Low birthweight, preterm, and small for gestational age babies in Scotland, 1981–1984

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Abstract

Study objective—The aim was to examine the effect of maternal age, gravidity, marital status, previous perinatal deaths, and parental social class on babies born low birthweight, preterm, and small for gestational age.

Design—The study used data on discharge summaries from all maternity hospitals in Scotland.

Setting—The study was based on all singleton deliveries in Scotland.

Participants—The analysis involved information on 259 462 singleton babies born during the four years 1981-84 in Scotland.

Measurements and main results—Previous perinatal death was found to be the strongest predictor for both preterm and low birthweight. Single mothers were at particularly high risk of having a small for gestational age baby and those who were previously married of having a preterm baby. Women aged less than 20 years old, those over 34 years old, nulligravidae, and those of parity 3 or more were also at increased risk of adverse pregnancy outcome. Mothers and fathers in manual social classes and those who could not be assigned a social class on the basis of their occupation were at increased risk for all three adverse outcomes studied. The babies of parents who were in manual occupations were twice as likely as those of parents in non-manual occupations to be small for gestational age and almost twice as likely to be low birthweight.

Conclusions—Mother’s social class is a risk factor for adverse pregnancy outcome independent of maternal age, parity, and adverse reproductive history, and also independent of father’s social class. Information on both parents’ occupations should be collected in maternity discharge systems.

Low birthweight, preterm, and small for gestational age are three terms commonly used to describe poor fetal growth and immaturity in the newborn. Low birthweight is usually applied to babies weighing less than 2500 g and preterm to babies born before 37 weeks gestation. In industrialised countries about 5–7% of liveborn babies are of low birthweight and 4–9% are preterm. Unlike low birthweight and preterm delivery there is no generally accepted definition of small for gestational age (SGA), and its estimated prevalence depends on the gestation specific cut off point of the birthweight distribution chosen.

Low birthweight, preterm delivery, and smallness for gestational age have all been associated with a wide range of parental characteristics. These relations are of particular interest for the public health sector, since they define groups within the population for which preventive interventions may be possible.

In this paper we examine the effects of maternal age, gravidity, marital status, previous perinatal death, and parental social class on babies born in Scotland over the four year period 1981–84.

Methods

Data on 259 462 babies born alive in Scotland during the four years 1981-84 were provided by the Scottish Health Service Common Services Agency. In Scotland, information about the parents and about the delivery is recorded on specially designed forms. These discharge summaries (SMRs) are completed for approximately 99% of births. The obstetric items recorded include birthweight, gestational age, and baby’s sex. Information about mother’s age, marital status, gravidity, previous reproductive history, occupation, and partner’s occupation is also requested. Social class is assigned on the basis of occupation, using the England and Wales Registrar General’s standard classification.8

In this paper, low birthweight refers to babies with birthweight below 2500 g and preterm to babies born before 37 weeks gestation, as measured from the first day of the last menstrual period. Small for gestational age (SGA) babies are defined as those babies falling on or below the 5th percentile of the appropriate gestation specific birthweight distribution.

The SPSSx and GLIM statistical packages were used for data processing and analyses. Unconditional logistic regression was used to study low birthweight, preterm delivery, and smallness for gestational age. Different models were constructed to estimate the relative risk of each outcome according to different risk factors. The likelihood ratio test, which examines differences in log likelihood statistics, was used to evaluate the fit between models. Interaction effects were also examined and are reported here when statistically significant.11

Multiple births (n = 3997), babies with weights lower than 500 g (n = 375, 0.2%), and babies whose SMR2 records had missing data on any of the variables under study (n = 2943, 1.3%) were excluded from the analyses. Thus, the final sample consisted of 252 147 (97.2%) of all singleton livebirths.
Results
Of all livebirths, 5.5% were of low birthweight, 5.1% were preterm, and 5.0% were, by definition, small for gestational age. The overall percentage of babies affected by at least one of these adverse outcomes was 9.2%.

