

# Home Birth:

## An annotated guide to the literature ©

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**Blix E, Kumle M, Kjaergaard H, Oian P, Lindgren HE. Transfer to hospital in planned home births: A systematic review. BMC Pregnancy and Childbirth, 2014 14:179. (Open access)**

**Study design:** Systematic review. The reviewers searched major databases (Medline, Embase, Cinahl, Swemed and Cochrane) using the MeSH terms "home childbirth." A total of 3366 studies were identified, of these 83 were reviewed in full text. Of these, 15 were included in the systematic review with data for a total of n=215,257 women. The authors evaluated the studies for quality based on whether they had a prospective design, whether the analysis was stratified by parity and type of caregiver, and whether the study population included at least 75% of the home birth group.

**Primary outcomes:** Frequency and indications for transfer from a planned home birth to the hospital, in particular reasons associated with higher risk outcomes and emergency transfers.

**Inclusion criteria:** Studies published after 1985 that evaluated outcomes of care for women in Western countries who had planned a home birth at the outset of labour and were attended by an authorized midwife or physician.

**Results:** Of the fifteen studies assessed, 6 of them were from contexts where home birth is integrated into the medical system. Of all studies reviewed one from the UK was found to be good quality, while all others were assessed as medium quality. Based on the review, the percentage of transfers to hospital varied from 9.9% to 31.9% across populations. The rate of emergency transfers reported varied from 0% to 5.4%. The most common indication for transfer was labour dystocia, occurring in 5.1% to 9.8% of all women planning home births. Indications for transfer related to fetal heart rate instability ranged from 1.0% to 3.6%, for postpartum haemorrhage from 0% to 0.2%, and for newborn respiratory distress from 0.3% to 1.4%. Overall, transfers from home to the hospital were higher for nulliparous women, and also in jurisdictions where home births were integrated into the healthcare system. The authors speculated this difference might be accounted for by the existence of stricter guidelines. The researchers surmised

that rates of transfers are not necessarily indications of quality of care or potential for adverse outcomes (e.g., high rates of transfer might be due to weather or regional contexts, while a low transfer rate could lead to higher rates of morbidity or mortality).

**Strengths:** Clear and transparent study inclusion criteria. Adhered to MOOSE guidelines for assessment of observational studies, PRISMA standards for reporting items, and a validated tool for assessing risk of bias. Two independent reviewers with third reviewer to resolve differences.

**Limitations:** The authors found considerable heterogeneity among the studies, due to differences in study populations and clinical practice. Heterogeneity also existed among the studies regarding the definition of emergency transfer; some defining emergency transfers as any transfer arriving by ambulance. Authors recommended that the development of a standardized definition would be useful in future studies. The researcher concluded that future place of birth studies should be stratified by parity, report the indications for transfer, describe the proportions and indications for emergency transfers, and examine the difference in transfer rates in each setting.

**Catling-Paul C, Coddington RL, Foureur ML, Homer CS. Publicly funded homebirth in Australia: A review of maternal and neonatal outcomes over 6 years. The Medical Journal of Australia. 2013. 198(11):616-620.**

**Study design:** This retrospective cohort study examines the outcomes of women and their infants who planned a home birth at one of the 12 publicly funded home birth programs in Australia between 2005-2010 (n=1807).

**Primary outcomes:** The primary maternal outcomes were mortality, place and mode of birth, perineal trauma, management of the 3rd stage of labour, postpartum haemorrhage, and transfer to hospital. Primary fetal outcomes were early neonatal mortality,

Apgar score at 5 minutes, birth weight, breastfeeding up to 6 weeks, significant morbidity, transfer to hospital and admission to NICU.

**Results:** The perinatal mortality rate was 3.3 per 1000 and 1.7 per 1000 births, when babies with known fetal anomalies were excluded. These rates are comparable to those reported in international studies. Rates of maternal morbidity and interventions were low. Of particular note was a very low PPH rate (2%), and a normal vaginal delivery rate of 90%. Women in this study also had high initial breastfeeding rates (96.8%) and at 6 weeks postpartum (69.0%).

**Strengths:** The cohort included 97% of publicly funded home births in Australia over the study period. Women were included if they planned a home birth at the onset of labour.

**Limitations:** Adverse neonatal outcomes were not stratified by parity.

*Cheyney M, Bovbjerg M, Everson C, Gordon W, Hannibal D, Vedam S. Outcomes of care for 16,924 planned home births in the United States: The Midwives Alliance of North America statistics project, 2004 to 2009. Journal of Midwifery & Women's Health. 2014. 59(1):17-27.*

**Study design:** Descriptive study of key outcomes of pregnancies and births planned at home or in a birth center as captured in the MANAStats 2.0 dataset (n=16,924).

