Maternal and newborn outcomes in planned home birth vs planned hospital births: a metaanalysis

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CRD summary
The maternal and newborn safety of planned home and planned hospital birth were compared. The authors concluded that less medical intervention during planned home birth was associated with a tripling of neonatal mortality. The conclusions should be interpreted with some caution as they did not reflect all the evidence presented and there was unexplained variability between studies for several outcomes.

Authors' objectives
To review the medical literature on the maternal and newborn safety of planned home versus planned hospital birth.

Searching
MEDLINE, EMBASE and Cochrane Database of Systematic Reviews were searched to November 2009 for studies published in English. Search terms were provided. Reference lists of included studies were scanned.

Study selection
Studies undertaken in developed Western countries and that compared maternal and newborn outcomes by planned delivery location were eligible for inclusion. Studies were excluded if there was insufficient data to complete a 2x2 table. The outcomes of interest were maternal intervention (for example, use of episiotomy or caesarian delivery), maternal mortality and morbidity (for example, infection or retained placenta) and neonatal outcomes that included five-minute Apgar score of less than 7, prematurity, low birthweight, perinatal and neonatal death. Perinatal death was defined as still birth of at least 20 weeks or 500g or death of a live-born within 28 days of birth. Neonatal death was defined as death of a live-born within 28 days of delivery. Perinatal deaths were assessed with and without deaths of offspring with congenital abnormalities.

The included studies were undertaken in Canada, Netherlands, USA, UK, Sweden, Switzerland and Australia. The studies examined outcomes for planned home delivery compared to planned hospital delivery. Home births had a certified midwife or doctor in attendance, someone other than a certified midwife or physician was in attendance or it was unclear who the birth attendant was. The earliest cohort of births was from 1976 to 1982 and the most recent was from 2003 to 2006. The source of data for outcome varied between studies and included birth registers, birth certificates, data collection forms, computer records and perinatal databases.

The authors did not state how many reviewers performed the selection.

Assessment of study quality
Study quality was assessed using a published instrument. Assessment appeared to have been undertaken by two reviewers.

Data extraction
Data on numbers of participants and events were extracted into 2x2 tables and odds ratios (ORs) were calculated.

Data were extracted by two reviewers. Disagreements were resolved by consensus.

Methods of synthesis
Meta-analysis was used to obtain pooled odds ratios and 95% confidence intervals (CI). A fixed-effect model was used where studies were homogenous (based on the Breslow-Day test); otherwise a random-effects model was used.

Sensitivity analyses excluded studies that used a matched design, studies based mainly on pre-1990 data, lesser quality
studies and those where the home birth attendant was unclear or was not a certified midwife.

**Results of the review**

Twelve studies were included and provided data on 342,056 planned home deliveries and 207,551 planned hospital deliveries. There was one randomised controlled trial, five population-based cohorts (two with matched controls), four prospective cohorts (one with matched pairs), one matched cohort and one prospective cohort.

**Maternal interventions:** Compared with planned hospital births, significantly fewer mothers who had planned home births had epidural analgesia during labour (OR 0.24, 95% CI 0.22 to 0.25), electronic fetal heart rate monitoring (OR 0.10, 95% CI 0.09 to 0.10), episiotomy (OR 0.26, 95% CI 0.24 to 0.28), operative vaginal delivery (OR 0.26, 95% CI 0.24 to 0.28) and caesarean delivery (OR 0.42, 95% CI 0.39 to 0.45). There was statistically significant heterogeneity in all analyses.

**Maternal outcomes:** Compared with planned hospital births, significantly fewer mothers who had planned home births experienced ≥3-degree laceration (OR 0.38, 95% CI 0.33 to 0.45), infection (OR 0.27, 95% CI 0.19 to 0.39), postpartum bleeding or haemorrhage (OR 0.66, 95% CI 0.61 to 0.71), perineal laceration (OR 0.76, 95% CI 0.72 to 0.81), vaginal laceration (OR 0.85, 95% CI 0.78 to 0.93) and retained placenta (OR 0.65, 95% CI 0.51 to 0.83). There was no statistically significant difference between groups in cord prolapse. There was statistically significant heterogeneity for the analyses of ≥3-degree laceration, postpartum bleeding, perineal laceration and retained placenta. Four studies reported no maternal deaths, hence meta-analysis was not performed for this outcome.

**Neonatal outcomes:** Compared with offspring of planned hospital births, offspring of planned home births were significantly less likely to be premature at less than 37 weeks (OR 0.72, 95% CI 0.55 to 0.96), low birth weight at less than 10% for gestational age or less than 2,500g (OR 0.60, 95% CI 0.50 to 0.71) and were more likely to be delivered at 42 weeks or more. Except for the low birth weight analysis, there was statistically significant heterogeneity.

There was no statistically significant difference between groups in perinatal death rate (OR 0.95, 95% CI 0.77 to 1.18) based on 507,109 participants, but the neonatal death rate was significantly higher in the planned home birth group (OR 1.98, 95% CI 1.19 to 3.28) based on 49,802 participants; this was higher when only offspring without congenital defects were included (OR 2.87, 95% CI 1.32 to 6.25).

**Authors' conclusions**

Less medical intervention during planned home birth was associated with a tripling of the neonatal mortality rate.

**CRD commentary**

The review had clearly specified inclusion criteria. A number of relevant sources were searched for studies. There was a risk that relevant studies were missed due to the exclusion of papers in languages other than English and those not published in peer-reviewed journals. Appropriate methods were used to reduce error and bias in quality assessment and data extraction; it was unclear whether this was the case for study selection. The results of the quality assessment and the cut-off used for defining poorer quality studies in the subgroup analysis were not reported. Statistical heterogeneity was assessed and taken into account by using a random-effects meta-analysis. However, it should be kept in mind when interpreting the results that the heterogeneity remained unexplained and the results where it was present may not have been applicable to all populations and settings.

Relevant study details were reported, but it was unclear which studies were in each meta-analysis and this made it difficult to assess whether the studies in each analysis were clinically and methodologically similar. The set of studies used in the analysis of neonatal mortality differed from the set for perinatal mortality. In particular, the largest study appeared to be included in the analysis of perinatal mortality, but not for neonatal mortality. Therefore, the results on neonatal mortality were based on a substantially smaller set of participants.

The authors' conclusions should be treated with some caution as they did not reflect all the evidence presented in the review and there was unexplained heterogeneity.
Implications of the review for practice and research

Practice: The authors do not state any implications for practice.

Research: The authors stated that research was required on how to reduce neonatal mortality among planned home births and to assess the economic aspects by planned birth location. Further data were required regarding maternal mortality, maternal and newborn readmission rates and indications, and newborn neurologic injury.

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