The role of primary care midwives in the Netherlands. Evaluation of midwifery care in the Dutch maternity care system: a descriptive study
Verburg, M.P.

Citation for published version (APA):
Evaluation of the quality of midwifery care in the Dutch maternity care system

*Summary of publications in peer reviewed medical Journals 1956-2011*
Table B. Evaluation of the quality of midwifery care in the Dutch maternity care system.

Summary of publications in peer reviewed medical Journals 1956-2011

Search strategy:

1. PubMed was searched, using the following (truncated) keywords in Title and/or abstract: (midwi* OR "maternity care" OR "maternity services" OR perinatal OR childbirth OR "home birth" OR homebirth OR "home delivery" OR "home deliveries") AND (Dutch OR Netherlands) NOT letter[pt] NOT editorial[pt] NOT comment[pt]. Limits: English, German, Dutch, Undetermined.
2. PubMed was searched again, now using the following (truncated) keywords in All fields: midwi* AND (Dutch OR Netherlands) NOT letter[pt] NOT editorial[pt] NOT comment[pt]. Limits: English, German, Dutch, Undetermined.
3. Aggregation of the results of search 1 and 2
4. The Dutch medical journal Nederlands Tijdschrift voor Geneeskunde was searched, using the following (truncated) keywords: Verloskund*, Vroedvrouw*, Beval*, Perinat*, within the category onderzoek (research).
5. Hand searching of the reference lists of the papers selected in step 3 and 4.

The first search procedure concerned the years 1956 up to 2005 and resulted in 36 relevant papers concerning Evaluation of midwifery care and in 35 relevant papers concerning the content of midwifery care. The search procedure was repeated for the years 2006 up to June 1st 2011 and resulted in 25 and 36 relevant papers, respectively.

Explanation of the table’s content:

The conclusions about the midwifery care or the maternity care system are extracted from the paper concerned, following the verbatim text as far as possible.

MR-factor: The midwives’ involvement in the research team.
OR-factor: The obstetricians’ involvement in the research team.

We assumed that the first-listed author for each study was the principal researcher. He/she was awarded 4 author points. The second- and the last-listed author each received 2 points, while all other authors listed were each awarded 1 author point. The midwives’ involvement in the research team, the MR-factor (denoting the extent to which midwives were represented in the research team) was calculated as the quotient of the number of author points for midwives, in relation to the available number of author points * 100. In the same way the obstetricians’ involvement in the research team (the OR-factor) was calculated (denoting the extent to which obstetricians were represented in the research team)

As an example: The paper ‘Perinatal mortality and morbidity in a nationwide cohort of 529,688 low-risk planned home and hospital births’ (2009) had 8 authors. The first, second and fourth author were midwives (4+2+1=7 author points for midwives); the fifth, sixth and seventh author were obstetricians (3*1 =3 author points) and the third and last author were neither midwife nor obstetrician ( 1 + 2 author points). Thus, the total number of author points available was 13. The MR-factor resulted in 7 : 13 * 100 = 54; the OR-factor resulted in 3 : 13 * 100 = 23.
<table>
<thead>
<tr>
<th>Year</th>
<th>Study Title</th>
<th>Authors</th>
<th>MR-factor</th>
<th>OR-factor</th>
<th>Scope</th>
<th>Outcome measure</th>
<th>Objective</th>
<th>Study design and methods</th>
<th>Coverage</th>
<th>Main results of the study</th>
<th>Conclusion about the maternity care system</th>
</tr>
</thead>
<tbody>
<tr>
<td>1971</td>
<td>Enkele beschouwingen naar aanleiding van een onderzoek over doodgeboorte in het jaar 1961 in Nederland</td>
<td>Breijer HBG, Stolk JG</td>
<td>0</td>
<td>33</td>
<td>maternity care system</td>
<td>perinatal mortality</td>
<td>To study factors concerning stillbirth in the Netherlands.</td>
<td>Data analysis</td>
<td>National, all stillbirths registered in Statistics Netherlands 1961</td>
<td>3724 stillbirths (≥ 28 weeks GA) out of 250,733 births (14.9 ‰)</td>
<td>Medical causes are thought to be deficient prenatal care and insufficient or actual absence of essential hospital facilities.</td>
</tr>
<tr>
<td>1978</td>
<td>Regionale perinatale sterfte en regionale hospitalisatie bij de bevalling in Nederland</td>
<td>Treffers PE</td>
<td>0</td>
<td>100</td>
<td>place of delivery</td>
<td>perinatal mortality</td>
<td>To establish a correlation between the regional perinatal mortality rate and the regional rate of hospitalization for childbirth.</td>
<td>Data analysis</td>
<td>Nationwide (Statistics Netherlands) 1956-1974</td>
<td>Not reported</td>
<td>There is little if any correlation between the regional perinatal mortality rate and the rate of hospitalization for childbirth.</td>
</tr>
</tbody>
</table>
### 1978

**De relatie tussen de hoogte van de perinatale sterfte en de plaats van bevalling: thuis, dan wel in het ziekenhuis** [The correlation between the perinatal mortality figures and the place of delivery: at home or in the hospital]

Hoogendoorn D<br>
MR-factor 0; OR-factor 0<br>
Scope: place of delivery<br>
Outcome measure: perinatal mortality

<table>
<thead>
<tr>
<th>Objective</th>
<th>To study the correlation between perinatal mortality and place of delivery per province.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study design and methods</td>
<td>Data analysis</td>
</tr>
<tr>
<td>Coverage</td>
<td>Nationwide (Statistics Netherlands)</td>
</tr>
<tr>
<td>Year(s) of the study</td>
<td>1952-1975</td>
</tr>
<tr>
<td>Number of women/cases included</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

**Main results of the study**
- A very high (negative) correlation between the percentages of women who delivered in an institution/hospital and the perinatal mortality rate.
- The higher the hospitalization rate within a province, the lower the perinatal mortality rate (in general).

**Conclusion about the maternity care system**
"Since normality can only be concluded in retrospect, the available data do not allow conclusions about whether a baby can be born at home as safely as in hospital if no increased risk had been identified."

### 1978

**Thuisgeboorten** [Childbirth at home]

Van Alten D<br>
MR-factor 0; OR-factor 100<br>
Scope: place of delivery<br>
Outcome measure: neonatal morbidity

<table>
<thead>
<tr>
<th>Objective</th>
<th>To gain insight into the reasons for hospitalization during the puerperal period of neonates, born at home.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study design and methods</td>
<td>Data analysis, using regional data to interpret the national data</td>
</tr>
<tr>
<td>Coverage</td>
<td>Regional (Wormerveer)</td>
</tr>
<tr>
<td>Year(s) of the study</td>
<td>1975</td>
</tr>
<tr>
<td>Number of women/cases included</td>
<td>2378 women delivered at home or in a midwife-led Birth Centre, giving birth to 2383 children</td>
</tr>
</tbody>
</table>

**Main results of the study**
- 3.0% neonatal admissions to hospital.
- Regional percentage consistent with the national database (comprising 81% of all deliveries at home) = 2.9%.
- Main reasons for referral: preterm (0.8%), SGA (0.7%), AS 10’<9 (0.8%), neonatal jaundice (0.4%).
- Follow-up study is needed in order to know whether the delay due to the postnatal referral has influenced the perinatal outcome.

**Conclusion about the maternity care system**
"For the time it seems safe to conclude from this study that giving birth at home or in a maternity clinic is not an irresponsible thing to do, provided that the mother has not been diagnosed with risk factors in her carefully conducted antenatal examinations."
1980 Eerste indrukken over het functioneren van het instituut "poliklinische bevallingen"
[First impressions of the functioning of the service for outpatient childbirth]
Hoogendoorn D 6

MR-factor 0; OR-factor 0
Scope: place of delivery
Outcome measure: perinatal mortality, interventions

<table>
<thead>
<tr>
<th>Objective</th>
<th>To describe the number and results of short-stay hospital deliveries.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study design and methods</td>
<td>Data analysis Stichting Medische Registratie Nederland</td>
</tr>
<tr>
<td>Coverage</td>
<td>Short-stay deliveries in 58 hospitals</td>
</tr>
<tr>
<td>Year(s) of the study</td>
<td>1978</td>
</tr>
<tr>
<td>Number of women/cases included</td>
<td>8777</td>
</tr>
<tr>
<td>Main results of the study</td>
<td>• Short-stay hospital delivery in 91% of cases attended by primary care (midwife or general practitioner).</td>
</tr>
<tr>
<td></td>
<td>• Prenatal care: 75% by midwife, 21% by general practitioner, 4% by obstetrician.</td>
</tr>
<tr>
<td></td>
<td>• In 92% of the deliveries no complications reported</td>
</tr>
<tr>
<td></td>
<td>• “Extremely low perinatal mortality” of 2,2‰ versus 12.4‰ nationally.</td>
</tr>
<tr>
<td>Conclusion about maternity care system</td>
<td>“If abnormalities of any significance are diagnosed in the course of the parturition, the woman is admitted to the obstetrician. This will influence the number of perinatal mortality.”</td>
</tr>
</tbody>
</table>

1980 Vermijdbare aspecten van perinatale sterfte; consequenties voor scholing en nascholing [Avoidable aspects of perinatal mortality; consequences for education and postgraduate education]
Eskes TKAB, Krakers RPhM, Evers JLH 7
MR-factor 0; OR-factor 100
Scope: primary versus secondary care
Outcome measure: perinatal mortality; factors contributing to substandard care

<table>
<thead>
<tr>
<th>Objective</th>
<th>To investigate the degree to which perinatal death was avoidable.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study design and method</td>
<td>Retrospective assessment of the medical records by two researchers</td>
</tr>
<tr>
<td>Coverage</td>
<td>Perinatal deaths in all births taking place in the St.Radboud hospital Nijmegen</td>
</tr>
<tr>
<td>Year(s) of the study</td>
<td>1976-1977</td>
</tr>
<tr>
<td>Number of women/cases included</td>
<td>3602 births, with 71 perinatal deaths</td>
</tr>
<tr>
<td>Main results of the study</td>
<td>• Perinatal mortality was 15 per 1000 (n = 46) in women cared for by the obstetrician from start pregnancy (group A), and 59 per 1000 (n = 25) in women who were referred to the hospital by general practitioner or midwife during pregnancy (group B).</td>
</tr>
<tr>
<td></td>
<td>• Perinatal death was classified as avoidable in 11% of cases in group A and 44% of cases in group B, respectively.</td>
</tr>
</tbody>
</table>
### Conclusion about the maternity care system

"If these data for the avoidability of perinatal death are representative for The Netherlands, it would mean that perinatal death could be reduced with 23%.

"Improvement in group B would only be possible by improving education and postgraduate education."

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### 1981 De doeltreffendheid van het selectiesysteem binnen de verloskundige zorg [The effectiveness of the selection system in maternity care]

Smits F 8  
MR-factor 0; OR-factor 100  
Scope: maternity care system  
Outcome measure: perinatal mortality, neonatal morbidity, referral

**Objective**

To determine to what extent women are referred to specialist care on medical grounds, how the various medical grounds for referral rate as risk factors, and whether pregnancies are divided into the right risk categories.

