Over the last 40 years, there has been a striking increase in the cesarean rates, though with variations, both within and between nations. While the American and Asian continents have the highest rates of cesarean, many European countries have lower rates.

In Norway, the early establishment of a national medical birth registry (The Medical Birth Registry of Norway, MBRN), entail visibility to the annual cesarean section rates since 1967 (Figure 3).

Figure 3 Cesarean rate development in Norway



Based on rates available from the Medical Birth Registry in Norway (MBRN), http://mfr-nesstar.uib.no/mfr/

In 1967 scarcely 2% of all deliveries were cesareans, increasing to 7-8% in the late 1970s and 12 % in the mid 1980s. The rate was fairly stable between 1986 and 1996, with a further rise from the beginning of 2000. In 2008, the cesarean rate was 17.1%, of which 39.5% elective cesareans, 54.4% acute cesareans and 6.0% unspecified.[9] The ratio between acute and elective cesareans has been relatively unchanged during the last decade, and is fairly similar to our neighboring countries.[10] In Norway, it seems to be a geographical variation in the cesarean rates. The Western part of Norway has lower rates compared to the national average

(*e.g.* the counties Hordaland 11.6%, Rogaland 14.2%, Sogn & Fjordane 15.0%, figures from 2008), while the Eastern regions are highest (*e.g.* Akershus 18.2%, Oslo 18.5%, Hedmark 19.5, Oppland 19.8%, Østfold 21.2%, figures from 2008).[9] There is also difference in cesarean rates between institutions of different size. The cesarean rate is higher among the medium sized institutions (1500-3000 deliveries per year) compared to large institutions (more than 3000 deliveries per year).[11]

The development in Norway corresponds to our neighboring countries. In Sweden the cesarean rate increased during the 1970s, amounted to 12-13% in 1983 and 17.2% in 2008.[12] Denmark has the highest rate in Scandinavia, reaching 21.5% in 2007.[13] In Europe, Italy has high rates (38% in 2008),[14] while the Netherlands[15] (15.1% in 2007) is similar to the Scandinavian level. In England the rate has gone from 9% in 1980 to 24.6% in 2008.[16] In 1970, the cesarean rate in the USA was 5% compared to 2% in Norway. However in the USA the increase has been steeper than in Norway, and the cesarean rate reached 20% in the 1980s and 32.8% in 2007.[17] In South American and Asian countries, such as Brazil, Chile, and China the rates are around 40%.[18-21] For the developing countries, access to health care, skilled personnel and vital interventions, like cesarean, is limited compared to industrialized countries. This will have impact on the rates reported, both within and between various African countries.[22;23]

Indications for performing a cesarean

A cesarean may have an absolute or a relative indication. An absolute indication implies that the surgery is lifesaving or of major importance to secure the health and safety of mother or child, *e.g.* placenta previa is usually considered an absolute indication for cesarean. Relative indications can broadly be grouped into protracted labor (dystocia), non-reassuring fetal hearth rate pattern (fetal distress), malpresentation of the fetus (breech presentation), previously scarred uterus (previous cesarean), or various maternal reasons.[24-26] According to a Norwegian study, the main indications for performing cesarean were fetal distress, failure to progress, previous cesarean delivery, breech ≥ 34 weeks, maternal request, preeclampsia, and failed induction (listed in declining frequency). These indications accounted for 78% of the operations.[24]

Fetal distress

One way of evaluating the fetus' wellbeing, before or during labor, is by electronic fetal monitoring systems (EFM), like cardiotocography (CTG), where the fetal hart rate patters are examined. Fetal distress is a term used to describe a compromised fetus during the antepartum or intrapartum period.[7] The term is often used in presence of non-reassuring fetal hearth rate patterns, as this may be a sign of reduced oxygen supply to the fetus. However, a challenge when using EFM such as CTG, have been low sensitivity.[27;28] Relevant to antepartum CTG, there is inter-rater variability concerning interpretation.[29] Increased use of cesarean delivery has coincided with the widespread use of ultrasound and CTG, but its efficacy in reducing the long-term neonatal morbidity related to fetal distress during labor has been questioned.[30;31] ST-waveform analysis (STAN) is a newer method, which combines CTG and fetal ECG analyzed by internal scalp electrode. Compared to traditional CTG, the STAN has reduced interpretation bias and higher specificity, and a reduction of neonatal morbidity and obstetric intervention might be achieved.[32-34]

Failure to progress

Failure to progress, protracted (prolonged) labour, slow progress or dystocia are terms used approximately synonymously to describe progress of labor is slower than the accepted norm.[7;35] Failure to progress may appear both during the first (opening stage) and second stage of labor. The two main causes to failure to progress are inefficient labor contractions (uterus dystocia) or mechanical factors (*e.g.* cephalopelvic disproportion or malposition of the fetal head).[7;24] Conceivably, there may be practice variations between delivery units with respect to when and how to intervene in case of failure to progress. The diagnostic criteria for the onset of failure to progress, or at which course it activates a cesarean, seems not entirely clear.[36;37]

Previous cesarean delivery

Early operative techniques caused the dogma "once a cesarean always a cesarean",[38] due to increased risk of scar rupture in subsequent labor. Improved operative techniques, however, have made a routine repeat cesarean not obligatory. Women with a previous cesarean have increased risk of uterine rupture if attempted trial of labor (TOL) compared to an elective repeat cesarean delivery (ERCD), but for both delivery modes the risk is below 1%.[39;40] Since the 1980s, the US National Institutes of Health have outlined and encouraged situations where vaginal birth after cesarean (VBAC) could be attempted, still the number of VBACs has declined during the last 15 years.[41] While low-risk women with previous cesarean in the US

have a repeat cesarean delivery rate of 92% (hence 8% VBACs, 2006-figures),[41] the ERCD rate among Norwegian women is 50%.[24] Elective repeat cesareans account for a third of the annual cesareans in the US,[39;42] but also a substantial proportion of cesareans in Norway, Sweden, and UK (range 9%-27%) are due to previous cesarean.[24;43-45]

Breech presentations

Some of the increase in cesarean rates during the last decade is ascribed the results of the Term Breech Trial, which concluded that a term fetus in breech position had better outcome if delivered by a planned cesarean compared to a vaginal birth.[46] Norwegian guidelines promote vaginal delivery given that certain selection criteria are followed during antenatal examinations and delivery process.[47-49] A higher proportion of women with fetus in breech position deliver vaginally in Norway compared to other countries (43% during the period 1981-89, versus 10-20% in other Western societies).[50] Among the nearly 5% with fetus in breech position, the cesarean rate was 67% (2008 birth cohort).[9]

Placenta previa

Placenta previa is a low implantation of the placenta resulting in a partial or completely covering of the internal ostium of the uterus,[7] and occurs in 2.8/1000 singleton pregnancies.[51] In case of placenta previa there is a risk of placental loosening and major bleeding. Placenta previa might be overestimated in early pregnancy as a result of the routine ultrasound scan, while its persistence to term will depend of the relationship between the distance from the internal os to the placental edge.[51;52] Hence the diagnosis is verified in the last trimester and the necessity of a cesarean established. A placenta previa is usually an absolute indication for cesarean. In partial (marginal lying) placenta previa vaginal delivery may be attempted.[53]

Maternal request

It is a growing concern about increase in elective cesareans for which there are no clear medical or obstetric justifications. Such cesareans are often referred to as requested, demanded or chosen by the patient, hence cesarean delivery (section) on maternal request. The concept cesarean section on maternal request (CDMR) refers to delivery of a singleton fetus at term by an elective cesarean section in the absence of a medical or obstetric indication.[54;55] Synonyms to the phrase are cesarean-on-demand, patient-choice cesarean, or no-indication cesarean. Controversy surrounds the rates of such cesareans because the definitions are ambiguous and the birth records unclear. A consensus conference on CDMR summed up that between 4% and 18% of all cesareans, internationally, are on maternal

request,[55] while studies from Scotland[26] and Australia[56] find that 20 and 27% of all elective cesarean were performed due to maternal request. It is argued, that in a population, approximately 1% of all deliveries will be cesarean sections requested by the pregnant women,[57] which is in line with the Norwegian data. In a study by Kolås and co-workers, 7.6% of the cesarean sections had maternal request as first or only indication, when reported by the physician in hospital records. In 37% of the cesareans more than one indication was reported, and maternal request as first choice was associated with previous cesarean delivery in 12.8%.[24]

Risks and benefits of a cesarean delivery

While cesarean, on one hand, is considered a safe operation both by patients and practitioners, it still involves operative risk in general, and risk of specific complications for either mother and/or child. The complication rate of a cesarean is estimated to be 21% and 27% in studies from Norway and Finland respectively.[10;58] The complication rate is higher in acute compared to elective cesareans (24% v*ersus* 16% respectively).[58] There is an increased risk of complications in case of high maternal age, obesity, maternal morbidity and with increasing cervical dilatation.[10;58]

Risk and benefits for the mother

Operational risks of a cesarean include anesthetic complications, damage due to utero-cervical lacerations[59] and acute bleeding.[58;59] Hemorrhage (>1,000 ml) is reported in 5%-9% of cesareans.[10;59] The odds for postpartum haemorrhage was doubled among women with elective cesarean (no prior cesarean) and 28% higher in women with elective repeat cesarean compared with spontaneous vaginal delivery.[60] However, there also seems to be reduced risk of bleeding complications in elective compared to acute cesarean or vaginal delivery.[61] Traumas such as lacerations of the uterus and vagina occur in approximately 5%, while injury to the urinary tract and bowel occur more infrequently (<0.5%).[59]

Cesarean is one important risk factor for maternal infection. Most common are endometritis, wound infections, and urinary tract infections. In recent studies, infections were diagnosed in 8-10% of cesarean patients[10;62] and cesarean might entail 5-20 times greater risk of infections compared to vaginal delivery.[63] Routinely prophylactic administration of antibiotics has reduced the incidence of maternal post-operative infections.[63;64] Although the absolute risk of thromboembolic events in pregnancy is low, it is considerably increased compared to non-

pregnant women at the same age.[65;66] The incidence of thromboembolic events is reported 0.13 and 0.17% in a Swedish[65] and an American study.[67] Even low, the incidence increases 2-5 times if delivery was by cesarean.

Most women are conscious of the risk of urine- and anal incontinence due to damage to the pelvic organs during vaginal delivery, and such worries has been proposed as explanation for increasing requests for cesarean.[68] There is epidemiological evidence for an association between parity and incontinence, though the direct effect of delivery mode is difficult to assess.[69;70] During pregnancy the pelvic floor muscles are exposed to stress which weakens the muscles, hence a cesarean will not entirely take away the risk of incontinence.[71-73] A recent review found a 33% pooled prevalence of any incontinence in all women during three first months postpartum, with a higher prevalence among the vaginal delivery group compared to the cesarean section group (31% *versus* 15%). However, longitudinal studies within the first year postpartum showed small differences in prevalence over time.[74]

In case of a TOL, there is increased risk of uterine rupture, compared to an ERCD. With an ERCD, the risk of uterus rupture is decreased. The risk of uterine rupture is estimated at 0.78% with a TOL and 0.02-0.06% with ERCD.[41] Placental complications such as placenta previa, placenta accreta and placental abruption are more frequent among women with a previous cesarean delivery compared to a previous vaginal delivery.[75;76] The risk of placenta previa seems to increase with increasing number of cesarean and shorter interval between pregnancies.[76]

There is reduced complication risk in elective compared with acute cesarean, for operations performed under epidural (compared to general anesthesia), or operations performed with no or low cervical dilatation (compared with high cervical dilatation).[58] In case of a cesarean, the pain during labor will be replaced with post-operative pain. A cesarean alleviates fear of birth, is socially convenient and allows family planning which may explain why some women might consider cesarean preferable.

Risk and benefits for the child

In a term pregnancy, the overall risk of fetal trauma is low irrespective of delivery mode, however the rate of fetal trauma is lower in cesarean than vaginal delivery. Fetal injury complicates approximately 1% of all cesareans.[77;78] In a cesarean, the final pass through the

pelvic region is avoided, which makes brachial plexus palsies or fractures less likely,[77;79] but increases the risk of respiratory problems. Relative to vaginal delivery, children born by cesarean have increased risk of neonatal respiratory conditions (respiratory distress syndrome, transient tachypnoea of the newborn or aspirations pneumonitis) at birth with a potential need of respiratory support and subsequent transfer to intensives care unit.[79-81]

Cesarean section is often justified in the assumed benefit for the fetus, especially with respect to intrapartum hypoxia and prevention of brain damage. However, the frequency of neonatal encephalopathy is low; hence moderate to severe neonatal encephalopathy occurs in about 0.4 % of term live deliveries.[82] In the literature, reducing the risks of stillbirth or cerebral palsy are some arguments proposed in favor of elective cesareans.[83] In patients who underwent elective cesarean at 39 weeks, there was 83% reduction on risk of moderate or severe encephalopathy,[82] however, the same report also pointed out that in most epidemiological studies the cause of cerebral palsy is not associated with intrapartum hypoxia. High cesarean rates do not necessarily reflect reduced neonatal mortality,[84] and conceivably increased rates of elective cesareans do not support reduction of cerebral palsy,[85] or lower rate of asphyxia.[86] However, with fetus in breech presentation, elective cesarean may reduce the overall risk of fetal death or neonatal mortality.[87]

Fetal skin lacerations are estimated to occur in 0.7% to 3% of cesarean deliveries, though more common in acute cesarean or cesarean in labor, compared to cesarean without labor.[77;88] Children delivered by a cesarean have increased risk of developing asthma during childhood, compared with children delivered vaginally.[89]

Risk and benefit in relation to a CDMR?

It is not easy to estimate morbidity and mortality after an elective cesarean requested by the mother and performed in the absence of a medical indication. Few studies exist and the knowledge rests on indirect evidence from related outcome groups.[90] In 2006, the US National Institutes of Health initiated a state of the science conference on cesarean on maternal request. It also initiated a technological assessment[91] that pointed out two key issues. First, as most studies have compared actual delivery and not planned delivery mode (intention to treat), this may reduce previous evidence' relevance when projected to CDMR. Second, except for urine incontinence, hemorrhage, and neonatal respiratory morbidity, other evidence on morbidity was too limited to conclude on differences in outcome between CDMR and

planned vaginal delivery. Given certain conditions (low risk pregnancy, single cephalic fetus at term) the existing evidence of risks and benefits of CDMR versus vaginal delivery, did not heavily favor one delivery method to another.[55]

Mortality

During the 1800s the estimated cesarean mortality rate was 75% in the US, but it gradually declined due to improvements in anesthetics, asepsis, suture of the uterus.[2] The current maternal mortality in Norway and the US is about 6-15 deaths per 100,000 pregnancies.[92-94] In the 21th century maternal deaths in the industrialized world are rare, which makes it difficult to obtain strong evidence of difference in mortality between planned cesarean and planned vaginal delivery.[90] The maternal death rate is reported to be 3-5 times greater following cesarean than vaginal delivery,[87;95-97] while others find essentially no increase in mortality.[98-100] Among the maternal deaths directly associated with cesarean, a majority occurred in women who were not classified at risk before pregnancy.[93;94] Studies tend to document increased risk of fetal mortality after cesarean compared to vaginal delivery, also among women considered to be at low risk for a cesarean,[87;101] however, with breech presentation cesarean might have a protective effect on fetal mortality.[87]

Concern about consequences of increasing rates

For several reasons the increase in cesarean section rates has raised issues of discussion, both among physicians and policy makers. First, it has been discussed whether cesarean rates above 15% have been essential in reducing the mortality and morbidity for mother and child.[84;97;101;102] What is considered the ideal rate have been a matter of debate.[102;103] Interestingly, the World Health Organization has recently stated that there is no empirical evidence for an optimum percentage, or range of percentages, of the acceptable level for cesarean.[104] Second, technical and medical improvements in treatment are likely to have impact on clinical decisions. For cesarean, this is apparent through increased use of relative indications. Third, increased use of cesarean rather than vaginal delivery may entail economic consequences if one delivery mode is more costly than the other. Most health care budgets are under strain, and the resources ought to be services that generate the greatest benefits. Fourth, increased use of cesarean is often ascribed to maternal or obstetrician factors, such as personal preferences, more predictable work hours and ease family planning, or increasing risk aversion among physicians as well as patients.

1.2 Risk attitude

"Risk, like beauty, is in the eyes of the beholder"[105]

Most decisions concerning health and medical affairs entail aspects of choice, uncertainty and risk. It seems likely to assume that people's decisions are governed by the perception of risk, and not necessarily by the true risk. It is therefore reasonable to believe that perceived risk may, consciously or unconsciously, influence and shape medical decisions and the choice of treatment.

Defining risk and risk aversion

The term risk can be defined in numerous ways. Berry states that one of the most frequently used definitions of risk is the one set down in 1983, where risk is defined as "..the probability that a particular adverse event occurs during a stated period of time, or results from a particular challenge. As a probability in the sense of statistical theory, risk obeys all the formal laws of combining probabilities".[106] The term risk is generally used in the sense of 'the probability of an adverse event', which is more or less in line with the definition proposed by British Medical Association in 1990: "risk is the probability that something unpleasant will happen".[106] When lay people use the term risk, they frequently consider two aspects: a probabilistic aspect and the consequences of outcome.[106;107] An optimal decision should be governed both by the probability and the valuation of the consequences.[108]

In 1944, John von Neumann and Oscar Morgenstern published their seminal expected utility theory (EUT).[108] In brief and somewhat simplified, EUT indicates that decisions should be based on the (subjective) valuation of the outcomes (*e.g.* a health states) and the probability of the outcomes. EUT allows for the decision makers (patients, doctors, etc.) to be risk averse, risk neutral or risk seeking. Attitude to risk can be explored by monetary lotteries.[109-111] Decision makers are risk averse if they prefer the expected value of a lottery to the lottery itself (*i.e.* accept a certain outcome of lesser value than the average value of a gamble), risk neutral if they are indifferent between the expected value and the lottery, and risk seeking if they prefer the lottery to the expected value (*i.e.* prefer a gamble to a certain outcome with the same average value).[110;111]

However, risk attitude is often used as a compound concept, with constructs from decision theory, cognitive psychology and economics. It represents the individual's willingness to accept uncertainty and risk in exchange for a certain possible outcome. Risk attitude can be defined as a person's preference for different levels of risk, and individuals can be classified as risk seekers (risk takers), risk neutral or risk averse (risk avoiders, safety seeking).[110] Risk seekers are often referred to as persons who enjoy adventures and is unconcerned with danger, whereas a risk avoiders are considered to be cautious, hesitant and more security-minded.[112]

Risk Attitude in a psychological perspective

Research in the field of psychology has established that the term risk attitude is challenging. It is not a firm and stable trait in the same way our personality traits are considered to be. Risk attitude is considered to be a multi dimensional concept. There are at least five areas (dimensions): financial-, recreational-, health/safety-, social- and ethical domains.[113;114] The individual risk attitude (*i.e.* degree of risk-taking) may vary depending on what area or domain the risk decisions concern. The risk attitude will also be influenced by the "framing" of the situation, whether the individual perceive the situation to be of gain or loss.[113;115] Some previous studies have approached the concept risk-attitude by using instruments considered to measure risk attitude in several domains.[116] These studies have psychological and sociological perspectives, using psychometric instruments, and are based on personality indexes and sensation seeking stimuli scales.[116-120] There are reasons to believe that an individual's risk attitude is related to choice of treatment and treatment preferences in several fields of medicine, and related to the decision to initiate treatment.[109;110] In a study of physicians' risk attitude, laboratory usage and referral decisions, physicians' risk attitude accounted for more than 50% of variance for several of the laboratory procedures.[116] There may also be correlation between emergency physicians' risk attitude and their triage decisions for patients with chest pain,[119] and risk aversion was associated with a higher referral rate among internists and family physicians.[118]

Risk attitude and delivery decisions

The perception of risk will depend of how we perceive probabilities, and how we value the consequences. Risk attitude is a question about taking or accepting a certain risk, and this is made "visible" through our decisions or behavior. It has been claimed that there is an increasing risk aversion among obstetricians,[121] and defensive medicine are estimated to cost the US society $80 billion per year.[122] For both the women and the physician, the concept of

risk is central to decisions about the mode of delivery. However, to the best of our knowledge, there are no previous studies of whether risk attitude might influence aspects of delivery.

1.3 Malpractice claims and defensive medicine

Obstetrics is a medical subspecialty especially prone to medical liability, and account for many malpractice claims nationally,[123;124] and internationally.[125] The majority of the cases relates to birth injuries, where the intrapartum assessment is questioned.

Malpractice claims and liability insurance
Malpractice claims, negligence claim, or professional litigation are all terms used to describe misconduct by a professional (*e.g*. a physician). If 'misconduct' is present, the conduct (*e.g*. procedure or treatment) fails to meet the standard required for the profession. Medical malpractice lawsuits are prominent in the United States and has increased in frequency since the 1975s.[126] In the US, the medical professionals acquire private insurances to cover liability, and such insurance is a professional requirement in most states. The premium varies, but is high for obstetricians doing deliveries.[127]

The development in the US raises concerns. First, increasing insurance premiums can cause reduced recruitment to the profession, involving the risk of reduced quality of and access to obstetric care.[126;128] Second, increased liability insurance costs and fear of litigation contributes to altered obstetric practice.[127;129] It is argued that litigation fear and malpractice claims encouraged development of "defensive medicine".

Defensive medicine
"Defensive medicine is a term that describes the particular attitude of people involved in health care who increase the use of test and procedures in order to avoid or to protect themselves against malpractice suits".[130] Defensive medicine can materialize as risk avoidance or risk reduction. Risk avoidance in the sense of avoiding procedures which provoke malpractice fear (hence avoid vaginal deliveries). Risk reduction in the sense that one undertakes more investigations or interventions than necessary due to malpractice fear (*e.g.* more CTG's, more cesarean).[131] Cesarean, however, is not a risk free procedure, but it is generally perceived to reduce the risk of birth injuries (*e.g*. risk of asphyxia and brain damage) known to encourage litigation. Defensive medicine becomes a challenge if it leads the physician to provide more care, *e.g.* increased referral rates, extended use of tests and procedures or change in practice patterns, than necessary. The increase in malpractice and cesarean rates, are concurrent incidents. Consequently, the increase in cesarean rates may be

attributable to defensive obstetrics, since a cesarean is considered to minimize the risk of criticism and malpractice claim. It can be more demanding to defend (the upholding of) a vaginal delivery than cesarean. The literature concerning the relationship between malpractice pressure and use of cesarean has yielded conflicting results. On one hand, several studies find higher cesarean rates among obstetricians exposed to higher malpractice pressure (*e.g*. high insurance premiums) compared to obstetricians exposed to lower pressure,[132-134] while others find no association.[125;135;136] Among physicians experiencing malpractice claims there is a modest effect on their subsequent cesarean rates.[137] In jurisdictions where professional liability is more frequent, it is likely to influence practice pattern of all physicians, not only those involved directly. This makes it difficult to ascertain any difference between physicians directly exposed to malpractice claims or not.[138]

Malpractice claims and defensive medicine in Norway

In Norway, we have a mild medico-legal climate in the sense that few cases regarding malpractice are tried in court. However, there are institutions that supervise and control the public health services, but also reward damages. The Norwegian System of Compensation to Patients (NPE, Norsk Pasientskadeerstatning) is one such institution. It was established to process compensation claims from patients who suffered injury as a result of treatment as an alternative to the court of law. To qualify for compensation, the patient must have sustained a major or permanent injury attributable to an error or omission in treatment. The term 'treatment' includes medical investigation, diagnosis and follow-up. Further, the injury must represent an economic loss (*e.g*. loss of income, loss of a provider or expenses for non-refundable medical treatment, medicines, transport). If a claim is awarded, the compensation will be based on ordinary principles of liability. The damage award is calculated individually depending on the medical impairment and the economical losses sustained. It is free of charge to file a claim before NPE, and if compensation is granted, the claimant will also recover reasonable legal fees. If a claim is rejected or just partly sustained, the claimant can file an administrative appeal, and ultimately present the case for a court of law.

The NPE regime is a 'no-blame no-fault' system. The right of compensation is related to an error or omission made by the health services, and the error does not need to be linked to lack of caution or negligence by a particular person.[124] Three percent of the complaints to NPE and 25% of the paid awards are related to injury to the child during birth.[123] During a nine year period (2000-november 2008), the NPE received in total 497 complaints regarding injury due

to delivery, from where 56% concerned injury to the child. In 33% of total cases, compensation was rewarded. 40% of the cases regarding child injury and 25% of cases regarding maternal injury resulted in compensation. (Personal communication, from senior advisor Mette Williumstad Thomsen in NPE on the 14th of November 2008). The Norwegian Board of Health Supervision (in Norwegian: Helsetilsynet) is an institution organized under the Ministry of Health. The Norwegian Board of Health Supervision receives information from various sources (*e.g*. patients, relatives, employers, the police, the media) about possible deficiencies in the health service. If deficiencies are identified, the Board of Health Supervision can give an administrative reaction against the organization in the form of instructions to correct the situation, or a reaction against health care personnel (e.g. warning, withdrawal of prescription right or authorization).

While most studies of malpractice and defensive medicine stems from the US, less is known about the situation in Europe.[130;131] Even though obstetricians in a public health system are less exposed to personal malpractice claims, increased awareness of patient complaints and fear of malpractice litigation may influence obstetricians in countries with a mild medico-legal climate to quicker recourse to cesarean section in clinical decision making.

1.4 Cost of delivery and willingness to pay

The increasing delivery rates have induced proposals for use of economic incentives to influence obstetric practice. When the cost of delivery is explored, most studies include the direct costs to the provider only (cost of staff and material inputs, nursing, *etc*).[139] Several studies conclude that cesareans are more costly in terms of resource use,[140-143] while others conclude that the choice of delivery mode has limited impact on the total costs of obstetric care.[144;145]

The cost difference is nuanced when one differentiate between acute and elective cesarean, and when cesareans are compared to instrumental or complicated vaginal deliveries.[139;141;143] A spontaneous vaginal delivery is considered least costly, while an acute cesarean entail highest costs, and instrumental vaginal delivery and elective cesarean are in the middle.[146] If elective cesarean is compared to vaginal delivery using augmentation or labor anesthetic the cost difference is reduced. An American study estimated the direct average medical costs of an elective cesarean to be in the order of 18%-25% higher than those if an uncomplicated vaginal delivery.[144] Among nulliparous women, there were essentially no cost difference between an elective cesarean and a vaginal delivery with induction/augmentation, and with labor anesthetics the costs of vaginal delivery exceeded elective cesarean by almost 10%. For multiparous women, vaginal deliveries with induction or augmentation had slightly lower costs than elective cesarean, while there was no cost difference if anesthetics were added. The average estimated costs of attempted vaginal delivery were only 0.2% lower than those of elective cesarean.[144] Also a Canadian study found lower costs for a planned cesarean than assisted vaginal delivery, vaginal delivery after induction of labor and cesarean delivery within labor.[140] These studies challenge the perception that cesareans in general are more costly, and indicate that there might be little difference in the short-term costs of elective cesarean and attempted vaginal delivery.