**Primary outcomes:** Demographic and antenatal characteristics, maternal and newborn outcomes, rates of common procedures and interventions, and transfer information for women who planned a home birth with a midwife in the United States.

**Results:** Nearly 94% of women had spontaneous vaginal births; cesarean rates (5.2%) and assisted vaginal birth (1.2%), and obstetric intervention (oxytocin augmentation) were very low. Among the women who attempted a vaginal birth after cesarean 87% were successful. The intrapartum transfer rate was 10.9% and the most frequent reason was failure to progress. For the total sample the use of oxytocin augmentation or epidural anesthesia was less than 5%. The majority of postpartum maternal transfers were for hemorrhage (1.5%), retained placenta, or laceration repairs; and for neonatal transfers for respiratory distress (0.9%). Most (86%) newborns were exclusively breastfeeding at 6 weeks of age. Excluding lethal anomalies, the early neonatal mortality

rate was 0.41/1000, the late neonatal mortality rates was 0.35/1000, and the intrapartum mortality rate was 1.30. These findings are congruent with those of other well-designed population based studies.

**Strengths:** Prospectively collected data. Reliable tracking of antenatal risk status, and identification of outcomes related to midwife-led planned home births regardless of actual place of birth. Largest sample of planned home births in the United States to date. Detailed reporting of adverse outcomes and related factors.

**Limitations:** Participation in the data collection process was voluntary, so this is not a population based study. It is estimated that about 20-30% of Certified Professional Midwives contributed to the repository and a lower percentage of Certified Nurse Midwives.

*Haaren-ten Haken T, Pavlova M, Hendrix M, Nieuwenhuijze M, de Vries R, & Nijhuis J. Eliciting preferences for key attributes of intrapartum care in the Netherlands. Birth: Issues in Perinatal Care. 2014. 41(2):185-194. (Open access)*

**Study design:** Prospective cohort study, using discrete choice questionnaire responses at around 16 weeks gestation to assess the relative importance of women's preferences during intrapartum care in the Netherlands. The study population is low-risk nulliparous women, and the women were analyzed by intended place of birth, midwifery-led home birth, hospital birth, and obstetric-led hospital birth (N=562).

**Primary outcomes:** Preferences in 7 domains: assistance during birth, ambiance of birth setting, place of birth, influencing decision-making during birth, pain-relief options, possibility of transfer, and co-payment.

**Results:** The study found that regardless of where women were choosing to give birth, Dutch women seek autonomy regarding decision-making. Women birthing in the hospital, either with midwives or obstetricians, had a strong preference for the possibility of pain relief. While women intending to birth at home also valued the possibility of pain relief, they had a strong preference for the ambiance of the home setting. All respondents had a strong preference for freedom of choice with regards to place of birth regardless of their intended place of birth. Women choosing obstetric care were more likely older and pregnant by assisted reproduction, with a higher rate of miscarriages.

**Strengths:** Validated methodology to assess complex decision making via scenario based multi-level response for each item in a quantitative survey. Comprehensive national sampling and recruitment strategy.

**Limitations:** Relatively small cohort. Results might be reflective of a Dutch maternity care system where pregnancy and birth are considered a normal physiologic process and where home birth is considered a safe option, and thus might not be generalizable.

*Hiraizumi Y, Suzuki S. Perinatal outcomes of low-risk planned home and hospital births under midwife-led care in Japan. Journal of Obstetrics & Gynaecology Research. 2013. 39(11): 1500-1504.*

**Study design:** A retrospective cohort study comparing the outcomes (n=291) of low-risk women who received midwife-led care (n=217) to low-risk women receiving standard obstetrical care. Of the 291 women, 168 chose home birth while 123 chose hospital birth.

**Primary outcomes:** Length of labour, augmentation, delivery mode, perineal laceration, PPH of >1000mL, maternal fever, neonatal asphyxia.

**Results:** The study found a 27% transfer rate from midwife to obstetric shared care. Of these 21% were due to failure of labour to progress, 19% for PPH, and 19% for fetal concerns. There was a significantly higher rate of transfer from midwife-led women who had chosen hospital births (34%), both intrapartum (23%) and post-partum (11%), as well as a higher rate of labour induction for the obstetric-led care group. However, there was no difference in rates of perinatal outcomes between groups regardless of place of delivery.

**Strengths:** Comparisons between midwife-led home birth group as well as midwife-led and obstetric led hospital birth groups began at onset of labour or with ROM or women between 37-41 weeks gestation. Exclusion criteria include a robust antepartum definition of low-risk, healthy and normal pregnancies.