**Study design and methods**

Prospective cohort study

**Coverage**

- **Year(s) of the study:** 1974  
- **Number of women/cases included:** 91% of all children, born in the region of Enschede  
  - 2035 pregnancies

**Main results of the study**

- 19% of the pregnant women attended in primary care had a primary medical indication.  
- 22% of the women with primary medical indication had no (valid) indication for specialist care.  
- Pregnancies were often divided into the wrong categories. Perinatal mortality, SGA and prematurity were as common in the population of women with previous complications as in the population of women without previous complications.  
- The grounds for referral listed in the List of Indications for Obstetric Care generally serve as adequate risk factors.  
- The added value of a once-only risk screening performed by an obstetrician at the 32-week point was questionable.

**Conclusion about the maternity care system**

"Maintaining a risk screening system is necessary, but the current screening system is inadequate because it is not applied consistently and because it divided pregnancies into a mere two categories. Improved risk screening will require multidisciplinary maternity co-operations in which midwives, GPs and gynaecologists all play an important part."

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### 1981 De verloskundige zorg en de plaats van de bevalling [Obstetric care and the location of delivery]

van Alten D 9  
MR-factor 0; OR-factor 100  
Scope: place of delivery  
Outcome measure: perinatal mortality; factors contributing to substandard care
## Objective
To compare national data with the results of an investigation conducted in Wormerveer.

### Study design and methods
Data analysis

### Coverage
Regional: independent midwifery practice and GP practices in Wormerveer

### Year(s) of the study
1978

### Number of women/cases included
4804 women giving birth to 4835 children

### Main results of the study
- 15.7% of all women were referred to secondary care during pregnancy and 6.6% intrapartum.
- In women under supervision of primary care (midwife or GP) at the start of labour the PMR was 3.0‰ (n = 12). In 6 cases the avoidability of the perinatal death may be discussed; 4 regarding primary care provider and 2 regarding secondary care provider.
- In the total group 1.0% of the women was delivered by Caesarean Section and 3.9% by artificial vaginal delivery. In women under supervision of primary care at the start of labour these percentages were 0.4% and 2.8%, respectively.

### Conclusion about maternity care system
“It appears to be possible, using relatively basic examination methods, to select women who will later have a (mostly) normal delivery. It has not been conclusively demonstrated that advanced monitoring methods are useful when such women give birth.”

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### 1981 Umbilical cord gases in home deliveries versus hospital-based deliveries

Eskes TK, Jongsma HW, Houx PC  
MR-factor 0; OR-factor 100  
**Scope:** place of delivery  
**Outcome measure:** neonatal morbidity

<table>
<thead>
<tr>
<th>Objective</th>
<th>To gain more insight in home deliveries.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study design and methods</td>
<td>Assessment of neonatal outcome by the value of umbilical cord gases.</td>
</tr>
<tr>
<td>Coverage</td>
<td>Region of Nijmegen: 6 midwives, 1 GP, 1 academic hospital</td>
</tr>
<tr>
<td>Year(s) of the study</td>
<td>Not reported</td>
</tr>
<tr>
<td>Number of women/cases included</td>
<td>85 home deliveries under supervision of primary care, matched with 85 hospital deliveries without medical reason, under supervision of secondary care and continuous monitoring (CTG, MBO)</td>
</tr>
<tr>
<td>Main results of the study</td>
<td>• The median values for pH in the umbilical artery (7.19) and base excess (-9.9 mmol/litre) in home deliveries differed significantly ($P &lt; 10^{-4}$) from those of matched controls (7.25 and -7.7, respectively) delivered in the hospital. Similar differences were noted for umbilical venous blood values.</td>
</tr>
<tr>
<td>Conclusion about the maternity care system</td>
<td>“We conclude by indirect evidence that continuous fetal surveillance and monitoring results in less acidotic gas valves of umbilical cord blood in hospital deliveries as compared to home delivery. The consequence of this finding for these mature newborns is not yet known.”</td>
</tr>
<tr>
<td>Year</td>
<td>Study Title</td>
</tr>
<tr>
<td>------</td>
<td>-------------</td>
</tr>
<tr>
<td>1982</td>
<td>Ervaringen met poliklinische bevallingen in een algemeen ziekenhuis [Experiences with outpatient deliveries in a general hospital]</td>
</tr>
<tr>
<td>1982</td>
<td>Neonatal morbidity in deliveries conducted by midwives and gynecologists. A study of the system of obstetric care prevailing in The Netherlands.</td>
</tr>
</tbody>
</table>
Main results of the study

- The pH and BE values were less favourable in the midwife group than in the gynecologist group ($P=0.01$ and $P=0.008$, respectively); no significant difference in pCO$_2$.
- 10 neurologically nonoptimal neonates in the midwife group vs. 0 in the gynecologist group.
- Neurological nonoptimality in the midwife group was related to acidosis.

Conclusion about maternity care system

“The obstetric system prevailing in The Netherlands, although concomitant with satisfying neonatal mortality figures, is not adequate from the point of view of neonatal morbidity. The better outcome of the infants born under the care of the gynecologist is most probably (also) due to the tools of surveillance used in the supervision of the deliveries.”

1984 Home confinement: the positive results in Holland

**Objective**
To find out how pregnancy, delivery and childbed period had progressed in relation to the place the women had opted for at start of pregnancy, and to obtain facts about neonatal outcomes.

**Study design and methods**
Structured interviews three weeks after delivery.

**Coverage**
Local: 99.3% of all women giving birth in the city of Groningen (and its surroundings) in one year 1981.

1470 women, at start pregnancy under the care of a midwife (67%) or the general practitioner (33%), divided in 3 groups: opting for home birth (27%), for hospital birth with 24-hours stay (37%), and for hospital birth with 7-day stay (37%), respectively.

**Main results of the study**
- Among women who had opted for home confinement significantly fewer complications occurred during pregnancy, delivery and puerperium than among those who had their babies in hospital followed by a 24-hour stay there or followed by a seven-day stay in a maternity ward.
- Intrapartum referral to the obstetrician for reason of ‘poor progress’ occurred in 4.6% of women still at home and in 11.7% of women already in hospital; no other significant differences in indications for referral.
- Morbidity was lower among babies born at home than among those born in hospital (admission to special infant care unit in 2.8%, 8.2% and 10.8% of the neonates in the separate groups, respectively).
- No perinatal mortality in neonates born at home.
### Conclusion about maternity care system

“The study suggests that it is a responsible decision for a normal healthy woman, given the right kind of antenatal supervision, to have her baby at home with the least risk of complications.”

### 1986 *Intra-uteriene vruchtdood* [Intra-uterine deaths]

Reijnders FJL, Meuwissen JHJM

**MR-factor 0; OR-factor 100**

**Scope:** primary versus secondary care

**Outcome measure:** perinatal mortality

<table>
<thead>
<tr>
<th>Objective</th>
<th>To determine to which extent the perinatal mortality rate in the hospitals was influenced by intra-uterine deaths, referred by primary care provider (midwife or general practitioner) after the death occurred.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study design and methods</td>
<td>Data analysis: Dutch perinatal registry of obstetricians</td>
</tr>
<tr>
<td>Coverage</td>
<td><strong>Year(s) of the study</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Number of women/cases included</strong></td>
</tr>
<tr>
<td></td>
<td>50% of all hospital deliveries (n = 58,619)</td>
</tr>
<tr>
<td></td>
<td>1983</td>
</tr>
<tr>
<td></td>
<td>578 intra-uterine deaths</td>
</tr>
<tr>
<td>Main results of the study</td>
<td>• 213 of the women were referred by primary care after the intra-uterine death had occurred (36,9%).</td>
</tr>
<tr>
<td></td>
<td>• The perinatal death figures in hospitals are influenced by referred intra-uterine deaths.</td>
</tr>
<tr>
<td>Conclusion about maternity care system</td>
<td>“The perinatal mortality rate does not serve as a criterion for comparison of the quality of primary care at home and secondary care in the hospital.”</td>
</tr>
<tr>
<td></td>
<td>“The avoidability of the cases of intra-uterine death in primary care has to be analysed.”</td>
</tr>
</tbody>
</table>

### 1986 Regional perinatal mortality and regional hospitalization at delivery in The Netherlands

Treffers PE, Laan R

**MR-factor 0; OR-factor 100**

**Scope:** place of delivery

**Outcome measure:** perinatal mortality

<table>
<thead>
<tr>
<th>Objective</th>
<th>To study the relation between the PMR and the percentage of hospital deliveries.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study design and methods</td>
<td>Data analysis (Statistics Netherlands), investigating different groups: the 11 provinces of The Netherlands, municipalities divided into groups according to the number of inhabitants, and the 17 cities with &gt; 100,000 inhabitants.</td>
</tr>
<tr>
<td>Coverage</td>
<td><strong>Year(s) of the study</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Number of women/cases included</strong></td>
</tr>
<tr>
<td></td>
<td>National</td>
</tr>
<tr>
<td></td>
<td>1980-1983</td>
</tr>
<tr>
<td></td>
<td>Not reported</td>
</tr>
</tbody>
</table>
| Main results of the study | • Hospitalization at delivery varied between provinces from 49.2% to 75.5%.  
• Hospitalization at delivery was clearly correlated with the degree of urbanization.  
No relation between the degree of hospitalization at delivery in the cities and the PMR |
| Conclusion about maternity care system | “The proportion of hospital delivery appears not to be a major factor determining the regional PMR in the current system of obstetric care in The Netherlands”.  
“The question whether an obstetric system comprising home deliveries is justified cannot be answered by perinatal mortality figures alone; other criteria, including infant morbidity, must also be taken into account”.

| 1986 | Indrukwekkende en tegelijk teleurstellende daling van perinatale sterfte in Nederland [Impressive but still disappointing decline in perinatal mortality in The Netherlands] Hoogendoorn D 16  
MR-factor 0 ; OR-factor 0  
Scope: place of delivery  
Outcome measure: perinatal mortality |
| Objective | To describe the trend in perinatal mortality related to place of delivery. |
| Study design and methods | Comparison of data collected by international organizations (e.g. WHO, EEC) |
| Coverage | All births in The Netherlands ? (not reported)  
1970 – 1984  
Not reported |
| Year(s) of the study | Number of women/cases included |
| Main results of the study | • After 1940 the PMR has shown a remarkable decrease: the PMR for 1982 (10.0‰) was 1/4 of the PMR for 1940.  
• Stagnation of the decline of PMR since 1982; by that The Netherlands have lost their internationally favourable position.  
• The proportion of home deliveries decreased progressively between 1950 and 1978 and remained stable since then.  
• The relationship between the home birth and the stagnation of decline in PMR must be discussed. |
| Conclusion about the maternity care system | “Reconsideration of the problems of obstetrical care and particularly also of the desirability of home vs. clinical delivery appears necessary.” |

MR-factor 0 ; OR-factor 100  
Scope: midwifery care  
Outcome measure: neonatal morbidity |
**Objective**

Standardized measurement of the arterial umbilical pH value of neonates, as a parameter of neonatal morbidity.

**Study design and methods**

Prospective cohort study

**Coverage**

All pregnant women who booked for antenatal care in a midwifery practice in the Zaanstreek 1982-1983

175 women: 91 nulliparous and 84 multiparous

**Main results of the study**

- Significant higher pH values of the neonates of nulliparous women delivered by midwives than those of the neonates of nulliparous women delivered by the obstetrician after referral during pregnancy. No difference between the first group and the nulliparous women who were referred intrapartum.

- No significant differences in the pH values of the neonates of multiparous women delivered by midwives, or delivered by the obstetrician after referral during pregnancy or after referral intrapartum.