There are few Norwegian cost analyses or cost-effectiveness analyses concerning alternative delivery modes. Data from the Activity Based Financing system indicate that an (uncomplicated) cesarean, including operative costs and 6 days length of stay, costs approximately NOK 55,000, compared with NOK 22,000 for a vaginal delivery and four days of stay.[147;148] In 2002, vaginal delivery for high risk women was estimated to cost

approximately NOK 63,000 compared to NOK 90,000 for a cesarean delivery, of which approximately 50% was covered by Activity Based Financing.[149] On the other hand, when comparing cost and refund for planned cesarean versus uncomplicated vaginal delivery, a recent publication based on the German refund system, found that cesarean could be profitable for the hospital.[150]

Despite knowledge of costs of general cesarean, the economic impact of elective cesarean on maternal request (CDMR) remains uncertain. In 2005 the Danish Sundhedsstyrelsen estimated that CDMR costs approximately DKK 5,000 more than a planned vaginal delivery among multiparous women, while there are no obvious additional costs for nulliparous women. If requests for cesarean increased with 5 percentage points this would imply increased annual cost of 6 million DKK.[145]. Obstetric interventions (*e.g.* epidural anesthesia, pharmaceutical induction, instrumental vaginal delivery or cesarean section) are costly to the health systems. The relative costs increased by almost 50% among primiparous and up to 36% among low-risk multiparous women as labor interventions accumulated, compared with vaginal birth and no intervention.[151]

Most cost studies seem to include the providers' direct costs in performing one delivery to another. There is less knowledge about how differences in mortality and morbidity profile for the delivery modes impact long term societal costs, including work absenteeism. Compared with spontaneous vaginal delivery, a cesarean delivery, as well as assisted vaginal delivery, is associated with increased maternal readmission rates.[152-154] In a Scottish study, cesarean deliveries had higher hospital readmission costs, while spontaneous vaginal delivery had higher costs of midwifery care. Instrumental vaginal deliveries had higher general practitioner costs when assessed two months post-partum.[146] There was no significant difference between spontaneous vaginal, instrumental vaginal or cesarean section with respect to post-discharge costs.[146;155]

Willingness to pay

The majority of cost analyses implies that increased cesarean rates, even planned cesareans among low-risk women, might entail a resource implication for society.[156] A clinical guideline from the College of Obstetricians and Gynaecologists in the UK indicated that reducing maternal request for planned cesarean could make resource available elsewhere.[157]

In our private economy, the prices of most goods are determined by the market. This applies even to necessities such as food, clothes and housing. Health services, on the other hand, are often considered to be allocated according to "needs" rather than willingness (and ability) to pay. In order to achieve a needs based use of health care, the health services have to be paid by a third party. While many countries fund their health service by various public or private insurance systems, in contrast, the Nordic countries have a tax based health care. Public funding implies that society's equity objectives are met, but it comes at the price of increased quantities of demanded services. The use of patient co-payments can therefore be considered as a policy to curb increasing demand and queuing in health care systems. From an economic perspective, the question is whether the cost of providing CDMR is reasonable in relation to the benefits or value for the women. If the willingness to pay for a service (the individual valuation of "utility") is lower than the real cost of the service, this might imply an efficiency loss for the society. From an economic point of view, there are then arguments in favor of patient co-payment. First, co-payment may reduce the efficiency loss in a public health service. Second, co-payment may contribute to financing the services. Consequently, the challenge is to balance efficiency and use of co-payment with equity and the principle of equal access for all to health services. In the Nordic countries, delivery is offered free of charge in public hospitals, and this is probably true in several other countries as well. In Norway there are few private hospitals, and none perform cesarean delivery. However, in the UK and the US there are private hospitals which supplement the public ones, where elective cesarean is available at self funding rates.[158]

1.5 Shared decision making and preferences for cesarean

Since the early 1990s there has been a shift in the medical decision process away from the traditional paternalistic approach, where doctors' made the decision on behalf of the patient, towards a more equal relationship between care provider and patient.[159;160] It has been argued that this change is due to stronger consumer sovereignty in health care, where the patient is no longer a "patient" passive care taker, but to a greater extent a consumer with knowledge about health and health care. Mass media and the emergence of the internet have facilitated the process. Physicians are challenged by technological and therapeutic progresses resulting in the development of different treatment alternatives for the same condition. The need to weigh risks and benefits of various treatments are increasingly done in cooperation with patients' values.

Patient autonomy versus shared decision-making

In decision making, the informed approach (synonymous terms 'consumerism', 'patient choice', 'informed choice') is seemingly the decision framework which most strongly attends to patient autonomy. The word 'autonomy' has a Greek origin, meaning self governance (self-government, self-rule). In this decision frame the physician provides the patient with relevant information, *e.g.* treatment options, risks and benefits, while the deliberation and final decision is made solely by the patient. The physician take no investment in the final decision, he does not "reveal" his own preference for treatment option or guide the final decision.[159;161] In shared decision making ('joint decision making') there is an interaction between the physician and the patient in the process of reaching a decision. The process is described to contain, ideally, the following steps: i) the patient is informed about the nature for her condition, and reasonable options for diagnosis and treatment, including risks and benefits of various alternatives, ii) the physician's particular advice for the patient is explained, iii) the patients preferences are elicited, iv) the physician seeks the patients approval for a negotiated plan.[162] Conceivably, among both physicians and patients a majority is in favour of a shared decision making process.[163;164]

Preferences for cesarean

In some early studies of delivery preferences, women who had undergone a cesarean were asked after the delivery about their delivery preferences, and the preferences of cesarean varied from 1.5% to 38%.[165-168] Findings among Italian and Australian women indicated that 10% of women with a prior vaginal delivery have a cesarean preference, while 23% of women with prior cesarean preferred cesarean in next pregnancy.[169;170]

When preferences are elicited, the proportion of cesarean preference is in the range 6-17% among pregnant women,[171-181] 9-13% among non-pregnant women,[181;182] and 6% among fathers-to-be.[183] Questions have been raised as to whether women increasingly prefer cesarean over vaginal delivery, however these questions are not easy to address.There are several challenges when comparing studies of maternal request because different researchers have had different approaches to define and delimit the topic, including to what extent the cause of the request is explored. Studies of women's reasons for requesting cesarean indicate that safety for themselves or the baby is relevant.[172;184;185] The most frequently stated cause is fear of birth (tochophobia), which may also include fear of labor pain and concerns of risks to the baby if vaginal delivery.[177;186;187] Previous complicated delivery, previous cesarean, breech presentation, or increasing maternal age are also associated with cesarean request.[188-190]

Several studies have looked into health personnel's (obstetricians and midwives) personal preference for delivery mode. It is argued that obstetricians' prefer cesarean for themselves (or their partners) to a greater extent than compared to midwifes and/or the general population.[189] Published studies indicate that between 9% and 21% of Israeli, Scottish, UK and US obstetrician would prefer elective cesarean for themselves or their partner in a hypothetical uncomplicated pregnancy.[191-196] A Norwegian study of 148 obstetricians found that 2% preferred cesarean for themselves or their partner in a future pregnancy,[197] corresponding to proportions found in a Dutch and in a Danish study.[198;199] Even though few Norwegian obstetricians report a preference for cesarean, there are significantly higher rates of children born by cesarean among physicians, in particular surgeons and obstetricians, than the general population.[200] Also, Norwegian female doctors and midwives have higher cesarean rates than other professionals at the same educational level.[201]

Even though patient autonomy is desirable among some patients, most patients prefer a joint decision making with the physician.[164] It is likely that practitioners vary in their compliance with patients' preferences, which may imply different approaches to reach a final treatment strategy. On the one hand, cesarean delivery is probably one of few areas where surgery is decided upon by the patient. On the other hand, it is claimed that physicians have reduced threshold for performing operative delivery.[202]

2 OBJECTIVE

2.1 Objective

On the background of the current knowledge, the aim of this PhD project was to address some issues related to delivery mode. It is clear that decisions about delivery mode are influenced by the pregnant women as the obstetrician. We therefore chose to approach the project from both sides.

This thesis explores the issue of 'cesarean on request' from the obstetrician's perspective (papers I and II) and from the pregnant woman's perspective (papers III and IV).
The fist studies explore obstetricians' opinions about various issues of cesarean on maternal request. We seek knowledge about obstetrician's choice of delivery mode (*e.g.* cesarean *versus* vaginal) when confronted about maternal request for cesarean in the presence of relative medical indications. When making decisions on delivery mode it is conceivable that obstetricians' own attitudes and experience may influence their decisions, thus we seek knowledge about a possible relationship between obstetrician's risk profile and decisions in favor of a cesarean. May the obstetricians' own risk-aversion influence their choice of cesarean? The concept of risk is central to decisions about the mode of delivery, for both the physician and the pregnant women. However, to the best of our knowledge, there are no previous studies of whether risk attitude might influence aspects of delivery.

The second part of this thesis explores how widespread a cesarean preference is in a pregnant population. To what extent do pregnant women prefer to deliver by a cesarean if they were given the opportunity to choose between delivery modes, and which determinants may influence such a request? Not the least, will a preference for cesarean during pregnancy influence on cesarean as the actual delivery mode?

2.2 Aims and hypotheses

Paper I

The aim of this study was first to describe variation in obstetricians' choice of delivery method when faced with identical 'paper-patients' who request cesarean delivery, and second to explore the determinants of such variation. The study was designed to test the following hypotheses:

1. Risk-averse obstetricians make decisions which favor cesarean delivery to a higher extent than risk-neutral obstetricians.
2. Obstetricians' decisions when faced with requests for cesarean deliveries are influenced by their perceived risk of complaints and malpractice litigation.

Specific research questions

- How do obstetricians' choose between of cesarean *versus* vaginal delivery in five paper-patients requesting cesarean?
- To what extent is an obstetrician's choice of delivery method influenced by their personal risk attitude and their perceived risk of complaints and malpractice litigation?

Paper II

The aim of Paper II was to explore obstetricians' opinions on cesarean delivery on maternal request in the absence of a medical indication, and the potential to regulate CDMR through financial incentives such as patient co-payment. The following hypotheses were tested:

1. Obstetricians, who find CDMR problematic from a clinical view point, are less willing to perform CDMR.
2. Obstetricians, who find CDMR problematic from a clinical view point, are more likely to reject public funding of cesareans and to favor co-payment for them.
3. Obstetricians, who are willing to perform CDMR, are more likely to favor public funding and reject co-payment.

Specific research questions

- Do Norwegian obstetricians find maternal requests for cesarean difficult from a professional view point?
- What is the opinion of Norwegian obstetricians towards performing CDMR?
- How do obstetricians value the use of co-payments as a policy tool to regulate the demand for CDMR?

Paper III

The aim of Paper III was first, to explore women's preferences for delivery mode, and second, to identify predictors of preferences for cesarean and estimate the probability that different groups of pregnant women would prefer cesarean delivery. The following hypothesis was tested:

1. Multiparous women have a stronger preference for cesarean than nulliparous women.

Specific research questions

- How widespread is a preference for cesarean within a population of pregnant women in Norway?
- What are the predictors of a cesarean preference, and how do they influence preferences?

Paper IV

The aim of this study was to explore the association between a preference for cesarean during pregnancy and the subsequent delivery method. The following hypothesis was tested:

1. Pregnant women with cesarean as their preferred delivery method are more likely to deliver by cesarean than those with a vaginal delivery preference.

Specific research questions

- Is there an association between a cesarean preference during pregnancy, and a subsequent delivery by planned cesarean? And if so, how much influence on the final outcome can be ascribed the patient's delivery preference?

3 MATERIALS AND METHODS

3.1 Obstetrician survey (Papers I and II)

Sample frame and study population

In papers I and II we explored the attitude and experiences of obstetricians working in Norway, concerning various issues of cesarean delivery on maternal request. The study population was Norwegian obstetricians and gynecologists, as well as senior residents working in the field of gynecology and obstetrics. In Norway the fields of gynecology and obstetrics are one specialty. In this thesis, physicians working in this specialty are denoted 'obstetricians' and the fields obstetrics.

In Norway there is no unit or register for all doctors working in the different specialties. Names and addresses of obstetricians and junior doctors registered in obstetrics were obtained from the Research Institute of the Norwegian Medical Association (NMA). The NMA was responsible for specialist approval in Norway; hence this register is likely to contain most specialists working in Norway. As junior doctors do not have the same obligatory registration of type of specialty, the registry is less complete for this segment of doctors. To reach as many junior doctors as possible we also obtained a list of assistant doctors from a commercial database (*i.e.* http://www.legejobb.no/nomi.81948.no.html, Den norske legedatabasen, NMI). We received names of 521 registered specialists and 374 junior doctors (201 from the NMA, respective 173 from NMI). Hence, we had a total number of 895 individuals. We removed duplicates and persons with unknown addresses leaving us with a sample of 732 doctors (516 approved specialists and 216 doctors under specialization). A questionnaire was sent by mail to all tentative respondents, together with a pre-paid return envelope, on the 12th October 2006. Reminders (including the questionnaire together with a pre-paid return envelope) were sent to non-responders 27th November 2006 and 5th January 2007. The data collection was closed the 20th February 2007. The questionnaire contained a registration number, which was linked to a separate list with respondents' names/addresses, only used for reminders. The list was maculated when data collection was closed. Except for the registration number, the questionnaire was anonymous and the collected information (respondents answer to the questionnaire) was registered without identification.

Response/study sample

Among the 732 respondents initially identified, 12 junior doctors were excluded because they did not work in the field of obstetrics, and 4 questionnaires were returned due to unknown address. This left us with 716 tentative respondents; consisting of 515 board-certified specialists and 201 junior doctors. Among the 716 eligible doctors, 188 did not respond to the survey while 21 indicated that they did not wish to participate. 507 (70.8%) respondents returned answered questionnaires, but 13 had many missing values (Paper I, Figure).

Data collection - Questionnaire

The questionnaire had four parts. The first part had patient stories, the second had questions about attitude to risk and fear of litigation, the third had questions about obstetricians' professional experiences and opinions concerning cesarean section on maternal request. The last part contained questions about socio-economic background. The questionnaire had seven A4-pages, of which the first page was an introductory letter, and the last page invited individual comments about the survey and the issues covered by the questionnaire (Appendix 1).

Part One: Clinical scenarios

Part one of the questionnaire dealt with physicians' preference for cesarean *versus* vaginal delivery. We briefly described five clinical scenarios in which a pregnant woman requests a cesarean. The scenarios had no "clear-cut" medical or obstetric indications that heavily favored one delivery method to the other. The scenarios, all modified examples from a clinical practice, were collected by the authors and designed in line with previous studies.[203;204] The five clinical scenarios covered the following aspects: previous complicated deliveries (case 1), slow progress (case 2), previous negative delivery experience (case 3), pelvic pain (case 4), and fetus in breech presentation (case 5). In each scenario the women and her pregnancy were briefly described, and a maternal request for a cesarean was put forward. At the end of each scenario the respondents were asked to indicate how they would respond to the woman's request. The respondents answered on a seven point Likert scale, ranging from 1: "I will definitely go for (or perform) elective (or acute) cesarean" to 7: "I will definitely go for vaginal delivery". (The text were somewhat nuanced depending on the case number). The aim of the design was to focus on cesarean sections performed on "relative" indications, given a maternal request. We wanted to explore whether specific physician (provider) characteristics' (*e.g*. risk attitude and fear of complaints and litigation) was associated with a final decision in favor of cesarean.

Part Two: Uncertainty and risk

Instrument to measure risk attitude

Investigating risk attitude in the context of delivery and medical decision making, involves certain challenges. In preparing the questionnaire we searched for an instrument that could reflect a person's tendency to accept and/or take risk on a general basis. Before we searched for instruments, we outlined five criteria to guide the choice of instrument:

a. It should not be an extensive inventory why inventories with 30-40 questions or more were excluded.
b. The items ought to be as general as possible, in order to avoid questions about situations that would not be relevant to obstetricians. For example, we excluded instruments with questions such as "going camping in the wilderness", "investing 10% of your annual income in a moderate growth mutual fund" [113;114].
c. The questions should be relevant to Norwegian conditions.
d. The inventory should be validated.
e. Preferably it should have been used in previous studies of health professionals to self-report their attitude to risk.

We considered various instruments when designing the obstetrician study.[114;115] Most of these instruments were either not relevant for health care or not validated. To our knowledge, a "gold standard" method for measuring risk attitude does not exist despite the development and revision of several psychometric instruments.[115] We chose to questions from the Jackson Personality Inventory, which was the only inventory that met the criteria.[205;206]

The Jackson Personality Inventory revised (JPI-R)

The Jackson Personality Inventory was developed to provide, in a convenient form, a set of measures of personality reflecting a variety of interpersonal cognitive, and value orientations likely to have important implications for a person's functioning. These measures of personality were derived from research in personality and social psychology,[205] initially published in 1976, and was, reportedly, the standard measure in this field for many years.[119] In 1994, the inventory was revised and evaluated in the light of recent research findings (JPI-R). The inventory is intended primarily for use in normal populations, and is said to be appropriate for use in research settings to contribute to the understanding of personality and its relation to behavior. The JPI was developed within the context of a dimensional formulation of personality. Hence all individuals are thought of as possessing the measured

trait or characteristic to some identifiable degree. The higher the person scores the greater the probability that the person will show behavior reflecting the dimension underlying the scale. The JPI-R consists of 300 true-false statements, representing 15 subscales, including a 20 items 'risk taking' subscale (Appendix 2). Individuals with high scores on this scale are prone to exposing themselves to situations having uncertain outcome, while low scorers prefer to be more cautious in their approach to things. We used an extract from the risk taking subscale to study whether Norwegian gynecologists' opinion towards choice of childbirth methods show any co-variation with their risk attitude. The same questions have been used in previous studies among health personnel to describe attitude to risk.[117-120;205;207;208]

Measuring Risk Attitude

Based on the above criteria we used six items from the JPI-R (Paper I, Appendix 2).[205] These items were originally adapted and validated by S. D Pearson and co-workers in 1995 to measure whether risk attitude among physicians in an emergency department influenced their triage decisions for patients with chest pain.[119] This inventory has been used in several studies of medical decision making.[117-120;207;208] We translated the six risk attitude items into Norwegian and translated them back twice into English to ensure correct translation. All items were scored on a six point Likert scale, and the scores were added into an index, with possible range from 6 (very risk averse) to 36 (very risk seeking). Individuals, who scored lower than one standard deviation below the mean, were classified as risk averse, while those who scored one standard deviation above mean were classified as risk seeking. The others were classified as risk neutral. This scoring is in line with the use of these items in previous studies.

Measuring perceived risk of complaints and malpractice litigation

We aimed to capture to what extent Norwegian obstetricians' consider the risk of professional litigation (in a wide sense) when making decisions concerning delivery. Respondents were asked to rank the extent to which their decisions about delivery were influenced by concerns about six different aspects: i) complaints to employers, ii) criticism by colleagues or in department meetings, iii) criticism in mass media, iv) litigation threats, v) complaints to the NPE, vi) or to the Norwegian Board of Health Supervision (Paper I, appendix 3). The responses to the six items were captured on a four-point scale (0 = "never", 1 = "seldom", 2 = "sometimes", 3 = "often") the total score (0-18) was subsequently added to an index of perceived risk of complaints and malpractice litigation ("Fear index").

Part Three: Professional experience and opinions – issues relevant to paper II

Opinions on CDMR and co-payment

The third part of the questionnaire aimed at exploring obstetricians' professional experiences and opinions regarding The respondents were asked about their attitude toward performing CDMR ("Would you agree to carry out a cesarean at the mother's request where no medical or obstetric indication is present?" The response alternatives were yes, no, or uncertain). Respondents who would perform CDMR were then asked about their reasons for this position (*e.g*. "consideration of the woman's autonomy", "avoid lack of compliance during labor", "avoid potential complaints if something goes wrong during labor"). The questionnaire had also questions about whether women should have the right to demand elective cesarean and whether the obstetrician finds clinical encounters where patients request cesarean problematic from a professionally point of view. We also asked the respondents whether or not the costs of an elective cesarean on maternal request should be publicly funded (covered 100% by the public health system). The respondents were subsequently asked how much they thought patients should pay for a CDMR. The respondents were informed that the additional cost of a cesarean compared to a vaginal delivery is about NOK 30,000/€ 3,750.

Part Four – Personal background information

This part contained socio-demographic background information such as respondents' age, gender, ethnic origin, and whether of not the respondent (or their partner) have had a baby delivered by elective cesarean. In addition there were questions concerning professional position, geographic work region, specialist status, work experience and professional field of interest.

Pilot

A preliminary version of the questionnaire was presented to 25 doctors, differing in age, experience and profession, however the majority with obstetric work experiences. Among the test-respondents 48% returned the questionnaire answered and with additional comments. The questionnaire was also discussed with (non-medical) academically skilled persons, experienced in constructing questionnaires. Based on the responses from the pilot and discussions, we revised some questions, reduced the number of questions, and regrouped some of the questions. The final version of the questionnaire was as described above.

Random allocation of additional information to scenarios 2 and 5

To test how additional information may impact the choice between cesarean and vaginal delivery, we added the information "being a lawyer" to scenario 2 ("Her husband, being a lawyer, says he will complain if it is not done a cesarean immediately") and "who is a doctor" to scenario 5 ("The woman, who is a doctor, is well informed about benefits and risks with vaginal delivery and cesarean". The two versions of the questionnaire were distributed randomly to all respondents. Among 732 posted schemes, 363 (49.7%) were with information and 369 (50.4%) were without the extra information. Among the returned questionnaires; 49.9% (n=253) was with additional information and 50.1% (n=254) without.

Misprint, questionnaire part II-1 (Risk attitude and Likert scale)

After the questionnaires were sent out we detected a printed error regarding one Likert scale in question II-1. This error resulted in the presentation of conflicting information. In the introductory text, doctors were asked to respond on a Likert scale from 1 till 6, where 1 was 'totally agree' and 6 'totally disagree'. However over the boxes where the respondents marked their answer, a reversed sequence was used (1 = 'totally disagree' and 6 = 'totally agree') (See illustration below).

Del II: Usikkerhet og risiko.

II-1. På flere områder vil beslutninger vi tar enten privat eller i yrkessammenheng, innebære elementer av usikkerhet og risiko. Det er stor variasjon i hvordan vi forholder oss til risiko (i betydning sannsynlighet for en uønsket hendelse). Nedenfor følger seks utsagn om væremåte, og vi ber deg svare i hvor stor grad disse utsagn stemmer for deg. Svarene avgis på en skala fra 1 til 6, hvor 1 er helt enig og 6 er helt uenig.

For hvert utsagn nedenfor ber vi deg sette et kryss i den boksen som best gir uttrykk for ditt standpunkt.

	Helt Uenig					Helt Enig
a. Jeg liker å ta risiko……..……..	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
b. Jeg prøver å unngå situasjoner som har usikkert utfall… …….	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
c. Det plager meg ikke å ta risiko hvis gevinsten er høy ……..…….	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
d. Jeg anser trygghet som et viktig element i alle deler av livet……...	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
e. Folk har fortalt meg at jeg ser ut til å like å ta sjanser……..……..	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
f. Jeg tar sjelden eller aldri en risiko hvis det finnes et annet alternativ…….	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

The misprint was corrected in the questionnaires sent out as reminders. Hence, among the 507 valid questionnaires, 73% had the misprint present while 27% had the corrected questionnaire. We manually checked each of the questionnaires for all 370 respondents with

incorrect questionnaires. Based on the expected responses, it seemed as if most respondents filled in, in accordance with the information immediately above the boxes, and not according to the introductory text. Most of the respondents did not comment on, and probably did not note, the disagreement between the introductory text and the response categories. If the respondent did not comment on the disagreement, we assumed that their stated responses were in accordance with the marked box categories. When comparing answers on corrected questionnaires to questionnaires with misprint, we found the same response patterns. One recipient answered inconsistent for all the statements and his responses were registered as missing. Five respondents did not answer part II at all, and some respondents left some, but not all statements missing. The total number of respondents answering the different statements varied between 491 till 498.

Quality assurance of data

The questionnaires were scanned and the data transferred to an electronic file. Subsequently, each record was, variable by variable and questionnaire by questionnaire, compared with the questionnaires and errors corrected. The rules for interpreting unclear questionnaire responses were noted in a codebook.