**Limitations:** The study has a very small sample size. The organization of levels of care and nature of the shared care relationships likely interact with the results and may not be generalizable. When looking at the tables, there also appears to be a significantly higher rate of cesarean section among birth that began in midwifery care, but the authors do not discuss this as an outcome. The outcomes of these deliveries might not be generalizable to a non-Japanese context as a hospital birth for low-risk

women in Japan means birthing in Tatami mat rooms, which seems more akin to "birth centres" than Western style hospitals. A further potential weakness was that those who developed risk factors intrapartum, such as thick meconium staining and ROM>24hrs were excluded from the study, and this exclusion might skew the results.

*Homer CS, Thornton C, Scarf VL, Ellwood DA, Oats JJ, Foureur MJ, Sibbritt D, McLachlan HL, Forster DA, Dahlen HG. Birthplace in New South Wales, Australia: An analysis of perinatal outcomes using routinely collected data. BMC Pregnancy and Childbirth. 2014. 14:206. (Open access)*

**Study design:** A population-based cohort study that examined the feasibility of using routinely collected data from the New South Wales Perinatal Data Collection and other linked registries to compare perinatal and maternal outcomes and interventions in labour by planned place of birth from 2000-08. Using similar methods to the Birthplace in England study, this study also examined the differences in labour interventions and neonatal mortality and morbidity across birth settings. Population studied was low-risk pregnant women with singleton pregnancy (N=258,161).

**Primary outcomes:** Stillbirth, early neonatal death (<7 days), neonatal encephalopathy, meconium aspiration syndrome, brachial plexus injury, fractured clavicle, and fractured humerus.

**Inclusion criteria:** Singleton, cephalic presentation following spontaneous labour at 37 weeks. Women were classified into three cohorts according to planned place of birth at the onset of labour: home, hospital or birth centre.

**Exclusion criteria:** Elective caesarean, born before arrival, <37 weeks gestation, no antenatal care, VBAC, babies with diagnosed congenital anomaly, labour induction for any reason, any baby diagnosed with a congenital condition and died within the first week of life.

**Results:** Rates of spontaneous vaginal delivery were highest in the home birth group (97%) compared to the birth centre (86%) and labour ward group (74%). Close to 19% of women transferred from home to hospital. The study found no statistically significant difference in stillbirth and early neonatal death, by birth setting or parity. The incidence of the primary outcome, although slightly higher for nulliparous women in the home birth

group, was not statistically significant between the three groups. Nulliparous women were more likely to transfer into hospital. Rates of intrapartum interventions were significantly lower in the birth centre or home birth groups except for severe perineal trauma. Women planning a home birth were more likely to be older, multiparous, and had a gestational age of >42 weeks compared to the labour ward cohort.

**Strengths:** Large sample size, place of birth was determined at the onset of labour at 37 weeks, and analysis of outcomes across birth settings separated women by parity.

**Limitations:** Exclusion criteria of induction of labour unclear, which might falsely exclude some morbidity in the planned hospital birth cohort. A retrospective dataset is only able to approximate planned place of birth. To try to establish a good approximate, they only looked at women spontaneously laboring at 37 weeks. Unclear whether planned home birth was part of publicly or privately funded practicing midwives. Lack of integration can cause delays in transfer of care, which can increase morbidities and attribute delays with planned home birth. Low sample in planned home birth cohort, 0.3% of the births in this Australian state, make studying rare outcomes difficult.

**Hutton EK, Reitsma A, Thorpe J, Brunton G, Kaufman K. Protocol: Systematic review and meta-analyses of birth outcomes for women who intend at the onset of labour to give birth at home compared to women of low obstetrical risk who intend to give birth in hospital. Systematic Reviews. 2014. 3: 55. (Open access)**

**Study design:** This is a protocol outlining a study design for a forthcoming systematic review and meta-analysis examining birth outcomes by place of birth in low-risk women.

**Primary outcomes:** The objective of this systematic review is to determine whether low-risk women planning a home birth at the onset of labour are more likely to experience a fetal or neonatal loss compared to low-risk women planning a hospital birth. Secondary outcomes will include maternal mortality and morbidity.

**Inclusion criteria:** Databases searched will be Embase, Medline, and AMED using OVID, CINAHL using EBSCO. Studies included in the review must be published since 1990, in a peer reviewed journal, and will need a comparison group. Cohorts will remain in their intended

place of birth rather than actual place of birth, and the place of birth must be determined at the onset of labour and analyzed by parity. The reviewers will separately analyze studies from settings where home birth is integrated into the health care system from those settings where it is not, and will ensure that any studies on planned home birth provide a complete data set (no missing cases). The reviewers will include information regarding inclusion/exclusion criteria for the planned home birth cohorts in any included studies.