**Conclusion about maternity care system**

“This study shows with respect to umbilical pH values, that there is no cause for concern about the Dutch obstetric system in which midwives take care of pregnant women and deliveries.”

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**1987 Neurologisch onderzoek bij pasgeborenen in een verloskundigenpraktijk** [Neurologic examination of newborn infants in an obstetrics practice]

Eskes M, Knuist M, van Alten D 18

MR-factor 0 ; OR-factor 100

Scope: midwifery care Outcome measure: neonatal morbidity

**Objective**

To investigate the effectiveness of the selection system in maternity care.

**Study design and methods**

Assessment of neonatal outcome by the arterial umbilical pH and by neurological examination with Prechtl’s method in the 2nd week postnatal

**Coverage**

All pregnant women who booked for antenatal care in a midwifery practice in the Zaanstreek. 1982-1983

177 neonates born under supervision of a midwife (n=116) or born under supervision of an obstetrician after referral during pregnancy (n = 26) or after intrapartum referral (n=35).

**Main results of the study**

- Significant higher neurological optimality scores of the neonates born under sole care of the midwife than the scores of the neonates born under care of the obstetrician after referral during pregnancy. No difference between the first group and the neonates born under care of the obstetrician after intrapartum referral.

- No relationship between the neonatal neurological optimality score and the arterial umbilical pH.

**Conclusion about maternity care system**

“There is no need for concern about the Dutch obstetric system in which midwives take care of pregnancies and deliveries, as the results of this study shows.”
<table>
<thead>
<tr>
<th>Year</th>
<th>Study Title</th>
<th>Authors</th>
<th>MR-factor</th>
<th>OR-factor</th>
<th>Scope</th>
<th>Objective</th>
<th>Study design and methods</th>
<th>Coverage</th>
<th>Year(s) of the Study</th>
<th>Number of Women/Cases Included</th>
<th>Main Results of the Study</th>
<th>Conclusion about Maternity Care System</th>
</tr>
</thead>
</table>
| 1989 | **Midwifery in the Netherlands. The Wormerveer study; selection, mode of delivery, perinatal mortality and infant morbidity** | Van Alten D, Eskes M, Treffers PE 19 | MR-factor 0; OR-factor 100 | Scope: midwifery care | Outcome measures: perinatal mortality, neonatal morbidity, interventions | To investigate the procedures used for selecting maternity care, and their results. | Prospective cohort study | Regional: independent midwifery practice in Wormerveer 1969 – 1983 | 7980 women from 20 weeks onwards, booked at the midwifery practice, giving birth to 8055 children | • Perinatal mortality 11.1‰ versus national 14.5‰.  
• The highest mortality (51.7‰) in the group of infants born after maternal referral during pregnancy.  
• Perinatal mortality in the group selected during pregnancy as low-risk was very low (2.3‰), with a low rate of intervention (caesarean sections 0.4%).  
• Of the infants born alive under sole care of a midwife, 3.8% were admitted to hospital.  
• Emergency admission because of birth asphyxia occurred in 0.4%. | “Selection of pregnant women into groups with high and with low risk is possible with the relatively modest means available to the midwife.”  
“Within the scope of the Dutch system of obstetric care it is possible to achieve very good results with midwifery care for selected women.” |

<table>
<thead>
<tr>
<th>Year</th>
<th>Study Title</th>
<th>Authors</th>
<th>MR-factor</th>
<th>OR-factor</th>
<th>Scope</th>
<th>Objective</th>
<th>Study design and methods</th>
<th>Coverage</th>
<th>Year(s) of the Study</th>
<th>Number of Women/Cases Included</th>
<th>Main Results of the Study</th>
<th>Conclusion about Maternity Care System</th>
</tr>
</thead>
<tbody>
<tr>
<td>1989</td>
<td><strong>Regionale verschillen in perinatale sterfte: het verband met enkele aspecten van de zorg rond de geboorte</strong> [Regional differences in perinatal mortality: associations with some aspects of perinatal care]</td>
<td>Mackenbach JP, van Leengoed PLM 20</td>
<td>MR-factor 0 ; OR-factor 0</td>
<td>Scope: place of delivery</td>
<td>Outcome measure: perinatal mortality</td>
<td>To investigate regional differences in perinatal mortality in relation to aspects of perinatal care (home deliveries, deliveries supervised by obstetrician; the presence of a hospital level 2 or 3).</td>
<td>Data analysis, controlling for a number of possible confounding variables</td>
<td>Nationwide (Statistics Netherlands) 1980-1984</td>
<td>9.163 perinatal deaths (5375 stillbirths and 3788 first-week mortality)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
• Perinatal mortality of 11.1‰ versus national 14.5‰.  
• The highest mortality (51.7‰) in the group of infants born after maternal referral during pregnancy.  
• Perinatal mortality in the group selected during pregnancy as low-risk was very low (2.3‰), with a low rate of intervention (caesarean sections 0.4%).  
• Of the infants born alive under sole care of a midwife, 3.8% were admitted to hospital.  
• Emergency admission because of birth asphyxia occurred in 0.4%. |  
“Selection of pregnant women into groups with high and with low risk is possible with the relatively modest means available to the midwife.”  
“Within the scope of the Dutch system of obstetric care it is possible to achieve very good results with midwifery care for selected women.” |
Main results of the study

• Large regional differences in PMR and place of birth.
• A positive association for the percentage of home deliveries and stillbirth.
• A positive association for the percentage of deliveries supervised by an obstetrician and first-week mortality due to other causes than congenital malformations or birth trauma.

Conclusion about the maternity care system

“There is no statistically significant evidence that Hoogendoorn was right about a possible correlation between the number of home births not decreasing any longer and reduced perinatal mortality rates. It is unknown whether there is a causal relation between the stillbirth rate and home births, and if so, which aspect of care leaves room for improvement. We will need perinatal audit of individual cases to determine whether care and mortality are related.”

1991 Place of delivery in The Netherlands: actual location of confinement

Kleiverda G, Steen AM, Andersen I, Treffers PE, Everaerd W

MR-factor 0; OR-factor 50

Scope: place of delivery
Outcome measure: referral

Objective
To compare preferences for either home or hospital confinement with the actual locations.

Study design and methods
Interviews at 18 and 34 weeks GA as well as 10 days postpartum

Coverage
8 independent midwifery practices in Amsterdam and Haarlem
1985
170 women receiving prenatal care from midwives at the beginning of their pregnancies

Main results of the study

• 59% of the women were referred to the obstetrician ante, intra or post partum.
• Fewer referrals in women with an initial preference for home confinement than in those who preferred a hospital confinement (53% versus 64%, not statistically significant).
• Positive attitudes towards a hospital confinement, more traditional attitudes towards female social roles and better overall psychological well-being showed predictive capacity for chances of referral.

Conclusion about maternity care system

“Partly the same variables that predicted a preference for hospital confinement were also able to predict the chance of a referral.”
### 1991 Safest birth attendants: recent Dutch evidence

**Tew M, Damstra-Wijmenga SM**

**MR-factor 0; OR-factor 0**

**Scope:** primary versus secondary care  
**Outcome measure:** perinatal mortality

<table>
<thead>
<tr>
<th>Objective</th>
<th>To examine how far the excess in predicted risk in women directed to obstetricians’ care for delivery in hospital, explains the eventual excess of mortality.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study design and methods</td>
<td>Data analysis, based on Statistics Netherlands and Perinatal Registration Netherlands</td>
</tr>
</tbody>
</table>
| Coverage | All registered births  
| Year(s) of the study | 1986  
| Number of women/cases included | 162,901 births |
| Main results of the study |  
| • For all births > 32 weeks GA the PMR is much lower under the non-interventionist care of midwives than under the interventionist management of obstetricians at all levels of predicted risk. |
| Conclusion about maternity care system | “Birth at home is the safer option and, despite all technological innovations, the claim for the greater safety of birth in hospital cannot be sustained.” |

### 1993 The Wormerveer study: perinatal mortality and non-optimal management in a practice of independent midwives

**Eskes M, Van Alten D, Treffers PE**

**MR-factor 0; OR-factor 100**

**Scope:** maternity care system  
**Outcome measure:** Perinatal mortality; factors contributing to substandard care

<table>
<thead>
<tr>
<th>Objective</th>
<th>To assess non-optimal management in cases of perinatal mortality.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study design and methods</td>
<td>Perinatal audit by a panel of independent experts</td>
</tr>
</tbody>
</table>
| Coverage | Regional: independent midwifery practice in Wormerveer  
| Year(s) of the study | 1969 – 1983  
| Number of women/cases included | 7980 women from 20 weeks onwards, booked at the midwifery practice, giving birth to 8055 children with 89 cases of perinatal mortality |
| Main results of the study |  
| • Preventable factors in 29 out of 66 cases of perinatal mortality, concerning the skill of the obstetrician (41%), the pediatrician (24%), the midwife (24%), the general practitioner (3%) and the behaviour of the patient (7%).  
| • Within the group of term pregnancies, preventable factors in 9 out of 20 cases of perinatal mortality: 4 cases within the hospital, 4 cases outside the hospital, and in 1 case both in and outside the hospital.  
| • Within the group referred to the obstetrician after intra-uterine death (n=13), in 2 cases non-optimal care by the midwife and in 1 case by the obstetrician. |
Conclusion about maternity care system

“Preventable factors are mainly present in decisions made during the prenatal period by the midwife and the obstetrician, and in care during labour, delivery and postnatal period by the obstetrician and the pediatrician.”

“The care of the midwife during labour and delivery and the place of delivery (in or outside the hospital) had little influence on preventable perinatal morbidity.”

1995 Blues and depression during early puerperium: home versus hospital deliveries

Pop VJ, Wijnen HA, van Montfort M, Essed GG, de Geus CA, van Son MM, Komproe IH

MR-factor 25; OR-factor 8

Scope: place of delivery
Outcome measure: maternal experiences

Objective
To investigate whether women who give birth at home are less prone to mood disturbances during the early puerperium than those who give birth in hospital.

Study design and methods
Prospective study

Coverage
5 midwifery practices and 1 hospital antenatal clinic in Veldhoven
Year(s) of the study
1988-1989
Number of women/cases included
293 pregnant women (133 nulliparous and 160 multiparous women)

Main results of the study
• 52% of the women gave birth at home.
• Parturition occurred where it had been planned in 77% of women; referral occurred later on in pregnancy in 11% and during labour in 12%. Nullipara had to be referred significantly more often than multiparae.
• In general, there was no difference in the incidence of blues and depression between women who gave birth at home and those who gave birth in hospital.
• Obstetric factors were not related to the occurrence of blues or depression in the early puerperium.

Conclusion about maternity care system
“Women who gave birth in hospital are no more prone to postpartum mood disturbances, such as blues and depression, than women who give birth at home.”

1995 Neonatal neurological outcome after low-risk pregnancies

Berghs G, Spanjaards E, Driessen L, Doesburg W, Eskes T

MR-factor 0; OR-factor 90

Scope: primary versus secondary care
Outcome measure: neonatal morbidity, intervention

Objective
To study neonatal neurological outcome and obstetrical interventions in a low-risk population.