Ethical Approval

The survey was approved by the Regional Committee for Medical Ethics in Research (REK, reference no S-06218), and from the Norwegian Social Science Data services (NSD, reference no 14901)

3.2 The MoBa-study, Papers III and IV

About the MoBa study

In papers III and IV we used data originating from the Norwegian Mother and Child Cohort Study (MoBa), a large cohort study conducted by the Norwegian Institute of Public Health (NIPH). The study is approved by The Regional Committee for Medical Research Ethics and the Norwegian Data Inspectorate. Data from the MoBa-study, including relevant data from the Medical Birth Registry of Norway(MBRN), is made available to researchers after a written application to the FHI.[209]

MoBa is a cohort consisting in total of more than 100,000 pregnancies recruited into the study from 1999 through 2008. The target population was all women who gave birth in Norway, and no exclusion criteria were applied. Recruitment started initially in the Western region of Norway, gradually expanding geographically and from 2005 the study became nationwide. In total 50 out of 52 maternity units participated, hence the majority of all pregnant women in Norway were invited to participate. The total participation rate was 38.5% of all the invited pregnancies.[210] Women were recruited through a postal invitation in connection with the routine ultrasound examination offered in Norway to all pregnant women at 17-19 weeks of gestation. Informed written consent was obtained from each participant. At the end of enrollment the cohort includes approximately 108,000 children (respectively 107 000 pregnancies), 90,700 women and 71,500 men. The last birth in the cohort occurred in June 2009. The MoBa database consists of data from six comprehensive questionnaires targeting the mother at 17 weeks of pregnancy through 36 months after birth, one questionnaire targeting the father, and biological material from both mother and child. In general, the questionnaires cover a wide range of socioeconomic factors, physical and mental health before and during pregnancy, medication, and a variety of environmental exposures and lifestyle habits. All questionnaires are available at www.fhi.no/morogbarn. (Appendix 3)

Data used in paper III and IV

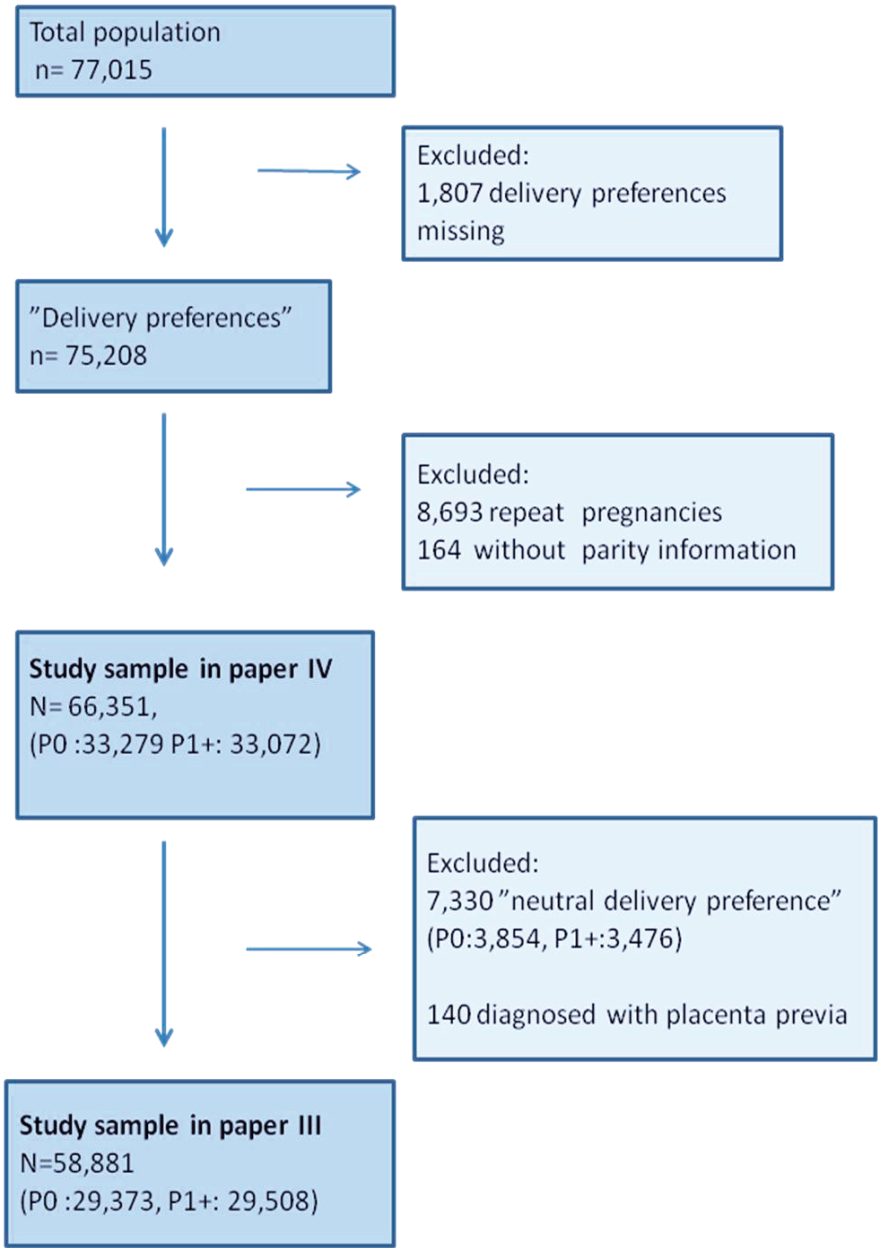
Papers III and IV in this thesis were based on version IV of the quality-assured data files released for research in February 2009. We used data from questionnaire 1 (17 weeks of pregnancy) and data from questionnaire 3 (30 weeks of pregnancy). In addition we used relevant information from the MBRN (version 4, released December 2009). Information from questionnaire 4 (answered when the child was approximately 6 months) as well as relevant

delivery specific information from the MBRN was also used in the analyses of the study questions in paper IV. In Norway, a midwife (or obstetrician) fills in an obligatory standardized form for every delivery after week 12, regarding maternal health before and during pregnancy as well as information about delivery and child outcome. This information is administered and data quality assured by the MBRN, which is a department under the NIPH.

Overall study sample

Women's preferences for cesarean delivery was a core variable, and hence only women who responded to a question about their preferred choice of delivery method were included in the study. The data file we received from the MoBa-organization had 77,015 respondents, but 1,807 were excluded due to missing information about delivery preferences (n=75,208). To ascertain independent observations only data from the first time a woman participated in the MoBa study was included, and 8,693 of repeat pregnancies were excluded. For 164 of the respondents information about parity was missing. After exclusions, the study population in paper IV encompassed 66,351 unique women, all giving birth during the period 2000-2008, 33,279 nulliparous (para 0, P0), and 33,072 multiparous (para1+, P1+). Due to the nature of the study questions in paper III, women diagnosed with placenta previa were excluded. Therefore the study population in paper III comprised of 58,881 women, respectively 29,373 nulliparous and 29,508 multiparous (Figure 4).

Figure 4: Flow chart of the study population



Variables

Outcome measure: Preference for delivery (paper III)

In paper III, the outcome variable was 'preference for delivery', based on women's response to the following statement: "If I could choose, I would prefer to have a cesarean", reported in week 30 of pregnancy. Agreement with the statement was reported through a six step response scale ("agree completely", "agree", "agree somewhat", "disagree somewhat", "disagree", "disagree completely"). Responses agree completely and agree were classified as "cesarean preference", while responses disagree and disagree completely were classified as "vaginal preference". For responders with responses in the middle ("agree somewhat" or "disagree somewhat"), the direction in favor of a cesarean or vaginal preference is unclear or may be equivalent to a "neutral" group. To avoid ascribing the respondents a strength of preference that was not originally there, we excluded individuals with the two middle response groups ("agree somewhat" and "disagree somewhat") from the analyses in paper III (n=7,330). In paper IV, these midpoint groups were classified as "neutral" in the analysis of actual delivery method.

Outcome measure: Mode of delivery (paper IV)

In paper IV the outcome measure was *de facto* delivery method of each respondent. Depending of the subsample analyses, the actual delivery mode was classified as either vaginal or cesarean section, respective elective cesarean (excusive CDMR as judged by the women) or CDMR as judged by the women. Information about the actual delivery mode stemmed in part from MBRN and in part from MoBa, however there was some conflict between the two information sources. In the study sample of 66,351 women, 9,480 respondents (14.3%) had cesarean delivery according to the MBRN information, while the corresponding number was 7,502 (11.2%) when based on self reporting (MoBa (Q4)). While 6,804 respondents were registered with cesarean in both sources, 2,676 were only registered as having a cesarean in MBRN data, and not in MoBa, and vice versa for 698 respondents. We assumed that a woman had cesarean whether this was reported in MBRN, MoBa or both, and this left us 10,178 cesareans (15.3% of the total births), which is fairly identical to the national average in Norway during the study period. Discrepancies regarding delivery classification (vaginal *versus* cesarean) in the data sources were handled as follows: The leading source to information about a cesarean, and classification into acute *versus* elective cesarean were MBRN, with one exception regarding CDMR. If cesarean sub classification in

MBRN was missing or categorized "unspecified" in MBRN, maternal information (MoBa) of acute versus elective was used, if available. Information on a planned cesarean because of maternal own preferences (CDMR) was extracted from the MoBa-data: "Was your child delivered by cesarean section?", "If yes, was the cesarean section planned?", "If planned cesarean, why", with the answer alternative "own preference") (≈CDMR as judged by the women). 'Maternal request' is not registered routinely as indication for cesarean in MBRN.

Explanatory variables

The choice of explanatory variables is explained in papers III and IV, and the details about the variables are provided in Tables 1 and 2 below, and attachment 3 (examples from the MoBa questionnaires).

Table 1: Variables relevant to paper III

Socioeconomic variables	Medical and obstetric variables	Emotional variables
Age, Marital status. Education, Work status. Income mother and partner. County of living. Smoking. Provider characteristics Place of antenatal check-ups. Gender of consulting obstetrician. Cesarean section rate on delivery hospital.	Maternal co-morbidity before pregnancy (includes hypertension, heart- and kidney disease, arthritis, and epilepsy). Diabetes Mellitus (incl gestational diabetes). Anxiety/depression (before pregnancy). Parity (Para 0, Para 1+)*. Plurality (more than one fetus). IVF. Early vaginal bleeding (bf 28 w.). Previous cesarean (P1+).	Fear of birth. Worries about not having a healthy child. Previous delivery experience (P1+). Satisfaction with antenatal check-ups. Previously lost a child. Exposed for physical or sexual abuse.

**Analyses performed on separate samples according to parity*

Table 2: Variables relevant to paper IV

Socioeconomic variables	Medical and obstetric variables
Age, Marital status.	Maternal co-morbidity before pregnancy
Education.	(incl. hypertension, heart- and kidney disease,
	arthritis, and epilepsy).
Emotional variables	Diabetes Mellitus (including gestational diabetes).
Preference for delivery	
	Parity (P0 *vs* P1+)*.
Provider characteristics	Plurality (more than one fetus).
Cesarean section rate on	Previous cesarean (P1+).
delivery hospital **.	Fetal Presentation
	Placenta previa or placental abruption**.
	Pre-eclampsia
	Dystocia
	Fetal distress

**Analyses performed on separate samples according to parity*

***Variables not included in regressions performed on the CDMR subsample*

3.3 Statistics

Descriptive statistics were used on to describe population characteristics (*e.g* mean, median and standard deviation). For difference in cross table we used the χ^2 test for bivariate analyses of categorical variables, *t*-tests for continuous ones and Mann-Whitney test for non-normally distributed continuous variables. To determine the extent to which changes in the value of one variable is associated with changes in another variable we used correlation analyses.[211]

Multivariate regressions
Predictors of responses to various questions were analyzed in multivariate logistic regression analyses. Regression analysis is a set of statistical methods to explore an association between the outcome (dependent variable) and the exposure (explanatory variables/independent variables). Compared with linear regression, which predicts the *value* of the dependent variable given the value of the explanatory variables, logistic regression gives information about the *probability* of an outcome given the value of the independent variables. The regression coefficients may be expressed either directly or translated to odds ratios.

The logistics regression model is based upon the equation:

$$\text{logit}\,(p) = \ln\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1 Z_1 + \beta_2 Z_2 + \cdots + \beta_n Z_n$$

where Z_1 is the first independent variable, Z_2 is the second an so on up to the *n*th independent variable. The term β_0 is the intercept or constant term, and is the value of logit(p) when all the independent variables are zero. The β_1, β_2 etc are the regression coefficients which can be expressed as odds ratios.[212;213]

Predicting the probability of the outcome
The predicted probability of e.g. having a cesarean preference, given all the independent (explanatory) variables (z_j) is given by:[214]

$$\Pr\,(y_j \neq 0 \,|\, z_j) = \frac{\exp\,(z_j\beta)}{1 + \exp\,(z_j\beta)}$$

This is estimated by adding the coefficient value of all the included variable and then exponentiation.

Interactions

The regression equation above represents a simple additive model which means that the impact of one independent variable on the dependent variable is independent of the other independent variables. Interaction means that this assumption does not hold. Interactions can be tested for either by interaction terms or by subgroup analysis.

An interaction tem is the product of two or more independent variables, but usually two. When an interaction term introduced in the regression model has a regression coefficient that is statistically different from zero, it means that interaction is present. The large number of independent variables in papers I-IV means that the potential number of interaction variables could be large. To avoid type 1 errors, we only tested for interactions that seemed plausible. For instance the association between those with a cesareans-preference and cesarean as delivery mode will depend on whether or not the women have had a previous cesarean, and also the association between prior cesarean and actual delivery mode (cesarean) is different among those with a cesarean preference versus a vaginal preference.

Significance level

	H_0 true	**H_0 wrong**
H_0 accepted	A	C P(C) = β Type II-error
H_0 rejected	B P(B)=α Type I error	D Test power: p(D) = 1 - β

When testing hypotheses, we aim at event A and D, while B and C lead to wrong conclusions (erroneous inference). A type I error occurs if one rejects the null hypothesis when it is true, hence the probability of event B, P(B). The probability of a type I error is equal to the level of significance of the test of hypothesis, and is denoted alfa (α). A type II error occurs when one rejects the alternative hypothesis when it in fact is true (*e.g.* accept the null hypothesis when it is wrong). The probability of a type II error is denoted by beta (β). Type II error occurs often due to small sample size.[212]

The test power is: (1-β), hence the probability of choosing the alternative hypothesis when the alternative hypothesis is correct (*i.e.* probability of rejecting H_0 when H_0 is wrong).[212] We

aim at reducing the risk of type 1 error; hence the level of significance (α) was set at a *p*-value < 0.05. Observations with missing values for any of the variables were excluded from the analyses.

Software

Data were analyzed in Microsoft Excel, in SPSS version 14.0/16.0 (SPSS, Inc, Chicago, IL), PASW Statistics 18 (formerly SPSS statistical package), and STATA version 11.0.

4 SUMMARY OF RESULTS AND MAIN FINDINGS

4.1 Paper I

Obstetricians' choice of cesarean delivery in ambiguous cases: Is it influenced by risk attitude or fear of complaints and litigation?

Results

For the five clinical scenarios, the proportions that would prefer cesarean delivery (score 1-3 on the Likert scale) varied from 8% (scenario 5; breech) to 60% (scenario 1; previous complicated delivery) across the five scenarios (Paper I, Table 1). For each scenario there was a considerable variation in the strength of preference for cesarean section. The risk attitude index varied from 6 to 32 (mean=15.6, SD=5.4, 95% CI 15.1-16.1). Among the respondents 70% (n=336) were classified as risk neutral (*i.e.* their sum score was 15.6 ±5.4), 16.2% (n=78) risk averse, and 14% (n=67) risk seeking. The fear index ranged from 0-18 (mean=5.4, SD=4.4, 95% CI 5.0-5.8) where 0 indicates no perceived risk of complaints and malpractice litigation. The fear index score was significantly higher among senior residents than board certified physicians ($\bar{x} = 6.05$, *versus* $\bar{x} = 5.16$, p=0.040, 95%CI (0.04, 1.75)). The fear index was associated with the choice of cesarean for all five scenarios, with odds ratios ranging from 1.05 to 1.10. Male gender and board certification were associated with the choice of cesarean (scenarios1 and 4 respectively), and obstetricians in Western and Northern health regions were more reluctant to cesarean compared to obstetricians in South (in scenarios 3 and 4 respectively), but a clear pattern throughout all the cases was not apparent for these determinants. For one of the scenarios (case 4), the odds of complying with patients' wishes were lower for risk-seeking obstetricians, while no effect was observed for the risk-averse. There was no association between risk attitude and choice of delivery in the remaining cases (Paper I, Table 3).

Main finding

The hypotheses were partly confirmed.

Obstetricians perceived risk of complaints and malpractice litigation may be one predictor of decisions in favor of cesarean, while no impact was observed for obstetricians own risk attitude.

4.2 Paper II

Norwegian obstetricians' opinion about cesarean section on maternal request: should women pay themselves?

Results

The majority of respondents (62%) considered patients request for a cesarean problematic from a clinical viewpoint, while 24% did not and 14% were neutral. The odds for considering such a situation problematic tended to be lower with increasing age, and lower among male obstetricians (*OR* 0.63; 95% *CI* 0.40-0.99), and those who worked in the Western region of Norway (*OR* 0.43; 95% *CI* 0.24-0.76). Forty-nine percent (n=246) of the obstetricians stated that they were willing to perform a CDMR, while the others were unwilling (28%, n=141) or uncertain (23%, n=116).

The results of multivariate regression indicate that board-certified specialists (*OR* 2.68; 95% *CI* 1.31-5.47*)* and obstetricians with origin in Eastern Europe (*OR* 3.23; 95% *CI* 1.05-9.89*)* were more likely to accept a request, while those working in the Western region of Norway were less likely to perform CDMR (*OR* 0.50; 95% *CI* 0.28-0.87) (Paper II, Table 2). There was correlation between the willingness to perform CDMR and being supportive of public funding (r=0.255, $p<0.01$) as well as rejecting patient co-payment (r= -0.265, $p<0.01$). The analyses also indicate that obstetricians who find CDMR problematic from a clinical viewpoint, to a greater extent will support co-payment (r=0.279, $p<0.01$) and reject public funding of CDMR (r=-0.163, $p<0.01$). Considering CDMR problematic and the willingness to perform CDMR showed no correlation (Appendix 4).

On the one hand, 35% of the respondents considered the costs of CS on maternal request to be a public responsibility. On the other hand, when informed of a potential excessive cost of cesarean *versus* vaginal delivery 38% (n=194) of the obstetricians' were uncertain regarding the issue of co-payments for CDMR, 18% (n=89) indicated a preference for zero co-payment, while 40% suggested use of co-payments ranging from €188 (NOK 1,500) - € 7,500 (NOK 60,000), with a median co-payment of € 2,500 (NOK 20,000). Median co-payment of female obstetricians were € 1,875 (NOK 15,000) and € 1,250 (NOK 10,000) for male obstetricians ($p<0.001$). The proportion of male respondents in favor of co-payment was 37% as compared to 64% of female obstetricians ($\chi^2= 23.94$, $p<0.001$).

Main findings

The first hypothesis, *i.e.* obstetricians who find CDMR problematic are less willing to perform CDMR, was not confirmed. The two remaining hypotheses were confirmed. Obstetricians who find CDMR problematic are more likely to reject public funding and support co-payment, while obstetricians willing to perform CDMR are more likely to favor public funding and reject co-payment.

4.3 Paper III

Why do some pregnant women prefer cesarean? The influence of parity, delivery experiences and fear

Results

Six percent of the study population (n^{tot}=58,881) preferred cesarean over vaginal delivery, of whom almost 4% had a strong preference ("agree completely"). While 2.4% of nulliparous had a strong preference for cesarean, the proportion among multiparous was 5.1% (Paper III, E-table 3). In comprehensive multivariate regressions: high maternal age, low educational level, smoking, plurality, worries about not having a healthy baby, fear of birth and reduced satisfaction with follow up were significantly associated with a preference for cesarean in both parity groups (Paper III, E-Table 4).

The estimated probability that a woman absent of potential predictors ("reference women") would have a cesarean preference was low (<2%), and fairly similar for both nulli- and multiparous (1.4% and 1.6% respectively). Presence of a single predictor, like high or low socio-economic status or maternal co-morbidity did not markedly alter the probability for a cesarean preference, contrary to if the women had fear of birth. While the preference for cesarean was <2% with low fear of birth (*i.e.* reference women; 'agree to some extent'), the predicted probability of preferring cesarean changed to 13.9% among nulliparous, and 9.1% among multiparous with high fear ('agree completely') of birth. Paper III-Table 5 presents the effects on the predicted probability of preferring cesarean of various combinations of risk factors eligible for both nulli- and multiparous women, indicating a trend of lower predicted probabilities among multiparous women. Among multiparous, the predicted probability for cesarean preference changed from 2% (reference women) to around 9% in case of either a previous cesarean or high fear of birth. If a previous negative delivery experience was combined with a previous cesarean and fear, the predicted probability of preference for CS ranged from 20% to 75% (Paper III, Figure 2).

Main finding

The hypothesis was not unambiguously confirmed.

The estimated probabilities that a woman absent of potential predictors ("reference women") would have a cesarean preference were fairly similar for both nulli- and multiparous women. However, for most comparable determinants the probability for a cesarean preference was higher among nulliparous women than among multiparous women.

4.4 Paper IV

Maternal preference for cesarean: Do they get what they want?

Results

15% of the total study population (n^{tot}=66,351) delivered by cesarean section, of which 38% were elective and 62% acute. One percent of all births in the sample were cesarean performed due to the mothers own preference, representing 16% of all elective cesareans and 5.5% of all cesareans.

A higher proportion of nulliparous compared to multiparous had a cesarean delivery. Among those who reported a vaginal delivery preference 88% *de facto* delivered vaginally, 9% had acute cesarean and 3% an elective cesarean. Among those who reported a cesarean preference, the delivery distribution was 51% vaginal, 13% acute cesarean and 36% delivered by elective cesarean (p<0.001) (Paper IV, Table 1).

In logistic regressions, there was a significant association between a preference for cesarean during pregnancy and cesarean section at delivery, both among nulli- and multiparous women, after adjusting for maternal and medical confounders. Among nulliparous women with a cesarean preference, the odds ratio (OR) for an acute cesarean was almost two times higher (OR 1.99, 95% CI 1.50-2.63) and for an elective cesarean 12 times higher (OR 12.48, 95% CI 9.60-16.24) than for women with a vaginal preference. For multiparous, the corresponding odds ratios were 2.94 (95% CI 1.32-6.55) and 9.42 (95% CI 4.34-20.48). Also high maternal age, fetus in breech position, maternal co-morbidity and delivery-relevant complications (*e.g*. dystocia, pre-eclampsia, and placenta previa) increased the odds of having an operative delivery for both parity groups (Paper IV, Table 2). For the multiparous group, a prior cesarean significantly increased the odds for an acute cesarean (OR 4.75, 95% CI 4.23-5.34), respective an elective cesarean (OR 22.24, 95% OR 18.45-26.80) (Paper IV, Table 2). Multivariate logistic regressions revealed a significant association between a maternal preference for cesarean and having a CDMR when adjusting for maternal indicators and medical confounders (Paper IV, Table 3).

The probability of an elective cesarean among low-risk nulliparous with a vaginal preference (”reference woman”) was 2% compared to 17% with a cesarean preference. For multiparous, the corresponding proportions were 1% with vaginal preference *versus* 22% with cesarean

preference. Given a cesarean preference, the likelihood of a CDMR, adjusted for relevant medical confounders, was 16% for nulliparous and 25% for multiparous (Paper IV, Table 4).

Main findings

The hypothesis was confirmed. There are higher proportions of cesarean deliveries among pregnant women with cesarean preferences compared to among women with vaginal preferences.

5 DISCUSSION

5.1 Methodological considerations

The findings and conclusions of this thesis should be viewed in the light of limitations of the studies (Papers I-IV). The basic question is whether the results are valid. Validity means that the conclusions are true (trustworthy). Validity concerns to what extent the findings of the study sample are true for the population from which the sample was drawn (internal validity) and to what extent the findings can be projected to other populations (external validity). The internal validity is threatened by selection bias, information bias, confounding and random errors. Bias can be defined as a systematic error introduced into sampling and drop out or statistical testing by systematically favoring some outcomes or answer over others.[215]

Selection bias

Selection bias can be defined as an error due to systematic difference in the characteristics of the groups under study. If the study sample is not representative of target population studied, this may impair the validity of the conclusions. Selection bias may be due to inappropriate sampling, loss of study objects (non response bias or drop-out bias) or missing data. Selection bias may impair the internal or the external validity or both. To some extent selectivity can seldom be completely avoided.[216] Non-response increases the risk of selection bias, but a low response rate will only introduce selection bias if the non-response is non-random. Ideally, but rarely practical, non-response bias should be handled by collecting relevant information about a sufficiently large and representative sample of non-responders. Then these should be compared with the respondents with respect to the characteristics the researchers wish to investigate. Selection bias may arise if the non-response is correlated with the variables of interest.

For the obstetrician data, we obtained a response rate of nearly 71%. Non-responders may have different opinions on cesarean on requests than the responders; still the risk of selection bias may be limited subsequent to the high response rate. We have no information about characteristics of the non-responders beyond gender which was equally distributed among responders and non-responders. However, we can not preclude that other characteristics may have a different distribution among responders compared with non-responders. Among the

invited MoBa women the response rate was 39%.[210] Taken into consideration that the study enrollment to reach the target of 100 000 women took almost 10 years, during which period the enrollment was nationwide for the last four years, it seems reasonable to assume that some selection bias is present.

However, low response rate is not unusual in large epidemiologic studies.[217] The MoBa participants are somewhat older, more nulliparous women, fewer stillbirths or miscarriages, lower rates of preterm birth and low birth weight. The women tend to be non-smokers, married or co-habiting, as well as using supplements (*e.g.* folic acid, vitamins) to a greater extent than the overall birth population.[218;219] These differences might indicate a certain degree of socioeconomic gradient associated with participation. Although some prevalence estimates may be biased, estimates of association can still be valid.[210;218] In a published validity study, no statistically relative differences in association measures were found between MoBa participants and the total birth population regarding eight exposure-outcome associations evaluated.[219]

In papers III and IV we compared nulliparous with multiparous women, and these groups were different with respect to some important variables. Only the multiparous group has experienced a prior birth, and might have been exposed to negative birth experiences or a prior cesarean. Even though we adjust for such variables in the subgroup analyses, we can not rule out differences in terms of other characteristics for which we do not have data. For example, women who disliked their first delivery may opt for no more pregnancies creating selection bias in that primiparous women have other attitudes than multiparous women. If such selection is present, possibly this might increase the risk of underestimating the preference for cesarean. Those who dislike pregnancy and birth, are not included, hence a risk of underestimating prevalence of a cesarean preference.

Information bias

Information bias is bias caused by errors in the collecting, recording, coding or processing of data.[216] Such bias may be present with respect to measurement of exposure as well as outcome. The regressions in papers I-IV included in total 38 different variables. Potentially, there could be information bias in each of them. For some of them such as age, educational attainment, place of living, work region, parity and plurality, any bias is unlikely. For others, bias may be present and influence the results.

The is no "gold standard" method to capture attitude to risk.[115] We used an extract from the Jackson Personality Inventory-Revised (JPI-R) to measure general risk attitude. This instrument is previously validated[205] and has been shown to predict medical decisions.[118;119;220] We could not confirm any association between risk aversion and delivery decisions. One explanation may be that the personality inventory does not capture those aspects of risk attitude that may influence medical decisions, and in particular delivery relevant aspects. In our study, the Cronbach *alpha* was 0.72 and in line with previously reported value.[119] Even though a high value of Cronbach's *alpha* can indicate that the items measure an underlying or latent construct (*i.e.* internal reliability or internal consistency), the reliability coefficient is no "proof". Another explanation may be that decisions about "paper patients" do not reflect real life decisions. The "fear index" was developed to obtain an index for six aspects of fear of complaints and litigation. The items were assumed, however, to capture similar elements of the same phenomena. This assumption was supported by the correlation between the individual items. The reliability coefficient, however, was low (Cronbach's *alpha* 0.35).