**Strengths:** The reviewers will assemble the cohorts so that both the actual and ideal practice of home birth is differentiated and reflected in the review. They will separately analyze women who meet local eligibility criteria from all women who plan a home birth at the onset of labour regardless of their eligibility. This review protocol addresses many of the weaknesses of previous home birth studies that only analyze birth/death certificates, or that do not parse out settings where planned home births are not integrated into the system, and where delays of transfer of care might negatively impact outcomes. This review protocol also attempts to minimize confounders and selection bias.

**Li Y, Townsend J, Rowe R, Knight M, Brocklehurst P, Hollowell J. The effect of maternal age and planned place of birth on intrapartum outcomes in healthy women with straightforward pregnancies: Secondary analysis of the Birthplace national prospective cohort study. BMJ Open. 2014. 4:1. (Open access)**

**Study design:** This prospective cohort study examines the relationship between maternal age and intrapartum interventions and adverse maternal and neonatal outcomes in low-risk women in England. Women were compared across two groups: those planning to give birth in an obstetric unit (OU) and those planning to give birth in a midwifery unit or at home (i.e., non-OU settings).

**Primary outcomes:** Intrapartum cesarean, instrumental delivery, syntocinon augmentation, and a composite measure of maternal interventions and adverse outcomes requiring obstetric care which include labour augment, instrumental and cesarean delivery, general anesthesia, blood transfusion, perineal laceration, maternal admission to higher level of care. This study also examined adverse perinatal outcomes, including admission to NICU, stillbirth after the onset of labour and early neonatal death. A secondary aim was to assess

whether the association between age, interventions and adverse perinatal outcomes differ by planned place of birth.

**Inclusion criteria:** Women aged over 16 without known medical or obstetric risk factors, with singleton pregnancies, planning vaginal birth at the onset of labour (N= 63,371).

**Results:** This study found that interventions and adverse outcomes requiring obstetric care increased with age. Low-risk women of all ages experienced fewer interventions in non-OU settings. Intrapartum transfers from non-OU to OU settings increased with age. Furthermore, in nulliparous women 40+ the risk of having a neonatal admission or perinatal death significantly increased relative to women aged 25–29. Adverse perinatal outcomes (absolute rates) were lower in non-OU settings for each age group among nulliparous women and for most age groups (except for women aged 40+) among multiparous women. Relative risks were not computed, as per the statistical analysis protocol.

**Strengths:** The prospective design, meticulous selection of the low-risk study cohort, adjustment of confounders, sensitivity analyses to account for complicating conditions at the start of care in labour and reporting of absolute event rates and relative risks for each primary outcome is exemplary.

*Rowe R E, Townsend J, Brocklehurst P, Knight M, Macfarlane A, McCourt C, Newburn M, Redshaw M, Sandall J, Silverton L, Hollowell J. Duration and urgency of transfer in births planned at home and in freestanding midwifery units in England: Secondary analysis of the Birthplace national prospective cohort study. BMC Pregnancy and Childbirth. 2013. 13:224. (Open access)*

**Study design:** This is a secondary analysis of data generated by the national UK Birthplace prospective cohort study. Population included low-risk women with singleton (37–42 weeks), ‘booked’ pregnancies, planning birth in Freestanding Midwifery Units (birth centres) or at home in England from 2008–2010 (N=27,842).

**Primary Outcomes:** Duration of time between transfer from home and free standing midwifery units to hospital, data was analyzed by: time to decision, arranging transfer, departure to first OU (obstetrical unit), overall transfer time, and after transfer.

**Results:** Transfers before and after the birth were analyzed separately. The primary reason for an urgent antepartum transfer was APH, FTP in 2nd stage and fetal distress in 1st and 2nd stage. The primary reason for a non-urgent transfer was FTP in 1st stage and pain relief. PPH was considered as a separate postpartum urgent transfer. In all settings nulliparous women were more likely to transfer in and the most common reason was FTP. The study found that the median transfer time from home to hospital was shorter for planned home births than from freestanding midwifery units (49 vs 60 minutes). In transfers that took 60 minutes or longer adverse neonatal outcomes occurred 1–2% of the time. Overall, most transfers from home or from FMU were for non-urgent reasons, and occur more quickly from home.