Study design and methods
A prospective non-randomised study; neurological examination of the full term neonate according to Prechtl

Coverage
6 midwifery practices, 9 general practices in and around the city of Nijmegen and the obstetrical service at the Nijmegen University Hospital.
Year(s) of the study
1984-1985
Number of women/cases included
1034 low risk deliveries: 638 guided by midwives, 128 by general practitioners, and 268 by obstetricians using electronic fetal monitoring. 49% of the women delivered at home.
Main results of the study

- The deliveries directed by the obstetricians showed higher complication and intervention rates for both nulliparous and parous women.
- There were no differences in neonatal neurological outcome between groups attended by midwives, general practitioners or obstetricians despite the lower social profile of the hospital group, and despite the higher intervention rate in the latter group.
- After normal pregnancy the course of delivery does not determine neonatal outcome as much as bystanders may expect, calamities not foreseen. This emphasizes the importance of the prenatal period for the newborn.

Conclusion about maternity care system

“For the outcome of low-risk pregnancy, the place of birth in the Nijmegen area is irrelevant.”

<table>
<thead>
<tr>
<th>Year(s) of the study</th>
<th>1990 - 1993</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of women/cases included</td>
<td>97 midwives and 1836 women with low risk pregnancies</td>
</tr>
</tbody>
</table>

Objective

To investigate the relation between the intended place of birth and perinatal outcome in women with low risk pregnancies receiving midwifery care.

Study design and methods

Analysis of prospective data, controlling for parity and social, medical and obstetric background by means of a ‘perinatal background index’, consisting of 31 items. For measuring ‘outcome’ a ‘perinatal outcome index’ was composed incorporating 22 items on childbirth, 9 on the neonatal condition and 5 on maternal conditions post partum.

Coverage

54 midwifery practices in the province of Gelderland

Main results of the study

- In nulliparous women, no relation was found between the planned place of birth and perinatal outcome after controlling for a favourable or less favourable background. Without control for this background, the perinatal outcome was significantly better for planned home births than for planned hospital births.
- In multiparous women, perinatal outcome was significantly better for planned home births than for planned hospital births, with or without control for background variables.

Conclusion about maternity care system

“The outcome of planned home births is at least as good as that of planned hospital births in women at low risk receiving midwifery care in the Netherlands.”
### 1998 Transfer from home to hospital: what is its effect on the experience of childbirth?

**Wiegers TA, van der Zee J, Keirse MJ**

**MR-factor 0; OR-factor 25**

**Scope:** place of delivery  
**Outcome measure:** maternal experiences

<table>
<thead>
<tr>
<th>Objective</th>
<th>To measure the experience of childbirth, e.g. the appropriateness of the chosen place of birth and the satisfaction with the midwife’s care of women planning to give birth at home (Group A) or in hospital (Group B).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study design and methods</td>
<td>Postal questionnaires to pregnant women at 36 weeks GA and 3 weeks after birth</td>
</tr>
</tbody>
</table>
| Coverage | Women receiving antenatal care from a midwife in the province of Gelderland  
**Year(s) of the study:** 1990 – 1992  
**Number of women/cases included:** 1640 out of 1836 women returned both questionnaires (745 nulliparous and 895 multiparous women) |
| Main results of the study | • In women who were referred to specialist care during labor, no difference occurred between women in Group A and women in Group B in their experience of the birth, the midwife’s care or the postpartum period.  
• Most women were inclined to make the same choice of birth location next time, whether or not they experienced an unplanned transfer.  
• Of the women who were not referred, those in the home birth group were more positive about the midwife’s care than those in the hospital group: 1.3 and 1.5, respectively (p<0.01) (1= very positive, 5 = very negative). |
| Conclusion about maternity care system | “it seems more important to reduce the fear of unplanned transfer, especially among nulliparas, than to advise women to choose a hospital birth in order to avoid such transfer”. |

### 1998 Confidential enquiry into maternal deaths in The Netherlands 1983-1992

**Schuitemaker N, van Roosmalen J, Dekker G, van Dongen P, van Geijn H, BennebroekGravenhorst J**

**MR-factor 0 ; OR-factor 100**

**Scope:** maternity care system  
**Outcome measure:** maternal mortality

<table>
<thead>
<tr>
<th>Objective</th>
<th>To determine the causes of maternal death in The Netherlands.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study design and methods</td>
<td>Confidential Enquiry into the Causes of Maternal Deaths</td>
</tr>
</tbody>
</table>
| Coverage | Nationwide  
**Year(s) of the study:** 1983-1992  
**Number of women/cases included:** 154 direct and indirect maternal deaths (80% of all maternal deaths) |
| Main results of the study | • The most frequent direct causes were (pre-) eclampsia, thrombo-embolism, obstetrical haemorrhage and sepsis; cerebro- and cardiovascular disorders were the most frequent indirect causes of death. |
• Age > 35 years and parity ≥ 3 are related to higher maternal mortality. Women from non-caucasian origin are more prone to death in comparison to caucasian women.
• In 4 of the 24 women where labour started at home, the place of birth played a significant role in delay.

Conclusion about maternity care system

“Most women were in good health before pregnancy, were in their 1st pregnancy and had uncomplicated obstetric histories. Early identification of women at risk and prompt referral if necessary is a goal for further improvement.”
“The relatively high percentage of home births in The Netherlands does not seem notably to have affected the MMR.”

de Galan-Roosen AEM, Kuijpers JC, Mackenbach JP
MR-factor 0 ; OR-factor 75
Scope: maternity care system
Outcome measure: Perinatal mortality; factors contributing to substandard care

Objective
To establish the distribution of perinatal mortality over the various levels of obstetrical care, taking into account the various causes of perinatal mortality.

Study design and methods
Prospective, descriptive. Record linkage between regional database and Statistics Netherlands. Assessment of the causes of death in relation to the responsible careprovider and the place of delivery.

Coverage
All parturitions of women living in the region Delft, regardless of the ultimate setting of the parturition.

Year(s) of the study
1983-1992

Number of women/cases included
28,983 children, 51% born under primary care management.

Main results of the study
• PMR 0.85% (n=247).
• In 26% of these, childbirth was under primary care responsibility, in 43% after risk selection from primary to secondary care, in 14% under the exclusive responsibility of secondary care and in 17% after risk selection from secondary to tertiary care.
• The most frequent causes of death were progressive placental insufficiency (43% of all deaths) and lethal congenital anomalies (23%).

Conclusion about maternity care system
“Prevention of perinatal mortality should not be achieved by a shift from 1st to 2nd care, but rather in different forms of co-operation between primary and secondary/tertiary care.”
“The focus should be on the timely detection of serious congenital anomalies and on developing clinically useful devices for detecting progressive placental insufficiency.”
“Further medicalization of childbirth may be expected to contribute only little to a further decrease of the perinatal mortality figures.”
### 2000

**Perinatal audit on avoidable mortality in a Dutch rural region: a retrospective study**
De Reu PAOM, Nijhuis JG, Oosterbaan HP, Eskes TK

**MR-factor 44; OR-factor 56**

**Scope:** maternity care system  
**Outcome measure:** Perinatal mortality; factors contributing to substandard care

<table>
<thead>
<tr>
<th>Objective</th>
<th>To analyse the mode and cause of perinatal mortality.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study design and methods</td>
<td>A perinatal audit group investigated and classified the cause of perinatal death, analyzing who was responsible for the patient at the moment the perinatal death occurred, or became inevitable.</td>
</tr>
<tr>
<td>Coverage</td>
<td>A rural Dutch region</td>
</tr>
<tr>
<td>Year(s) of the study</td>
<td>1994-1995</td>
</tr>
<tr>
<td>Number of women/cases included</td>
<td>73 perinatal deaths between the 24th week of pregnancy till the 7th day post-partum</td>
</tr>
</tbody>
</table>
| Main results of the study | • 23 cases (32%) were classified as probably or possibly avoidable: 6/32 in the primary care group (19%); 15/35 in the secondary care group (45%) and 1/4 in the tertiary care group (25%).  
• Intra-uterine growth retardation, congenital malformations and ante partum haemorrhage were the most determinant factors for perinatal mortality. |
| Conclusion about maternity care system | “The Dutch obstetrical care system as such, for example home deliveries, did not effect the perinatal mortality rate.” |

### 2000

**Regional trend variations in infant mortality due to perinatal conditions in the Netherlands**
Treurniet HF, Looman CW, van der Maas PJ, Mackenbach JP

**MR-factor 0; OR-factor 0**

**Scope:** maternity care system  
**Outcome measure:** neonatal morbidity

<table>
<thead>
<tr>
<th>Objective</th>
<th>To describe and explain regional variations in trends in infant mortality due to perinatal conditions.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study design and methods</td>
<td>Data analysis (Statistics Netherlands)</td>
</tr>
<tr>
<td>Coverage</td>
<td>Nationwide</td>
</tr>
<tr>
<td>Year(s) of the study</td>
<td>1984-1994</td>
</tr>
<tr>
<td>Number of women/cases included</td>
<td>5972 infants &lt;1 year who died from diseases of the neonatal period</td>
</tr>
</tbody>
</table>
| Main results of the study | • Statistically significant variations in mortality trends between regions.  
• No relationship could be demonstrated between mortality and health care factors, i.e.: place of delivery (home/hospital), supervision of delivery (midwife/physician), and the presence of a hospital with specialised neonatal care (NICU). |
| Conclusion about maternity care system | “Regional differences in trends in infant mortality due to perinatal conditions in the Netherlands could not be explained by variations in health care factors. This is an important finding as the Dutch system of obstetric care, that includes a considerable number of home deliveries, has been subject to much debate.” |
### 2000
**The hour of birth: comparisons of circadian pattern between women cared for by midwives and obstetricians**
Heres MH, Pel M, Borkent-Polet M, Treffers PE, Mirmiran M

<table>
<thead>
<tr>
<th>MR-factor</th>
<th>OR-factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>70</td>
</tr>
</tbody>
</table>

**Scope:** primary versus secondary care

**Outcome measure:** interventions

<table>
<thead>
<tr>
<th>Objective</th>
<th>To examine the difference, if any, between midwives' care and obstetricians' care in the circadian pattern of the hour of birth in spontaneous labour and delivery.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Study design and methods</th>
<th>Descriptive study. Data analysis of the Perinatal Database of the Netherlands (LVR), comprising 83% of all births under midwives' care and 75% of all births under obstetricians' care.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Year(s) of the study</th>
<th>1990</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Number of women/cases included</th>
<th>57,871 women receiving midwives' care and 31,999 women receiving obstetricians' care with spontaneous labour and spontaneous delivery.</th>
</tr>
</thead>
</table>

| Main results of the study | • There was a difference in the circadian pattern of the hour of birth between midwives' and obstetricians' care.  
|                           | • Peak times differed 5.43 hours (CI 4.23-7.03) for primiparous and 3.34 hours (CI 3.00-4.08) for multiparous women between the midwives' group and the obstetricians' group respectively.  
<table>
<thead>
<tr>
<th></th>
<th>• In obstetricians' care the duration of normal labour appears to be prolonged, presumably by an increased level of stress.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Conclusion about maternity care system</th>
<th>“The care of midwives appears to be the most appropriate care in normal birth.”</th>
</tr>
</thead>
</table>

### 2002
**Substandard factors in perinatal care in The Netherlands: a regional audit of perinatal deaths**

<table>
<thead>
<tr>
<th>MR-factor</th>
<th>OR-factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>22</td>
</tr>
</tbody>
</table>

**Scope:** maternity care system

**Outcome measure:** perinatal mortality; factors contributing to substandard care

<table>
<thead>
<tr>
<th>Objective</th>
<th>To determine whether substandard factors were present in cases of perinatal death, and whether there were differences in the frequency of substandard factors by level of care, particularly between midwives and obstetricians and between home and hospital births.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Study design and methods</th>
<th>Population-based perinatal audit with explicit evidence-based audit criteria</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Coverage</th>
<th>Northern part of the province of South-Holland; all levels of care included</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Year(s) of the study</th>
<th>1996 and 1997</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Number of women/cases included</th>
<th>332 perinatal deaths</th>
</tr>
</thead>
</table>
Main results of the study

- In 25% of the perinatal deaths a substandard factor was identified, possibly (19%) or probably (6%) related to the perinatal death.
- Substandard factors were mainly maternal/social (10% of all deaths, most frequently: maternal smoking) and antenatal care factors (10% of all deaths, most frequently: detection of IUGR).
- No statistically significant differences were found in scores between midwives and obstetricians or between home and hospital births.

