INTRODUCTION

There are two main national sources of statistical information on maternity and births in England. The Office for National Statistics (ONS) collects data based on the statutory registration of births. The Department of Health collects hospital episode statistics (HES) that are derived from data provided by hospital patient administration systems. HES maternity records describe those episodes which relate to the delivery of a baby. These are mainly deliveries which take place in NHS hospitals; deliveries that take place in non-NHS hospitals and those occurring at home should be included in HES, but relatively few are. Some items of information about mothers and babies, for example date of birth and birthweight, are collected by both systems. Others items are collected by just one.

It was originally envisaged that the HES system would collect clinical data and that, for maternity records, the NHS number of the baby and the social class of the parents would be obtained from the Office of Population Censuses and Surveys (OPCS, now replaced by ONS). These two items would then be included in the HES maternity record. This did not in fact materialise; if it had done so then linkage between the two systems for live births would have been routinely possible. (Babies who are stillborn are not allocated an NHS number.)

It is a legal requirement that births are registered within 42 days. The registration details to be provided by the parent(s) or other informant is covered by the Births and Deaths Registration Act 1953. Other particulars are collected for statistical purposes under the Population Statistics Act 1960; these are held on an ONS statistical database but are not entered on the public record.
If linkage of births and HES maternity records were successful, this would provide information for statistical purposes on the completeness and accuracy of the HES data, and enhance ONS statistics on births and their outcome by adding information such as gestational age, mother’s ethnic origin and previous pregnancies.

**Scope**

The study described in this article was an investigation into whether linkage was possible. A small amount of analysis of the resulting linked records was undertaken for illustrative purposes only. The study also limited the investigation to HES maternity records which included information about the babies born in the delivery episodes (the ‘baby tails’). This information is missing from some maternity records, and the results of the study give an indication of the number of such records which existed in the time period considered. Only those data items which it was thought might be useful for linkage were requested.

**Background**

The HES system, which is owned by the Department of Health, holds each maternity episode in England in a two-part record. The first part consists of a set of fields common to all hospital episode records, not just maternities, containing details of the mother. The second part consists of up to six ‘baby tails’ with information about each of the babies, live and still born, in that delivery, including birthweight, multiplicity, delivery type and place. In particular the babies’ details include gestation and birth order. The mother’s details include ethnicity and the number of previous pregnancies which resulted in one or more registrable births, (that is, all live births, and any still births at twenty-four or more completed weeks of gestation).

The ONS births database contains details of all babies born in England and Wales, including their birthweight and multiplicity. Each baby’s record also contains information about the mother, and about the father if the birth is registered jointly by both parents or is within a marriage. This includes the parents’ countries of birth. If the mother is married, the record will also contain the number of babies born to her by her current husband and by any previous husband(s). For multiple live births, the time of each birth is also recorded.

Linkage of information from birth registration and HES would add value to both systems. As there are procedures in place to check that the legal requirement to register a birth is met, the ONS births database is considered to be largely complete. Therefore records on the ONS database, corresponding to births in NHS hospitals, for which there were no HES maternity records, would provide a good indication of under-recording in the HES system. As was stated earlier, few births at home and in private hospitals are recorded in HES.

Conversely, if there were HES records which did not link to ONS records this would either question the assumption that ONS birth registration is complete, or it might indicate a failure in the matching process, or else it might suggest that there was inconsistency in the recording of place of delivery between HES and birth registration.

There are several key improvements to birth registration statistics which would result from this linkage. Under the Population (Statistics) Act 1938, the registrar asks married women registering a birth how many previous children they have had, by their current husband and any former husband. ONS data on parity therefore excludes the many births which now take place outside marriage. In 1997, these were 37 per cent of all live births in England and Wales. However the HES maternity record holds the number of a woman’s previous pregnancies which resulted in one or more registrable babies. Thus linkage would improve birth statistics on the total number of previous children born to all women, both inside and outside marriage.

There is considerable interest in disaggregating birth statistics by ethnicity. This information is needed to understand fertility patterns for population estimates and projections, to identify inequalities in infant and perinatal mortality, and to improve understanding of the interaction of social and biological factors. ONS registration data has mother’s country of birth, but the HES maternity record holds the mother’s ethnicity. This should give better information, as country of birth is not a useful indication of ethnicity, especially for women whose parents or grandparents were immigrants to Britain. The problems in using country of birth as an indicator of ethnicity has been discussed in many publications including *Population Trends* and *Birth Counts*.