**Strengths:** Large cohort with a well-defined definition of low-risk.

**Limitations:** Unclear whether intended place of birth was determined at the onset of labour or earlier in pregnancy.

*de Jonge A, Geerts CC, van der Goes BY, Mol BW, Buitendijk SE, Nijhuis JG. Perinatal mortality and morbidity up to 28 days after birth among 743 070 low-risk planned home and hospital births: A cohort study based on three merged national perinatal databases. BJOG. 2014. DOI: 10.1111/1471-0528.13084.*

**Study design:** Nationwide cohort study based on Dutch national registration data. Women were eligible for inclusion if they qualified for midwifery care at the onset of labour.

**Primary outcomes:** Differences by planned place of birth in intrapartum and neonatal death, Apgar scores, and admission to the NICU within 28 days of birth.

**Inclusion criteria:** The study population comprised low-risk women under midwifery care at the onset of labour over a 10 year period. Women with an unknown place of birth (n=71,909) were excluded from the primary analysis, but included in a sensitivity analysis. Findings are reported by parity (N=743,070).

**Results:** Authors found no significant differences in the rates of intrapartum and neonatal death up to 28 days after birth. The intrapartum and neonatal death rate up to 28 days was 1.02 per 1000 for planned home birth, and 1.09 per 1000 for planned hospital births in nulliparous women. The rate for multiparous women was 0.59 per 1000 for planned home birth and 0.58

per 1000 for planned hospital births. Apgar scores less than 7 at 5 minutes and admissions to the NICU were significantly lower for parous women in the planned home birth group. Wax et al. excluded De Jonge et al's 2009 study from their meta-analysis because the study did not look at deaths up to 28 days. In this article De Jonge et al. assert that future similar meta-analyses will show no significant increases in neonatal death up to 28 days in the planned home birth group as more than 95% of home birth data would come from the current study. The findings demonstrate that in a system where midwifery is well integrated into the medical system there is no association between planned home birth and adverse perinatal outcomes.

**Strengths:** Very large cohort with reliable comparison group. Good definition of low-risk, exclusion/inclusion criteria, sensitivity analyses, ability to control for ethnicity and some socio-economic indicators, and reporting of results by parity.

**Limitations:** Admission to NICU is not always a good proxy for measuring adverse outcomes, as other studies have shown that admissions might be higher when babies are born in tertiary care with potentially fewer adverse outcomes than those admitted to secondary care. The precise timing of deaths was difficult to ascertain in some cases.

**Wiegerinck MM, Danhof NA, Van Kaam AH, Tamminga P, Mol BW. The validity of the variable "NICU admission" as an outcome measure for neonatal morbidity: A retrospective study. Acta Obstetrica Et Gynecologica Scandinavica. 2014. 93(6): 603-609.**

**Study design:** Retrospective study of neonates admitted to a tertiary hospital NICU in the Netherlands between 2000-2010, to determine whether NICU admission is a valid surrogate to measure neonatal condition in clinical studies (N=749).

**Primary outcomes:** Percentage of neonates/infants that died during NICU admission, diagnosis on admission, treatment received and a Neonatal Therapeutic Intervention Score System (NTISS).

**Inclusion criteria:** The study population was divided into four groups: those born at home, those born in hospital under the care of a midwife (primary care), those born in hospital under the care of an obstetrician (secondary care), and those born in a perinatal centre (tertiary care). The study sample was limited to infants

of singleton pregnancies, minimum GA of 37 weeks, admitted to NICU within 24 hours for delivery related problems.

**Exclusion criteria:** Infants at risk before start of labour, and those with congenital chromosomal disorders, infants exposed to drugs during pregnancy and those born to mothers with immunodeficiency viral infection.

**Results:** The study found that neonates born in secondary care had the highest morbidity, length of admission, mortality rate and NTISS scores. The secondary care infants had the highest death rate (22%) and infants in tertiary care had the lowest rates (1%). The authors state the infants in tertiary centers are more likely admitted for monitoring (level 2) and infants from secondary care are more likely to need level 3 care and are in more serious condition. This introduces bias in clinical studies that use NICU admissions as an outcome measure. The authors concluded that higher rates of admission to the NICU is not a valid outcome measure when comparing birth settings, because it does not implicate a higher incidence of morbidity.

**Strengths:** Reasons for NICU admissions were meticulously recorded, meaningful exclusion and inclusion criteria were applied and a therapeutic intervention score was calculated that presents weighted information about the medical condition of the infants and the treatments required.

**Limitations:** Authors did not distinguish between level 2 and level 3 NICU admissions and do not discuss many alternatives to using NICU admissions, such as NICU admissions > 24 hours or NICU days per 1000 births.

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