Conclusion about maternity care system

“There is no evidence that the frequency of substandard factors is related to specific aspects of the perinatal care system in The Netherlands.”

“Further quality improvement of obstetric care is possible by better implementation of guidelines for effective and safe care. It is expected that these improvements could reduce the PMR by between 6% and 25%”.

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2004

**Does a pregnant woman's intended place of birth influence her attitudes toward and occurrence of obstetric interventions?**

van der Hulst LAM, van Teijlingen ER, Bonsel GJ, Eskes M, Bleker OP

**MR-factor 40; OR-factor 30**

**Scope: place of delivery**

**Outcome measure: maternal experiences, interventions**

<table>
<thead>
<tr>
<th>Objective</th>
<th>To examine the impact of women's intended place of birth (home or hospital) and the course of pregnancy and labor when attended by midwives.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study design and methods</td>
<td>Prospective study. The course of labor was measured by the frequency of interventions by midwives and obstetricians</td>
</tr>
<tr>
<td>Coverage</td>
<td>Low-risk pregnant women, gestation 20 to 24 weeks, enrolled in 25 random midwifery practices</td>
</tr>
<tr>
<td>Year(s) of the study</td>
<td>1998-1999</td>
</tr>
<tr>
<td>Number of women/cases included</td>
<td>625</td>
</tr>
</tbody>
</table>

Main results of the study

- 70% of all women opted for a home birth.
- Technical interventions by midwives (sweeping membranes and amniotomy) were more likely in women opting for a home birth than those who opted for a hospital birth.
- Multiparas opting for hospital birth were more likely to experience consultations and referrals.
- Within the group of multiparas referred for obstetrician care, women intending to have a home birth experienced fewer interventions (e.g., induction, augmentation, pharmacologic pain relief, assisted delivery, cesarean section) compared with those who had opted for a hospital birth (13.1 and 28.0, respectively).

Conclusion about maternity care system

“Women opting for a home birth demonstrated a smoother course of the birth process, compared with women who desired to deliver in the hospital, as measured by fewer obstetric interventions.”
### 2004

**Determinanten van hoge Nederlandse perinatale sterfte onderzocht in een complete regionale cohort, 1990-1994**

Bais JM, Eskes M, Bonsel GJ

MR-factor 0; OR-factor 75

Scope: maternity care system

Outcome measure: Perinatal mortality; factors contributing to substandard care

<table>
<thead>
<tr>
<th>Objective</th>
<th>To analyse the effects of population-based determinants and of professional and organisational factors on perinatal mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study design and methods</td>
<td>Population-based prospective cohort study; perinatal audit.</td>
</tr>
<tr>
<td>Coverage</td>
<td>Regional, 3 midwifery practices and a local hospital in the Zaanstreek 1990-1994</td>
</tr>
<tr>
<td>Year(s) of the study</td>
<td>1990-1994</td>
</tr>
<tr>
<td>Number of women/cases included</td>
<td>8031 pregnancies, 92 perinatal deaths &gt; 22 weeks GA until 28 days post partum</td>
</tr>
</tbody>
</table>
| Main results of the study | • In 31 of 92 singleton pregnancies followed by perinatal mortality, a relationship to substandard care was established.  
• In 7 cases (8%) this relationship was probable (6x obstetrician, 1x midwife).  
• The PMR was significantly affected by parity, multiple pregnancy, maternal age, conservative management in case of early preterm birth and a restrictive screening policy for lethal birth defects. |
| Conclusion about maternity care system | “Although clinical policy played a modest role, a negative role of the organisation of obstetric care was unlikely in this cohort.” |

### 2004

**Effectiveness of detection of intrauterine growth retardation by abdominal palpation as screening test in a low risk population: an observational study**

Bais JM, Eskes M, Pel M, Bonsel GJ, Bleker OP

MR-factor 0; OR-factor 90

Scope: midwifery care

Outcome measure: perinatal mortality, neonatal morbidity

<table>
<thead>
<tr>
<th>Objective</th>
<th>To evaluate the performance of midwives concerning abdominal palpation as a screening test for detecting IUGR in a low risk population, and ultrasound as a diagnostic test performed by obstetricians in women referred for suspected IUGR. under standard practice conditions.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study design and methods</td>
<td>Population-based observational study</td>
</tr>
<tr>
<td>Coverage</td>
<td>Regional, 3 midwifery practices and a local hospital in the Zaanstreek 1990-1994</td>
</tr>
<tr>
<td>Year(s) of the study</td>
<td>1990-1994</td>
</tr>
<tr>
<td>Number of women/cases included</td>
<td>6318 women from 20 weeks onwards, booked at the midwifery practice and considered low-risk at 20 weeks GA</td>
</tr>
</tbody>
</table>
Main results of the study

- Abdominal palpation as a screening test for IUGR is of limited value: the observed sensitivities were 28% for SGA ≤ 2.3 and 21% for SGA p ≤ 10, respectively.
- After ultrasound in case of sustained suspicion, the sensitivity in detection of SGA was 25% and positive predictive value (PPV) 16%. In detection of SGA p ≤ 10 sensitivity was 15% and PPV 55%, which means 45% were false positives.

Conclusion about the maternity care system

“The diagnostic performance of abdominal palpation as a screening test for IUGR detection in a low risk population is disappointing.”

“Routine ultrasound does not improve detection rate nor perinatal morbidity and mortality.”

<table>
<thead>
<tr>
<th>Year(s) of the study</th>
<th>Data concerning obstetric care in 3 midwifery practices in the Delft area, the Netherlands 1998-1999 72 pregnancy records</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Objective</th>
<th>To investigate the frequency and nature of sub-standard care factors in non-complicated pregnancies in primary obstetric care.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Study design and methods</th>
<th>Retrospective investigation of medical files, using a checklist containing criteria based on the Obstetrics Indication List, the Cochrane Pregnancy and Childbirth Database, and from an expert panel</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Coverage</th>
<th>Outcome measure: factors contributing to substandard care</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Main results of the study</th>
<th>“Sub-standard care factors were demonstrated in many of the pregnancies investigated. A limited number of these factors gave reason to question whether guidelines for good quality perinatal care are being properly applied.”</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Subject</th>
<th>Aaldriks AA, Wolleswinkel-van den Bosch JH; Mackenbach JP</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>MR-factor</th>
<th>50</th>
</tr>
</thead>
<tbody>
<tr>
<td>OR-factor</td>
<td>0</td>
</tr>
</tbody>
</table>

Substandaardfactoren in de verloskundige eerstelijnszorg [Sub-standard factors in primary obstetric care]
### 2006

#### A comparison of labour and birth experiences of women delivering in a birthing centre and at home in the Netherlands

Borquez HA, Wiegers TA

MR-factor 0; OR-factor 0

**Scope:** place of delivery  
**Outcome measure:** maternal experiences

**Objective**
To compare the labour and birth experiences of women who delivered at home without complications with the experiences of women who delivered in a birth centre without complications.

**Study design and methods**
Descriptive study; postal questionnaires at 1-6 months after birth.

**Coverage**
Women recruited from one birth centre and three midwifery practices in an urban area of the Netherlands

- **Year(s) of the study:** 2003
- **Number of women/cases included:** 193 women; 129 delivered at home and 64 delivered in the birth centre

**Main results of the study**
- The home-birth group perceived less pain, desired less pain-relieving medication, believed they knew their midwife better, and rated their birth setting 'higher' than the birth-centre group.
- The birth-centre group emphasised safety, having medical help available, and convenience, whereas the home-birth group placed more importance on the home being trustworthy and dependable, having their own place and belongings, and feeling comfortable and relaxed.

**Conclusion about maternity care system**
"Having an understanding of a woman's labour and delivery experience allows health-care providers to continue to improve the quality of maternity care."

### 2007

#### Dutch women's perceptions of childbirth in the Netherlands

Johnson TR, Callister LC, Freeborn DS, Beckstrand RL, Huender K

MR-factor 20; OR-factor 0

**Scope:** place of delivery  
**Outcome measure:** maternal experiences

**Objective**
To explore the lived experience of childbirth in Dutch women who had given birth at home in the Netherlands.

**Study design and methods**
Qualitative study using audiotaped interviews by an American research team

**Coverage**
Midwifery practice Voorburg

- **Year(s) of the study:** 2004-2005
- **Number of women/cases included:** 14

**Main results of the study**
- Themes included the advantages of giving birth in the home, where the women felt more in control of their environment; the difficulty and normalcy of the pain associated with giving birth; the feelings of fulfilment and empowerment that come with childbirth and motherhood; and the importance of the supportive role of the midwife-caregiver.
**Conclusion about maternity care system**

“Women in a culture different from that of the United States who gave birth at home felt fulfilled and empowered by the experience”. “Some of the beneficial attributes of the Dutch maternity care system, as articulated by these women, can and should be implemented into healthcare in the US.”

---

**2007 Does a referral from home to hospital affect satisfaction with childbirth? A cross-national comparison**

Christiaens W, Gouwy A, Bracke P

MR-factor 0 ; OR-factor 0

Scope: place of delivery

**Objective**

To compare Dutch and Belgian maternity care systems with regard to the influence of being referred to specialist care during pregnancy or intrapartum while planning for a home birth.

**Study design and methods**

Retrospective study; two questionnaires were filled out at 30 weeks of pregnancy and within the first two weeks after childbirth, respectively.

**Coverage**

Women in Gent (Belgium) and Tilburg (The Netherlands)

**Year(s) of the study**

2004-2005

**Number of women/cases included**

563 women

**Main results of the study**

- Home births are more satisfying than hospital births.
- Belgian women are more satisfied than Dutch women
- Women who are referred to the hospital while planning for a home birth are less satisfied than women who planned to give birth in hospital and did.
- A referral has a greater negative impact on satisfaction for Dutch women.

**Conclusion about maternity care system**

“In the Dutch maternity care system home births lead to higher satisfaction, but once a referral to the hospital is necessary satisfaction drops and ends up lower than satisfaction with hospital births that were planned in advance.”

---

**2008 Evaluation of 280,000 cases in Dutch midwifery practices: a descriptive study**

Amelink-Verburg MP, Verloove-Vanhorick SP, Hakkenberg RM, Veldhuijzen IM, Bennebroek Gravenhorst J, Buitendijk SE

MR-factor 55; OR-factor 9

Scope: midwifery care

**Objective**

To assess the nature and outcome of intrapartum referrals from primary to secondary care within the Dutch obstetric system.

