NHS Patient Survey Programme

2018 survey of women's experiences of maternity care

Technical details for analysing trust-level results

Published January 2019

CQC publication

Contents

1. Introduction

This document outlines the methods used by the Care Quality Commission (CQC) to score and analyse the trust-level results for the 2018 Maternity Survey, which are available on the CQC website and in the benchmark reports for each trust.

The survey results are available for each trust on the CQC website. The survey data is shown in a simplified way, identifying whether a trust performed 'better' or 'worse' or 'about the same' as the majority of other trusts for each question. This analysis is based on a statistic called the **'expected range'** (see section 6.3). On publication of the survey, an A-to-Z list of trust names will be available at the link below, containing further links to the survey data for all NHS trusts that took part in the survey: **http://www.cqc.org.uk/maternitysurvey**

The CQC webpage also contains a statistical release document containing England-level results, alongside relevant national policy and comparisons with the results from the 2013, 2015, and 2017 surveys. Further information on the survey is available in the Quality and Methodology report.

A benchmark report is also available for each trust. An antenatal and postnatal benchmark report is also available for each trust that (a) completed the maternity attribution exercise and (b) had a sufficient number of respondents whose antenatal and/or postnatal care could be attributed to the trust. Results displayed in benchmark reports are a graphical representation of the results displayed for the public on the CQC website (see further information on section 7). These have been provided to all trusts and will be available on the Survey Co-ordination Centre website at: **http://nhssurveys.org/surveys/1363**. The tables at the end of each benchmark report also highlight any statistically significant changes in trust scores between 2017 and 2018.

2. Selecting data for reporting

Scores are assigned to responses to questions that are of an evaluative nature: in other words, those questions where results can be used to assess the performance of a trust (see section 6.1 for more detail). Questions that are not presented in this way tend to be those included solely for 'routing' respondents past any questions that may not be relevant to them (such as question C5 'Did the pain relief that you used change from what you had originally planned?') or those used for descriptive or information purposes (such as question C9 'What position were you when your baby was born?').

The scores for each question are grouped on the website, and in the benchmark reports for each trust, according to the sections of the questionnaire. For example, the questionnaire for the 2018 maternity survey included sections on 'care while you were pregnant (antenatal care)', 'your labour and the birth of your baby' and 'care at home after the birth'.

Alongside both the question and section scores on the website are one of three statements:

- Better
- About the same

- Worse.

This analysis is based on a statistic called the **'expected range'** (see section 6.3)

3. The CQC organisation search tool

The organisation search tool contains information from various areas within the Care Quality Commission's functions. The presentation of the survey data was designed using feedback from people who use the data. As well as meeting data user needs, it presents the groupings of the trust results in a simple and fair way, showing where we are more confident that a trust's score is 'better' or 'worse' than we'd expect, when compared with most other trusts.

The survey data can be accessed through the A to Z link available at **http://www.cqc.org.uk/maternitysurvey**, or by searching for a provider on the **CQC home page** and then clicking on 'Surveys'**.**

4. The trust benchmark reports

Benchmark reports should be used by NHS trusts to identify how they performed in comparison to most other trusts that took part in the survey. Tables at the end of the report show if a score has significantly increased or decreased compared with the last maternity survey in 2017. From this information, areas for improvement can be identified. The reports are available from the Survey Coordination Centre website: **http://nhssurveys.org/surveys/1363**.

The graphs included in the reports display the trust's scores, compared with the full range of results from all other trusts that took part in the survey. A separate graph is present for each scored question. The black diamond represents the trust's score on the question, for this year's survey. The bar represents the range of results for the question across all trusts that took part in the survey. The bar is divided into three sections:

- If a trust score lies in the grey section of the graph, the trust's score is 'about the same' as most other trusts in the survey.
- If a trust scores lies in the orange section of the graph, the trust score is 'worse' than expected when compared with most other trusts in the survey.
- If a score lies in the green section of the graph, the trust score is 'better' than expected when compared with most other trusts in the survey.

Note that, because the uncertainty around the result is too great, the black diamond (the trust's score) is not shown for questions answered by fewer than 30 women.

