The cost-effectiveness of home birth
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Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

Health technology
Home births managed by certified nurse-midwives (CNMs) for low-risk mothers with uncomplicated births.

Type of intervention
Treatment and secondary prevention.

Economic study type
Cost-effectiveness analysis.

Study population
Low-risk mothers with uncomplicated births. The exclusions included mothers under 16 and over 39 years of age, low birth weight infants, twins, nonvertex presentations, repeat cesarean sections, and women with major medical or prenatal problems.

Setting
Hospital and community. The economic study was carried out in the USA.

Dates to which data relate
Some effectiveness data were obtained from a single survey study of home births managed by CNMs, carried out in September 1993; the data collection form was sent to all nurse-midwives who identified themselves as having attended home births between 1987 and 1991. Some effectiveness data were based on the literature published between 1987 and 1995. Resource use data on home births managed by CNMs were based on a survey covering the 1987-1991 period. The price years were 1987, 1991, and 1998.

Source of effectiveness data
The evidence for the final outcomes was based on a single study of home births managed by CNMs and on a literature review.

Link between effectiveness and cost data
Costing was retrospectively performed on the single study patient sample (all but three practices) used in the effectiveness analysis.

Study sample
Power analysis was not performed to determine the sample size. The study sample consisted of 157 CNMs identified as having had home birth practices. These represented 121 solo practitioners and 36 CNMs in 15 group practices, for a total of 136 expected participating practices. Of these, 92 practices (67.6%) returned questionnaires. Two of the 92
questionnaires returned were excluded as ineligible. Thus there were 90 practices providing data for this study, representing a 66.2% response.

There were 11,788 intended home births in the participating practices during the period from 1987 to 1991. There were 10,176 actual births in the home, representing 86% of pregnancies in which the intention, prior to the onset of labour, was to deliver at home, and 92% of pregnancies in which the intention, after the onset of labour, was to deliver at home.

**Study design**

The study was a retrospective case series, which was carried out in 136 practices in 29 US states. The duration of follow-up was not explicitly specified. Regarding loss to follow-up, it was reported that the respondents provided detailed information for 96% of all reported hospital transfers when labour began in the home, including information about adverse outcomes. The authors reported that detailed follow-up information was available for only 72% of antepartum referrals, raising the possibility that there could have been more adverse outcomes in this group than were reported here.

All nurse-midwives known to the American college of Nurse-Midwives (ACNM) were mailed a questionnaire to identify those with active home birth practices. To identify other CNMs who may not have been known to the ACNM, notices were placed in several home birth related journals. Those who identified themselves to the committee by responding to these recruitment efforts thus formed the population from which the sample was derived.

A data collection form was developed by members of the Home Birth Committee and included questions about numbers of intended home births and referrals/transfers, descriptions of the circumstances of exceptional (unexpected or adverse) outcomes, the use of emergency equipment, and the presence of birth assistants. Other questions covered risk-screening criteria, medical consultants, and continuing education. Participating nurse-midwives were asked to complete this form using their delivery log books. Group practices were asked to designate one member of the group to complete the form. Those who failed to respond to two mailed inquiries and the telephone call were considered to be nonresponders.

**Analysis of effectiveness**

The analysis of effectiveness appears to have been conducted on the basis of treatment completers only. The clinical outcome measures were overall perinatal mortality, maternal deaths, intrapartum and neonatal mortality for those intending home birth at the onset of labor, intrapartum and neonatal mortality rate when deaths associated with congenital anomalies were excluded, overall transfer rate, including antepartum referrals, intrapartum transfer rate for those intending home birth at the onset of labor, assessment of nurse-midwives decision rules and whether they were sufficiently equipped to cope with emergency situations.

**Effectiveness results**

The overall perinatal mortality was 4.2 per 1,000, including known third-trimester fetal demises.

There were no maternal deaths.

The intrapartum and neonatal mortality for those intending home birth at the onset of labour was 2 per 1,000; the overall neonatal mortality rate for this group was 1.3 per 1,000.

When deaths associated with congenital anomalies were excluded, the intrapartum and neonatal mortality rate was 0.9 per 1,000; the neonatal mortality was 0.2 per 1,000.

The overall transfer rate, including antepartum referrals, was 15.9%.

The intrapartum transfer rate for those intending home birth at the onset of labour was 8%.

Most responding nurse-midwives used standard risk-assessment criteria, only delivered low-risk women at home, and were prepared with emergency equipment necessary for immediate neonatal resuscitation or maternal emergencies.
Clinical conclusions
This study supports previous research indicating that planned home birth with qualified care providers can be a safe alternative for healthy lower risk women.

Outcomes assessed in the review
The outcomes assessed were intrapartum mortality (per 1,000), neonatal mortality (per 1,000), and cesarean birth rate.

Study designs and other criteria for inclusion in the review
Not reported.

Sources searched to identify primary studies
Not reported.

Criteria used to ensure the validity of primary studies
Not reported.

Methods used to judge relevance and validity, and for extracting data
Not reported.

Number of primary studies included
A total of 4 studies were included.

Methods of combining primary studies
It appears that each individual outcome was based on a single separate study.

Investigation of differences between primary studies
Not reported.

Results of the review
The outcomes were:

Intrapartum mortality per 1,000 (without congenital anomalies):
all home births, 0.7 (0.7);
all births in birth centre, 0.4 (0.3);
all hospital births, 0.0 (0.0);

Neonatal mortality per 1,000 (without congenital anomalies):
all home births, 1.3 (0.2);
all births in birth centre, 0.8 (0.3);
all hospital births, 2.2 (2.0)
Cesarean birth rate:

all home births, 3% (0.3%);

all births in birth centre = 4.4% (not available);

all hospital births, 8.3% - 26.9% (not available).