**Study design and methods**

Descriptive study; data analysis (the midwives’ part of The Netherlands Perinatal Registry)
| Coverage       | Midwifery database, national data (part of The Netherlands Perinatal Registry)  
               | Year(s) of study 2001-2003  
               | Number of women/cases included 280,097 low-risk women under exclusive care of a primary level midwife at the start of labour |
|----------------|-----------------------------------------------------------------------------------------------------------------|
| Main results of the study | • 68.1% of the women completed childbirth under exclusive care of a midwife.  
• 3.6% were referred on an urgency basis, with main reasons fetal distress and postpartum haemorrhage.  
• 28.3% were referred without urgency, predominantly during the first stage of labour (73.6% of all referrals).  
• Women who had planned a home delivery were referred less frequently than women who had planned a hospital delivery.  
• On average, the mean Apgar score at 5 minutes was high (9.72%) and the peripartum neonatal mortality was low (0.05%) Adverse neonatal outcomes occurred most frequently in the urgent referral group, followed by the group of referrals without urgency and the nonreferred group. |
| Conclusion about maternity care system | “Risk selection is a crucial element of the Dutch obstetric system and continues into the postpartum period. The system results in a relatively small percentage of intrapartum urgent referrals and in overall satisfactory neonatal outcomes in deliveries led by primary level midwives.” |

**2008**  
**Substandard care in maternal mortality due to hypertensive disease in pregnancy in the Netherlands**  
Schutte JM, Schuitemaker NW, van Roosmalen J, Steegers EA  
MR-factor 0; OR-factor 100  
Scope: maternity care system  
Outcome measure: maternal mortality, factors contributing to substandard care  

<table>
<thead>
<tr>
<th>Objective</th>
<th>To review the standard of care in cases of maternal mortality due to hypertensive diseases in pregnancy and to make recommendations for its improvement.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study design and methods</td>
<td>Confidential enquiry and audit by the Dutch Maternal Mortality Committee, in order to identify factors contributing to substandard care</td>
</tr>
</tbody>
</table>
| Coverage | All maternal deaths reported to the MMC due to hypertensive disease in pregnancy in the Netherlands 2000-2004  
Number of women/cases included 27 cases of maternal death due to hypertensive disease in pregnancy |

| Scope: | maternity care system |
| Outcome measure: | maternal mortality, factors contributing to substandard care |
### Main results of the study

- In 26 cases (96%), substandard care factors were present, of which in 17 cases (63%) more than five different items.
- In community midwifery care, the most frequent substandard care factor was no testing for proteinuria when clearly indicated (41%).
- In hospital care, the most frequent substandard care was related to insufficient diagnostic testing when indicated (41%), insufficient management of hypertension by obstetricians (85%), no use or inadequate use of magnesium sulphate (67%), inadequate stabilisation before transport to tertiary care centres and/or delivery (52%) and failure to consider timely delivery (44%).

### Conclusion about maternity care system

"Training of midwives and obstetricians should be improved, guided by clear local protocols.”

---

### 2008 Severe maternal morbidity during pregnancy, delivery and puerperium in the Netherlands: a nationwide population-based study of 371,000 pregnancies

**Zwart JJ, Richters JM, Ory F, de Vries JI, Bloemenkamp KW, van Roosmalen J**

**MR-factor 0; OR-factor 73**

**Scope:** maternity care system

**Outcome measure:** maternal morbidity; factors contributing to substandard care

#### Objective
To assess incidence, case fatality rate, risk factors and substandard care in severe maternal morbidity in The Netherlands.

#### Study design and methods
Prospective population-based cohort study

#### Coverage
- **Year(s) of the study:** 2004-2006
- **Number of women/cases included:** 2552 women with severe maternal morbidity, with all pregnant women in The Netherlands in the same period as reference cohort (n = 371,021). In a subset of 63 women (2.5%), the care provision was assessed through clinical audit

#### Main results of the study

- Severe maternal morbidity complicates at least 71 ‰ of all pregnancies in The Netherlands: major obstetric haemorrhage (4.5 ‰), eclampsia (6.2 ‰), uterine rupture (6.1 ‰) and intensive care unit admission 2.4 ‰.
- Non-Western immigrant women had a 1.3-fold increased risk of severe maternal morbidity when compared with Western women.
- Substandard care was found in 39 of a subset of 63 women (62%).

#### Conclusion about maternity care system

"Since substandard care was found in the majority of assessed cases, reduction of severe maternal morbidity seems a mandatory challenge.”

“Home delivery appeared to be a strong protective factor for severe maternal morbidity in The Netherlands with a RR of 0.1 (95% CI 0.1-0.2). This again demonstrates the proper functioning of the Dutch risk selection system.”
### 2008  Perinatal factors related to negative or positive recall of birth experience in women 3 years postpartum in the Netherlands


**MR-factor 58; OR-factor 0**

**Scope:** maternity care system

**Outcome measure:** maternal experiences

<table>
<thead>
<tr>
<th>Objective</th>
<th>To investigate Dutch women's views of their birth experience 3 years after the event.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study design and methods</td>
<td>Postal questionnaire to women with at least one prenatal, perinatal, or postnatal visit to the participating midwifery practice.</td>
</tr>
<tr>
<td>Coverage</td>
<td>8 midwifery practices from across The Netherlands</td>
</tr>
<tr>
<td>Year(s) of the study</td>
<td>2004 (concerning births in 2011)</td>
</tr>
<tr>
<td>Number of women/cases included</td>
<td>1308 women</td>
</tr>
</tbody>
</table>
| Main results of the study | • 96% of all women who gave birth at home and 77% of women who gave birth in hospital felt ‘very happy’ or ‘quite happy’ looking back on their birth experience (in total: 83% of all women).  
• More than one in five primiparas looked back negatively compared with one in nine multiparas  
• Factors for looking back negatively included e.g.: having had an assisted vaginal delivery or unplanned C section; no home birth; referral during labor; not having had a choice in pain relief |
| Conclusion about maternity care system | “Factors associated with negative recall of birth experience 3 years postpartum are linked not to demographic variables but to obstetric interventions and referral during labour.”  
“Further research needs to be undertaken to understand women’s expectations and experiences of birth within the Dutch maternity system.” |

### 2008  Etnische verschillen in de voorkeur voor thuisbevallingen en het zorgtraject dat zwangeren doorlopen [Ethnic differences in preference for home delivery and in pregnancy care received by pregnant women]

Anthony S, Amelink-Verburg MP, Korfker DG, van Huis AM, van der Pal-de Bruin KM

**MR-factor 40; OR-factor 0**

**Scope:** place of delivery

**Outcome measure:** referral

<table>
<thead>
<tr>
<th>Objective</th>
<th>To investigate differences among pregnant women from various ethnic groups in terms of pregnancy care and the place of delivery.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study design and methods</td>
<td>Descriptive, retrospective data analysis (The Netherlands Perinatal Registry). The ethnic categories defined in the registries were: Dutch, Mediterranean, other European, African, Hindu, Asian and unknown</td>
</tr>
<tr>
<td>Coverage</td>
<td>Nationwide</td>
</tr>
<tr>
<td>Year(s) of the study</td>
<td>1995-2002</td>
</tr>
<tr>
<td>Number of women/cases included</td>
<td>1,401,892 pregnancies</td>
</tr>
</tbody>
</table>
### Main results of the study
- Asian and ‘other European’ women often started pregnancy care and most often completed the delivery under the care of a midwife (44.6% and 45.3%, respectively).
- Hindu and African women often started pregnancy care directly with an obstetrician and were least likely to complete their births under the primary care of a midwife (33.1% and 28.0%, respectively).
- 39% of the Dutch women completed delivery with a midwife.
- Of those women who started the delivery under the care of a midwife, 3 out of 4 Dutch women, 1 out of 3 Mediterranean women and only 1 out of 5 Hindu women ultimately elected for a home birth.

### Conclusion about maternity care system
"Large ethnic differences exist in both pregnancy care and preference for place of delivery and, ultimately, place of birth. This should be taken into account in policy-making and in the provision of information regarding the Dutch midwifery system.”

---

**2008 Perinatale sterfte in Nederland gedurende 2000-2006; risicofactoren en risicoselectie**

[Perinatal mortality in The Netherlands 2000-2006; risk factors and risk selection]

Ravelli AC, Eskes M, Tromp M, van Huis AM, Steegers EA, Tamminga P, Bonsel GJ

MR-factor 8; OR-factor 12

**Scope:** maternity care system

**Outcome measure:** perinatal mortality

### Objective
To gain insight in recent perinatal mortality figures in The Netherlands and their relation with important risk factors, risk groups and risk selection among pregnant women.

### Study design and methods
Retrospective cohort study, data analysis (The Netherlands Perinatal Registry)

### Coverage

<table>
<thead>
<tr>
<th>Year(s) of study</th>
<th>Number of women/cases included</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000-2006</td>
<td>1.3 million births &gt; 22 weeks GA</td>
</tr>
</tbody>
</table>

### Main results of the study
- Maternal age (< 20 or ≥ 40 years) and high multiparity (≥ 4) were risk factors for perinatal mortality but showed low prevalence (< 3%). Non-Western ethnicity and nulliparity were important risk factors (relative risk of both 1.4) with a prevalence of 16% and 46%, respectively.
- Full-term births (≥ 37 weeks G) accounted for 26% of all perinatal mortality with a mortality risk of 2.8 per 1000 births.
- In the full-term born group perinatal mortality was 0.4 per 1000 births in home births, 2.7 per 1000 births in outpatient clinics and 4.5 per 1000 births when the women were referred to the gynaecologist before start of labour.

### Conclusion about maternity care system
"At a population level, low or high maternal age and high parity are less important risk factors than expected. More detailed research is indicated into the mortality of very preterm births but also of full-term born children.”
### 2008 Operative deliveries in low-risk pregnancies in The Netherlands: primary versus secondary care

Maassen MS, Hendrix MJ, van Vugt HC, Veersema S, Smits F, Nijhuis JG

**MR-factor 0; OR-factor 36**

**Scope:** primary versus secondary care

**Outcome measure:** interventions

<table>
<thead>
<tr>
<th>Objective</th>
<th>To compare planned place of birth and incidence of operative delivery among women at low risk of complications at the time of onset of labor.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study design and methods</td>
<td>Retrospective data analysis (The Netherlands Perinatal Registry)</td>
</tr>
<tr>
<td>Coverage</td>
<td>The Netherlands</td>
</tr>
<tr>
<td>Year(s) of study</td>
<td>2003</td>
</tr>
<tr>
<td>Number of women/cases included</td>
<td>107,667</td>
</tr>
</tbody>
</table>
| Main results of the study | • Women at low risk who planned to give birth in secondary care, had a significantly higher rate of operative deliveries than women who began labor in primary care where they intended to give birth (18% vs. 9%, OR 2.25, 95% CI 2.00-2.52).  
• For caesarean section, the rates were 12 percent versus 3 percent (OR 3.97, 95% CI 3.15-5.01), irrespective of parity. |
| Conclusion about maternity care system | “The rate of operative deliveries was significantly lower for low-risk pregnant women who gave birth in a primary care setting compared with similar women who planned birth in secondary care.”  
“These findings clearly demonstrate the need for a prospective study to examine the relationship between planned place of birth and mode of delivery and neonatal and maternal outcomes.” |

### 2009 Regional perinatal mortality differences in the Netherlands; care is the question

Tromp M, Eskes M, Reitsma JB, Erwich JJ, Brouwers HA, Rijninks-van Driel GC, Bonsel GJ, Ravelli AC

**MR-factor 8; OR-factor 23**

**Scope:** maternity care system

**Outcome measure:** perinatal mortality

<table>
<thead>
<tr>
<th>Objective</th>
<th>To study regional variation in perinatal mortality within the Netherlands and to identify possible explanatory factors for the found differences.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study design and methods</td>
<td>Data analysis (The Netherlands Perinatal Registry), calculating differences in perinatal mortality between 4 distinct geographical regions (North-East-South-West)</td>
</tr>
<tr>
<td>Coverage</td>
<td>nationwide</td>
</tr>
<tr>
<td>Year(s) of study</td>
<td>2000-2004</td>
</tr>
<tr>
<td>Number of women/cases included</td>
<td>904,003 singleton births &gt; 22 weeks GA</td>
</tr>
</tbody>
</table>
Main results of the study

• The northern region had the highest PMR (11.2‰ versus 10.1‰ nationally, the lowest number of spontaneous deliveries, the lowest number of women selected as low risk at start of delivery, and the lowest number of home births (19.7% vs. 30.4% in the eastern region).
• Among births ≥ 37 weeks GA, regional mortality differences were largest for births in women transferred from low to high risk during delivery (but only small variations in% of intrapartum transfer).
• The excess risk in the northern region accounts for about 19 deaths a year.