5. The maternity survey attribution exercise

For some women, a number of questions will relate to care that they received from their GP or other provider, rather than the acute trust where they gave birth. For example, the trust that provided care during labour and birth may not have provided antenatal and postnatal care. As a result, for some sections of the questionnaire, respondents will not have been reflecting on care attributable to the trust from which they were sampled. Due to this uncertainty, since 2010, trust-level data were only published in benchmark reports and the CQC website for 19 questions out of 77 questions. The trust data was only published for scored question responses where we could be confident that respondents were definitely referring to care received from the acute trust, rather than other providers. The responses to all questions, however, were published in the national summary on the CQC website.

During the development of the 2013 survey, a number of options were considered for improving the attribution of responses to providers, and pilot work was conducted to determine the most effective approach. Following this pilot work, it was decided that trusts would, in the first instance, be asked to use electronic records on the provision of antenatal and postnatal care to indicate whether they had provided each respondent's antenatal and/or postnatal care. However, if these records were not available, trusts provided postcode details to identify the women in their sample who lived in postcode sectors where the trust delivered maternity care. We refer to this two-stage process as the 'attribution exercise'. This attribution methodology, developed in 2013, was followed in 2015, 2017 and 2018.

In the 2018 Maternity Survey, 122 trusts (out of 129) completed the attribution exercise. This information was used to identify the respondents who were likely to have been referring to the acute trust when responding to the antenatal and postnatal care sections of the questionnaire. Scored results and reports for antenatal and postnatal care were then produced based on analyses involving only those respondents.

Each of these 122 trusts provided both **postnatal** attribution data and **antenatal** data. Antenatal and postnatal attribution data were suppressed for one trust and postnatal data only were suppressed for two trusts due to low numbers of respondents (less than 30). Therefore, a total of 121 trusts received an antenatal benchmark report and 119 trusts received a postnatal benchmark report.

The data for the antenatal and postnatal sections cannot be considered as statistically robust as the data for the labour and birth questions, for several reasons:

1. Although the value of the data for exploring individual trust performance is improved, due to the more accurate attribution of responses to provider, the lack of complete coverage across all trusts means that we cannot fairly say that one trust is 'better' or 'worse' than all others. Therefore, in antenatal and postnatal reports, trust results are only identified as being 'better' or 'worse' than most of the subset of trusts that completed the attribution exercise. As we cannot say that the subset of trusts is representative of all trusts it is not a true benchmark for performance across England.
2. Where electronic records are not available, the attribution is based on the respondent's postcode. Unfortunately, there are no means available to identify women who receive care from a more distantly located provider for other reasons, such as requiring specialist care, or moving to a new house during or after pregnancy. Some respondents may have been included in the trust's antenatal and/or postnatal data and analyses despite having received care from another provider.

3. NHS trusts complete the attribution exercise themselves. Due to the limitations of the process, the Survey Coordination Centre is unable to verify the accuracy of the exercise. This means that we cannot be certain about the reliability of the attribution of the data.

The antenatal and postnatal survey data from the trusts that completed the attribution exercise will be shared with those trusts. The data will be considered by the Care Quality Commission (CQC) to inform its intelligence model and will be shared with CQC inspectors. While the reports will be published on the survey coordination centre website, **http://www.nhssurveys.org/**, they will not be published on the CQC website for the reasons given above.

Trusts with antenatal and postnatal benchmark reports should keep the above caveats in mind when interpreting their data.

6. Interpreting the data

6.1 Scoring

Questions are scored on a scale from 0 to 10. Details of the scoring for this survey are available in **Appendix A** at the end of this document.

The scores represent the extent to which the patient's experience could be improved. A response assigned a score of 0 refers to the most negative patient experience we can measure, and a response assigned a score of 10 refers to the most positive patient experience we can measure.

Where a number of options lay between the most negative and most positive responses, they are placed at equal intervals along the scale. Where options are provided that did not have any bearing on the trust's performance in terms of peoples' experience, the responses are classified as 'not applicable' and a score is not given. Similarly, where respondents state that they could not remember, or did not know the answer to a question, a score is not given.

6.2 Standardisation

Results are based on 'standardised' data. We know that the views of a respondent can reflect not only their experiences of NHS services, but can also relate to certain demographic characteristics, such as age and parity (whether a woman has given birth previously). The mix of patients varies across trusts, and this could lead to bias, resulting in a trust appearing better or worse than they would if they had a slightly different profile of patients. To account for this, we 'standardise' the data. Standardising data adjusts for these differences and enables the results for trusts to be compared more fairly than could be achieved using non-standardised data.