The characteristics of mothers giving birth to low birthweight, preterm, and SGA babies are summarised in Table I. In all cases the χ² heterogeneity test, which was performed for each of the variables and for each outcome, was statistically significant (p<0.05). Each of the three outcomes appears to have a U shaped relationship with maternal age, the percentages being highest in those under 20 years and those over 34 years of age. This relationship was more marked for low birth weight and preterm delivery than for SGA. The association between the three outcomes and gravidity is similarly U shaped. Again the relationship appears weakest for SGA.

When mother’s occupation was used to assign social class, the lowest percentage of all three outcomes was recorded in the “non-manual” category and the highest in the “other” category (Table I), with manual workers falling in between. The relationship was similar when father’s occupation was used as the basis for social class classification. For both non-manual and manual workers, however, the proportion of babies with an adverse outcome was greater when mothers’, rather than fathers’, occupation was used.

Table II gives the relative risks of adverse outcome adjusted for the effects of all variables in Table I and for baby’s sex. For each adverse outcome the group at lowest risk of low birthweight was taken as the reference category. After adjustment the relationships remained broadly similar to those already described for the crude analysis. Closer inspection of the data showed, however, that the association between low birthweight and gravidity varied with age (fig 1).

### Table I Low birthweight (LBW), preterm, and small for gestational age (SGA) by parental characteristics. Scotland, 1981–84.

<table>
<thead>
<tr>
<th>Gravidity</th>
<th>Births (n)</th>
<th>LBW (%)</th>
<th>Preterm (%)</th>
<th>SGA (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mother’s age (years)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;20</td>
<td>25 127</td>
<td>7.7</td>
<td>8.0</td>
<td>5.8</td>
</tr>
<tr>
<td>20-29</td>
<td>168 658</td>
<td>5.2</td>
<td>4.7</td>
<td>5.1</td>
</tr>
<tr>
<td>30-34</td>
<td>43 386</td>
<td>4.9</td>
<td>4.6</td>
<td>4.2</td>
</tr>
<tr>
<td>&gt;34</td>
<td>14 976</td>
<td>6.1</td>
<td>5.9</td>
<td>4.9</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>218 924</td>
<td>5.0</td>
<td>4.7</td>
<td>4.7</td>
</tr>
<tr>
<td>Single previously married</td>
<td>23 379</td>
<td>8.7</td>
<td>7.6</td>
<td>7.2</td>
</tr>
<tr>
<td>Previous perinatal death</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>245 270</td>
<td>5.3</td>
<td>5.0</td>
<td>5.0</td>
</tr>
<tr>
<td>1</td>
<td>5688</td>
<td>10.0</td>
<td>9.9</td>
<td>6.0</td>
</tr>
<tr>
<td>&gt;34</td>
<td>406</td>
<td>15.4</td>
<td>17.5</td>
<td>6.4</td>
</tr>
<tr>
<td>Social class</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-manual</td>
<td>71 478</td>
<td>4.8</td>
<td>4.6</td>
<td>4.6</td>
</tr>
<tr>
<td>Manual</td>
<td>32 784</td>
<td>6.6</td>
<td>5.6</td>
<td>6.3</td>
</tr>
<tr>
<td>Other</td>
<td>23 015</td>
<td>7.9</td>
<td>7.9</td>
<td>6.6</td>
</tr>
<tr>
<td>Housewives</td>
<td>124 870</td>
<td>5.2</td>
<td>4.9</td>
<td>4.7</td>
</tr>
</tbody>
</table>

Table II Adjusted relative risks (RR) with 95% confidence intervals (CI) for low birthweight (LBW), preterm, and small for gestational age (SGA) by mother’s age, gravidity, previous perinatal death, marital status, and parental social class, Scotland, 1981–84.