Another improvement to birth registration statistics would be the addition of gestational age at delivery. This should be included in all HES maternity records, but is recorded by ONS only for stillbirths. More complete gestation data would enhance statistics on babies’ survival and enable better conception statistics, eg for teenage pregnancies.

**Confidentiality**

The security and confidentiality advisory group of the Department of Health gave ethical approval for the HES service contractor to supply a sample of HES maternity data. The dataset chosen for the pilot study was the set of maternity records for all births in February 1997. That year was selected because the return of most 1997 HES data had been completed when the pilot study began, and February was taken as a typical month.

The data custodians for ONS births registration and statistics data gave permission for the records for births in February 1997 to be used. In particular the data custodian for ONS birth statistics gave permission for the mother’s date of birth to be used for linkage purposes. This data item is protected by the Population Statistics Act, but can be used within ONS for statistical purposes. It was essential to use mother’s date of birth for linkage, as the only variables pertaining to mother’s identity which were provided in the HES dataset were date of birth and postcode.

A high level of data security was observed at all times during the study.

**Method**

**Overview**

The HES data extract contained 28,376 maternity records, these being all the records for delivery episodes during February 1997 for which information on the babies were included. The structure of the records and the data fields selected for analysis are illustrated in Box 1.

Each record contained up to six ‘baby tails’. There were 56 duplicate records, which were eliminated by a combination of automatic and manual techniques. The dataset was then converted into records which each consisted of the details of one baby and the corresponding mother. The result was a set of 28,702 records, which will henceforth be referred to as HES birth records.

Records for births which occurred in England in February 1997 were extracted from ONS births registration data. There were 46,066 of these. The variables which were used to link HES and ONS birth records are detailed in Box 2. They are given the labels shown.
Box one

Illustration of a HES maternity record for a single delivery episode, showing the fields requested in the data extract used for the linkage feasibility study.

**Mother’s details**
- Date of admission
- Date of birth
- Ethnic group
- Home address (postcode only)
- Provider code
- Hospital provider
- Purchaser code

1st ‘baby tail’
- Birth order = 1
- Live/stillbirth indicator
- Birthweight
- Delivery method
- Place of delivery (eg NHS hospital)
- Date of birth
- Gestation
- Number of registrable babies in this episode
- Number of previous registrable babies born to mother
- Gender

2nd ‘baby tail’
- Birth order = 2
- Live/stillbirth indicator
- Birthweight
- Delivery method
- Place of delivery (eg NHS hospital)
- Date of birth
- Gestation
- Number of registrable babies in this episode
- Number of previous registrable babies born to mother
- Gender

Up to 6 ‘baby tails’

Box two

<table>
<thead>
<tr>
<th>HES record</th>
<th>ONS record</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Mother’s section</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother’s full date of birth</td>
<td>Mother’s full date of birth</td>
<td>DOBM</td>
</tr>
<tr>
<td>Mother’s year and month of birth</td>
<td>Mother’s year and month of birth</td>
<td>YMDOBM</td>
</tr>
<tr>
<td>Full postcode</td>
<td>Full postcode</td>
<td>PCODE</td>
</tr>
<tr>
<td>First three characters of postcode</td>
<td>First three characters of postcode</td>
<td>PCODE3C</td>
</tr>
<tr>
<td>(b) ‘Baby tail’</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baby’s date of birth</td>
<td>Baby’s date of birth</td>
<td>DOBB</td>
</tr>
<tr>
<td>Gender</td>
<td>Gender</td>
<td>SEX</td>
</tr>
<tr>
<td>Birthweight</td>
<td>Birthweight</td>
<td>BWT</td>
</tr>
<tr>
<td>(c) ‘Baby tail’ – to distinguish multiple births</td>
<td>time of birth</td>
<td></td>
</tr>
</tbody>
</table>

Box three

<table>
<thead>
<tr>
<th>Stage</th>
<th>Matching criteria</th>
<th>HES records matched (of those remaining unmatched)</th>
<th>Cumulative total of HES records matched</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DOBB, DOBM, SEX, PCODE</td>
<td>81.2%</td>
<td>81.2%</td>
</tr>
<tr>
<td></td>
<td>DOB, DOBM, SEX, PCODE</td>
<td>43.1%</td>
<td>89.3%</td>
</tr>
<tr>
<td></td>
<td>DOB, DOBM, SEX, PCODE3C, BWT</td>
<td>35.5%</td>
<td>93.1%</td>
</tr>
<tr>
<td></td>
<td>DOB, DOBM, SEX, PCODE3C, BWT (YMDOBMB, PCODE3C, BWT)</td>
<td>34.8%</td>
<td>95.5%</td>
</tr>
<tr>
<td></td>
<td>DOB, DOBM, PCODE3C, BWT (plus DOB)</td>
<td>77.8%</td>
<td>99.0%</td>
</tr>
</tbody>
</table>
Record linkage