The results of the 2018 Maternity Survey are standardised by **age and parity (see Appendix B).**

6.3 Expected range

The ‘better’, ‘about the same’, and ‘worse’ categories are based on the 'expected range’, which is calculated for each question for each trust. This is the range within which we would expect a particular trust to score if it performed about the same as most other trusts in the survey. The range takes into account the number of respondents from each trust, as well as the scores for all other trusts, and allows us to identify which scores we can confidently say are 'better' or 'worse' than the majority of other trusts (see **Appendix C** for more details). Analysing the survey information in such a way allows for fairer conclusions on each trust’s performance. This approach presents the findings simply and in a way that takes account of multiple factors.

As the ‘expected range’ calculation accounts for the number of respondents at each trust who answer a question, it is not necessary to present confidence intervals around each score for the purposes of comparing across all trusts.

6.4 Conclusions made on performance

It should be noted that the data only show performance relative to other trusts; we have not set absolute thresholds for ‘good’ or ‘bad’ performance. Thus, a trust may have a low score for a specific question, while still performing very well on the whole. This is particularly true on questions where the majority of trusts exhibit a high score.

A separate report, which explores how overall results between trusts vary across the country, is available on the CQC site **http://www.cqc.org.uk/maternitysurvey.** This report focuses on identifying significantly higher levels of better or worse patient experience **across the entire survey**, rather than considering performance on individual questions.

6.5 Comparing scores across trusts or across survey years

The expected range statistic is used to arrive at a judgement of how a trust is performing compared with all other trusts that took part in the survey. However, if you wish to use the scored data in another way—for example, to compare scores between two different trusts or subsets of trusts—you will need to apply an appropriate statistical test to ensure that any differences are ‘statistically significant’. ‘Statistically significant’ means that it is very unlikely that any difference between scores is due to chance.

7. Further information

The results for England, and trust level results, can be found on the CQC website. Also available is a ‘quality and methodology’ document which provides information about the survey development and methodology:
http://www.cqc.org.uk/maternitysurvey

The results from previous maternity surveys carried out between 2007 and 2017 are available at the link below. Please note that due to redevelopment work, results from the 2018 survey are only comparable with 2013, 2015, and 2017:
http://www.nhssurveys.org/surveys/299

Full details of the methodology for the survey, including questionnaires, supporting materials, sampling instructions and the survey development report are available at:
http://www.nhssurveys.org/surveys/1168

More information on the NHS Patient Survey Programme, including results from other surveys and a programme of current and forthcoming surveys can be found at:
www.cqc.org.uk/surveys

Appendix A: Scoring for the 2018 Maternity Survey

The following describes the scoring system applied to the evaluative questions in the survey, taking question C20 ‘Did you have confidence and trust in the staff caring for you during labour and birth?’ (see Figure A1) and question D9 ‘Thinking about your stay in hospital, how clean was the room or ward you were in?’ (see Figure A2) as examples.

For C20, the least positive response option, ‘No’, was assigned a score of 0. The middling option, ‘Yes, to some extent’, was assigned a score of 5. The most positive response, ‘Yes, definitely’, was assigned a score of 10. Lastly, if the respondent selected ‘Don’t know / can’t remember’, their response was treated as ‘not applicable', and no score was assigned for this question.

Figure A1 Scoring example: Question C20 (2018 Maternity Survey)

C20 Did you have confidence and trust in the staff caring for you during labour and birth?	
Yes, definitely	10
Yes, to some extent	5
No	0
Don’t know / can’t remember	Not applicable

Where a number of response options were available between the most negative and most positive response options, scores were assigned at equal intervals between 0 and 10. For example, for D9, on the cleanliness of the ward or room, the following response options were available:

- Very clean
- Fairly clean
- Not very clean
- Not at all clean

The most positive response option, ‘Very clean’, was assigned a score of 10. The second most positive, ‘Fairly clean’, was assigned a score of 6.7. The third most positive response option ‘Not very clean’ was assigned a score of 3.3. Lastly, the least positive response option, ‘Not at all clean’, was assigned a score of 0 (see below).