Conclusion about maternity care system

“Regional differences in perinatal mortality exist in the Netherlands. These differences could not be explained by demographic or socio-economic factors, however clinical risk group analysis showed indications for a role of health care factors.”

Ravelli AC, Tromp M, van Huis M, Steegers EA, Tamminga P, Eskes M, Bonsel GJ
MR-factor 8; OR-factor 17
Scope: maternity care system
Outcome measure: perinatal mortality

Objective
To analyse the recent trend in Dutch perinatal mortality and the influence of risk factors.

Study design and methods
A retrospective cohort study in The Netherlands. Data analysis (The Netherlands Perinatal Registry), with and without risk adjustment.

Coverage
Year(s) of the study
2000-2006
Number of women/cases included
1,246,440 singleton births

Main results of the study
• Perinatal mortality among singletons declined from 10.5 to 9.1 per 1000 total births in the period 2000-2006.
• The decline was most prominent among births complicated by congenital anomalies, among premature births (32.0-36.6 weeks) and among term births.
• Home births showed the lowest mortality risk

Conclusion about maternity care system

“The prevalence of home deliveries in term infants (27%) is paired with a very low perinatal mortality risk (0.4 ‰).”
### 2009: The quality of maternity care services as experienced by women in the Netherlands

**Wiegers TA** 53  
**MR-factor 0; OR-factor 0**  
**Scope: maternity care system**  
**Outcome measure: maternal experiences**

<table>
<thead>
<tr>
<th>Objective</th>
<th>To evaluate the quality of care from the perspective of clients.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study design and methods</td>
<td>Postal survey both in the 3rd trimester and 4 weeks post partum. The ‘care path’ of the women is described based on care provider and place of birth</td>
</tr>
<tr>
<td>Coverage</td>
<td>Clients of 4 insurance companies</td>
</tr>
<tr>
<td>Year(s) of the study</td>
<td>2007</td>
</tr>
<tr>
<td>Number of women/cases included</td>
<td>1248 pregnant clients</td>
</tr>
</tbody>
</table>
| Main results of the study | • 41.5% remained in primary care throughout pregnancy, labor, birth and the postpartum period, receiving care from a midwife or general practitioner, 31.3% of respondents gave birth at home.  
• 58.5% experienced referral from primary to secondary care or reverse, at least once.  
• Women, regardless of parity, were very positive about the quality of the maternity care they received. |
| Conclusion about maternity care system | “The quality of care as experienced by women is high throughout the care system.”  
“With regard to the care during labor and birth the quality of care scores are higher when women know their care provider, when they give birth at home, when they give birth in primary care and when they are assisted by their own midwife.” |

### 2009: A trend analysis in referrals during pregnancy and labour in Dutch midwifery care 1988-2004

**Amelink-Verburg MP, Rijnders ME, Buitendijk SE** 54  
**MR-factor 75 ; OR-factor 0**  
**Scope: midwifery care**  
**Outcome measure: referral**

<table>
<thead>
<tr>
<th>Objective</th>
<th>To assess the trends and patterns of referral from midwives to obstetricians within the Dutch maternity care system and the differences in referral patterns between nulliparous and parous women.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study design and methods</td>
<td>Descriptive study; data analysis (the midwives’ part of The Netherlands Perinatal Registry)</td>
</tr>
<tr>
<td>Coverage</td>
<td>nationwide</td>
</tr>
<tr>
<td>Year(s) of study</td>
<td>1988-2004</td>
</tr>
<tr>
<td>Number of women/cases included</td>
<td>1 977 006 pregnancies, attended by a primary care level midwife</td>
</tr>
</tbody>
</table>
Main results of the study

- From 1988 to 2004 an increase of 14.5% (from 36.9 to 51.4%) occurred in referrals from primary midwifery care to secondary obstetric care (ante partum +9.0%, intrapartum +5.2% and postpartum +0.3%).
- In parous women, the increase in referrals was greater (+16.6%) than in nulliparous women (+12.3%).
- Previous caesarean section, requirement for pain relief and the presence of meconium-stained amniotic fluid were the main contributors to the changes in referral rates.

Conclusion about maternity care system

“During a 17-year period, there was a continuous increase in the referral rate from midwives to obstetricians. Primary prevention of caesarean section and antenatal preparation for childbirth are important interventions in the maintenance of primary obstetric care for low-risk pregnant women.”

2009  Perinatal mortality and morbidity in a nationwide cohort of 529,688 low-risk planned home and hospital births

MR-factor 54; OR-factor 23

Scope: place of delivery
Outcome measure: perinatal mortality, neonatal morbidity

Objective
To compare perinatal mortality and severe perinatal morbidity between planned home and planned hospital births, among low-risk women who started their labour in primary care.

Study design and methods
Retrospective cohort study, data analysis (The Netherlands Perinatal Registry)

Coverage
Nationwide
Year(s) of study 2000-2006
Number of women/cases included 529,688 low-risk women who were in primary midwife-led care at the onset of labour

Main results of the study
- 60.7% of all women intended to give birth at home, 30.8% planned to give birth in hospital (and 8.5% intended place unknown).
- No significant differences were found between planned home and planned hospital birth concerning intrapartum death, neonatal death during the first 24 hours, neonatal death up to 7 days, admission to neonatal intensive care unit.

Conclusion about maternity care system

“The relative high PMR in The Netherlands cannot be explained by the large number of planned home births.”
“Planning a home birth does not increase the risks of perinatal mortality and severe perinatal morbidity among low-risk women, provided the maternity care system facilitates this choice through the availability of well-trained midwives and through a good transportation and referral system.”
2010  
<table>
<thead>
<tr>
<th>Mortaliteit en morbiditeit van aterm pasgeborenen op de neonatale intensivecareunit in de regio Utrecht [Mortality and morbidity among full-term neonates in a neonatal intensive care unit in the Utrecht region, the Netherlands]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evers AC, van Leeuwen J, Kwee A, Brouwers HA, Koopman-Esseboom C, Nikkels PG, Duyn A, Bruinse HW</td>
</tr>
<tr>
<td>MR-factor 0; OR-factor 46</td>
</tr>
<tr>
<td>Scope: maternity care system</td>
</tr>
<tr>
<td>Outcome measure: perinatal mortality; neonatal morbidity</td>
</tr>
<tr>
<td>Objective</td>
</tr>
<tr>
<td>Study design and methods</td>
</tr>
<tr>
<td>Coverage</td>
</tr>
<tr>
<td>Year(s) of study</td>
</tr>
<tr>
<td>Number of women/cases included</td>
</tr>
<tr>
<td>Main results of the study</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Conclusion about maternity care system</td>
</tr>
</tbody>
</table>

2010  
<table>
<thead>
<tr>
<th>Introducing maternal morbidity audit in the Netherlands</th>
</tr>
</thead>
<tbody>
<tr>
<td>van Dillen J, Mesman JAJM, Zwart JJ, Bloemenkamp KWM, van Roosmalen J</td>
</tr>
<tr>
<td>MR-factor 20; OR-factor 80</td>
</tr>
<tr>
<td>Scope: maternity care system</td>
</tr>
<tr>
<td>Outcome measure: maternal morbidity; factors contributing to substandard care</td>
</tr>
<tr>
<td>Objective</td>
</tr>
<tr>
<td>Study design and methods</td>
</tr>
</tbody>
</table>
### Evaluation of the quality of midwifery care

<table>
<thead>
<tr>
<th>Coverage</th>
<th>Selected women from a nationwide cohort of 2552 women with severe maternal morbidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year(s) of the study</td>
<td>2005-2008</td>
</tr>
<tr>
<td>Number of women/cases included</td>
<td>67 women with severe maternal morbidity of which 17 after delivery under primary care (7.5%)</td>
</tr>
</tbody>
</table>
| Main results of the study | • The incidence of severe maternal morbidity in The Netherlands was 7.1 ‰. In women delivered under the responsibility of a midwife or GP, the incidence was 1.6 ‰, and in women with completed home birth 1.4 ‰.  
• Substandard care was identified in 53 of 67 women (79%). |
| Conclusion about maternity care system | “The lower risk for severe maternal morbidity after delivery under the responsibility of the primary care giver seems to reflect the proper functioning Dutch system of risk selection. However, also here substandard care was judged to be present in the majority of cases.”  
“Ongoing audit of women with severe acute maternal morbidity is promoted both at local and national level” |