Linkage was performed, using a sequence of programs written in SAS, version 6.12, in five stages. The method used was based on a previous feasibility study into linking congenital anomaly and birth records. After each stage, matched records were saved to a separate file, and only unmatched records were processed in the next stage. It was necessary to use some manual processing to deal with multiple births.

At each stage there were a number of instances where more than one ONS record matched a single HES record. Most of these were eliminated by applying extra matching criteria, additional to those which were used at that stage. For example, most duplicates at stage one were eliminated by comparing birthweight. It was then necessary to consider remaining duplicate matches to see if they were due to multiple births. This was done manually, by comparing HES birth order with ONS time of birth. An investigation into whether an automatic method could be developed was outside the scope of this feasibility study.

The details of the matching criteria, and how they were combined at each stage, are shown in Box 3, using the labels defined in Box 2. HES records matched at each stage are shown, expressed as a percentage of records not matched at previous stages, and also the cumulative total matched.

RESULTS

Summary

Ninety-nine per cent of the records in the HES extract were matched with ONS birth records. This accounted for less than two-thirds of the actual number of births in England during the period in question, February 1997. The completeness of the HES maternity records varied between different regions. Since only one per cent of HES records were not matched, there was no indication of any lack of completeness in ONS births data.

The HES records which were matched were representative of the sample studied, and data fields which were held in both HES and ONS birth records were found to match in the majority of cases.

Outcome of the matching process

After the completion of all five stages, ninety-nine per cent of the births in the HES maternity records were matched with an ONS birth record. Of the original 28,376 HES maternity records, 28,121 were matched, and of the 28,702 individual babies, 28,488 were linked to an ONS birth record.

Sixty-two per cent of the ONS records were matched. The other 38 per cent of ONS birth records would be accounted for mainly by HES maternity records which did not include information about the babies, and were therefore not included in the extract used for this study. Lack of completeness would also be caused by births which did not take place in NHS hospitals, for example home births, of which only eleven per cent are included in the HES system (see introduction) and private hospitals. However, in 1997, only three per cent of births in England and Wales took place other than in NHS hospitals, so this would only account for a very small part of the missing 38 per cent. This shortfall in ONS records linked is considered again below, (see outcome by gestation).

There were three HES maternity records containing twins for which only one baby from each was matched with an ONS birth record, and two more where one twin in each could not be matched due to insufficient information. In all other cases where the HES record held multiple births, either all the babies in the record were matched or none were.

<table>
<thead>
<tr>
<th>Regional office (1997)</th>
<th>Number of births in Feb 1997 (ONS)</th>
<th>Number of births from linked HES Records</th>
<th>Percentage matched</th>
<th>Number of births in unmatched HES records</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northern &amp; Yorkshire</td>
<td>5,707</td>
<td>1,217</td>
<td>21%</td>
<td>8</td>
</tr>
<tr>
<td>Trent</td>
<td>4,321</td>
<td>3,228</td>
<td>75%</td>
<td>22</td>
</tr>
<tr>
<td>Anglia &amp; Oxford</td>
<td>5,038</td>
<td>1,547</td>
<td>31%</td>
<td>11</td>
</tr>
<tr>
<td>North Thames</td>
<td>7,381</td>
<td>4,613</td>
<td>62%</td>
<td>41</td>
</tr>
<tr>
<td>South Thames</td>
<td>6,522</td>
<td>3,827</td>
<td>59%</td>
<td>17</td>
</tr>
<tr>
<td>South and West</td>
<td>5,550</td>
<td>3,648</td>
<td>66%</td>
<td>7</td>
</tr>
<tr>
<td>West Midlands</td>
<td>5,207</td>
<td>5,027</td>
<td>97%</td>
<td>49</td>
</tr>
<tr>
<td>North West</td>
<td>6,345</td>
<td>5,268</td>
<td>83%</td>
<td>36</td>
</tr>
<tr>
<td>Other (purchaser code not HA)</td>
<td>6,245</td>
<td>5,268</td>
<td>83%</td>
<td>36</td>
</tr>
<tr>
<td>Total</td>
<td>47,252</td>
<td>28,488</td>
<td>60%</td>
<td>199</td>
</tr>
</tbody>
</table>

The linked records were analysed for completeness, representativeness and accuracy. They were also used to perform sample analyses, to illustrate how new information could be obtained as a result of linkage.