The fear of birth variable is based on a question concerning to what extent the respondents fear the upcoming delivery. According to information from the Moba organization, the variables relevant to feelings related to forthcoming childbirth were constructed specifically for the MoBa study, though inspired by previously published work. Delivery preferences,[179] as well as some of the explanatory variables used in the regressions (*e.g.* fear of birth), may well change during pregnancy, while we captured the variables only once. How this variation may impact the results is unclear. Questions have been raised about the validity of prospective surveys of cesarean section on maternal request, if preferences are measured at only one point in time.[221] In contrast to some previous studies of delivery preferences,[165;222] however, we measured women's delivery preferences well before delivery, hence their reported preferences are not influenced by the actual delivery. Even if we do not have in-depth information about what the delivery preference variable captures, it was a strong predictor of subsequent delivery outcomes (Paper IV).

While it is easy to distinguish between cesarean and vaginal delivery for those involved, information bias may arise in the recording or coding of the event. When we chose to always

assume that cesarean was the outcome when conflict between self reported and birth register reported cesarean, this may bias the proportion of cesarean up. We believe that the large number of women who did not report cesarean when this was reported in the birth register (n=2,676) is explained by the design of questionnaire 4 in MoBa, and consider it likely that the outcome in fact was cesarean. The impact of any information bias here on the regression estimates will depend on the nature of the information bias.

The validity of 'paper-patients', which were used in this study, as a surrogate measure (proxy variable) for actual behavior carries the risk of information bias. Although the method has proven valid in some studies[223] others report limited validity.[224;225] We can not rule out that obstetricians would act different from what they theoretically state, if real clinical situations were examined.

Confounding bias

The word confound has a latin origin meaning to mix together or confuse.[215] Confounding occurs if an association between two variables is distorted by a third variable (confounder).[211;216] A confounding factor may mask an actual association or falsely display an apparent association between variables where no *de facto* association between them exists. If confounding factors are not considered and included in the analyses, the conclusion may be biased. Variables that ought to be explored as possible confounders are those with known or suspected relation with both the dependent and independent variable. In all papers, we have aimed at including many relevant factors in our regression analyses, to reduce confounding and bias' in the effect estimates, although we can not preclude that the associations found can be altered by underlying causes (variables) not included. In our studies, previous cesarean and negative delivery experiences were confounders when analyzing predictors of preferences for delivery method. Such confounding was the reason that we arrived at different conclusions about parity and preferences than a previous study based on the same data.[175] Clearly, our conclusions may be influenced by confounders we do not have information about. Such confounders could for example be the obstetrician's attitudes towards CDMR and shared decision making in papers III and IV.

Random errors

In all research random errors may occur in sampling of subjects and measurement of exposures and outcomes. The statistical methods used in most medical research ("frequentist statistics") aims to avoid drawing false conclusions on the basis of random variation. Still,

type I errors may occur. This is particularly important issue in this thesis due to the many statistical tests performed on the data. The methods used in statistical testing imply that 1 in 20 significance tests will be "significant" by chance when the level is set equal to 5%.

External validity

External validity concerns generalization of findings and to what extent the findings and conclusions are valid for broader populations (*i.e.* conclusions going outside the study population). Unfortunately, there are no universal criteria for external validity, and here the judgment is based on discretion.[226] In both our study samples, the procedure aimed to capture the entire population of obstetricians, respectively all pregnant women in Norway. The issue of external validity then becomes a question whether our findings may be valid for populations outside Norway. There may be differing opinions across obstetricians in different countries due to variation in practice patterns, clinical management *(i.e*. treatment traditions) and characteristics in the health service. Norwegian guidelines promote vaginal delivery of breech to a greater extent than for example the US and many other countries, and it is then unclear to what extent our findings would hold for obstetricians outside Norway. Also, generalisability concerning obstetrician's opinions about co-payment must be done with care. There are differences between countries in the organizing and financing of the health care services, and also the tradition with out-of pocket payment. In Norway, all pregnancy care and delivery is without co-payment at all. This entail that the respondents may perceive the question as unfamiliar, unrealistic or even provocative. This may impact on the reference frame and hence answers of the respondents. A discussion concerning external validity will concern whether the views upon delivery preferences and delivery mode of Norwegian women are different from pregnant women in other countries. It is conceivable that opinions and attitudes of women as well as physicians are influenced by local cultures, and this may reduce the external validity of the findings.

Causal inference

Causality is the relationship between an event (the cause) and a second event (the outcome), where the second event is understood as a consequence of the first.[215;226;227] There is no simple way to establish whether an observed relationship is causal. The English epidemiologist, Sir Austin Bradford Hill, in 1965 proposed a list of nine criteria when discussing the causality of an association.[228] On the one hand the Hill criteria have been criticized for not clearly distinguish causal from non-causal relations,[227] still the criteria (or some subset of the criteria) are used in many studies in an attempt to evaluate or justify

causality.[229] In causality the time aspect is important, the cause must come before the effect (outcome) (temporality in Hill's criteria). A lack of a time dimension in the cross-sectional design is one reason for care when making causal inference. For example we do not know whether litigation fear influences choice of delivery mode, or whether previous decisions about delivery mode may have caused litigation fear (paper I). We find that a cesarean preference forego a cesarean as the delivery outcome (paper IV), and viewed by the Hill criteria a causal claim may be justified. First, we have *strength* of the association in high association measures. The odds ratios of cesarean preferences range from 2 till 380 for the various outcomes (acute, elective, or CDMR). Second, our findings are *consistent* with previous findings.[230] Third, it is likely that a preference for cesarean is related to a *specific* outcome (choice of delivery mode), and not a myriad of outcomes. Fourth, we have *temporality* in the relationship, as preferences is stated and measured before the outcome occurs. Fifth, the existence of a *biological gradient* could be present since we observe a stronger effect on the outcome relative to strength of preferences. Six, the relation ship is *plausible*, and last, the association is *coherent with* the development of maternal request as indication for surgery. However, those with cesarean preference may well be different from the vaginal preference group (selection bias) which makes it difficult to directly compare the outcome (cesarean versus vaginal) and conclude that the cesarean preference is the direct cause to difference in delivery mode between the two groups.

5.2 General discussion

Main findings paper I/II

- Obstetricians' decisions about cesarean request in ambiguous clinical cases vary.
- Perceived risk of complaints and litigation is associated with compliance with the requested cesarean, while risk attitude is not.
- The additional costs of cesarean on maternal request was considered to be a public responsibility among 35% of the obstetricians, while 40% suggested use of co-payments ranging from €188 - € 7 500.
- Female obstetricians favored use of co-payments more often than males and suggested higher co-payments.

It has been claimed that there is a growing risk aversion among obstetricians,[121] which may result in defensive obstetrics and subsequent unnecessary procedures, including excessive cesarean.[121;231] Our study, however, could not confirm any association between obstetricians risk aversion and increased acceptance of cesarean.

Even though the method for measuring 'fear of perceived risk of complaints and malpractice litigation' may be criticized, it is plausible that such fear influences obstetricians' behavior. Some surveys among obstetricians in the US report that 80-90% of obstetricians have experienced complaints or lawsuits.[127;232;233] In the US liability concerns have a negative impact on both job satisfaction, and recruitment to the specialty.[234] In Europe obstetricians face financial claims less frequently, but fear of litigation among obstetricians is now mentioned more often than before.[235] Norway has traditionally had a low medico-legal burden, and obstetricians are not personally responsible for financial claims. However, our results indicate that the perceived risk of complaints and litigation may explain variation in clinical practice even in the context of a mild medico-legal climate. In Norway, there were in total 34 lawsuits, *i.e.* professional liability due to obstetric malpractice, from 1988 up to 2008 (Personal communication from managing director Trygve Harvold, The Lovdata Foundation, 01.23.08), and from the 1169 compensation cases processed by the Norwegian System of Compensation to Patients (NPE) between 1988 and 2006, compensation was rewarded in 374 cases.[123] This number represents approximately 20 cases among the approximately 60,000 deliveries each year. These numbers imply approximately 0.03 lawsuits per 1000 deliveries,

1.03 complaints to NPE per 1000 delivery, and compensation rewarded in 0.3 complaints per 1000 delivery. The low number of complaints and the absence of financial risk for the obstetrician may indicate that they overstate the risks associated with complaints and litigation. It should be noted, however, that people's behavior is likely to be influenced by the perceived risk rather than the real risk. Also potential self-reproach and loss of status following complaints may be more important for physicians than the financial consequences. A formal complaint or a lawsuit may entail lack of self-confidence and esteem among peers and patients, while financial losses or loss of authorization (medical license) is an unlikely outcome.

In the presence of ambiguous or relative medical indications, which on one hand can "medically justify" acceptance of the request, Norwegian obstetricians' seem reluctant to consent to a cesarean. In four out of five paper-patients the proportion of obstetricians consenting to a cesarean was below 30%, which is a more reserved attitude than observed in a related study.[204] Obstetricians attitude to 'CDMR' has been studied in several countries. In paper II, 49% of the Norwegian obstetricians report willingness to perform CDMR, which is consistent with previous findings both in Europe[236] and the US.[237] Noteworthy, there seems to be considerable variation in obstetricians' attitude to CDMR in different countries, and there are seemingly no "systematic" relation between obstetricians' attitude and the national cesarean rate. In our survey, the obstetricians seem less willing to consent to the paper patient's request, relative to their reported willingness to perform a CDMR. This may indicate that obstetricians to a greater extent accept to perform (implement) the operation, than to make decisions about it. This notion is supported by the fact that a majority of obstetricians found issues of cesarean on request difficult.[238]

Ideally, patients' socioeconomic characteristics should not influence decisions about cesarean. Our results indicate that obstetricians were more likely to comply with cesarean request when informed that the paper patient was a physician, however no similar effect was observed for the law profession. While a Finish study did not find higher cesarean rates among health professional than others,[239] this have been the case among obstetricians compared to other medical specialties.[200;240] Also, the rate have been reported to be higher among female doctors and midwifes compared to other professionals with comparable educational duration (non-medical training),[200;201] though the educational disparity have become less apparent in recent

time.[241] Conceivably, expert patients are better capable of communication their symptoms as well as preferences to the obstetrician, who thereafter includes patient preferences into the decision-making, which makes it more likely to have a cesarean if that is the preference of the expert patient. On one hand, clinical uncertainty favor the expert patients, because they asses and interpret their symptoms and send a precise signal to the physician.[241] On the other hand, favoring expert patients might reflect that the patient is given patient autonomy by the virtue of her profession, and not due to her clinical signs or communicative skills.

Obstetricians in the Western part of Norway found CDMR less problematic and were less willing to perform CDMR.[238] This might reflect national differences in practice patterns. Hospitals in the Western part of Norway have lower cesarean rates compared to hospitals in other regions and compared with the national average.[11;242] Conceivably, this difference can not in total be explained by patient characteristics or patient preferences. A study of regional variation in cesarean rates in Canada concluded that the variation was not explained by patient illness or differences in practice patterns, but could reflect differences in practitioners' approach to medical decision making, *e.g.* in the trade off between cesarean and assisted vaginal delivery.[243]

Several studies indicate that cesarean is more costly than vaginal delivery,[141;143;146] however there is no consensus about the cost difference, and some claim there is little or no difference.[144;145] The Norwegian DRG system indicates that cesareans entail higher costs than vaginal, and co-payment may be one way of financing the additional costs. When obstetricians were queried about their view upon cesarean and co-payment, 40% favored co-payments while 38% were uncertain in the question of co-payments. Obstetricians who consider maternal request for cesarean problematic, are more in favor of patient co-payments and less in favor of total public funding. Co-payment might be seen as an instrument to ease decision-making, because out-of-pocket payment may function as a deterrent of CDMR among women who do not feel strongly about it. It is both challenging and time-consuming for obstetricians to provide objective counseling that accurately reflects current understanding of best practice. Introduction of co-payments for CDMR may entail that fewer public resources are channeled away from other, perhaps more beneficial, health care services, and thus reduce opportunity costs (*i.e.* as measured by the health benefits forgone in one patient who might have used the same health resources). Within public health care systems,

physicians are increasingly expected to act as “double-agents”. Physicians have traditionally been the agent of the patient, attending the patents interests and preferences, but physicians are increasingly expected to also act as the society’s agent and contribute to efficient resource allocation for all individuals in need. Co-payment is a controversial issue in the context of public health care and the potential consequences of co-payment is discussed in paper II. Co-payment is not necessary a suitable or an immediate solution to meet increasing cesarean rates, and the findings of obstetricians’ attitude do not support such an arrangement.

Main findings paper III/IV

- Relatively few (6%) pregnant women report a cesarean preference during delivery.
- Fear of birth, previous negative delivery experiences or previous cesarean strongly increases the probability of a cesarean preference.
- Parity *per se* has little influence on a cesarean preference.
- Among women with a cesarean preference, 49% subsequently had a cesarean (13% acute and 36% elective), respectively 12% (9% acute and 3% elective) among those with a vaginal preference.
- Multivariate logistic regressions revealed a significant association between a maternal preference for cesarean and having an elective as well as acute cesarean, when adjusted for maternal and medical confounders.

There is increased interest in patient’s preferences in the medical literature. A Medline search with the terms “patient preference(s)” lists nearly 4,000 articles (15.02.2011) with the majority published within the last decade. Even though the term “patient preferences” lacks a universally accepted definition, patient preferences are statements made by individuals regarding the relative desirability of a range of health experiences, treatment options, or health states.[244] The phenomenon of maternally requested cesareans has been much debated in weekly magazines such as Times and Newsweek, as well as in medical journals. Concerns have been raised, first because an increasing proportion of women seemingly express a preference for cesarean. Secondly, because the cesarean on maternal request may stem from convenience, in which the term "too posh to push" has been coined for upper class or celebrity women.

Our findings, as well as other research, do not support these statements.[174;245-248] When 5% in our study sample preferred cesarean over vaginal delivery, 3.5% among nulliparous and 6.6% among multiparous, this is in accordance with the lower range of previous studies, in which cesarean prevalence estimates range from 6% to17%.[172;173;176-178;180;181;245;249] Importantly, precaution ought to be drawn when discussing prevalence based on the MoBa-data. There might be a selection bias in the interest of those participating. The Moba questionnaires are extensive to read and fill out, and conceivably this may lead to higher participation among those who are good at reading or have a special interest in pregnancy and delivery. Whether this is likely to result in an underestimate of prevalence of cesarean preference is difficult to say.

The concept of CDMR was originally used for maternally requested cesarean without any medical or obstetric indications.[55] How obstetricians define "medical" or "obstetric" indication will depend on their valuation of risk in the context of patient preferences and autonomy. There is no clear distinction between cesarean on the basis of fear as a 'medical indication' and fear as 'CDMR'. To some extent, the choice of label is a matter of taste and discretion among obstetricians, and a question about how the pregnant women present her arguments to promote her interests. It is conceivable that physicians more often will use the term "maternal request" rather than a medical indication when they move from a paternalistic to shared decision making. The increase in "maternal requests" as indication for performed cesarean does not necessarily mean that the requests are without a reason. Few women request a cesarean in the absence of, what she considered, to be a clinical or psychological reason.[184]

Although we found that multiparous women expressed a preference for cesarean more frequently than nulliparous ones, we believe that it is not parity *per se* which drives this preference, but rather the fact of already having had a cesarean or a bad experience during a previous delivery. The predicted probability that a pregnant woman will request a cesarean in the absence of potential indications is low (<2%), whether she is nulliparous or multiparous. With several risk factors present, the predicted probability of a cesarean preference is higher among nulliparous than multiparous (Paper III).

We find that a cesarean preference increases the probability for a cesarean delivery, both with respect to elective cesareans, but also acute. Even though this association may well be causal, it is less clear how the preference influence the decision making among those involved (the pregnant woman, the midwife, and the obstetrician). A woman with a vaginal preference may have a an even stronger preference to avoid a cesarean in case of a lengthy trial of labor, while the women with a cesarean preference will use her preference as a bargaining power to oust the obstetrician to agree in a cesarean delivery. While decisions about acute cesarean is made on a short time notice, it is more uncertainty to the decision making process surrounding the elective cesarean. There is scarce with literature investigating how decision upon delivery mode is made for women with a cesarean preference. The pregnant woman, primary care (general practitioner and/or midwife) and the hospital (where delivery is scheduled), can be considered to represent a triangle. Within this triangle, clinical considerations of risks and benefits, considerations of cost-effectiveness, and patient values and preferences may influence the final decision. To our knowledge, little is known about the details of this process.

In Norway, as well as many other European countries, midwives are the main caregiver for normal birth. Only when an instrumental vaginal or a cesarean delivery is considered will an obstetrician be called upon, making it unusual for obstetricians to attend vaginal births. In ambiguous cases where the obstetrician is not called upon, the woman may give birth by vaginal delivery when the obstetrician may have chosen a cesarean. Even though this thesis has focused on the pregnant woman and her obstetrician, it is clear that the midwife also plays an important role. It was beyond the scope of this thesis, however, to explore midwife factors.

An important aspect of preference elicitation is risk communication. Unfortunately, physicians may lack accurate information about the various risks associated with delivery, and may have limited knowledge, experience or skills with respect to risk communication. To the extent patients receive risk information, they may not understand it, and this may depend on education, experience, emotions and numeracy.[250-253]

When deciding upon mode of delivery for women with a previous cesarean, the medical tradition is to evaluate the risks associated with an elective repeat cesarean delivery (ERCD) and the risks associated with trial of labor (TOL), not least the risk of unsuccessful vaginal

delivery or uterine rupture. In Norway the TOL rate is 64%, among which 80% are successful vaginal deliveries.[40] Internationally, the rate of elective repeat cesarean declined when vaginal birth after cesarean (VBAC) was promoted, but during the last decade it has increased again in the US.[41] There may be several reasons for this, but it may illustrate the difficulty in quantifying and weighing risk. It is argued that the risk-benefit calculus has been even more complex when patient preferences are to be integrated into the decision. There exist little research into how women patients value TOL *versus* ERCD, and when they would prefer one rather than the other (*e.g.* strength of preferences).[254;255] Traditionally, decisions about mode of delivery have not been considered an area for shared decision making.[256] However, VBACs may be one exception where medical considerations go side by side with patient preferences. In clinical practice, women with previous cesarean are probably often offered a choice between planned vaginal and planned cesarean, unless contraindications to vaginal exist[257]. A study of the use of computer based decision aids indicate that structured information may reduce decisional conflict about delivery mode.[258] Use of decision aids among women with prior cesarean was associated with greater knowledge, less anxiety and a higher rate of vaginal deliveries compared with standard care by midwives and obstetricians.[259]

Interestingly, it is not always agreement between the woman's and the physicians (patient record) picture of the reasons for the cesarean.[260] CDMR is an ambiguous term that lacks specificity. One may question whether the use of "maternal request" as indication for surgery really benefits patients and obstetricians. To the best of our knowledge, the term CDMR is a term used by more often by health personnel, while the women tend to explain the cesarean with fear or other specific reasons. When women who request a cesarean are given support and specific counseling, 58% changed to vaginal delivery preference, in which case they were also pleased when asked after delivery.[261]

Respect for patient autonomy is frequently used as an argument for accepting maternal request for cesarean.[204;236;262] There is a general understanding in medical ethics, that patients have strong negative rights which imply that the patient is entitled to reject a treatment proposal or to actively choose between available treatment alternatives.[263;264] There is less consensus about the extent of a patient's positive rights, *i.e.* the right to a cesarean when the obstetrician does not offer it.[265] Also, there are differing opinions about whether obstetricians

ought to initiate discussions about elective cesarean (on no-indication) during pregnancy care.[266;267]

Increased interest in shared decision making have coincided with more focus on patients right's in health care.[268;269] In Norway, patients have the right to voice a preference between available treatments provided that they are medical defendable. The legal right to treatment is also contingent upon cost-effectiveness. This implies that the right to treatment apply only when the health benefits are "reasonable" in comparison with the costs.[269;270] It is clear that Norwegian law does not give women a legal right to request cesarean, without any medical indication. Hence, it is the doctor who decides which treatment to provide, but the patient's preference is relevant and should be included in the medical decision.[6;147] In general, giving legal rights to treatment and modes of treatment, have uncertain implications. One thing is to impose legal responsibility and sanctions in case of obstetric errors or malpractice, another matter is to provide women with an *a-priori* legal right to cesarean. The legal component in the decision for a treatment should be *a-posteriori*, if involved at all.

6 POLICY IMPLICATIONS

The aim of this study was primarily to generate knowledge about the phenomenon of cesarean section in a modern health care system. Still, the study may have implications for practical life.

The variation in responses to the five paper patients indicate that it may be difficult to determine which delivery mode is optimal. This finding would be useful for all those involved in lawsuits and complaints. In this context hindsight bias may be an important psychological phenomenon. Hindsight bias means that a judgment, for instance about the appropriateness of a vaginal delivery, may be unconsciously influenced by knowledge of an adverse (or good) outcome.

Whether patient co-payment should be used to reduce cesarean rates is a political question and not a decision for obstetricians. However, the findings of papers I and II indicate considerable difficulties in using co-payments. First, if co-payments were to be used to discourage "unnecessary" cesareans, it would be difficult to establish what is unnecessary even for experienced physicians. Second, obstetricians' attitudes to co-payments are mixed, and a co-payment policy is likely to be resisted by many obstetricians (and women!). To the extent that women would be exempted from co-payments on medical grounds, it would be easy for doctors to circumvent the payment. Such policies are therefore likely to introduce unfairness for (some) women unless they were made universal.

In a modern health care service, patient preferences should be elicited and included into the care of the patient, also regarding decision upon delivery mode. It is a difference between eliciting patient preferences and (routinely) offer cesarean delivery by request. It is less likely that requests for cesarean will increase dramatically if preferences were elicited early during pregnancy. Apparently, few women prefer cesarean just out of "convenience". Rather the cesarean preference is understandable and the reasons can be explained in (pseudo)-medical terms. If a cesarean preference is revealed, women's decisional conflict regarding delivery mode may be addressed with relevant information on risk and consequences of different delivery modes. Along with clinical guidelines, patient preferences provide directions for the obstetrician in clinical decisions where there is no strong evidence against cesarean.

7 FUTURE RESEARCH QUESTIONS

Even though these studies have generated new knowledge, they have also revealed need for further research. In particular we would suggest seven areas of research:

- Studies of the impact of obstetricians' risk attitudes on real life decisions.
- Studies of the decision-making concerning CDMR.
- Studies of women's willingness to pay for cesarean. Even though we have doubts about use of copayments for cesarean, studies of their willingness to pay for cesarean could be interesting because contingent valuation is a method for eliciting the strength of preferences.
- Studies of changes in women's delivery preferences during subsequent pregnancies, and how any change of preference is related to previous mode of delivery and how a certain delivery mode may impact on preferences.
- Studies to compare the short and long-term outcome and women's satisfaction of CDMR with uncomplicated vaginal deliveries.
- Studies of the long term consequences of previous cesarean with respect to complications in subsequent pregnancies.
- Studies, preferably randomized clinical trails, of how a decision aid for pregnant women may influence anxiety about adverse delivery outcomes, delivery preferences, delivery mode, decision conflict and the extent of shared decision making.

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PAPERS I - IV

PAPER I

Fuglenes D, Øian P, Kristiansen IS
Obstetricians' choice of cesarean delivery in ambiguous cases:
is it influenced by risk attitude or fear of complaints and litigation?

Am J Obstet Gynecol 2009;200:48.e1-48e.8

PAPER II

Fuglenes D, Øian P, Gyrd-Hansen D, Olsen JA, Kristiansen IS.
Norwegian obstetricians' opinions about cesarean section on maternal request: should women pay themselves?

Acta Obstet Gynecol Scand 2010;89:1582-1588

PAPER III

Fuglenes D, Aas E, Øian P, Botten G, Kristiansen IS.
Why do some pregnant women prefer cesarean?
The influence of parity, delivery experiences and fear.

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Why do some pregnant women prefer cesarean?
The influence of parity, delivery experiences and fear.

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Article Condensation:

Multiparous women more often prefer cesarean than nulliparous, but the difference may be attributable to delivery experiences rather than multiparity *per se*.

Short version of the article title: Predictors of preferences for cesarean.

Why do some pregnant women prefer cesarean? The influence of parity, delivery experiences and fear.

Dorthe FUGLENES, Eline AAS, Grete BOTTEN, Pål ØIAN, Ivar Sønbø KRISTIANSEN

Abstract:

Objective: To identify predictors of preferences for cesarean among pregnant women, and estimate how different predictors influence preferences.

Design: Cross sectional study based on the Norwegian Mother and Child Cohort Study (MoBa) (n=58,881).

Results: Six percent of the study population preferred cesarean over vaginal delivery. While 2.4% of nulliparous had a strong preference for cesarean, the proportion among multiparous was 5.1%. The probability that a woman, absent potential predictors, would have a cesarean preference was similar (<2%) for both nulli- or multiparous. In the presence of concurrent predictors such as previous cesarean, negative delivery experience and fear of birth, the predicted probability of a cesarean request ranged from 20% to75%.

Conclusion: The proportion of women with a strong preference for cesarean was higher among multiparous than nulliparous women, but the difference was attributable to factors such as previous cesarean or fear of delivery and not to parity *per se*.

Word Count: 149

Keywords: Cesarean delivery, Maternal request, Preference, Probability, Regression analysis.

Introduction

During the last decade there has been much interest in patient-demanded cesareans and the increasing cesarean delivery rates in industrialized countries.[1-3] In the US, approximately 5% of all deliveries were by cesarean in 1970, increasing to 20% in the 1980s and 32% in 2007.[4] Although the US has experienced a steeper increase over time, a similar pattern is seen in many European countries. In Norway, the cesarean delivery rate was approximately 2% in the 1970, 12% in the 1980s, and 17% in 2008.[5] This worldwide increase has caused great concern. One explanation that has been advanced for the increase is cesarean as the delivery option of choice. Increased attention to patient autonomy and shared decision making[6,7] means that women who express a preference for cesarean delivery might obtain a surgical rather than vaginal delivery on the basis of a "weak" or even lacking medical indication. A consensus conference estimated that 4-18 % of all cesareans were performed on maternal request.[8] The reasons some women prefer cesarean section are therefore of interest to clinicians as well as policy makers.