**Measure of benefits used in the economic analysis**
The benefit measure was the increment of 1/1000 in the probability of a normal birth (or avoiding intrapartum or neonatal mortality, and cesarean sections).

**Direct costs**
Costs were not discounted due to the short time frame of the cost analysis. Some quantities were reported separately from the costs and some cost items were reported separately. Cost analysis covered a weighted cost of every possible outcome after deciding on a particular birth location, including the costs of complications such as emergency transportation to hospital. The perspectives adopted in the cost analysis were mothers’, governments’, insurance companies’, and that of other purchasers of birthing services. Cost analysis was based on charges to the mother for a routine birth. Cost calculations for the home birth were based on an outcome survey from descriptions of 11,788 intended home births managed by CNMs between 1987 and 1991. Sixty responses came from midwives in 29 states and represented 66% of the 90 known home birth practices operated by CNMs. The first sample of charge data for the home births came from the same survey. A total of 57 (95%) of the 60 practices responded to the cost inquiry or follow-ups. A second cost study was performed in 1998 to verify that the 1991 findings accurately reflected current charge relationships. Charge information was collected from 54 practices in 26 states, with a response rate of 71%. Follow-up phone, mail, and e-mail contacts were used to avoid the bias that could result from a sampling of only those who readily replied to the questionnaire. The birth centre charge was taken from a study published in 1995. The hospital charges were an average of figures from a study published in 1996 and the Health Insurance Association of America published in 1991. The price years were 1987, 1991, and 1998.

**Indirect Costs**
Indirect costs were not considered.

**Currency**
US dollars ($).

**Sensitivity analysis**
No sensitivity analysis was carried out.

**Estimated benefits used in the economic analysis**
Intrapartum and neonatal mortality per 1,000 (without congenital anomalies) were as follows:

all home births, 2.0 (0.9);

all births in birth centre, 1.3 (0.7);

all hospital births, 2.2 (2.0).

The Cesarean birth rate was as follows (without congenital anomalies):

all home births, 3% (0.3%).
all births in birth centre, 4.4% (not available);

all hospital births, 8.3% - 26.9% (not available).

Cost results
The mean (SD) charge associated with a home birth in 1991 was $1,711 ($597) compared to $3,385 for birth in a birth centre and $5,382 for a birth in hospital. The mean (SD) charge for home births was $1,548 ($584) in 1987, and $1,823 ($809) in 1998.

Synthesis of costs and benefits
In some comparisons no combination of costs and effects was required due to one of the options being dominant relative to the others. In cases where it was required, the incremental charge per increase of 1/1,000 in the probability of avoiding intrapartum or neonatal mortality was used. In terms of intrapartum fetal and neonatal mortality, home births and birth centre births were dominant strategies compared to hospital births. The cost-effectiveness ratio between home and birth centre was $2,624, indicating that, in birth centres, there was an additional charge of $2,624 per increase of 1/1,000 in the probability of avoiding intrapartum or neonatal mortality.

Authors’ conclusions
The authors concluded that their study provides relevant information for hospital, home, and birth centre births. The average uncomplicated vaginal birth costs 68% less in a home setting than in a hospital, and births initiated in the home offer a lower combined rate of intrapartum and neonatal mortality and a lower incidence of cesarean delivery.

CRD COMMENTARY - Selection of comparators
It appears that the use of hospital or/and birth centres, as the commonest location for birth, were regarded as the comparator. You, as a database user, should consider whether this is applicable in your own setting.

Validity of estimate of measure of effectiveness
Although the single study covering the home births managed by CNMs was unique in its description of more than 11,000 home births, its internal validity might have been adversely affected by the retrospective nature of the study design and the relatively low response rate, as acknowledged by the authors. It was acknowledged that it was possible that some adverse outcomes were not reported or that the one third of home birth practices that did not respond had a disproportionate number of undesirable outcomes. The internal validity of the effectiveness results obtained from other literature cannot be objectively assessed as the authors used other published studies related to the principal survey. Regarding the degree to which the study sample was representative of the study population in the single study of CNMs home birth, it was acknowledged that one of the limitation of the study was that recruitment depended on self-identification as a home birth provider; if there were many nurse-midwives who did not respond to the invitation to so identify themselves, then the true population of such providers is unknown, and the study sample may be less representative of all CNM home birth practitione

Validity of estimate of measure of benefit
The estimation of benefits was obtained directly from the effectiveness analysis. This choice of estimates was justified.

Validity of estimate of costs
Good features of the cost analysis were that some quantities were reported separately from the costs, adequate details of methods of cost estimation were given, and the price years and the perspective adopted in the cost analysis were reported. However, the use of charges instead of true costs, and the retrospective nature of the cost analysis may have adversely affected the internal validity of the cost analysis. The effects of alternative procedures on indirect costs were not addressed. Sensitivity and statistical analyses were not performed on resource consumption or cost data. Cost results
may not, therefore, be generalisable to other countries.

**Other issues**
The authors’ conclusions may need to be treated with caution given the limitations of the retrospective study and literature review to derive effectiveness estimates and the caveats relating to the cost analysis. The issue of generalisability to other settings or countries was not addressed. Some comparisons were made with other studies.

**Implications of the study**
It was reported that a prospective study that would identify a cohort of women planning home birth, which would address some of the concerns regarding the limitations of the retrospective study of CNMs home birth, was in progress, at the time of the publication of this study, under the direction of one of the authors. The authors suggest that this research supports the conclusion that home birth is a cost-effective health care alternative that warrants further attention.

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