**Completeness**

There was considerable variation in completeness of the HES linked data for the different regional offices in 1997, based on the ONS recording of region of occurrence. Figure 1 compares the number of linked records for each region with the number of births in that region during February 1997.

Unmatched HES births were analysed, as far as possible, by region. In most records the first three characters of the purchaser code indicated the regional office, other cases were counted as ‘other’. Table 1 compares the number of births in each region, according to ONS data, the number of births in matched HES records, analysed by region as derived from the linked birth record, and the number of births in unmatched HES records, analysed by region derived from the purchaser code in the maternity record.

Table 1 also shows that over 95 per cent of West Midlands births were fully registered on the HES maternity system, while in the Northern and Yorkshire region less than 25 per cent of deliveries had information about babies.

**Representativeness**

The characteristics of HES records matched and not matched were compared. In each case, there were marked similarities between the two sets of records. This shows that the records which were matched were representative of the HES data extract.

Table 2 shows the age of mother and birthweight of baby as given in the HES record. Mother’s age was divided into five year bands between ages 20 and 40, below 20, and 40 and over. The matching rates in each of the age groups between 20 and 40 was very similar. There was a very slightly higher proportion not matched for mothers aged under 20 and over 39.

For birthweight, the proportion of records which were matched, compared to those which were not matched, was similar for each weight group, although a slightly higher proportion of HES records were unmatched both for birthweights of less than 1,500 grams, and of for those of 4,000 grams and over. There were sixteen records where the birthweight given by HES was less than 100 grams, and these were excluded from Table 2. (One of these was for a stillbirth, the rest appeared to be clerical errors.)

**Accuracy**

For those records which were matched, three fields were analysed for agreement between values in the HES record and the matched ONS birth records. They were birthweight, multiplicity and the live/stillbirth indicator. In addition, for stillbirths the gestational ages were compared between the matched records.
There was a high level of agreement between birthweights in HES records and the matching ONS records. This is shown in Figure 2. For birthweights higher than 1,500 grams there was over 90 per cent agreement. For very low birthweights there was 80 per cent agreement. Birthweight was indeed used as a linkage criterion in twenty per cent of the matches, but this on its own cannot account for the high rate of agreement.

Figure 3 shows that, where there was disagreement, the discrepancy was less than 25 grams in the majority of cases where the birthweight was more than 1,500 grams. For very low birthweights, the majority of cases had discrepancies of more than 500 grams. Around 250 records in all showed a difference of more than 500 grams. Several of these records were examined to see whether there might be an obvious clerical error, such as transposed digits, but no evidence of this was found.

| Previous number of previous children from ONS record |
|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 and over | No stated parity | Total |
| 4,041 | 264 | 95 | 35 | 8 | 4 | 2 | 1 | 3,578 | 8,028 |
| 260 | 3,795 | 42 | 3 | 3 | 1 | | 1,840 | 5,944 |
| 61 | 198 | 1,451 | 22 | 10 | 1 | | 838 | 2,571 |
| 16 | 30 | 96 | 505 | 10 | 1 | 1 | 389 | 1,048 |
| 3 | 11 | 26 | 35 | 151 | 6 | 1 | 143 | 376 |
| 6 | 1 | 2 | 6 | 10 | 61 | 1 | 62 | 149 |
| 1 | 1 | 2 | 9 | 29 | 3 | 21 | 68 |
| 7 and over | 3 | 1 | 3 | 1 | 7 | 40 | 25 | 32 |
| No stated parity | 2,553 | 2,327 | 1,077 | 324 | 139 | 45 | 33 | 73 | 10,592 | 28,488 |

Note: This is shown as a percentage comparison in Figure 4.
The comparison between values of multiplicity in the HES records and the matched ONS records is shown in Table 3. All but 11 of the HES records had a value present. These included ‘6’, which is a default value, and ‘9’, which is null. There were eleven babies with missing multiplicity values in the HES record, and they were in fact registered as twins. According to ONS births data, in those records which were linked to HES records there were 732 babies registered as twins and 30 as triplets. There were no higher order multiple births registered, although 73 HES birth records had multiplicity equal to four. (These were all for deliveries which took place in one particular hospital in the north west region.)