Preferences for cesarean are often associated with factors such as anxiety and fear of birth.[9-11] Previous cesarean delivery, previous negative birth experiences, maternal age, and socio-economical factors are among other determinants.[12-18] The effect of increased parity on delivery preferences has also been discussed, and previous studies have indicated that multiparous women more often prefer cesarean than nulliparous ones.[12,13,19]

In this study we explore determinants of a cesarean preference in a large study sample, and predict the probability that different groups of pregnant women would prefer cesarean.

Materials and Methods

We used data from the Norwegian Mother and Child Cohort Study (MoBa), a study conducted by the Norwegian Institute of Public Health,[20] and data from the Medical Birth Registry of Norway (MBRN).

MoBa is a cohort consisting of more than 100,000 pregnancies recruited into the study from 1999 through 2008. The target population was all women who gave birth in Norway and no exclusion criteria were applied. In total 50 out of 52 maternity units participated. The total participation rate was approximately 44% of all the invited pregnancies.[21,22] Women were recruited to the study through a postal invitation in connection with the routine ultrasound examination offered in Norway to all pregnant women at 17-19 weeks of gestation. Informed written consent was obtained from each participant. The study was approved by The Regional Committee for Medical Research Ethics and the Norwegian Data Inspectorate. The MoBa study encompasses information on socioeconomic factors, physical and mental health, medication, and a variety of environment exposures and lifestyle habits before and during pregnancy.

Only women who responded to a question about their preferred choice of delivery method were included in the present study. From the MoBa data file (version IV) of 77,015 possible respondents, 1,971 were excluded due to missing information on parity or delivery preference, 140 due to placenta previa and 7,330 were excluded due to neutral delivery preference. To ascertain independent observations, only data from the first time a woman participated in the MoBa study was included and 8,693 of repeat pregnancies were excluded. The final study sample encompassed 58,881 unique women, 29,373 nulliparous, and 29,508 multiparous.

Based on knowledge from previous research,[7,12,15,19,23] we defined *a priori* a model with explanatory variables including socio-economical information, obstetric and medical factors, emotional factors and provider characteristics to study how these factors impact on the preference for cesarean (E-Figure 1). The outcome variable, delivery preference, was measured in week 30 of pregnancy by response to the statement: "*If I could choose, I would prefer to have a cesarean*" captured on a six-point response scale (*"agree completely", "agree", "agree somewhat", "disagree somewhat", "disagree", "disagree completely"*). As there were no neutral categories, the two middle response groups ("agree somewhat" and "disagree somewhat") were excluded from the study analyses (n=7,330) because the direction of these preferences is unclear with respect to cesarean delivery on maternal request.

Emotional variables, captured in week 30, were measured by the respondents' agreement with the following statements: "*I am really dreading giving birth"(*fear of birth*),* "*I worry all the time that the baby will not be healthy or normal"* and "*On the whole, I am satisfied with the way I have been followed up by the health service"*. Responses were captured on a six-point response scale. If multiparous, previous delivery experience (*"If you have given birth before, in general, how was the experience of giving birth*?") was scored on a five-point scale, with answer categories "*very good", "good"*, "*alright"*, "*bad"* or *"very bad"*. Information about a previous loss of a child ("*Have you ever lost a child*?", "yes", "no") was also elicited. Socio-economical background characteristics were extracted from MoBa (survey at 17 weeks) and/or MBRN and included: age (age<35, age≥35), marital status (married/cohabitant *versus* no partner), education (5 groups), work status (working, student/apprentice, not working), smoking habits, income (grouped), and county. Pre-existing maternal co-morbidity included diabetes (preexisting or gestational), chronic diseases (including hypertension, cardiac- or

renal disease, rheumatoid arthritis or epilepsy) and anxiety/depression. These background variables were extracted from MBRN or MoBa survey at 17 weeks. We limited obstetric risk factors to those most likely to occur and with which women were likely to be familiar before stating delivery preferences in week 30 of pregnancy. The obstetric risk factors were bleeding before week 28, pregnancy due to IVF, or multiple pregnancy, all variables extracted from the MBRN. Provider characteristics, extracted from MoBa survey at 30 weeks, included type of antenatal care ('hospital (outpatients) clinic' *versus* 'other' (*e.g.* captures public health centre/midwife care, or general physician). If applicable, the gender of the obstetricians was also registered. We adjusted for the annual cesarean section rate at the hospital where the mother was to deliver (MBRN).

Based on a set of personal, medical and emotional factors we defined a "reference woman", *i.e.* a subset of women with expected low risk of interventions and adverse outcome, inspired by the "standard primipara" method originally suggested by Paterson and co-workers.[24,25] The reference nulliparous woman is without any of the usual risk factors associated with a preference for cesarean. She is below 35 years of age, married or cohabitant, with a median level education and no co-morbidity. She has an average level of emotional stress (including low levels of fear of birth and low worries about not having a healthy child).
The reference multiparous resembles the nulliparous in the relevant factors, and she also has a good previous delivery experience with no prior cesarean.

From the regression coefficients we estimated the predicted probabilities[26] that the reference woman would have a preference for cesarean. Subsequently, we estimated the probabilities for women with different combinations of risk factors.

We used SPSS for descriptive statistics and $\chi 2$ –tests and STATA[27] to conduct logistic regression analysis (Logit) to determine the predictors of preference for cesarean. The dependent variable were dichotomized such that response categories "agree completely" and "agree" were classified as a cesarean preference, whereas "disagree completely" and "disagree" were classified as vaginal preference. Because parity has been identified as an important factor associated with many aspects of pregnancy and delivery, nulliparous (para 0) and multiparous (para 1+) women were analyzed separately. A p-value < 0.05 was considered statistically significant. The goodness-of-fit was estimated by means of log likelihood ratio test (McFadden). Observations with missing values for any of the variables were excluded from the analyses (n=2,557 for nulliparous and n=5,984 for multiparous).

Results

The mean age of the study sample was 28 years for nulliparous and 32 years for multiparous women. There was a higher proportion below the age of 35 years among nulliparous compared to multiparous (92% *versus* 76%). The majority in both parity groups was married or cohabitant. In both groups, nearly 40% had completed up to four years of university, while 26% of nulliparous and 21% of multiparous had four years or more of university. 85% of the respondents were employed. Approximately 2% of the total population was pregnant with more than one fetus. There was a similar percentage of co-morbidity in both parity groups, while the percentage of in vitro fertilization was 3% among nulliparous compared to 1% among multiparous (E-table 1). Among multiparous respondents 12% had a previous cesarean. The majority of the respondents were satisfied with their follow up during pregnancy and with their previous delivery experience (E-table 2).

Six percent of the study sample preferred cesarean over vaginal delivery. In the total study sample (n=58,881), 3.7% "agreed completely" that cesarean delivery was their preferred choice of delivery, while 65.8% "disagreed completely" in preferring cesarean delivery (E-Table 3). The proportions were 2.4% and 64.2% *versus* 5.1%, and 67.4% for nulliparous and multiparous, respectively. The proportion that preferred cesarean was higher among multiparous compared to nulliparous women (χ^2=328, p<0.001).

We performed separate logistic regressions to analyze preferences for cesarean among nulliparous and multiparous women, including, respectively 23 and 25 socio-economic, medical, obstetric and emotional explanatory variables. Eight variables were significantly associated with a preference for cesarean (E-Table 4), both among nulliparous and multiparous women: high maternal age, low educational level, work status (not working), smoking, plurality, worries about not having a healthy baby, fear of giving birth, and reduced satisfaction with follow up. Two additional variables were significant for only the nulliparous group: pre-existing chronic disease, and high income partner. A prior cesarean, previous negative delivery experiences, antenatal care at outpatient clinic, and delivery at hospital with high cesarean rate were significantly associated with a preference for cesarean among multiparous women. Generally, region was not a significant explanatory variable; only one of 19 counties was associated with higher preference for cesarean among nulliparous while three counties were associated with lower preference for cesarean among multiparous. According to McFadden's goodness-of-fit test[26] the covariates explained 23% of the variation in preferences among nulliparous, and 30% among the multiparous women.

Fear of birth, previous cesarean, and bad experiences in previous deliveries were the strongest predictors of preferences for cesarean. Compared with having no fear of birth, the odds for

preferring cesarean was 27 times greater among nulliparous with high fear of birth, and 6 times greater among the multiparous. The odds for preferring cesarean were 6 times greater among those with previous cesarean and 3-6 times greater among those with previous negative delivery experiences (E-table 4).

Model predictions

For a nulliparous or multiparous "reference" woman the predicted probability of preferring a cesarean is under 2% (Table 5). Adding one risk factor increases the predicted probability: with age above 35 years the predicted probability is 2.9% among nulliparous versus 2.4% among multiparous, while with plural pregnancy predicted probability is 2.7% for nulliparous and 4.3% for multiparous (Table 5). Similar (or lower) differences in the predicted probability occur if other risk factors are changed: education (low instead of high), smoke habits (smoker instead of non-smoking) or income level (low or high *versus* middle) [results not shown in table]. While the preference for cesarean was <2% with low fear of birth (*i.e.* reference women; 'agree to some extent'), the predicted probability of preferring cesarean increases to 13.9% among nulliparous, and 9.1% among multiparous with high fear ('agree completely') of birth.

Table 5 presents the effects for the reference woman of various combinations of risk factors on the predicted probability of preferring cesarean. For example, nulliparous women aged 35+ with a high fear of birth have a 26% predicted probability of preferring cesarean, while it is 13% among multiparous (Table 5). If she also has a chronic disease (*e.g.* diabetes mellitus) and experienced early vaginal bleeding, the predicted probability is 43% among nulliparous and 18% among multiparous (Table 5).

Among multiparous, the predicted probability for cesarean preference changes from 2% (reference women) to 9.5% in case of a previous cesarean or high fear of birth (E-figure 2). If a previous negative delivery experience is combined with a previous caesarean and fear, the predicted probability indicates a strong change in favour of cesarean preference (E-figure 2).

Comment

Although multiparous women expressed a preference for cesarean more frequently than nulliparous women, the regression results indicate that it is not parity *per se* that drives this preference, but rather the fact of already having had a cesarean or a bad experience during a previous delivery.

The predicted probability that a pregnant woman will request a cesarean in the absence of potential indications is low (<2%), either being nulliparous or multiparous (Table 5). Variations in maternal socio-economic status or general health had little impact on the probability of preferring a cesarean. Fear of birth combined with delivery specific factors (*i.e.* previous cesarean or negative delivery experiences) strongly changed the probability in favor of a cesarean request.

A main strength of this study was the comprehensive dataset from a national cohort.[20,21] Although the participation rate was modest,[21] the sample was representative of the Norwegian birth population. The total Norwegian birth cohort, during the same time period, had a mean age of 29 years (nulliparous 27, primiparous 30) and the proportion of first-time mothers of 41%.[5] Multiparous and women with low socio-economic status were underrepresented. This could influence the regression and hence probability predictions, but the direction of a potential bias here is unclear. A sample with this many covariates allows us to control for

many factors, thus reducing the potential for confounding, although confounding can not be totally disregarded due to unobserved variables, not least cultural ones. A possible weakness in our study population is the risk of self-selection. Women who dislike the delivery may opt for no more pregnancies, and multiparous women may consequently represent a select group compared to nulliparous. Delivery preferences,[28] as well as some of the explanatory variables used in the regressions (*e.g.* fear of birth), may well change during pregnancy, while we captured the variables only once. How this variation may impact the results is unclear.

Previous publications report cesarean preferences in the range of 6%-17%.[11,12,16,18,29-32] In the present study, consisting of a larger study sample than most previous studies, 5.6% preferred cesarean, but only 3.7% expressed a strong preference for cesarean.

To our knowledge, this is the first study to estimate the predicted probability that different groups of women prefer cesarean. A high fear of birth, either alone or in combination with risk factors such as high maternal age, plurality or maternal co-morbidity, results in a higher probability for cesarean preference among nulliparous compared to multiparous (Table 5). The predicted impact of fear of birth in favor of a cesarean preference, is consistent with previous knowledge in that fear of birth is s a frequent cause to patient demanded cesarean.[9,10] Women may have a "rational" reason, personal or medical, for their cesarean preference, hence preferences for cesarean may have many determinants that constitute a complicated causal web. Social and cultural influences will likely form the preference, but are variables that are difficult to measure.

Among multiparous with previous cesarean, the predicted probability for a cesarean preference in current pregnancy was 9.5%, increasing to 20%-40% in combination with either

fear of birth or previous negative delivery experience present (Figure 2). Even though medical evidence and professionals' attitudes are moving away from the dogma "once a cesarean always a cesarean",[33,34] maternal request is still a dominant factor in repeat elective cesarean section.[35,36] This might illustrate the challenge of uniting evidence based medicine with patient autonomy and shared decision making.

Many studies, including ours, report that multiparous women more often prefer cesarean than nulliparous. While previous studies seem to conclude that multiparity *per se* causes a stronger preference for cesarean,[13,19] our study augments earlier findings by adjusting for more factors that may cause confounding. In fact, we observe that multiparous women have similar preferences for cesarean when previous cesarean and previous delivery experiences are also adjusted for (Table 5). It is conceivable that nulliparous base their preferences on expectations (*e.g*. like fear of birth), while multiparous, to greater extent, are governed by their experiences.

While most women have a low probability of preferring cesarean, the probability may exceed 20% among those with several medical and/or psychological risk factors. Among multiparous, delivery specific factors such as previous bad delivery experience, previous cesarean and fear of birth strongly increase the probability of preferring cesarean in current pregnancy (Figure 2). Identifying these factors after the first delivery and creating targeted interventions to address a woman's concerns could help avoid medically "unnecessary" cesareans in future pregnancies. A cesarean should not necessary be the only "treatment" to secure maternal and fetal well-being in these situations.

The findings of this study may have implications for researchers as well as clinicians. We would suggest that clinical trials should be undertaken to see whether high risk women's preferences for cesarean can be changed by more information about the different delivery modes and the fact that large groups of experienced women prefer vaginal delivery. Even though this study contributes to a better understanding of the preferences for cesarean, further research should explore to what extent a cesarean preference influences the actual birth mode.

Conclusion

Multiparous women more often prefer cesarean than nulliparous, but the difference may be caused not by the multiparity *per se*, but various delivery specific factors that potentially can be influenced by information or other means of support.

Acknowledgements

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Figure Legend

E-Figure 1**:** Factors that might influence and modify the preference for a cesarean.

E-Figure 2: The influence of delivery specific risk factors on the predicted probabilities (%) of having a cesarean preference among multiparous women.

Tables:

E-Table 1: Socio-economical and co-morbidity characteristics according to parity

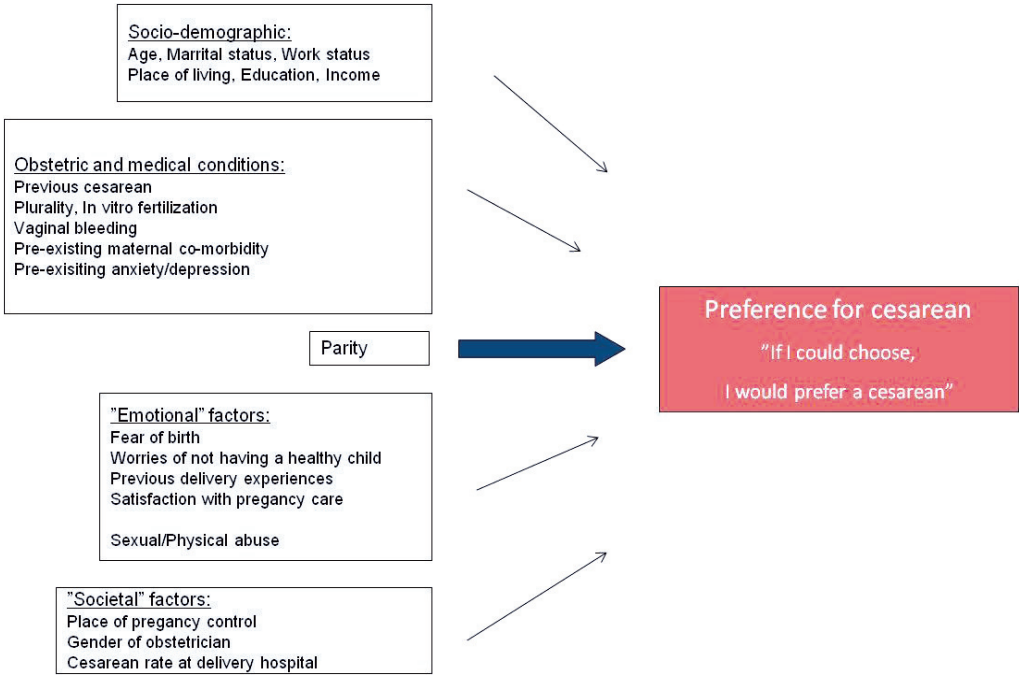
E-Table 2: Emotional factors according to parity

E-Table 3: Preference for cesarean delivery

E-Table 4*:* Logistic regression analyses of preference for cesarean

Table 5: Predicted probabilities (%) of cesarean preference, according to maternal characteristics.

E-figure 1 Factors that might influence and modify the preference for a cesarean



E-Table 1
Socio-economical and co-morbidity characteristics according to parity

Characteristic	Para 0 (n=29,373) n	(%)	Para 1+ (n=29,508) n	(%)
Age				
<35	27,057	(92.1)	22,291	(75.5)
≥35	2,316	(7.9)	7,217	(24.5)
Marital status				
Married/cohabitant	28,100	(95.7)	28,908	(98.3)
Single	1,250	(4.3)	498	(1.7)
Native language				
Norwegian (including Sami)	27,674	(94.2)	28,147	(95.4)
Urdu	35	(0.1)	35	(0.1)
English	158	(0.5)	163	(0.6)
Other	1506	(5.1)	1163	(4.0)
Education				
Compulsory (secondary) school	461	(1.6)	760	(2.6)
High school	8,835	(30.4)	10,419	(35.9)
Higher education < 4 years	11,611	(39.9)	11,259	(38.8)
Higher education > 4 years	7,535	(25.9)	5,989	(20.6)
Other	631	(2.2)	623	(2.1)
Work status				
Student/apprentice	3,092	(10.7)	1,381	(4.8)
Working	24,770	(85.6)	24,478	(84.8)
Not working	1,083	(3.7)	3,016	(10.4)
Previous cesarean	NA	NA	3,522	(11.9)
Plurality (twins)	481	(1.6)	429	(1.5)
Pregnancy due to in-vitro-fertilization	974	(3.3)	374	(1.3)
Vaginal bleeding (up to week 28)	1,242	(4.2)	1,237	(4.2)
Diabetes Mellitus				
No	28,989	(98.8)	29,107	(98.7)
Pre-existing diabetes	153	(0.5)	154	(0.5)
Gestational diabetes	208	(0.7)	240	(0.8)
Pre-existing anxiety/depression	2,582	(8.8)	2,304	(7.8)
Pre-existing chronic diseases*	737	(2.5)	768	(2.6)

*Includes presence of hypertension, cardiac- or renal disease, rheumatoid arthritis or epilepsy

E-Table 2 Emotional factors according to parity

Characteristic	**Para 0** (N=29,373)		**Para 1+** (N=29,508)	
	n	**(%)**	**n**	**(%)**
Worries about not having a healthy baby				
Disagree completely	2,373	(8.1)	2,966	(10.1)
Disagree	8,4905	(29.0)	8,569	(29.2)
Disagree to some extent	5,803	(19.8)	5,515	(18.8)
Agree to some extent	9,323	(31.9)	9,119	(31.1)
Agree	2,181	(7.5)	2,117	(7.2)
Agree completely	1,093	(3.7)	1,061	(3.6)
Fear of birth				
Disagree completely	3,581	(12.2)	4,458	(15.2)
Disagree	8,317	(28.4)	7,540	(25.7)
Disagree to some extent	4,519	(15.4)	3,551	(12.1)
Agree to some extent	8,510	(29.1)	8,223	(28.0)
Agree	2,822	(9.6)	3,281	(11.2)
Agree completely	1,517	(5.2)	2,282	(7.8)
Satisfaction with antenatal check ups				
Agree completely	8,684	(30.1)	9,913	(34.3)
Agree	15,850	(54.8)	15,510	(53.6)
Agree to some extent	2,921	(10.1)	2,378	(8.2)
Disagree to some extent	927	(3.2)	738	(2.5)
Disagree	395	(1.3)	309	(1.1)
Disagree completely	121	(0.4)	94	(0.3)
Previous delivery experience				
Very good	N/R	N/R	5,781	(22.0)
Good	N/R	N/R	10,125	(38.5)
Alright	N/R	N/R	6,215	(23.7)
Bad	N/R	N/R	2,218	(8.4)
Very bad	N/R	N/R	1,503	(5.7)

E-Table 3 Preferences for cesarean delivery (%)

"If I could choose, I would have a cesarean"	**Para 0** (n=29,373) %	**Para 1+** (n=29,508) %	**Total** (n=58,881) %
Agree completely	2.4	5.1	3.7
Agree	1.6	2.3	1.9
Disagree	31.9	25.2	28.6
Disagree completely	64.2	67.4	65.8

E-Table 4: Logistic regression analyses* of preference for cesarean †

		Para 0 (n=26,816)	**Para 1+ (**n=23,524)
Covariate	**Coding**	**Odds Ratio (95%CI)**	**Odds Ratio (95%CI)**
Age (years)	<35	Ref	Ref
	35+	2.14‖ (1.71-2.66)	1.48‖ (1.30-1.69)
Education	Compulsory school	Ref	Ref
	High school	0.94 (0.62-1.43)	0.67§ (0.49-0.90)
	Higher education < 4 years	0.71 (0.46-1.10)	0.46‖ (0.34-0.64)
	Higher education >4 years	0.61‡ (0.38-0.96)	0.44‖ (0.31-0.61)
	Other	0.65 (0.35-1.22)	0.93 (0.60-1.47)
Work status	Working	Ref	Ref
	Student/apprentice	1.15 (0.88-1.51)	1.72‖ (1.32-2.26)
	Not working	1.37‡ (1.00-1.88)	1.32§ (1.08-1.61)
Previous cesarean	No	Ref	Ref
	Yes	N/R	6.39‖ (5.63-7.26)
Plurality (twins)	No	Ref	Ref
	Yes	2.03§ (1.30-3.16)	2.70‖ (1.86-3.92)
Smoking	Never	Ref	Ref
	Sometimes	1.26‡ (1.00-1.58)	0.80 (0.64-1.00)
	Daily	1.30§ (1.09-1.54)	1.24§ (1.06-1.43)
	Unknown	0.93 (0.73-1.18)	1.02 (0.85-1.21)
Pre-existing chronic diseases	No	Ref	Ref
	Yes	1.85§ (1.31-2.63)	1.32 (0.96-1.80)
Worries about not having a healthy baby	Disagree completely	Ref	Ref
	Disagree	1.15 (0.79-1.68)	1.05 (0.83-1.34)
	Disagree to some extent	1.18 (0.80-1.73)	0.95 (0.73-1.22)
	Agree to some extent	1.48‡ (1.03-2.12)	1.22 (0.97-1.54)
	Agree	1.85§ (1.26-2.73)	1.86‖ (1.42-2.44)
	Agree completely	2.98‖ (2.01-4.41)	2.50‖ (1.87-3.36)
Fear of birth	Disagree completely	Ref	Ref
	Disagree	0.74 (0.49-1.13)	0.70§ (0.54-0.90)
	Disagree to some extent	1.36 (0.90-2.07)	0.72‡ (0.53-0.97)
	Agree to some extent	2.35‖ (1.64-3.37)	0.93 (0.73-1.18)
	Agree	6.89‖ (4.78-9.95)	2.26‖ (1.76-2.89)
	Agree completely	26.93‖ (18.75-38.68)	5.63‖ (4.38-7.24)
Satisfaction with antenatal check ups	Agree completely	Ref.	Ref.
	Agree	1.05 (0.89-1.24)	1.11 (0.97-1.26)
	Agree to some extent	1.44§ (1.14-1.82)	1.34§ (1.09-1.65)
	Disagree to some extent	1.53‡ (1.08-2.15)	1.27 (0.91-1.77)

	Disagree	1.39 (0.82-2.34)	1.71‡ (1.08-2.71)
	Disagree completely	1.61 (0.76-3.33)	1.95 (0.85-4.47)
Previous delivery experience	Very good	Ref	Ref
	Good	N/R	1.20 (0.95-1.50)
	Alright	N/R	1.94§ (1.54-2.44)
	Bad	N/R	3.12‖ (2.44-3.99)
	Very bad	N/R	5.61‖ (4.37-7.22)

* The variables marital status, maternal income, previously lost a child, pregnancy due to IVF, vaginal bleeding, diabetes, anxiety/depression, previously exposed to physical or sexual abuse and obstetrician's gender were also included in the analyses but not significantly associated with delivery preferences. Four variables (partner's income, county, place of pregnancy control, and cesarean rate at delivery hospital) were omitted from the table for the sake of brevity. The full table is available upon request.

† Response to the question "If I could choose, I would have a cesarean" (1='agree completely' and 'agree', 0=disagree completely' and 'disagree').

‡ *0.05* >*p-value* > 0.01

§ 0.01 > *p*-value > 0.001

‖*p-value* <0.001

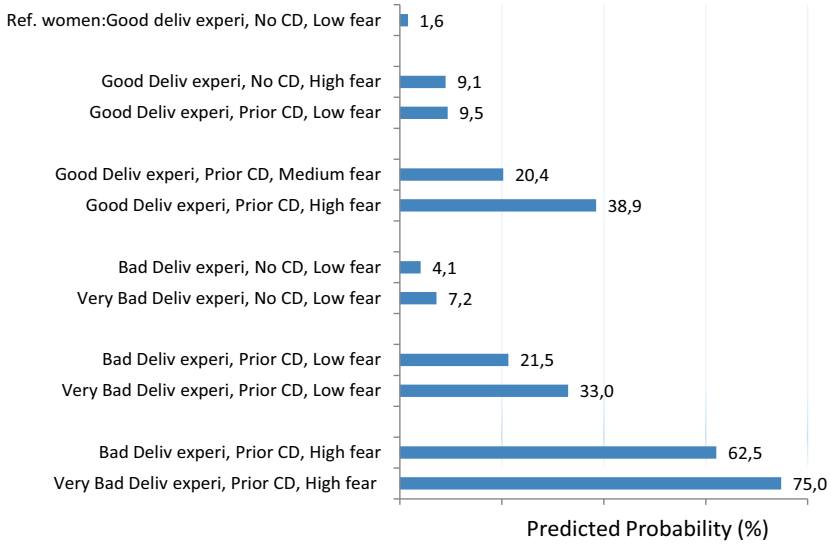
Table 5 Predicted probabilities (%) of cesarean preference*, according to maternal characteristics.