### Avoidable mortality in small-for-gestational-age children in the Netherlands

| Objective | To analyze avoidable perinatal mortality in small-for-gestational-age (SGA) children. |
| Study design and methods | Evaluation of perinatal mortality in SGA newborns by means of perinatal audit. |
| Coverage | Three regions of the Netherlands |
| Year(s) of study | 2003-2004 |
| Number of women/cases included | 55 perinatal deaths out of 2,396 SGA-newborns |
| Main results of the study | • Substandard care factors (SSF) in 22 cases (40%); in 16 of these the relation to the death was possible or (very) probable.  
• Before referral IUGR was suspected only in 22% of all SGA-cases.  
• The ‘fatal moment’ occurred in 22% of all cases during embryogenesis; in 17 29% the responsible caregiver was a midwife and in 39% an obstetrician.  
• In 2 cases (3%) perinatal death may be the result of inadequacies related to the obstetrical-chain-care. |
| Conclusion about maternity care system | “Failure in timely diagnosis of FGR appears to be an important issue in all cases of perinatal mortality in SGA-children.”  
“More adequate action by caregivers could decrease perinatal mortality in nearly 1/3 among SGA-children.” |
<table>
<thead>
<tr>
<th>Year</th>
<th>Title</th>
<th>Authors</th>
<th>MR-factor</th>
<th>OR-factor</th>
<th>Scope</th>
<th>Outcome measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>Pregnancy and labour in the Dutch maternity care system: what is normal? The role division between midwives and obstetricians</td>
<td>Amelink-Verburg MP, Buitendijk SE</td>
<td>67</td>
<td>0</td>
<td>midwifery care</td>
<td>referral</td>
</tr>
<tr>
<td></td>
<td>Objective</td>
<td>To analyse the evolution of the concept of &quot;normality&quot; in pregnancy and labour.</td>
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<tr>
<td></td>
<td>Study design and methods</td>
<td>Descriptive study. Analysis of the consecutive Lists of Obstetric indications (LOI) from 1958 onwards, in relation to data of the Netherlands Perinatal Registry (the midwives’ part of the Registry)</td>
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<tr>
<td></td>
<td>Coverage</td>
<td>Nationwide</td>
<td>1958-2003 (Lists of Obstetric Indications) and 1988-2004 (data analysis)</td>
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<tr>
<td></td>
<td>Year(s) of study</td>
<td>1 977 006 pregnancies, attended by a primary care level midwife</td>
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</tr>
<tr>
<td></td>
<td>Number of women/cases included</td>
<td></td>
<td>61</td>
<td>0</td>
<td>maternity care system</td>
<td>interventions</td>
</tr>
<tr>
<td></td>
<td>Main results of the study</td>
<td>• The number of conditions for obstetric care defined in the successive LOIs, increased from 39 in 1958 to 143 in 2003.</td>
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<td></td>
<td></td>
<td>• In the course of time, the nature and the content of many indications changed, as did the assignment to the most appropriate care provider.</td>
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<td></td>
<td></td>
<td>• The odds of the obstetrician being involved in the birth process increased from 24.7% in 1964 to 59.4% in 2002.</td>
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<tr>
<td></td>
<td>Conclusion about maternity care system</td>
<td>“Multidisciplinary research is urgently needed to better determine the risk status and the optimal type of care and care provider for each individual woman in her specific situation, taking into account the risk of both under- and over-treatment.”</td>
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<td></td>
<td></td>
<td>“Safely keeping women in primary care could be considered one of a midwife's interventions, just as a referral to secondary care may be. The art of midwifery and risk selection is to balance both interventions, in order to end up with the optimal result for mother and child.”</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>2010</th>
<th>Pain acceptance and personal control in pain relief in two maternity care models: a cross-national comparison of Belgium and the Netherlands</th>
<th>Christiaens W, Verhaeghe M, Bracke P</th>
<th>0</th>
<th>0</th>
<th>maternity care system</th>
<th>interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Objective</td>
<td>To assess the contribution of the Belgian and Dutch care context to the pain acceptance and the medication use during labour.</td>
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<tr>
<td></td>
<td>Study design and methods</td>
<td>Descriptive study using questionnaires at 30 weeks of pregnancy and within the first 2 weeks after childbirth, respectively</td>
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</tr>
</tbody>
</table>
### Coverage

**Year(s) of study**
2004-2005

**Number of women/cases included**
327 women having a hospital birth without obstetric intervention

### Main results of the study

- Dutch women with a normal hospital birth are six times less likely to use pain medication during labour, compared to their Belgian counterparts.
- This country difference cannot be explained by labour pain acceptance, since Dutch and Belgian women giving birth in a hospital setting are characterised by a similar labour pain acceptance.
- For Dutch women the use of pain medication is lowest if women experience control over the reception of pain medication and have a positive attitude towards labour pain.

### Conclusion about maternity care system

"Apart from individual level determinants, such as length of labour or pain acceptance, our findings suggest that the maternity care context is of major importance in the study of the management of labour pain."

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### 2010 The comparison of birth outcomes and birth experiences of low-risk women in different sized midwifery practices in the Netherlands

**Fontein Y**

**MR-factor100 ; OR-factor 0**

**Scope: midwifery care**

**Outcome measure: referral, interventions, maternal experiences**

### Objective

To examine maternal birth outcomes and birth experiences of low-risk women in the Netherlands in different sized midwifery practices.

### Study design and methods

Descriptive study using postal questionnaires six weeks after the estimated due date

### Coverage

143 midwifery practices of small-size (1-2 midwives), medium-size (3-4 midwives) or large-size (5 or more), respectively.

### Year(s) of study

2007

### Number of women/cases included

718 Dutch speaking women with uncomplicated pregnancies

### Main results of the study

- Women in small-sized practices were significantly more likely to experience lower rates of referral and lower rates of interventions (e.g. pain relief, CTG registration and unplanned caesarean sections).
- Women in small-sized practices were significantly more likely to know their midwife or midwives and were more frequently supported by their own midwife after referral in comparison to women in practices with more than two midwives.
- Women in small-sized practices had higher levels of a positive birth experience than women in practices with more than two midwives.

### Conclusion about maternity care system

“The support of development of small midwifery practices and financial acknowledgement for continuity of care after referral can play an important role in a change to less referrals and interventions during birth as well as to satisfaction with women’s experiences of birth.”
### 2010  
**Perinatal mortality and severe morbidity in low and high risk term pregnancies in the Netherlands: prospective cohort study**  
Evers AC, Brouwers HA, Hukkelhoven CW, Nikkels PG, Boon J, Egmond-Linden A, Hillegersberg J, Snuif YS, Sterken-Hooisma S, Bruinse HW, Kwee A

**MR-factor 6; OR-factor 63**  
**Scope**: primary versus secondary care  
**Outcome measure**: perinatal mortality; neonatal morbidity

**Objective**  
To compare incidences of perinatal mortality and severe perinatal morbidity between low risk term pregnancies supervised in primary care by a midwife and high risk pregnancies supervised in secondary care by an obstetrician.

**Study design and methods**  
Cohort study using aggregated data from a national perinatal register

**Coverage**  
Region Utrecht, covering 13% of the Dutch population  
Year(s) of study 2007-2008  
Number of women/cases included Pregnant women at 37 weeks' gestation or later with a singleton or twin pregnancy without congenital malformations (37,735 newborns)

**Main results of the study**  
- The overall perinatal death rate was 2.62 ‰ (60 ante partum and 22 intrapartum stillbirths, and 210 NICU admissions of which 17 neonates died).
- NICU admission rates did not differ between pregnancies supervised by a midwife and those supervised by an obstetrician.
- After start of labour in primary care a significant higher risk of delivery related perinatal death than after start of labour in secondary care (RR 2.33).
- After intrapartum referral a higher risk of delivery related perinatal death than after start labour in secondary care (RR 3.66) and a higher risk of NICU admission (RR 2.51).

**Conclusion about maternity care system**  
"The Dutch obstetric care system may not be as effective as once thought."

"An important limitation of the study is that aggregated data of a large birth registry database were used and adjustment for confounders and clustering was not possible. However, the findings are unexpected and the obstetric care system of the Netherlands needs further evaluation".

### 2011  
**Pregnant women’s fear of childbirth in midwife- and obstetrician-led care in Belgium and the Netherlands: test of the medicalization hypothesis**  
Christiaens , van de Velde S, Bracke P

**MR-factor 0; OR-factor 0**  
**Scope**: primary vs. secondary care  
**Outcome measure**: women’s experiences

**Objective**  
To propose and test a conceptual model of fear of childbirth, and to explore the relation between fear of childbirth and medicalization.

**Study design and methods**  
Questionnaires at 30 wks GA
### Evaluation of the quality of midwifery care

| Coverage | City of Ghent (Belgium) and Tilburg (the Netherlands); 5 hospitals and 27 midwifery practices |
| Year(s) of the study | Sept 2004 – Sept 2005 |
| Number of women/cases included | 790 pregnant Women |

| Main results of the study |
| Belgian women in midwife-led care were more fearful of medical interventions and hospital care than the Dutch. |
| Both Belgian and Dutch women receiving midwifery care reported less fear compared to those in obstetric antenatal care. |

| Conclusion about maternity care system |
| “Irrespective of the maternity care model, antenatal care providers are crucial in preventing fear of childbirth.” |

### 2011 Provinciale verschillen in perinatale sterfte en reistijd tot ziekenhuis [Differences between Dutch provinces in perinatal mortality and travel time to hospital.]

Ravelli ACJ, Rijninks-van Driel GC, Erwich JJHM, Mol BWJ, Brouwers HAA, Abu-Hanna A, Eskes M

**MR-factor 29; OR-factor 33**

**Scope: maternity care system**

**Outcome measure: perinatal mortality**

| Objective |
| To investigate differences in perinatal mortality between Dutch provinces and to determine the significance of risk factors including travel time from home to the hospital during labour. |

| Study design and methods |
| Population-based cohort study. Data analysis (The Netherlands Perinatal Registry) |

| Coverage |
| Nationwide |
| Year(s) of the study | 2000-2006 |
| Number of women/cases included | 1,242,725 singleton births |

| Main results of the study |
| The PMR in the Netherlands was 9.9 ‰. |
| The PMR varied between provinces from 11.3 ‰ to 9.2 ‰. Friesland and Groningen had significantly higher PMR. |
| The provinces with the highest PMR had the lowest planned home births |
| Starting late with perinatal care (≥ 18 weeks GA) was an important risk factor. |
| Longer travel time (≥ 20 minutes) was an independent risk factor associated with perinatal mortality, adjusted OR 1.7 |

<p>| Conclusion about maternity care system |
| The differences in PMR per province can be explained by longer travel time to the hospital during labour. Late start of perinatal care and low socio-economic status also affect the mortality rate. These risk factors need to be taken into account during registration, investigation, audit and obstetric policy.” |</p>
<table>
<thead>
<tr>
<th>Year</th>
<th>Travel time from home to hospital and adverse perinatal outcomes in women at term in the Netherlands</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MR-factor 7 ; OR-factor 29</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Scope</strong>: maternity care system</td>
<td></td>
</tr>
<tr>
<td><strong>Outcome measure</strong>: perinatal mortality; neonatal morbidity</td>
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</tr>
</tbody>
</table>

| Objective | To study the effect of travel time, at the start or during labour, from home to hospital on mortality and adverse outcomes in pregnant women at term in primary and secondary care. |
| Study design and methods | Population-based cohort study. Data analysis (The Netherlands Perinatal Registry) |
| Coverage | Nationwide |
| Year(s) of study | 2000-2006 |
| Number of women/cases included | 751,926 hospital births |

<table>
<thead>
<tr>
<th>Main results of the study</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Women indicated as low risk at start of labour and delivered in a outpatient clinic had the lowest PMR (0.5‰) and lowest adverse neonatal outcome rate (2.4‰) (mortality, Apgar &lt;4 and/or admission to NICU). PMR not increased by travel time.</td>
<td></td>
</tr>
<tr>
<td>• After intrapartum referral (in 25% of cases) PMR was 1.9‰ and adverse outcome rate 6.5‰. PMR not significantly increased by travel time.</td>
<td></td>
</tr>
<tr>
<td>• Women indicated as high-risk at start of labour and delivered in a hospital had a PMR of 1.6‰ and adverse outcome rate 6.6‰. Travel time ≥ 20 minutes increased the risk of PMR (OR 1.18) and adverse outcome (OR 1.19).</td>
<td></td>
</tr>
</tbody>
</table>

| Conclusion about maternity care system | “A travel time from home to hospital of 20 minutes or more by car is associated with an increased risk of mortality and adverse outcomes in women at term in the Netherlands. These findings should be considered in plans for the centralisation of obstetric care.” |
References

19. van Alten D, Eskes M, Treffers PE. Midwifery in The Netherlands. The Wormerveer study; selection, mode of delivery, perinatal