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>LBW (RR 95%CI)</th>
<th>Preterm (RR 95%CI)</th>
<th>SGA (RR 95%CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;20</td>
<td>21, 12, 2*</td>
<td>14, 13, 15*</td>
<td>9, 08, 09*</td>
</tr>
<tr>
<td>20-29</td>
<td>1, 0</td>
<td>1, 0</td>
<td>1, 0</td>
</tr>
<tr>
<td>30-34</td>
<td>1, 0</td>
<td>1, 0</td>
<td>1, 0</td>
</tr>
<tr>
<td>&gt;34</td>
<td>1, 0</td>
<td>1, 0</td>
<td>1, 0</td>
</tr>
</tbody>
</table>

### Figure 1 Low birthweight by maternal age and gravidity

In young mothers (less than 20 years old), low birthweight increased with increasing gravidity, the risk for mothers of gravidity 3 or more being approximately two and a half times greater than that of mothers in their first pregnancy. In older mothers (more than 34 years old) the relationship was reversed, women having their first baby having twice the risk of those having a second or higher order birth.

The adjusted relative risks for low birthweight, preterm delivery, and smallness for gestational age for mothers and fathers by social class are graphed in figs 2 and 3. Social class I is the reference category. When women’s occupation is used as the basis for social class classification the relative risk for low birthweight, preterm delivery, and SGA increases from social class I to
through to social class III: the gradient being
greatest for low birthweight, followed by SGA,
and then preterm delivery. For low birthweight
and preterm delivery no further increase with
social class occurs, whereas for SGA the adjusted
relative risk continues to increase from 1·5 in
social class III: to 1·8 in social class V. When
father's occupation is used as the basis for social
class classification there is a consistent positive
gradient from social class I through to social class
V for all three adverse outcomes (fig 3).
The social class gradients become more marked
when the joint effects of mothers' and fathers' social
class are considered (table III). The risk of
having a low birthweight baby, for example, when
the mother is a manual worker increases from 1·2
when the father has a non-manual job to 1·8 when
the father has a manual job, and further to 1·9
when the father is classified as "Other".

Discussion
The data analysed in this paper come from a single
source. At present, no similar collection system
exists in England and Wales. In these Scottish
data, low birthweight, preterm and small for
gestational age were associated with previous
perinatal death, marital status, maternal age,
parity, and social class. These findings are
consistent with previous reports. Previous
perinatal death was found to be the strongest
predictor of adverse pregnancy outcome and this
effect was more marked for low birthweight and
preterm delivery than for SGA (table II). Marital
status clearly predicted different levels of adverse
pregnancy outcome. Single and formerly married
mothers (ie, separated, divorced, and widowed)
were, on average, at higher risk than married
mothers. Marital status has been shown to be
associated with a number of behavioural patterns
and habits which could be related to perinatal
outcome. As compared to married women, for
example, those who are single are less likely to use
health services, and those who are previously
married are more likely to smoke.

 Mothers younger than 20 years and those older
than 34 years had higher risks for low birthweight
and preterm delivery than mothers within the 20
to 34 year age range. Overall, the relationship
between gravidity and low birthweight and
preterm delivery was similarly U shaped.
However, in young mothers the risk of low
birthweight increased with increasing gravidity.
This relationship was not found for preterm
delivery and SGA. Mothers who by the age of 20
years have already had three pregnancies must
have had short pregnancy intervals, and short
birth spacing has been associated with an
increased risk of low birthweight. Moreover,
mothers with high rank gravidity and short birth
spacing were more likely to be included more than
once in the study, since each mother appears in the
analyses as many times as she had births. This
could bias some of the associations if parents in a
certain category were more likely to have more
adverse pregnancy outcomes unrelated to the
factors under study.

Traditionally the relationship between social
class and pregnancy outcome has concentrated on
the social class of married women as measured by
their husbands' occupation. In the data examined
here social status of either parent was found to be
related to the risk of adverse outcome (tables I
and II). When the joint effects of mothers' and fathers' social
class were examined, smallness for
gestational age was most affected by differences in
parental social class, while preterm delivery was
the least affected (table III). Babies whose parents
were both manual workers were twice as likely as
those whose parents were both non-manual
workers to be small for gestational age. Clearly,
mothers' social class has an effect independent
of fathers' social class; and information on both
parents' occupations should be collected in
maternity discharge systems.

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