	Para 0	Para 1+
Reference woman	1.4	1.6
Age≥ 35 years	2.9	2.4
Anxiety/depression before pregnancy	1.6	1.7
Pre-existing diabetes mellitus/chronic disease	2.4/2.5	2.2/2.1
Pregnant with more than one fetus	2.7	4.3
Medium fear† of birth	3.9	3.8
High fear† of birth	13.9	9.1
Age≥35 and high fear † of birth	25.6	12.9
Age≥35, Co-morbidity (diabetes mellitus), and vaginal bleeding, medium fear †of birth	15.6	8.3
Age≥35, Co-morbidity (diabetes mellitus), and vaginal bleeding, high fear† of birth	42.7	18.4
Age≥35, plural pregnancy and high fear†	41.1	28.6

***** Responses 'agree completely' and 'agree' to the question "If I could choose, I would prefer to have a cesarean" is defined a cesarean preference.

†Fear of giving birth is divided into low (equals response category "agree to some extent"), medium ("agree"), and high ("agree completely").

E-Figure 2: The influence of delivery specific risk factors* on the predicted probabilities (%) of having a preference for cesarean†, among multiparous women.



*Delivery specific risk factors includes: experience of previous delivery ('Deliv experi'), previous cesarean delivery ('Prior CD'), and level of fear of birth (low="agree to some extent", medium="agree", or high ="agree completely").
†Responses 'agree completely' and 'agree' to the question "If I could choose, I would prefer to have a cesarean" is defined a cesarean preference.

Clinical implications:

- The predicated probability that a low-risk woman will have a cesarean preference is less than 2%.
- Parity *per se* has little influence on a cesarean preference.
- Fear of birth or previous negative delivery experiences strongly increase the probability of a cesarean preference.
- Early identification of these factors might be helpful to develop interventions to address women's concern.

PAPER IV

Fuglenes D, Aas E, Øian P, Botten G, Kristiansen IS.
Maternal preference for cesarean; Do they get what they want?

Manuscript, submitted

APPENDICES

APPENDIX 1: Obstetrician survey; complete questionnaire in English and Norwegian

APPENDIX 2: Original JPI-R Risk taking subscale

APPENDIX 3: MoBa survey; extracted parts of questionnaires 3 and 4

APPENDIX 4: Table Correlation Analysis – Paper II

APPENDIX 5: Tables from papers II-IV with full regression models

APPENDIX 1

OBSTETRICIAN SURVEY
COMPLETE QUESTIONNAIRE IN ENGLISH AND NORWEGIAN

UNIVERSITY OF OSLO
FACULTY OF MEDICINE

Institute of Health Management and Health Economics
P.O. Box 1089 Blindern
NO-0317 Oslo
Telephone: + 47 22 84 50 39
Email: post-keisersnitt@medisin.uio.no

Reg. nr

Invitation to participate in a research project: "Cesarean section and the attitudes of Norwegian gynecologists"

Dear Colleague

The Institute of Health Management and Health Economics at the University of Oslo and the Research Institute of the Norwegian Medical Association, wish to research gynecologists'' attitudes to caesarean section. Questionnaires have been sent out to all specialists and physicians currently undertaking specialist training in gynecology/ obstetrics. We hope that you will take the time to fill out this questionnaire.

If you have received this form but are not a specialist or undertaking training in gynecology/ obstetrics, we would ask you to place an x here ☐, and return the form in the enclosed envelope.

Participation in the study is voluntary. By filling out and returning the questionnaire you also consent to participate in the study. It is possible to withdraw from the study, as long as this is done before the project is completed (at the latest 31.08.09), and to have all information about yourself deleted.

All information will be dealt with confidentially and it will not be possible to identify individuals. The registration number on the questionnaire will only be used in the event of any reminders. After the project has been finished, all information will be anonymised. Results from the study will be published as group data so that no individual physician can be identified.

The study is financed by the University of Oslo. The project is evaluated by the Norwegian Social Science Data Services and by the Regional Committee for Medical Research Ethics.

The questionnaire has four parts: case studies, risk evaluation, questions about professional experience and general background questions. It will take about 10 minutes to fill out the questionnaire. It is very important that you complete the entire questionnaire.

If you have any comments on the questionnaire or the study you can enter these in the last part of the questionnaire. If you have any questions or comments you are also welcome to contact us via e-mail (post-keisersnitt@medisin.uio.no) or telephone (tel. +47 22 84 50 39, Dorthe Fuglenes).

Deadline
The questionnaire must be returned in the enclosed envelope by 10 November 2006.

Thank you for your help!

Yours faithfully

Grete Botten
Professor/ Head of Institute
Institute of Health Management and Health Economics
University of Oslo

Olaf Aasland
Head of Institute
The Research Institute of the Norwegian
Medical Association

Pål Øian
Professor/Consultant physician
Dept. of Gynecology and Obstetrics
The University Hospital of North Norway

Dorthe Fuglenes, PdD-student
Institute of Health Management and
Health Economics
University of Oslo

Part I: Case Studies.

Imagine that you are the doctor having to make a decision in the case studies described below. We would like you to answer according to how you would deal with a similar situation. Try to disregard guidelines for practice on your ward or what you think may be the "right" answer. We would like to emphasize that there is no "correct answer" for these case studies. For each of the case studies we would ask that you place an x in the box which most closely describes your opinion.

Case study 1

At an antenatal check-up you meet a woman aged 36. She is gravida 5, para 4. Her first 4 babies all had birth weights between 4200g and 4600g. Her first baby was born vaginally with shoulder dystocia and brachial plexus injury, remission after 6 months. In her second pregnancy she was delivered by elective cesarean due to breech presentation. Her third baby was born vaginally without complications. The fourth baby was born vaginally, complicated birth with shoulder dystocia and brachial plexus injury, remission after 6 months.
The woman is now 37 weeks pregnant with her fifth child, uncomplicated pregnancy, the woman's weight is 140kg, and the baby's estimated birth weight is 4200g. The woman is requesting a cesarean due to her previous birth experiences. What do you do?

I would definitely go for an elective cesarean — *I would definitely go for a planned vaginal birth*

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7

Case study 2

You are on call on a maternity ward and are asked to come and see a 28 year old nulliparous woman with spontaneous labor, week 40, uncomplicated pregnancy. SF measurements are within the normal range. The woman has been worried that her baby could sustain brain injury during the birth, and has mentioned this at several of her antenatal check-ups. To begin with she didn't want to give birth vaginally but after close follow-up by an experienced midwife and gynecologist the woman decided to go ahead with a vaginal birth. You are called to see her by the midwife because of slow progress. Labor has lasted for 19 hours. On examination the cervix is fully dilated, the fetal head is below the ischial spine, but not on the pelvic floor. Sagittal suture is in the right occiput anterior or left occiput anterior position; you think you can feel the posterior fontanelle at 2 o'clock. Some moulding of the fetal head. CTG shows synchronous contractions, uncomplicated variable decelerations. The woman asks for a caesarean, and says she is worried about her baby. Her husband, a lawyer, says he will make a complaint if a cesarean is not carried out immediately. On the basis of this information, how would you deal with the situation?

I would definitely go for an elective cesarean — *I would definitely go for a planned vaginal birth*

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7

Case study 3

31 years old woman, gravid 2, para 1, 37 weeks pregnant, no complications. Foetus in cephalic presentation. SF measurements in lower normal range. In her first labor uterine hypertonicity and bradycardia occurred, after which her baby was delivered by vacuum extraction due to fetal stress. The baby's weight was 3900 g, Apgar score 7/9, normal pH in umbilical cord blood. The woman sustained a third degree perineal rupture which was repaired under general anesthesia. She has not had problems with incontinence or anal incontinence as a result of the rupture. The patient wishes to have an elective cesarean. What do you do?

I would definitely go for an elective cesarean — *I would definitely go for a planned vaginal birth*

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7

Case study 4

29 year old woman, gravida 2, para 1, geational age 38 weeks, no complications, fetus in cephalic presentation, SF measurements within normal range. After her first pregnancy and labor the woman has suffered from pelvic pain (though there has been no significant deterioration in the present pregnancy). Examinations have been carried out (x-ray, ultrasound and MR), but no pathological findings have been made. The woman felt she was cared for badly during her last labor, and has made a complaint about your colleague at her last place of birth. The case is being dealt with by the Norwegian Board of Health Supervision. The patient seems determined and insistent, and is not interested in discussing delivery methods. The woman refuses to give birth vaginally because she is of the opinion that this will cause further damage to her pelvis, and wants to have a cesarean. What do you do?

I would definitely go for an elective cesarean — *I would definitely go for a planned vaginal birth*

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7

Case study 5

At an antenatal check-up you meet a 26 year old woman, gravida 1, pregnancy duration 39 weeks, fetus in breech presentation, uncomplicated pregnancy. The fetus has an estimated weight of 3200g, conjugata vera is 11.7 cm, total pelvic outlet is 32.8 cm, in other words satisfactory for a vaginal breech birth. External cephalic version has been attempted, but was not successful. The woman, who is a doctor, is well informed of the advantages and risks of vaginal birth and cesarean section. She is still very unsure of which delivery method she should choose and asks for your advice. What do you do?

I would definitely go for an elective cesarean — *I would definitely go for a planned vaginal birth*

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7

Part II: Uncertainty and risk.

II-1. The decisions we make in many areas of life, in both private and professional contexts, will often contain an element of uncertainty and risk. Our attitudes to risk (*i.e.* the probability of an undesirable situation occurring) vary greatly. The following is a list of six statements concerning attitude to risk. We would like you to answer according to how true these statements are for you, using a scale from 1 to 6 in which 1 is "totally disagree" and 6 is "totally agree".

For each statement below please place an x in the box which most closely describes your attitude.

	Totally disagree					**Totally agree**
a. I enjoy taking risks…….……..	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
b. I try to avoid situations that have uncertain outcomes …….	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
c. Taking risks does not bother me if the gains involved are high…….…… …….	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
d. I consider security an important element in every aspect of my life……...	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
e. People have told me that I seem to enjoy taking chances…….……..……..	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
f. I rarely, if ever, take risks when there is another alternative…..…….	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

II-2. When you make decisions about type of delivery (both vaginal and cesarean), would you take into consideration the risk of experiencing any of the following:

Please choose one option for each line by placing an x in one box

The risk of:	***Often***	***Occasionally***	***Rarely***	***Never***
A complaint being made to your employer	☐	☐	☐	☐
A complaint being made to the Norwegian Board of Health Supervision	☐	☐	☐	☐
A case being reported to the Norwegian System of Compensation to Patients.....	☐	☐	☐	☐
A case being taken to court (Litigation treat)	☐	☐	☐	☐
A case being the object of negative discussion at a morning meeting/ on a ward (criticized by colleagues)	☐	☐	☐	☐
A case receiving negative attention in the mass media, (being critizied in mass media)	☐	☐	☐	☐

II-3. Have you ever experienced any of the following because you **carried out** a cesarean?

Please place one x per line	**Yes**	**No**
A complaint being made to the hospital/other employer.....	☐	☐
A complaint being made to the Norwegian Board of Health Supervision	☐	☐
A case being reported to the Norwegian System of Compensation to Patients.....	☐	☐
A case being taken to court (Litigation treat).....	☐	☐
A case being the object of negative discussion at a morning meeting/ on a ward (criticized by colleagues)	☐	☐
A case receiving negative attention in the mass media (being criticized in mass media).....	☐	☐

II-4. Have you ever experienced any of the following because you **didn't** carry out a cesarean?

Please place one x per line	**Yes**	**No**
A complaint being made to the hospital/other employer.....	☐	☐
A complaint being made to the Norwegian Board of Health Supervision	☐	☐
A case being reported to the Norwegian System of Compensation to Patients.....	☐	☐
A case being taken to court (Litigation treat).....	☐	☐
A case being the object of negative discussion at a morning meeting/ on a ward (criticized by colleagues)	☐	☐
A case receiving negative attention in the mass media (being criticized in mass media).....	☐	☐

Part III: Professional experience and assessments

1. How many deliveries have you carried out?

(Give approx no.)	In 2005	Total no. in your career
Breech births		
Forceps/ vacuum		
Cesarean		

2a. Would you agree to carry out a cesarean at the mother's request, and where no medical or obstetric indication is present?

Please choose one answer

Yes ☐
No ☐
Not sure ☐

2b. If your answer to 2a was yes, what is/ are your reason(s)?

Place an x in one or several boxes

Out of consideration to the woman's Autonomy ☐
In order to avoid possible problems with lack of patient cooperation during labor ☐
To avoid a potential complaint if something were to go wrong during labor ☐
Other reason ☐

If other reason, please give details:
……
……

3. What is your opinion regarding a woman's right to demand an elective cesarean?

Place an x in one or several boxes

She should have an absolute right to choose a cesarean ☐
She should have a say in the matter ☐
The doctor should take the final decision ☐
Not sure ☐

4. To what extent does the fear of complaints from patients affect your enjoyment of your work as a gynecologist / obstetrician?

Place an x in one box

My enjoyment is not affected at all — *My enjoyment is greatly affected*

1	*2*	*3*	*4*	*5*	*6*	*7*
☐	☐	☐	☐	☐	☐	☐

5. Do you experience decision making about whether to grant a requested cesarean as problematic from a clinical viewpoint?

Place an x in one box

Not problematic — *Very problematic*

1	*2*	*3*	*4*	*5*	*6*	*7*
☐	☐	☐	☐	☐	☐	☐

6. Do you think that the cost of an elective requested cesarean should be covered by the government?

Place an x in one box only

Yes ☐
No ☐
Not sure ☐

7. It is estimated that a cesarean costs approximately 30 000 NOK (approx €3750) more than a vaginal birth. If it was possible for pregnant women to choose a cesarean (without a medical or obstetric indication), how much do you think the woman should have to contribute herself?

Amount: ☐

Not sure ☐

8. If one were to permit "patient requested" cesareans for pregnant women, how do you think this would affect the rate of cesareans?

Place an x in one box

The number of women who request a cesarean would increase ☐
The number of women who request a cesarean would decrease ☐
The rate of cesareans would not be significantly affected ☐
Not sure ☐

Part IV: About you

9. How old are you?

Age: .....

10. What is your sex?

Female ☐
Male ☐

11. What is your ethnic origin?

Place an x in one box

Scandinavia ☐
Western Europe ☐
Eastern Europe ☐
North America ☐
South America ☐
Africa ☐
Asia ☐
Oceania ☐

12. Have you or your partner ever given birth by elective caesarean?

Place an x in one box

Yes ☐
No ☐
Not sure ☐

13. What type of position do you have as your main job?

Place an x in one box

Assisting physician ☐
Consultant ☐
Private practice ☐
Other (please specify): ☐
Not working. ☐
Retired ☐

14. Which health region do you work in?

Place an x in one box

South ☐
East ☐
West ☐
Central ☐
North ☐

15a. Are you a qualified specialist (board certified) in gynecology and obstetrics?

Place an x in one box

Yes ☐
No ☐

15b. If you answered yes in 15a; in which year did you gain your specialist training?

_____ Year

16. What area is your main professional interest in?

Choose one alternative

General gynecology ☐
Obstetrics ☐
Assisted fertilization ☐
Gynecological oncology ☐
"All-rounder".. ☐
Other ☐

Finally we would like you to answer the following question:

17. Imagine that you are in a shopping mall. It turns out that the mall is celebrating an anniversary. All customers receive a lottery ticket, and yours is the winning ticket. You can choose between NOK 30 000 (€ 3750) cash in hand **or** a new lottery ticket. The new lottery ticket gives you a 50% chance of winning NOK 100 000 (€ 12500) and a 50% chance of winning NOK 1000 (185 USD). What would you choose?

Choose one alternative

Take the guaranteed NOK 30 000 (€ 3750)..... ☐

Take the lottery ticket which gives a 50 % chance of winning NOK 100 000 (€ 12500) and a 50 % chance of winning NOK 1000 (€ 125)……. ☐

If you have comments on the study or any of the questions, please write them here:

_____

_____

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_____

Thank you very much for your help!

Please place the form in the stamped envelope, and send it in the post.

UNIVERSITETET I OSLO
DET MEDISINSKE FAKULTET

Institutt for helseledelse og helseøkonomi
Postboks 1089, Blindern
NO-0317 Oslo
Tlf: 22 84 50 39
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Reg.nr

Forespørsel om deltagelse i forskningsprosjekt: "Keisersnitt: Norske gynekologers vurderinger"

Kjære kollega

Institutt for helseledelse og helseøkonomi Universitetet i Oslo og Legeforeningens forskningsinstitutt ønsker å undersøke gynekologenes vurderinger av keisersnitt. Vi sender ut et spørreskjema til alle spesialister og leger under spesialisering i gynekologi/obstetrikk. Vi håper du tar deg tid til å svare på dette spørreskjemaet.

Dersom du har mottatt skjemaet, men ikke er spesialist eller under utdannelse i gynekologi/obstetrikk, ber vi deg sette et kryss her☐ og deretter returnere skjemaet i vedlagte svarkonvolutt.

Deltakelse i undersøkelsen er frivillig. Ved å svare på og returnere skjemaet samtykker du i å delta i undersøkelsen. Det er mulig å trekke seg fra undersøkelsen på ethvert tidspunkt før prosjektets slutt (senest 31.08.09) og få alle opplysninger om seg selv slettet.

Alle opplysninger vil bli behandlet konfidensielt og avidentifisert. Skjemaets registreringsnummer brukes kun ved eventuelle påminnelser. Etter at prosjektet er avsluttet vil alle opplysninger bli anonymisert. Resultatene av undersøkelsen vil bli publisert som gruppedata, uten at den enkelte lege kan gjenkjennes.

Studien er finansiert av Universitetet i Oslo. Prosjektet er tilrådd av Norsk Samfunnsvitenskapelig Datatjeneste AS og av Regional Komité for medisinsk forskningsetikk.

Spørreskjemaet har fire deler: kasuistikker, risikovurdering, spørsmål om faglig erfaring samt generelle bakgrunnsspørsmål. Det vil ta ca 10 min å fylle ut skjemaet. Det er av stor verdi for oss at du besvarer skjemaet fullstendig.

Hvis du har kommentarer til spørreskjemaet eller undersøkelsen kan disse anføres til slutt i skjemaet. Du er også velkommen til å ta kontakt med oss på email (post-keisersnitt@medisin.uio.no) eller telefon (tlf. 22 84 50 39, Dorthe Fuglenes) ved spørsmål eller kommentarer.

Svarfrist
Skjemaet returneres i vedlagte svarkonvolutt innen 10. november 2006.

På forhånd tusen takk for hjelpen!

Med vennlig hilsen

Grete Botten
Professor/Instituttleder
Institutt for helseledelse og helseøkonomi
Universitetet i Oslo

Olaf Aasland
Instituttsjef
Legeforeningens Forskningsinstitutt

Pål Øian
Professor/avd.overlege
Kvinneklinikken
Universitetssykehuset Nord-Norge

Dorthe Fuglenes
Stipendiat
Institutt for helseledelse og helseøkonomi
Universitetet i Oslo

Del I: Kasuistikker.

Forestill deg at du er legen som må ta en beslutning i kasuistikkene nedenfor. Vi ber deg svare hvordan du tror du vil håndtere en tilsvarende situasjon. Prøv å se bort fra hva som er praksis på din avdeling eller hva du tror er "riktig" svar. Vi vil presisere at det ikke finnes en" fasit" for kasuistikkene. For hver av kasuistikkene ber vi deg sette et kryss i den boksen som ligger nærmest din oppfatning.

Kasuistikk 1

På en svangerkapskontroll møter du en kvinne på 36 år. Hun er gravida 5, para 4. Alle hennes tidligere barn har hatt en fødselsvekt på mellom 4200g og 4600g. Hennes førstefødte ble født vaginalt med skulderdystoci og plexusskade, remisjon etter 6 måneder. Hennes andre barn lå i seteleie og kvinnen ble forløst ved elektivt keisersnitt. Hennes tredje barn ble født vaginalt uten komplikasjoner. Det fjerde barnet ble født vaginalt, komplisert med skulderdystoci og plexuskade, remisjon etter 6 måneder.

Kvinnen er nå 37 uker gravid med sitt femte barn, ukomplisert svangerskapsforløp, kvinnens vekt er 140 kg, barnet har en estimert fødselsvekt på 4200g. Kvinnen ønsker keisersnitt på grunn av sine tidligere fødselserfaringer. Hva gjør du?

Jeg vil helt sikkert gå for elektivt keisersnitt — *Jeg vil helt sikkert gå for planlagt vaginal forløsning*

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7

Kasuistikk 2

Du har vakt på en fødeavdeling og blir tilkalt til en 28 år gammel kvinne i spontan fødselsstart uke 40, primigravida, ukomplisert svangerskap. SF-mål i normalområdet. Kvinnen har ved flere av kontrollene i svangerskapet nevnt frykt for at hennes barn skal bli hjerneskadet i fødselsforløpet. Hun ville i utgangspunktet ikke føde vaginalt, men etter tett oppfølging hos erfaren jordmor og gynekolog har kvinnen blitt motivert til vaginal fødsel. Du blir tilkalt av jordmor pga langsom fremgang. Fødselen har vart i 19 timer. Ved eksplorasjon er mormunnen utslettet, hodet står under spina, men ikke på bekkenbunnen. Pilsøm i skråvidden, du lurer på om lille fontanelle kjennes kl 02. Noe fødselssvulst. CTG viser ri-synkrone, ukompliserte variable decelerasjoner. Kvinnen ber om keisersnitt, og sier hun er redd for sitt barn. Ektefellen, som er jurist, sier han vil klage om det ikke gjøres keisersnitt umiddelbart. På bakgrunn av de skisserte opplysninger, hvordan vil du håndtere situasjonen?

Jeg vil helt sikkert gå for akutt keisersnitt — *Jeg vil helt sikkert gå for (fortsatt) vaginal forløsning*

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7

Kasuistikk 3

31 år gammel kvinne, gravida 2, para 1, 37 uker gravid, uten komplikasjoner. Barnet i hodestilling, SF-mål i nedre normalområdet. I hennes første fødsel tilkom uterushypertoni og bradykardi, hvoretter hun ble forløst med vakuumekstraksjon pga føtalt stress. Barnets vekt 3900 g, Apgar score 7/9, normal pH i navlestrengsblod. Kvinnen fikk en sfinkterruptur (perinealruptur grad III) som ble sydd i narkose. Hun har ikke vært plaget av inkontinens eller flatulens etter rupturen. Pasienten ønsker elektivt keisersnitt. Hva gjør du?

Jeg vil helt sikkert gå for elektivt keisersnitt — *Jeg vil helt sikkert gå for planlagt vaginal forløsning*

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7

Kasuistikk 4

Kvinne, 29 år, gravida 2, para 1. Nå 38 uker gravid, uten komplikasjoner, barn i hodeleie, SF-mål innen normalområdet. Kvinnen har etter forrige svangerskap og fødsel vært plaget med bekkensmerter (dog ingen vesentlig forverring i pågående svangerskap). Det er gjennomført undersøkelser (røntgen, ultralyd og MR) uten funn av patologi. Kvinnen følte seg dårlig ivaretatt ved forrige fødsel, og har klaget på din kollega ved sitt forrige fødested. Saken ligger til behandling hos Helsetilsynet. Pasienten fremstår bestemt og pågående, og er uinteressert i å diskutere forløsningsmetode. Kvinnen er avvisende til vaginal fødsel da hennes oppfatning er at dette vil skade hennes bekken ytterligere. Kvinnen ønsker keisersnitt. Hva gjør du?

Jeg vil helt sikkert gå for elektivt keisersnitt — *Jeg vil helt sikkert gå for planlagt vaginal forløsning*

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7

Kasuistikk 5

Ved en svangerskapskontroll møter du en 26 år gammel kvinne, gravida 1, svangerskapsvarighet 39 uker, foster i seteleie, og ukomplisert svangerskap. Barnet har en estimert vekt på 3200g, conjugata vera er 11,7 cm, sum utgang er 32,8 cm, altså tilfredsstillende mål for vaginal setefødsel. Det er forsøkt ytre vending, men dette lyktes ikke. Kvinnen, som er lege, er godt informert om fordeler og risiko ved vaginal forløsning og ved keisersnitt. Hun er fortsatt meget usikker på hvilken forløsningsmetode hun foretrekker og ber om et råd fra deg. Hva gjør du?

Jeg vil helt sikkert gå for elektivt keisersnitt — *Jeg vil helt sikkert gå for vaginal forløsning*

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7

Del II: Usikkerhet og risiko.

II-1. På flere områder vil beslutninger vi tar enten privat eller i yrkessammenheng, innebære elementer av usikkerhet og risiko. Det er stor variasjon i hvordan vi forholder oss til risiko (i betydning sannsynlighet for en uønsket hendelse). Nedenfor følger seks utsagn om væremåte, og vi ber deg svare i hvor stor grad disse utsagn stemmer for deg. Svarene avgis på en skala fra 1 til 6, hvor 1 er helt uenig og 6 er helt enig.

For hvert utsagn nedenfor ber vi deg sette et kryss i den boksen som best gir uttrykk for ditt standpunkt.

	Helt Uenig					**Helt Enig**
a. Jeg liker å ta risiko…….……..	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
b. Jeg prøver å unngå situasjoner som har usikkert utfall… ……	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
c. Det plager meg ikke å ta risiko hvis gevinsten er høy ……..…….	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
d. Jeg anser trygghet som et viktig element i alle deler av livet……..	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
e. Folk har fortalt meg at jeg ser ut til å like å ta sjanser……..……..	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
f. Jeg tar sjelden eller aldri en risiko hvis det finnes et annet alternativ…….	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

II-2. Når du tar beslutninger om forløsning (både vaginal og keisersnitt), vil du da ta hensyn til risikoen for å oppleve noen av de følgende hendelser:

Sett ett kryss pr. linje

Risiko for…	*Ofte*	*Av og til*	*Sjelden*	*Aldri*
Klage til arbeidsgiver.....	☐	☐	☐	☐
Klage til Helsetilsynet…	☐	☐	☐	☐
Å få en sak meldt til Norsk Pasientskadeerstatning …	☐	☐	☐	☐
Å få en sak vurdert i rettsapparatet	☐	☐	☐	☐
Å få negativ omtale på morgenmøtet/i avdelingen	☐	☐	☐	☐
Å få negativ omtale i massemedia.....	☐	☐	☐	☐

II-3. Har du tidligere opplevd noen av de følgende hendelser fordi du **utførte** et keisersnitt?