Table 3 shows that the multiplicity in the matched HES records is the same as that in ONS birth registrations for 97.5 per cent of singletons and 93.4 per cent of twins. Overall the accuracy of multiplicity in matched HES records was 97.4 per cent.

The live/stillbirth indicator agreed in over 96 per cent of records. A little over three per cent of HES records did not have a value for this variable.

ONS birth records include gestational age for stillbirths, so the values of this were compared between the HES and the matched ONS records. There were 115 stillbirths in the HES data extract, and 64 per cent of these had the same value for gestational age in both records. An additional 21 per cent of the still births had gestational age differing by one week between the HES and matched ONS records.

NEW INFORMATION

Parity

In ONS birth records, the previous number of children born to the mother is recorded only if she is married, and refers to the children born to her current or any former husband. With the increasing number of babies born outside marriage, this gives an incomplete picture. However, the value in the HES maternity record is the usual definition of clinical parity and includes all previous live and still births. We would therefore expect the HES value to be at least as large as the ONS value, if not larger. The comparison between these values is shown in Table 4.

There were 37 per cent of linked ONS records with no stated parity. Of these 65 per cent had a parity recorded on the linked HES record. Similarly for HES, 36 per cent of the records had parity not stated, and of those 64 per cent of linked ONS records had a stated parity. Thus linkage would enable a complementary improvement between the two systems in generating true clinical parity statistics.

Figure 4 shows, for HES records where parity was stated, and for different HES parity values, how ONS parity in the matched records compared. Where parity was stated on both ONS and HES records, the value was the same in 88 per cent of cases. There were four per cent of cases where the parity in the HES record was lower than that in the linked ONS birth record, and seven per cent where the HES parity value was higher.

Outcome by gestational age

ONS birth records contain length of gestation only for stillbirths. Linkage therefore would enable more complete analysis of births data by gestation. An example of the type of analysis which might be undertaken is illustrated in Figure 5. This shows the proportion of births in the linked records for which a death had been notified by the time the ONS data extract was taken, i.e. August 2000. If the child had died, the infant mortality linkage indicator in the birth record would be set.

Figure 5 is an example only, and is not intended to be a study of infant mortality. The analysis is based on just one month’s data, and the linked records accounted for only 62 per cent of registered births (see results,
above). To get a proper picture of survival by gestation it would be necessary to obtain the date of death from the ONS infant mortality database.

**Ethnicity**

HES records should include mother’s ethnicity, whereas ONS birth records contain mother’s country of birth (and father’s if he was present at birth registration, or the mother was married). Mother’s country of birth is always present in the birth record, but, as discussed above (see background), this is not a complete indicator of the child’s ethnicity. Linkage should therefore enhance this information.

The HES system allowed for eight different ethnic groups, based on the 1991 Census definitions, plus ‘other’. ONS birth statistics are based on a standard list of mothers’ countries of birth. Table 5 shows the mother’s ethnic group by country of birth for these groups. The table also shows that 50.5 per cent of the matched HES records had an ethnic group recorded.

Table 5 demonstrates that, where the ONS birth record gave the mother’s country of birth as the United Kingdom, 5.9 per cent of HES records indicated ethnicity other than white. For nearly all countries of birth of the mothers, approximately half of the HES records had a meaningful ethnic group recorded. The exceptions were for mothers born in Bangladesh and Pakistan, where ethnic group was recorded for 76 per cent and 71 per cent of records, respectively.

**Discussion**

When looking at the five stages of linkage, it should be noted that this was a pilot study into the feasibility of linkage. As such, the linkage criteria, which are shown in Box 3, were being developed as the study progressed. For example the fourth stage yielded relatively few new matches compared to the fifth, and would probably be omitted if another linkage exercise were undertaken.

If a larger HES dataset were to be linked with births, for example an entire year, then it would be preferable if some of the processes which were performed manually could be automated. However investigation of this was outside the scope of this feasibility study. Further, even if such a method were devised to differentiate twins, it is very likely that triplets, and higher order multiple births, would require some manual intervention.

It should also be noted that the very high rate of linkage reported here is partly due to the nature of the exercise as a feasibility study. The purpose was to see if linkage was possible, manual methods were used at various stages, including checking from time to time to see whether records were correctly linked. If more automated procedures resulted in a lower linkage rate, it would be necessary to consider whether fuller linkage justified the cost of using some manual processes.