Sett ett kryss pr. linje	**Ja**	**Nei**
Klage til sykehus eller annen arbeidsgiver	☐	☐
Klage til Helsetilsynet	☐	☐
Å få en sak meldt til Norsk Pasientskadeerstatning	☐	☐
Å få saken vurdert i rettsapparatet.....	☐	☐
Å få negativ omtale på morgenmøtet/i avdelingen..	☐	☐
Å få negativ omtale i massemedia	☐	☐

II-4. Har du tidligere opplevd noen av de samme hendelser fordi du **ikke utførte** et keisersnitt?

Sett ett kryss pr. linje

	Ja	*Nei*
Klage til sykehus eller annen arbeidsgiver	☐	☐
Klage til Helsetilsynet	☐	☐
Å få en sak meldt til Norsk Pasientskadeerstatning	☐	☐
Å få saken vurdert i rettsapparatet.....	☐	☐
Å få negativ omtale på morgenmøtet/i avdelingen..	☐	☐
Å få negativ omtale i massemedia	☐	☐

Del III: Faglig erfaringer og vurderinger

1. Hvor mange forløsninger har du utført?

(Angi ca antall)	I 2005	Samlet i yrkeskarrieren
Setefødsler		
Tang/vakuum		
Keisersnitt		

2a. Kunne du tenke deg å utføre et keisersnitt etter ønske fra den gravide, uten at det foreligger medisinsk eller obstetrisk indikasjon?

Sett ett kryss

Ja ☐
Nei ☐
Usikker ☐

2b. Hvis ja på spørsmål 2a, hva er din(e) begrunnelse(r)?

Sett ett el. flere kryss

Av hensyn til kvinnens autonomi ☐
For å unngå mulige problemer med manglende samarbeid med pasienten under fødsel ☐
Unngå mulig klagesak dersom noe går galt under fødselen ☐
Annet ☐
Hvis annet, oppgi hva:
……
……

3. Hva mener du om kvinnens rett til å kreve elektivt keisersnitt?

Sett ett eller flere kryss

Hun bør ha en absolutt rett til selvbestemt keisersnitt ☐
Hun bør ha rett til medbestemmelse ☐
Legen bør ta den endelige beslutning ☐
Usikker ☐

4. I hvilken grad påvirker frykt for klager fra pasienter din trivsel som gynekolog/obstetriker?

Sett ett kryss

Trivsel påvirkes ikke i det hele tatt — *Trivsel påvirkes i meget stor grad*

1	2	3	4	5	6	7
☐	☐	☐	☐	☐	☐	☐

5. Opplever du situasjoner med pasienters ønske om keisersnitt som faglig vanskelig?

Sett ett kryss

Ikke vanskelig — *Meget vanskelig*

1	2	3	4	5	6	7
☐	☐	☐	☐	☐	☐	☐

6. Synes du at det er det offentliges oppgave å dekke kostnadene ved keisersnitt etter mors ønske?

Sett ett kryss

Ja ☐
Nei ☐
Usikker ☐

7. Merkostnadene ved keisersnitt er anslått til ca 30 000 kroner. Dersom det skulle bli mulig for gravide å få utført keisersnitt på eget ønske (og uten at det foreligger medisinsk eller obstetrisk indikasjon), hvor mye mener du da at den gravide burde betale selv?

Beløp: ☐

Usikker ☐

8. Dersom man tillater "selvvalgt" keisersnitt for gravide, hvordan tror du dette vil påvirke keisersnittsfrekvensen?

Sett ett kryss

Antall kvinner søm ønsker keisersnitt vil øke…… ☐
Antall kvinner søm ønsker keisersnitt vil avta…….. ☐
Ønsket om keisersnitt vil ikke påvirkes vesentlig…. ☐
Usikker…….. ☐

Del IV: Om deg selv

9. Hvor gammel er du?

Alder: ☐

10. Hva er ditt kjønn?

Kvinne ☐
Mann ☐

11. Hvilken etnisk opprinnelse har du?

Sett ett kryss

Norden ☐
Vest-Europa ☐
Øst-Europa ☐
Nord-Amerika ☐
Sør-Amerika ☐
Afrika ☐
Asia ☐
Australia ☐

12. Har du eller din ektefelle/samboer født barn ved elektivt keisersnitt?

Sett ett kryss

Ja ☐
Nei ☐
Usikker ☐

13. Hvilken type stilling har du som hovedarbeid?

Sett ett kryss

Assistentlege ☐
Overlege ☐
Privat praksis ☐
Annet (beskriv gjerne): ☐
Ikke yrkesaktiv ☐
Pensjonist ☐

14. I hvilken helseregion arbeider du?

Sett ett kryss

Sør ☐
Øst ☐
Vest ☐
Midt ☐
Nord ☐

15a. Er du godkjent spesialist i kvinnesykdommer og fødselshjelp?

Sett ett kryss

Ja ☐
Nei ☐

15b. Hvis ja på spørsmål 15a; i hvilket år fikk du spesialistgodkjenning?

_____ Årstall

16. Hvor har du din faglige hovedinteresse?

Velg ett alternativ

Generell gynekologi ☐
Obstetrikk ☐
Assistert befruktning ☐
Gynekologisk onkologi ☐
"All-rounder" ☐
Annet ☐

Til slutt vil vi gjerne få vite følgende:

17. Forestill deg at du er på et kjøpesenter, hvor det akkurat den dagen feires et jubileum for senteret. Alle kunder mottar ett lodd, og ditt lodd gir førstepris. Du har da valget mellom 30.000 kr i kontanter **eller** et nytt lodd. Det nye loddet innebærer 50% sjanse for å vinne 100.000 kroner og 50% sjanse for 1000 kroner. Hva vil du velge?

Sett kun ett kryss

Ta sikker gevinst på 30.000 kr..... ☐

Ta loddet med 50 % sjanse for 100.000 kr og 50 % sjanse for 1000 kroner… ☐

Har du kommentarer til undersøkelsen eller til enkeltspørsmål, så skriv gjerne disse her:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Tusen takk for hjelpen!

Legg skjemaet i den frankerte svarkonvolutten, og send det i posten.

APPENDIX 2

ORIGINAL JPI-R RISK TAKING SUBSCALE

The original risk taking subscale, as presented in the Jackson Personality Inventory-Revised

Jackson Personality Inventory- Revised, Risk Taking Subscale
(T; true, F; false)

(T) When I want something, I'll sometimes go out on a limb to get it.
(T) I would enjoy bluffing my way into an exclusive club or private party.
(T)If the possible reward was very high, I would not hesitate putting my money into a new business that could
fail.
(T) People have told me that I seem to enjoy taking chances.
(T) The thought of investing in stocks excites me.
(T) I enjoy taking risks.
(T) Taking risks does not bother me if the gains involved are high.
(T) I would enjoy the challenge of a project that could mean either a promotion or loss of a job.
(T) I think I would enjoy almost any type of gambling.
(T) In games I usually "go for broke" rather than playing it safe.
(F) I rarely make even small bets.
(F) If I invested any money in stocks, it would probably only be in safe stocks from large, well-known companies.
(F) When in school, I rarely took the chance of bluffing my way through an assignment.
(F) Skin diving in the ocean would be much too dangerous for me.
(F) I rarely, if ever, take risks when there is another alternative.
(F) I would prefer a stable position with a moderate salary to one with a higher salary but less security.
(F) I consider security an important element in every aspect of my life.
(F) I try to avoid situations that have uncertain outcomes.
(F) I would participate only in business undertakings that are relatively certain.
(F) I probably would not take the chance of borrowing money for a business deal even if it might be profitable.

APPENDIX 3

MOBA SURVEY
EXTRACTED PARTS OF QUESTIONNAIRES 3 AND 4

den norske Mor & barn undersøkelsen

Questionnaire 3C

This questionnaire applies mainly to the period after week 12 of your pregnancy. We will ask you some questions which you may recognise from the first questionnaire. We do this because we want to continue following your and your child's progress. It would be useful for you to consult your pregnancy health card before you start answering the questions so that you can use the information contained in it when completing this questionnaire. If you feel uncomfortable with a question or it is difficult to answer, you can skip this question and go on to the next one.

This questionnaire will be processed by a computer. It is therefore important that you follow these instructions:

- Use a blue or black ballpoint pen.
- Put a cross in the box that is most relevant like this: ☒
- If you put a cross in the wrong box, correct it by filli
- Write a number or capital letter in the large green bo
  It is important that you only write in the white are

Number: 1 2 3 4 5 6 7 8 9 0

Please do not use this questionnaire. Contact us at morbarn@fhi.no or phone + 47 53 20 40 40 if you need a questionnaire.

- When entering a single-digit number in boxes containing two or more squares, use the square on the right.
  For example: 5 is written like this: | 5 |
- A number of questions in this questionnaire concern the week of pregnancy. *For example: If you want to indicate something that happened 14 weeks after your last period, enter a cross in the box for week 13-16.*
- Specific information concerning, for example, medication or profession should be written in the boxes or on the lines provided. Please write clearly in CAPITAL LETTERS.
- Remember to enter the date when you completed the questionnaire.

Please return the completed questionnaire in the stamped addressed envelope provided.

Date when the questionnaire was completed | | Day | | Month | | | | Year (write the year in full, e.g. 2001)

Antenatal care and health

1. Where have you been to antenatal check- ups? (Fill in one or more boxes.) Specify how many times.

- ☐ Public health centre | | times
- ☐ Doctor's surgery | | times
- ☐ Hospital (outpatients) clinic | | times

2. Who has examined you each time? (Fill in one or more boxes.) Specify how many times.

- ☐ Midwife | | times
- ☐ General practitioner | | times
- ☐ Gynaecologist | | times
- ☐ Public health nurse | | times

3. Is your doctor male or female? How many times have you gone to him/her?

General practitioner	☐ female		times
	☐ male		times
Gynaecologist	☐ female		times
	☐ male		times

4. If you visit or have visited a gynaecologist or hospital clinic for your antenatal check-ups, what is or was the reason?

- ☐ Referred due to complications during this pregnancy
- ☐ Referred due to previous illness or complications in previous pregnancies
- ☐ On your own initiative without a referral
- ☐ Referred for another reason

Questionnaire 3c M&B 20,000 1101

5. Do you agree with the following statements concerning your antenatal check-ups?

	Agree completely	Agree	Agree somewhat	Disagree somewhat	Disagree	Disagree completely
I have been given sufficient advice and information	☐	☐	☐	☐	☐	☐
I have been well taken care of	☐	☐	☐	☐	☐	☐
There was not enough time during the consultations	☐	☐	☐	☐	☐	☐
I felt secure during these check-ups	☐	☐	☐	☐	☐	☐
I have been able to discuss everything I needed to during the check-ups	☐	☐	☐	☐	☐	☐
On the whole, I am satisfied with the way I have been followed up by the health service	☐	☐	☐	☐	☐	☐

6. Have you contacted a midwife or doctor in addition to your normal check-ups?

	No	Yes
Midwife	☐	☐
Doctor	☐	☐

7.If yes, was it difficult to get an appointment?

	Midwife	Doctor
Not difficult	☐	☐
Somewhat difficult	☐	☐
Very difficult	☐	☐

8. Have you had a gynaecological examination during your pregnancy (internal examination)? If so, how many times?

☐ No
☐ Yes ☐☐ Times

9. How many ultrasound examinations have you had during your pregnancy?

External ultrasound examination ☐☐ Times

Internal ultrasound examination ☐☐ Times

10. How many children are you expecting? ☐

11. Have you been offered an amniocentesis or placenta biopsy?

☐ No (go to question 16)
☐ Yes

12. If yes, were any tests performed and what were the results?

	Was the test performed? Yes	Was the test performed? No	Were the results normal? Yes	Were the results normal? No
Amniocentesis	☐	☐	☐	☐
Placenta biopsy	☐	☐	☐	☐

If the tests were abnormal, describe the findings:

_____

13. If an amniocentesis or placenta biopsy was performed, what was the reason?

☐ Due to my age (normally 38 or older at the time of delivery)
☐ Previous child with a chromosome disorder
☐ Previous child with neural tube defect (spina bifida)
☐ Epilepsy (medication for epilepsy)
☐ Ultrasound findings
☐ Other

14. Were there complications during the first 2 weeks following the amniocentesis?

☐ No
☐ Yes

15. If yes, what kind of complications?

☐ Vaginal bleeding
☐ Leakage of amniotic fluid
☐ Abdominal pain (similar to or stronger than menstrual pains)
☐ Other _____

16. Have you had an X-ray during pregnancy?

☐ No
☐ Yes

17. If yes, what part of your body was X-rayed? How many X-rays were taken and in which week of pregnancy? (Fill in one or more boxes.)

	Week of pregnancy 0-12	13-16	17-20	21-24	25-28	29+	No. of times
Teeth	☐	☐	☐	☐	☐	☐	☐☐
Lungs	☐	☐	☐	☐	☐	☐	☐☐
Arms or legs	☐	☐	☐	☐	☐	☐	☐☐
Pelvis/abdomen/back	☐	☐	☐	☐	☐	☐	☐☐
Other	☐	☐	☐	☐	☐	☐	☐☐

18. Have you received treatment to prevent a premature birth during this pregnancy? (Fill in one or more boxes.)

☐ No
☐ Yes, relax or bed-rest
☐ Yes, medication
Which medicines? _____

19. Have you been vaccinated during this pregnancy?

☐ No
☐ Yes
Which vaccine? _____

20. Has the midwife or doctor told you that you have or have had high blood pressure during this pregnancy?

☐ No
☐ Yes

21. If yes, what was the highest reading during this pregnancy? (High blood pressure is over 140/90) (Refer to your health card.)

☐☐☐ / ☐☐☐ *E.g.* 150 / 95

☐ Don't know

22. Have you had high blood pressure without being pregnant?

☐ No
☐ Yes
☐ Don't know

23. If yes, what was the highest reading before this pregnancy?

☐☐☐ / ☐☐☐ *E.g.* 150 / 95

☐ Don't know

	Number of cups/glass	Organic (fill in)
12. Juice/squash	☐☐	☐
13. Diet juice/squash	☐☐	☐
14. Milk (skimmed, low fat, whole)	☐☐	☐
15. Yogurt, all types	☐☐	☐
16. Yogurt with active Lactobacillus all types	☐☐	☐
17. Other type of cultured milk (kefir)	☐☐	☐
18. Other	☐☐	☐

111. How often did you consume alcohol before and how often do you consume it now?

	Last 3 months before last period	In this pregnancy week of pregnancy 0–12	13–24	25+
Roughly 6-7 times a week	☐	☐	☐	☐
Roughly 4–5 times a week	☐	☐	☐	☐
Roughly 2-3 times a week	☐	☐	☐	☐
Roughly 1 time a week	☐	☐	☐	☐
Roughly 1–3 times a month	☐	☐	☐	☐
Less then once a month	☐	☐	☐	☐
Never	☐	☐	☐	☐

Alcohol units
Alcohol units are used to compare the different types of alcoholic beverages. 1 alcohol unit = 1.5 cl. pure alcohol.

1 glass of beer	= 1 alcohol unit
1 wine glass of red or white wine	= 1 alcohol unit
1 sherry glass of sherry or other fortified wine	= 1 alcohol unit
1 spirit glass of spirits or liqueur	= 1 alcohol unit
1 bottle/can breezer or cider	= 1 alcohol unit

112. In the period just before you became pregnant and during this pregnancy, how many times have you consumed 5 units or more of alcohol? *(See the explanation for units.)*

	Last 3 mths before last period	In this pregnancy week of pregnancy 0–12	13–24	25+
Several times a week	☐	☐	☐	☐
Once a week	☐	☐	☐	☐
1-3 times a month	☐	☐	☐	☐
Less than once a month	☐	☐	☐	☐
Never	☐	☐	☐	☐

113. How many units do you usually drink when you consume alcohol? *(See the above explanation.)*

	Last 3 mths before last period	In this pregnancy week of pregnancy 0–12	13–24	25+
10 or more	☐	☐	☐	☐
7–9	☐	☐	☐	☐
5–6	☐	☐	☐	☐
3–4	☐	☐	☐	☐
1–2	☐	☐	☐	☐
Less than 1	☐	☐	☐	☐

114. If you have changed your drinking habits before this pregnancy, when did the change occur? *(Fill in one or more boxes.)*

	Reduced intake	Increased intake
Last 3 months before last period	☐	☐
During pregnancy weeks 0-6	☐	☐
During pregnancy weeks 7-12	☐	☐
During pregnancy weeks 13-24	☐	☐
After pregnancy week 25	☐	☐

115. If you have modified your consumption of alcohol, how important were the following factors? *(Fill in one or more boxes.)*

	Not relevant	Not very important	Quite important	Important	Very important
Nausea, discomfort	☐	☐	☐	☐	☐
Altered taste	☐	☐	☐	☐	☐
For the baby's sake	☐	☐	☐	☐	☐
Depression/problems	☐	☐	☐	☐	☐
Other reasons	☐	☐	☐	☐	☐

You and your life now

116. What is your current civil status?
- ☐ Married
- ☐ Cohabiting
- ☐ Single
- ☐ Divorced/separated
- ☐ Widowed
- ☐ Other

117. Do you have anyone other than your husband/partner you can ask for advice in a difficult situation?
- ☐ No.
- ☐ Yes, 1 or 2 people
- ☐ Yes, more than 2 people

118. How frequently do you meet or talk on the telephone with your family (other than your husband/partner and children) or close friends?
- ☐ Once a month or less
- ☐ 2-8 times a month
- ☐ More than twice a week

119. Do you often feel lonely?
- ☐ Almost never
- ☐ Seldom
- ☐ Sometimes
- ☐ Usually
- ☐ Almost always

120. If you have given birth before, in general, how was the experience of giving birth?
- ☐ Very good
- ☐ Good
- ☐ Alright
- ☐ Bad
- ☐ Very bad

121. Do you agree or disagree with the following statements relating to the forthcoming birth of your baby?
(Fill in for each statement.)

	Agree completely	Agree	Agree somewhat	Disagree somewhat	Disagree	Disagree completely
I want to give birth as naturally as possible without painkillers or intervention	☐	☐	☐	☐	☐	☐
I am really dreading giving birth	☐	☐	☐	☐	☐	☐
I want to have enough medication so that the birth will be painless	☐	☐	☐	☐	☐	☐
I want to have an epidural regardless	☐	☐	☐	☐	☐	☐
I want to have an epidural if the midwife agrees	☐	☐	☐	☐	☐	☐
If I could choose I would have a caesarean	☐	☐	☐	☐	☐	☐
I think the woman herself should decide whether or not to have a caesarean	☐	☐	☐	☐	☐	☐
I worry all the time that the baby will not be healthy or normal	☐	☐	☐	☐	☐	☐
I am really looking forward to the baby coming	☐	☐	☐	☐	☐	☐

122. How do these statements describe your relationship? (Only answer if you have a partner.)
(Fill in for each statement.)

	Agree completely	Agree	Agree somewhat	Disagree somewhat	Disagree	Completely disagree
My husband/partner and I have a close relationship	☐	☐	☐	☐	☐	☐
My partner and I have problems in our relationship	☐	☐	☐	☐	☐	☐
I am very happy in my relationship	☐	☐	☐	☐	☐	☐
My partner is usually understanding	☐	☐	☐	☐	☐	☐
I often think about ending our relationship	☐	☐	☐	☐	☐	☐
I am satisfied with my relationship with my partner	☐	☐	☐	☐	☐	☐
We often disagree about important decisions	☐	☐	☐	☐	☐	☐
I have been lucky in my choice of a partner	☐	☐	☐	☐	☐	☐
We agree on how children should be raised	☐	☐	☐	☐	☐	☐
I think my partner is satisfied with our relationship	☐	☐	☐	☐	☐	☐

123. Have you been bothered during the last 2 weeks by any of the following? *(Enter a cross in a box for each item.)*

	Not bothered	Slightly bothered	Fairly much bothered	Very much bothered
1. Feeling fearful	☐	☐	☐	☐
2. Nervousness or shakiness inside	☐	☐	☐	☐
3. Feeling hopeless about the future	☐	☐	☐	☐
4. Feeling blue	☐	☐	☐	☐
5. Worrying too much about things	☐	☐	☐	☐
6. Feeling everything is an effort	☐	☐	☐	☐
7. Feeling tense or keyed up	☐	☐	☐	☐
8. Suddenly scared for no reason	☐	☐	☐	☐

124. How often do you experience the following in your everyday life? *(Fill in for each statement.)*

	Seldom/ never	Fairly seldom	Sometimes	Often	Very often
Feel pleased about something	☐	☐	☐	☐	☐
Feel happy	☐	☐	☐	☐	☐
Feel joyful, as though everything is going your way	☐	☐	☐	☐	☐
Feel that you will scream at someone or hit something	☐	☐	☐	☐	☐
Feel angry, irritated or annoyed	☐	☐	☐	☐	☐
Feel mad at someone	☐	☐	☐	☐	☐

125. How well do these statements describe you? *(Fill in for each statement.)*

	Incorrect	Partly correct	Almost correct	Completely correct
I always manage to solve difficult problems if I try hard enough	☐	☐	☐	☐
If anyone opposes me, I find a way to get what I want	☐	☐	☐	☐
I am sure that I can cope with unexpected events	☐	☐	☐	☐
I am calm when I encounter difficulties because I trust my ability to cope	☐	☐	☐	☐
When I am in a difficult situation, I usually find a solution	☐	☐	☐	☐

den norske **Mor & barn undersøkelsen**

Questionnaire 4 - When your child is around 6 months old

This questionnaire comes in two parts. The first part is about your child, while the other part is about yourself. It will help if you have your child's health card to hand before you start answering the questions so that you can use the information contained in it when completing this questionnaire. If you find a question difficult to answer, you can skip it and go onto the next question.

If you have had twins or triplets, complete one questionnaire for each child.

The questionnaire will be processed by a computer. *It is therefore important that you follow these instructions when completing it:*

- Use a blue or black ballpoint pen.
- In the small check boxes, enter *a cross* to indicate what y
  If you make a mistake you can delete the cross by filling
- Write numbers in the large green boxes.
  It is important that you only write in the wh

Please do not use this questionnaire. Contact us at morbarn@fhi.no or phone + 47 53 20 40 40 if you need a questionnaire.

Number: 0 1 2 3 4 5 6 7 8 9

- In the case of numbered boxes with more than one square, enter a one-digit number in the right box. *Example: 5 is entered as follows* 5
- Date boxes are split into 3 sections, with the first one for the day of the month, the second one for the month and the last one for the year.

So, enter the date as follows: 6 (Day) 5 (Month) 2005 (Year)

- Specific information concerning, *for example, medication* should be written on the lines provided. *Please write clearly!*

As soon as you have completed the questionnaire, return it to us in the enclosed stamped addressed envelope.

Specify the day, month and year when the questionnaire was completed: Day ____ Month ____ Year ____ *(write the year in full, e.g. 2005)*

About your child's birth

1. Is your child a boy or girl?

☐ Boy
☐ Girl

2. How big was your child when he/she was born?

Birth weight: ____ g
Length: ____ cm

3. In which week of your pregnancy did you give birth?

____ week

4. How long was your child in hospital after the birth?

Number of days ____ or weeks ____

5. Was your child transferred to another department or hospital after the birth?

☐ No
☐ Yes

If yes, specify _____

6. Was your child delivered by caesarean section?

☐ No
☐ Yes

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7. If yes, was the caesarean section planned?

- ☐ No
- ☐ Yes

If yes, why?

- ☐ Breech presentation
- ☐ Previous caesarean
- ☐ Pregnancy complication or mother taken ill
- ☐ Poor growth or other factor relating to the foetus
- ☐ Own preference
- ☐ Other

8. Were there any complications during the birth?

- ☐ No
- ☐ Yes

If so, describe:_____

9. Were you admitted or transferred to another department or other hospital due to complications in connection with the birth? *(Applies both before and after the birth.)*

- ☐ No
- ☐ Yes

10. If yes, where?

Department:

_____

Hospital: _____

11. How many days were you in hospital in connection with the birth?

Before the birth ☐☐ Number of days

After the birth ☐☐ Number of days

12. Did the birth go as you had expected?

- ☐ Yes, as expected
- ☐ No, it went better
- ☐ Neither/nor
- ☐ No, it was worse
- ☐ Don't know

13. How true do you think the following descriptions are of the birth? *(Enter a cross in a box for each item.)*

	Fairly true	Partially true	Not true
I felt safe and in good hands	☐	☐	☐
I was in a lot of pain	☐	☐	☐
I received too few pain-killing drugs	☐	☐	☐

14. Was anyone from your close family present at the birth?

- ☐ Yes, child's father
- ☐ Yes, someone else
- ☐ No

About your child

Nutrition

15. What did you give your child to drink during the first week of life?
(You can enter a cross in more than one box.)

- ☐ Breast milk
- ☐ Water
- ☐ Sugar water
- ☐ Formula
- ☐ Other, specify: _____
- ☐ Don't know/don't remember

16. What has your child been given to drink during the first 6 months of his/her life?
(Enter a cross for each month you gave your child the relevant drink.)

	Child's age in months						
	0	1	2	3	4	5	6
Breast milk	☐	☐	☐	☐	☐	☐	☐
Standard Collett formula	☐	☐	☐	☐	☐	☐	☐
Collett formula with Omega 3	☐	☐	☐	☐	☐	☐	☐
Standard NAN formula	☐	☐	☐	☐	☐	☐	☐
Nan HA1 formula	☐	☐	☐	☐	☐	☐	☐
Other milk, specify: _____	☐	☐	☐	☐	☐	☐	☐
Water	☐	☐	☐	☐	☐	☐	☐
Squash/Juice	☐	☐	☐	☐	☐	☐	☐

17. How often do you give your child the following to drink at the moment? *(Enter a cross in a box for each item.)*

	Never/ seldom	1-3 times a week	4-6 times a week	At least once a day
1. Breast milk	☐	☐	☐	☐
2. Breast milk supplement	☐	☐	☐	☐
3. Normal sweet milk, any type	☐	☐	☐	☐
4. sour milk (yogurt, buttermilk, etc.)	☐	☐	☐	☐
5. Organic milk products (milk, yogurt)	☐	☐	☐	☐
6. Boiled water	☐	☐	☐	☐

Cont.

APPENDIX 4

TABLE CORRELATION ANALYSIS – PAPER II

Paper II - Correlation analyses

Spearman's rho (Correlation coefficient)	**Willingness to perform CDMR?** (yes *vs* no/uncertain)	**'CDMR problematic'?** (Score 1-4= not difficult, score 5-7= difficult)	**Should funding of CDMR be a public responsibility?** (yes *vs* no/uncertain)	**Attitude to co-payment?** (Amount=0 *vs* amount>0) ("uncertain" excluded)
Willingness to perform CDMR?	**1.000**	-.058	.255**	-.265**
'CDMR problematic'?	**-.058**	**1.000**	-.163**	.279**
Should funding of CDMR be a public responsibility?	**.255****	**-.163****	**1.000**	-.738**
Attitude to co-payment?	**-.265****	**.279****	**-.738****	**1.000**

**. Correlation is significant at the 0.01 level (2-tailed).

APPENDIX 5

TABLES FROM PAPERS II-IV WITH FULL REGRESSION MODELS

Paper II-Table 2 with full regression models

Logistic regression analyses (OR, (95%*CI*)) of responses to questions on obstetricians' opinions about CDMR*

Multivariate logistic regression		**"CDMR problematic"?** (Not /neutral = 0) (Problematic = 1) (n=450)	**Willing to perform CDMR?** (No/uncertain = 0) (Yes = 1) (n=449)	**Should funding of CDMR be a public responsibility?** (No/uncertain = 0) (Yes = 1) (n=449)
Age	<39	1	1	1
	40-49	0.64 (0.29-1.39)	0.80 (0.40-1.62)	1.93 (0.89-4.18)
	50-59	**0.24‡ (0.10-0.56)**	0.90 (0.42-1.96)	**2.57† (1.11-5.95)**
	60 +	**0.30† (0.12-0.76)**	1.08 (0.45-2.59)	2.42 (0.95-6.14)
Gender	0 = female, 1 = male	**0.63† (0.40-0.99)**	1.03 (0.66-1.60)	**2.14‡ (1.36-3.37)**
Ethnic origin	Nordic countries	1	1	1
	Western Europe	2.08 (0.89-4.89)	1.86 (0.88-3.93)	1.01 (0.46-2.22)
	Eastern Europe	2.61 (0.69-9.90)	**3.23† (1.05-9.89)**	0.79 (0.26-2.45)
	Asia and others	2.65 (0.70-9.99)	0.38 (0.12-1.26)	0.23 (0.05-1.06)
Working region of Norway	East	1	1	1
	South	0.82 (0.47-1.43)	1.12 (0.66-1.89)	1.05 (0.61-1.83)
	West	**0.43‡ (0.24-0.76)**	**0.50† (0.28-0.87)**	1.00 (0.56-1.79)
	Middle	0.70 (0.36-1.35)	0.80 (0.43-1.47)	0.92 (0.48-1.78)
	North	0.98 (0.44-2.19)	0.62 (0.30-1.30)	1.40 (0.65-2.99)
Specialist status	0 = Physician under specialist training 1=Board-certified specialist	1.59 (0.73-3.49)	**2.68‡ (1.31-5.47)**	0.88 (0.40-1.92)
Risk attitude	Risk neutral	1	1	1
	Risk averse	1.18 (0.67-2.08)	1.37 (0.79-2.36)	1.31 (0.75-2.28)
	Risk seeking	0.71 (0.40-1.28)	0.79 (0.45-1.39)	0.70 (0.38-1.30)
Fear of complaints and litigation-index	0 = not at all/never 18 = very often	1.05 (1.00-1.10)	1.04 (0.99-1.09)	1.00 (0.95-1.05)

*All explanatory variables listed are included in the multivariate logistic regressions. OR: Odds ratio, CI: Confidence Interval.

† *p*-value 0.05 < 0.01, ‡ *p*-value 0.01< 0.001.

Paper III - Table 4 with full regression models

Logistic regression analyses of preference for cesarean†
($n^{para\ 0}$=26,816, $n^{para\ 1+}$=23,524)

		Para 0		Para 1+	
Covariate	**Coding**	**Odds Ratio (95%CI)**	**p-value**	**Odds Ratio (95%CI)**	**p-value**
Age	<35	Ref		Ref	
	35+	2.14 (1.71-2.66)	**0.000**	1.48 (1.30-1.69)	**0.000**
Marital status	Married/partner	Ref		Ref	
	Not married/single	1.17 (0.87-1.57)	0.309	1.36 (0.92-2.00)	0.125
Education	Compulsory (secondary) school	Ref		Ref	
	High school + started high school	0.94 (0.62-1.43)	0.766	0.67 (0.49-0.90)	**0.009**
	Completed higher edu < 4 years	0.71 (0.46-1.10)	0.128	0.46 (0.34-0.64)	**0.000**
	Started or compl higher edu >4 years	0.61(0.38-0.96)	**0.032**	0.44 (0.31-0.61)	**0.000**
	Other	0.65 (0.35-1.22)	0.180	0.93 (0.60-1.47)	0.761
Affiliation	Working	Ref		Ref	
	Student/apprentice	1.15 (0.87-1.51)	0.320	1.72 (1.32-2.26)	**0.000**
	Not working	1.37 (1.00-1.88)	**0.050**	1.32 (1.08-1.61)	**0.006**
Income mother	< 150,000	Ref		Ref	
(NOK)	150,000 – 199,999	1.03 (0.77-1.38)	0.850	1.09 (0.87-1.35)	0.446
	200,000 – 299,999	1.08 (0.84-1.38)	0.561	1.11 (0.91-1.35)	0.291
	300,000 – 399,999	1.25 (0.94-1.65)	0.119	1.21 (0.96-1.51)	0.105
	400,000 – 499,999	1.35 (0.92-1.97)	0.122	1.28 (0.94-1.73)	0.120
	500,000 +	0.95 (0.58-1.55)	0.837	1.15 (0.79-1.68)	0.474
	None	1.24 (0.85-1.83)	0.266	1.22 (0.82-1.81)	0.319
	Unknown	1.02 (0.65-1.60)	0.943	0.99 (0.69-1.41)	0.957
Income father	< 150,000	Ref		Ref	
(NOK)	150,000 – 199,999	1.23 (0.82-1.86)	0.318	0.97 (0.63-1.49)	0.899
	200,000 – 299,999	1.51 (1.11-2.06)	**0.009**	1.00 (0.71-1.42)	0.980
	300,000 – 399,999	1.26 (0.92-1.73)	0.156	1.00 (0.71-1.41)	0.984
	400,000 – 499,999	1.36 (0.96-1.94)	0.084	0.88 (0.61-1.26)	0.473
	500,000 +	1.52 (1.05-2.18)	**0.026**	1.00 (0.70-1.45)	0.981
	None	1.12 (0.61-2.05)	0.710	0.91 (0.36-2.29)	0.846
	Unknown	1.26 (0.86-1.85)	0.243	0.97 (0.65-1.45)	0.877
County	Oslo	Ref		Ref	
	Østfold	1.45 (1.01-2.09)	**0.044**	0.86 (0.62-1.19)	0.365
	Akershus	1.10 (0.81-1.48)	0.552	0.95 (0.72-1.26)	0.738
	Hedmark	1.37 (0.89-2.10)	0.156	0.99 (0.68-1.44)	0.956
	Oppland	1.49 (0.96-2.30)	0.075	0.48 (0.32-0.73)	**0.001**
	Buskerud	1.33 (0.93-1.90)	0.116	0.87 (0.63-1.21)	0.417
	Vestfold	1.37 (0.76-2.47)	0.299	0.74 (0.44-1.26)	0.268
	Telemark	1.24 (0.75-2.07)	0.397	0.85 (0.56-1.30)	0.462
	Aust-Agder	0.98 (0.59-1.62)	0.923	1.16 (0.77-1.73)	0.473
	Vest-Agder	1.23 (0.78-1.93)	0.377	0.68 (0.46-1.02)	0.060
	Rogaland	0.83 (0.57-1.22)	0.350	0.84 (0.60-1.17)	0.295
	Hordaland	1.04 (0.73-1.46)	0.844	0.73 (0.52-1.01)	0.059
	Sogn og Fjordane	1.31 (0.81-2.13)	0.276	0.60 (0.39-0.93)	**0.022**
	Møre og Romsdal	1.10 (0.76-1.59)	0.617	0.86 (0.64-1.16)	0.325

	Sør-Trøndelag	1.02 (0.63-1.67)	0.925	0.93 (0.62-1.37)	0.676
	Nord-Trøndelag	1.33 (0.87-2.04)	0.187	0.83 (0.58-1.19)	0.309
	Nordland	1.15 (0.74-1.79)	0.520	0.79 (0.56-1.10)	0.159
	Troms	0.56 (0.23-1.36)	0.197	1.09 (0.64-1.84)	0.762
	Finnmark	1.08 (0.52-2.27)	0.830	0.44 (0.25-0.78)	**0.005**
Previous cesarean	No	Ref	N/R	Ref	
	Yes	N/R		6.39 (5.63-7.26)	**0.000**
Previously lost a child	No	Ref	N/R	Ref	
	Yes	1.33 (0.76-2.32)	0.316	0.82 (0.64-1.06)	0.123
Plurality (twins)	No	Ref		Ref	
	Yes	2.03 (1.30-3.16)	**0.002**	2.70 (1.86-3.92)	**0.000**
IVF (this pregnancy)	No	Ref		Ref	
	Yes	1.31 (0.92-1.86)	0.136	1.38 (0.89-2.13)	0.146
Bleeding before week 28	No	Ref		Ref	
	Yes	1.22 (0.89-1.67)	0.224	1.09 (0.83-1.43)	0.538
Smoking	Never	Ref		Ref	
	Sometimes	1.26 (1.00-1.58)	0.050	0.80 (0.64-1.00)	0.053
	Daily	1.30 (1.09-1.54)	**0.003**	1.24 (1.06-1.43)	**0.006**
	Unknown	0.93 (0.73-1.18)	0.533	1.02 (0.85-1.21)	0.858
Diabetes	No information	Ref		Ref	
	Diabetes before pregnancy	1.78 (0.85-3.73)	0.126	1.39 (0.76-2.54)	0.280
	Pregnancy induced diabetes	1.51 (0.80-2.86)	0.205	1.05 (0.63-1.76)	0.855
Chronic diseases before pregnancy (includes ht, hart- and kidney disease, RA and epilepsy)	No	Ref		Ref	
	Yes	1.85 (1.31-2.63)	**0.001**	1.32 (0.96-1.80)	0.086
Anxiety/Depression (before or during first 17 weeks of pregnancy)	No	Ref		Ref	
	Yes	1.18 (0.96-1.46)	0.125	1.03 (0.85-1.24)	0.793
Physical abuse	No	Ref		Ref	
	Yes	1.19 (0.95-1.48)	0.130	0.88 (0.72-1.07)	0.193
Sexual abuse	No	Ref		Ref	
	Yes	0.84 (0.67-1.05)	0.125	0.88 (0.73-1.06)	0.189
Worries about not having a healthy baby	Disagree completely	Ref		Ref	
	Disagree	1.15 (0.79-1.68)	0.464	1.05 (0.83-1.34)	0.675

	Disagree to some extent	1.18 (0.80-1.73)	0.411	0.95 (0.73-1.22)	0.692
	Agree to some extent	1.48 (1.03-2.12)	**0.033**	1.22 (0.97-1.54)	0.093
	Agree	1.85 (1.26-2.73)	**0.002**	1.86 (1.42-2.44)	**0.000**
	Agree Completely	2.98 (2.01-4.41)	**0.000**	2.50 (1.87-3.36)	**0.000**
Fear about giving birth	Disagree completely	Ref		Ref	
	Disagree	0.74 (0.49-1.13)	0.174	0.70 (0.54-0.90)	**0.006**
	Disagree to some extent	1.36 (0.90-2.07)	0.110	0.72 (0.53-0.97)	**0.030**
	Agree to some extent	2.35 (1.64-3.37)	**0.000**	0.93 (0.73-1.18)	0.537
	Agree	6.71 (4.64-9.68)	**0.000**	2.26 (1.76-2.89)	**0.000**
	Agree Completely	26.93 (18.75-38.68)	**0.000**	5.63 (4.38-7.24)	**0.000**
Satisfaction with antenatal check ups	Agree completely	Ref.		Ref.	
	Agree	1.05 (0.89-1.24)	0.545	1.11 (0.97-1.26)	0.125
	Agree to some extent	1.44 (1.14-1.82)	**0.002**	1.34 (1.09-1.65)	**0.006**
	Disagree to some extent	1.53 (1.08-2.15)	**0.015**	1.27 (0.91-1.77)	0.168
	Disagree	1.39 (0.82-2.34)	0.222	1.71 (1.08-2.71)	**0.021**
	Disagree completely	1.61 (0.76-3.33)	0.202	1.95 (0.85-4.47)	0.116
Previous delivery experience	Very good	Ref		Ref	
	Good	N/R	N/R	1.20 (0.95-1.50)	0.130
	Alright	N/R	N/R	1.94 (1.54-2.44)	**0.006**
	Bad	N/R	N/R	3.12 (2.44-3.99)	**0.000**
	Very bad	N/R	N/R	5.61 (4.37-7.22)	**0.000**
	Combinations/0	N/R	N/R	1.23 (0.73-2.05)	0.437
Pregnancy control	GP or Midwifery	Ref		Ref	
	Outpatient clinic	1.07 (0.91-1.25)	0.419	1.29 (1.13-1.47)	**0.000**
Gender Gynecologist	Women	Ref		Ref	
	Male	0.84 (0.64-1.10)	0.198	1.07 (0.86-1.34)	0.542
	Both	1.38 (0.96-2.00)	0.081	1.00 (0.74-1.36)	0.988
	Unknown	0.73 (0.58-0.91)	**0.005**	0.93 (0.77-1.14)	0.491
CS-rate	<10%	Ref		Ref	
	10-11%	1.13 (0.67-1.91)	0.647	1.06 (0.67-1.69)	0.807
	12-13%	1.17 (0.68-2.00)	0.579	1.22 (0.76-1.95)	0.417
	14-15%	1.19 (0.70-2.03)	0.519	1.23 (0.78-1.97)	0.375
	16-17%	1.08 (0.62-1.88)	0.799	1.33 (0.82-2.15)	0.246
	18-19%	1.01 (0.57-1.79)	0.969	1.31 (0.80-2.14)	0.285
	20%+	1.46 (0.77-2.74)	0.245	1.78 (1.04-3.06)	**0.037**

† Response to the question "If I could choose, I would have a cesarean" (1='agree completely' and 'agree', 0=disagree completely' and 'disagree').

N/R = not relevant

Paper IV-Table 2 with full regression models

Multivariate logistics regression of delivery outcome*
(0= vaginal, 1= acute cesarean, respectively 1= elective cesarean (CDMR excluded))

		Nulliparous Women		Multiparous Women	
		Acute Cesarean[i] (n=31,306) OR (95%CI)	**Elective Cesarean[ii] (excl. CDMR) (n=28,469) OR (95%CI)**	**Acute Cesarean[iii] (n=30,339) OR (95%CI)**	**Elective Cesarean[iv] (excl. CDMR) (n=29,927) OR (95%CI)**
Age (years)	(<35=ref) 35+	**1.67 (1.49-1.88)**	**2.70 (2.17-3.36)**	**1.28 (1.14-1.43)**	**1.37 (1.20-1.57)**
Education	Compulsory school	Ref	Ref	Ref	Ref
	High school	0.89 (0.69-1.17)	0.80 (0.46-1.37)	1.17 (0.81-1.69)	0.81 (0.49-1.33)
	Higher education < 4 years	**0.76 (0.58-0.99)**	0.77 (0.45-1.32)	0.81 (0.56-1.18)	0.63 (0.38-1.03)
	Higher education >4 years	**0.67 (0.51-0.88)**	0.81 (0.47-1.40)	0.93 (0.63-1.36)	0.68 (0.41-1.14)
	Other	0.93 (0.66-1.31)	0.79 (0.38-1.63)	0.95 (0.55-1.64)	1.17 (0.60-2.31)
Marrital status	(Married/cohab=1) Not married/cohab=1	1.01 (0.84-1.20)	1.15 (0.82-1.61)	1.15 (0.83-1.59)	**0.55 (0.35-0.89)**
Plurality (twins)	(No=0) Yes=1	**1.53 (1.22-1.92)**	0.91 (0.64-1.29)	0.80 (0.59-1.09)	**0.55 (0.38-0.81)**
Presentation	Cephalic	Ref	Ref	Ref	Ref
	Breech	**8.37 (7.24-9.67)**	**106.56 (88.89-127.75)**	**16.91 (14.06-20.33)**	**76.97 (60.91-97.27)**
	other	**4.92 (3.17-7.66)**	**4.81 (1.48-15.65)**	**9.92 (6.04-16.29)**	**6.19 (2.09-18.32)**
Chronic diseases	(No = ref) Yes	**1.33 (1.08-1.63)**	**1.86 (1.29-2.68)**	**1.64 (1.26-2.13)**	1.28 (0.91-1.82)
Diabetes	No	Ref	Ref	Ref	Ref
	DM before pregnancy	**3.00 (2.09-4.30)**	**4.57 (2.26-9.23)**	**3.25 (2.05-5.13)**	**3.15 (1.76-5.64)**
	Gestational diabetes	**1.99 (1.41-2.81)**	**2.03 (1.02-4.04)**	**1.90 (1.26-2.87)**	1.16 (0.67-2.01)
Preference	Vaginal	Ref	Ref	Ref	Ref
	Neutral	**1.41 (1.19-1.67)**	**2.35 (1.82-3.04)**	**2.76 (1.36-5.60)**	**2.82 (1.10-7.27)**
	Cesarean	**1.99 (1.50-2.63)**	**12.48 (9.60-16.24)**	**2.94 (1.32-6.55)**	**9.42 (4.34-20.48)**
Previous cesarean	(No=0) Yes=1	N/R	N/R	**4.75 (4.23-5.34)**	**22.24 (18.45-26.80)**
Dystocia [†]	(No= 0) Yes=1	**1.26 (1.16-1.36)**	**0.24 (0.20-0.30)**	**1.33 (1.16-1.51)**	**0.29 (0.23-0.37)**
Placental problems[‡]	(No= 0) Yes=1	**36.27 (23.22-56.67)**	**43.28 (23.59-79.43)**	**63.01 (41.26-96.23)**	**66.58 (39.15-113.23)**
Pre-eclampsia	(No=0) Yes=1	**3.69 (3.27-4.15)**	**2.01 (1.50-2.68)**	**2.93 (2.36-3.63)**	1.28 (0.93-1.77)
Fetal distress	(No=0) Yes=1	**5.29 (4.82-5.81)**	NR	**14.86 (12.72-17.36)**	NR
Preferences * Presentation	Vag pref* Cephalic pres	Ref	Ref	-	Ref
	Neutral pref* Breech pres	1.16 (0.78-1.73)	**0.58 (0.37-0.91)**	-	0.73 (0.41-1.31)
	Neutral pref*Other pres	2.02 (0.47-8.78)	-	-	0.18 (0.02-2.24)
	Cesarean pref * Breech pres	2.36 (0.98-5.71)	0.78 (0.27-2.24)	-	**0.20 (0.09-0.41)**
	Cesarean pref * Other pres	4.41 (0.41-47.94)	-	-	4.07 (0.29-57.23)
Preferences* Education	Vaginal pref*Low educat	-	-	Ref	Ref
	Neutral pref* High school	-	-	**0.44 (0.21-0.92)**	1.11 (0.43-2.90)
	Neutral pref * High	-	-	0.75 (0.36-1.57)	1.89 (0.73-4.94)

	edu< 4y				
	Neutral pref *High edu>4y	-	-	0.71 (0.33-1.53)	1.48 (0.55-4.00)
	Neutral pref *Other	-	-	0.28 (0.08-1.03)	0.45 (0.11-1.96)
	Cesarean pref *High school	-	-	1.21 (0.53-2.79)	**2.30 (1.04-5.07)**
	Cesarean pref *Higher edu<4y	-	-	1.78 (0.76-4.17)	**3.78 (1.70-8.42)**
	Cesarean pref *Higher edu>4y	-	-	1.63 (0.66-4.06)	**4.01 (1.73-9.27)**
	Cesarean pref *Other	-	-	2.14 (0.54-8.51)	**4.14 (1.30-13.17)**
Preferences *Prior CS	Vag pref* No prior CD	NR	NR	-	Ref
	Neutral pref*Prior CS	NR	NR	-	**0.62 (0.43-0.88)**
	Cesarean pref *prior CS	NR	NR	-	**0.47 (0.34-0.65)**
Preferences * Dystoci	Vag pref* no dystoci	1	1	1	1
	Neutral pref * dystoci	**0.80 (0.65-0.99)**	0.94 (0.59-1.48)	1.18 (0.88-1.57)	**0.59 (0.37-0.95)**
	Caesarean pref*dystoci	**0.60 (0.41-0.88)**	**0.26 (0.12-0.54)**	**0.34 (0.22-0.51)**	**0.51 (0.33-0.78)**
Preferences * Asphyxia	**Vag pref* no asphyxia**	1	NR	1	NR
	Neutral pref * asphyxia	**0.78 (0.61-1.01)**	NR	**0.29 (0.20-0.43)**	NR
	Caesarean pref*asphyxia	**0.67 (0.42-1.08)**	NR	**0.30 (0.18-0.50)**	NR

*Interactions between preference and respectively education, presentation, plurality, and previous cesarean were tested, and significant interaction terms were included in the final model, but not illustrated for brevity.

[i] Significant interaction term were neutral preference*dystocia and cesarean preference*dystocia

[ii] Significant interaction term was cesarean preference*dystocia, and neutral preference*breech presentation.

[iii] Significant interaction term were neutral preference*low education, neutral preference*dystocia, cesarean preference*dystocia, neutral preference*asphyxia, cesarean preference*asphyxia.

[iv] Significant interaction terms were preference*education, preference*presentation, neutral preference*prior cesarean, cesarean preference*prior cesarean, neutral preference*dystocia, cesarean preference*dystocia, cesarean preference*breech presentation, cesarean preference*higher educational level.

† Captures mechanical disproportion, slow progress, and oxytocin augmentation.

‡ Includes placenta previa and abruption placenta.

Paper IV-Table 3 with full regression models

Multivariate regression of CSMR* (0= vaginal, 1= CSMR)

		Nulliparous	Multiparous
		CDMR (n=26,692) OR (95%CI)	**CDMR (n=27,974) OR (95%CI)**
Age (years)	(<35=ref) 35+	**4.88 (2.90-8.19)**	0.96 (0.73-1.27)
Education	Low education (Up to high school)	1	1
	Higher education	0.98 (0.65-1.47)	**1.45 (1.14-1.84)**
Marrital status	(Married/cohab=ref). Not	0.63 (0.26-1.50)	0.91 (0.44-1.88)
Plurality (twins)	(No=ref) Yes	**2.81 (1.18-6.70)**	1.82 (0.81-4.10)
Presentation	Cephalic	1	1
	Breech	**25.46 (12.46-52.02)**	**20.03 (8.67-46.29)**
Chronic diseases	(No = ref) Yes	1.45 (0.53-3.96)	0.87 (0.40-1.92)
Diabetes	No	1	1
	Pre-existing diabetes	**4.50 (1.40-14.45)**	0.68 (0.26-1.78)
Preference	Vaginal	1	1
	Neutral	**18.10 (8.69-37.70)**	**13.98 (7.87-24.78)**
	Cesarean	**380.66 (191.49-756.68)**	**260.88 (164.89-412.77)**
Dystocia†	(No= ref) Yes	**0.22 (0.06-0.78)**	**0.18 (0.05-0.60)**
Pre-eclampsia	(No=ref) Yes	0.30 (0.08-1.05)	0.42 (0.17-1.04)
Previous Cesarean	(No=ref) Yes	N/R	**9.66 (4.98-18.71)**
Preferences* Presentation	(Vaginal)Pref*Cephalic presentation	NR-non significant	Ref
	Neutral pref* Breech	NR -non significant	0.95 (0.29-3.16)
	Cesarean pref * Breech	NR -non significant	**0.23 (0.06-0.88)**
Preferences * Prior cesarean	(Vag)Pref * No prior CS	NR -non significant	1
	Neutral pref* Prior CS	NR -non significant	0.64 (0.27-1.52)
	CS pref* Prior CS	NR -non significant	**0.47 (0.23-0.97)**
Preference* Dystocia	Vag pref* no dystocia	1	1
	Neutral pref * dystocia	0.29 (0.04-2.03)	0.67 (0.14-3.11)
	Caesarean pref*dystocia	**0.06 (0.01-0.43)**	**0.24 (0.06-0.98)**

*The following interaction terms were tested between preference and respectively education, presentation, plurality, dystocia, fetal distress and previous caesarean. Only significant interaction terms were included in the final model, but not illustrated for brevity.

[i]Significant interaction term was caesarean preference*dystocia.

[ii]Significant interaction terms were cesarean preference*dystocia, cesarean preference*breech presentation, and cesarean preference*previous cesarean.

† Includes mechanical disproportion, slow progress, and oxytocin augmentation

ERRATA

Corrections, approved by the adjudicating committee

Section 3.2, The MoBa-study, page 36: Figure 1, Flowchart
Study sample in paper IV, the number in each subgroup *is corrected* to P0=33,279 and P1+=33,072, respectively.

Paper IV page 14:
Updated invalid reference (now reference number 30), hence the reference list *is updated*.

Errata

Appendix 5, Paper IV –Table 2 with full regression models.
In the table the variable name 'asphyxia' in the interaction terms *should be* replaced with 'fetal distress'.
The footnotes *should accordingly be replaced with:*
*Interactions between preference and respectively education, presentation, plurality, and previous cesarean were tested, and significant interaction terms were included in the final model.
[i] Significant interaction term were neutral preference*dystocia and cesarean preference*dystocia
[ii] Significant interaction term was neutral preference*breech presentation, and cesarean preference*dystocia.
[iii] Significant interaction term were neutral preference*low education, cesarean preference*dystocia, neutral preference* fetal distress, cesarean preference* fetal distress.
[iv] Significant interaction terms were cesarean preference*breech presentation, cesarean preference*higher educational levels, neutral preference*prior cesarean, cesarean preference*prior cesarean, neutral preference*dystocia, cesarean preference*dystocia.
† Captures mechanical disproportion, slow progress, and oxytocin augmentation.
‡ Includes placenta previa and placental abruption.