A further consideration is that the HES data extract provided was of maternity records which included birth details. This study did not attempt to link maternity records which did not include birth details (‘baby tails’), and this would probably account for the fact that 38 per cent of births recorded by ONS did not have corresponding HES maternity records. The matching criteria shown in Box 3 all used data fields belonging to the baby tail.

**Conclusion**

This feasibility study was successful, showing that it was possible to achieve a high linkage rate of HES maternity records with ONS birth records. There was a high level of agreement between the two datasets in terms of birthweight and multiplicity.

Linkage provided new information which would enhance the birth statistics produced by both systems. For the HES system it was found that one-third of maternity episodes were missing from the extract provided, which indicated that they did not include details of the births. If information were provided to the Department of Health on the number missing for each health authority, this would assist in getting more complete data.

For the ONS births data, linkage added value by providing gestational age and ethnicity. Gestational age is only present on ONS records for stillbirths, and ethnicity is not recorded at birth registration. Linkage also improved information on previous registrable births for ONS, adding this information for two-thirds of those records which had none given at registration.

It was therefore shown that it was possible to link HES maternity records which included birth details with ONS birth records and that this could provide positive benefits, including improved statistics on parity, ethnicity and gestation.

### Table 5 Ethnic groups by mother’s country of birth

<table>
<thead>
<tr>
<th>Mother’s country of birth from ONS record</th>
<th>Number of matched HES births</th>
<th>White</th>
<th>Black – Caribbean</th>
<th>Black – African</th>
<th>Black – other</th>
<th>Indian</th>
<th>Pakistani</th>
<th>Bangladeshi</th>
<th>Chinese</th>
<th>Other ethnic group</th>
<th>Total with stated ethnicity</th>
<th>Not given or invalid*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total‡</td>
<td>28,488</td>
<td>12,219</td>
<td>237</td>
<td>225</td>
<td>294</td>
<td>348</td>
<td>642</td>
<td>335</td>
<td>87</td>
<td>828</td>
<td>14,387</td>
<td>13,273</td>
</tr>
<tr>
<td>United Kingdom**</td>
<td>24,969</td>
<td>11,711</td>
<td>195</td>
<td>39</td>
<td>266</td>
<td>147</td>
<td>178</td>
<td>30</td>
<td>40</td>
<td>581</td>
<td>12,606</td>
<td>11,782</td>
</tr>
<tr>
<td>Total outside United Kingdom</td>
<td>3,519</td>
<td>508</td>
<td>42</td>
<td>186</td>
<td>28</td>
<td>201</td>
<td>464</td>
<td>305</td>
<td>47</td>
<td>1,781</td>
<td>1,781</td>
<td>1,491</td>
</tr>
<tr>
<td>India</td>
<td>287</td>
<td>3</td>
<td>2</td>
<td>150</td>
<td>5</td>
<td>4</td>
<td>160</td>
<td>123</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pakistan</td>
<td>638</td>
<td>8</td>
<td>10</td>
<td>438</td>
<td>8</td>
<td>10</td>
<td>454</td>
<td>174</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bangladesh</td>
<td>413</td>
<td>2</td>
<td>1</td>
<td>13</td>
<td>294</td>
<td>11</td>
<td>314</td>
<td>88</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>East Africa</td>
<td>168</td>
<td>15</td>
<td>19</td>
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<td>43</td>
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<tr>
<td>Far East**</td>
<td>124</td>
<td>16</td>
<td>1</td>
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* Values ‘9’ and ‘X’.
‡ All HES births which were matched (live and still).
** Including Isle of Man and Channel Islands.
†† Excluding South Africa.
*** Hong Kong, Malaysia and Singapore.
Key points

- A pilot study was undertaken into the feasibility of linking maternity records from the Hospital Episode Statistics system with ONS birth records.

- The study achieved 99 per cent linkage of HES maternity records which included information about the babies born.

- The set of HES maternity records for February 1997 which included birth information accounted for two-thirds of all births in England in that month.

- Birthweights recorded on the two systems agreed for over 95 per cent of all babies who weighed more than 1,500 grams at birth.

- Linking the two sets of records would enhance the statistics produced by both systems. In particular, the ONS birth statistics could include analysis by gestation and ethnicity. Information on previous registrable birth could be added for around two-thirds of mothers who were unmarried when they registered the births of their babies.

References

7. SAS is a registered trademark of SAS Institute Inc., Cary, NC, USA.