Figure A2 Scoring example:
Question D9 (2018 Maternity Survey)

D9 Thinking about your stay in hospital, how clean was the hospital room or ward you were in?	
Very clean	10
Fairly clean	6.7
Not very clean	3.3
Not at all clean	0
Don't know / can't remember	Not applicable

All analysis is carried out on a 'cleaned' data set. 'Cleaning' refers to the editing process that is undertaken on the survey data. A document describing this can be found at: **http://www.nhssurveys.org/surveys/1235**.

As part of the cleaning process, responses are removed for any trust that has fewer than 30 respondents to a question. This is because the uncertainty around the result is too great and, moreover, very low numbers would risk respondents being identified from their responses. For 40 trusts, responses to question F16 'If, during evenings, nights or weekends, you needed support or advice about feeding your baby, were you able to get this?' were removed from the analysis due to fewer than 30 respondents. In addition, for one trust, responses to questions B6, B7 and B14 were removed due to fewer than 30 respondents.

The scoring method for each question used in the analysis, under headings to identify which report they are contained within, are set out below.

ANTENATAL CARE

Section B: Care while you were pregnant (antenatal care)

B4. Were you offered any of the following choices about where to have your baby? (Cross ALL that apply)	
I was offered a choice of hospitals	2.5
I was offered a choice of giving birth in a midwife led unit or birth centre	2.5
I was offered a choice of giving birth in a consultant led unit	2.5
I was offered a choice of giving birth at home	2.5
I was not offered any choices	0
I had no choices due to medical reasons	Not applicable
Don't know	Not applicable

Answered by all

B6. Did you get enough information from either a midwife or doctor to help you decide where to have your baby?	
Yes, definitely	10
Yes, to some extent	5
No	0
No, but I did not need this information	Not applicable
Don't know / can't remember	Not applicable

Answered by all

Antenatal check-ups

B7. During your pregnancy were you given a choice about where your antenatal check-ups would take place?	
Yes	10
No	0
Don't know / can't remember	Not applicable

Answered by all

B9. During your antenatal check-ups, did the midwives appear to be aware of your medical history?	
Yes, always	10
Yes, sometimes	5
No	0
Don't know / can't remember	Not applicable

Answered by all

B10. During your antenatal check-ups, were you given enough time to ask questions or discuss your pregnancy?	
Yes, always	10

Yes, sometimes	5
No	0
Don’t know	Not applicable

Answered by all

B11. During your antenatal check-ups, did the midwives listen to you?	
Yes, always	10
Yes, sometimes	5
No	0
Don’t know / can’t remember	Not applicable

Answered by all

B12. During your antenatal check-ups, did a midwife ask you how you were feeling emotionally?	
Yes, definitely	10
Yes, to some extent	5
No	0
Don’t know / can’t remember	Not applicable

Answered by all

During your pregnancy

B13. During your pregnancy, did you have a telephone number for a midwife or midwifery team that you could contact?	
Yes	10
No	0
Don’t know / can’t remember	Not applicable

Answered by all

B14. During your pregnancy, if you contacted a midwife, were you given the help you needed?	
Yes, always	10
Yes, sometimes	5
No	0
No, as I was not able to contact a midwife	0
I did not contact a midwife	Not applicable

Answered by all

B15. Thinking about your antenatal care, were you spoken to in a way you could understand?	
Yes, always	10
Yes, sometimes	5
No	0
Don’t know / can’t remember	Not applicable

Answered by all

B16. Thinking about your antenatal care, were you involved enough in decisions about your care?	
Yes, always	10
Yes, sometimes	5
No	0
I did not want / need to be involved	Not applicable
Don't know / can't remember	Not applicable

Answered by all

B17. During your pregnancy did midwives provide relevant information about feeding your baby?	
Yes, definitely	10
Yes, to some extent	5
No	0
I did not want / need this information	Not applicable
Don't know / can't remember	Not applicable

Answered by all

LABOUR AND BIRTH REPORTS

Section C: Your labour and the birth of your baby

C1. At the very start of your labour, did you feel that you were given appropriate advice and support when you contacted a midwife or the hospital?	
I did not contact a midwife / the hospital	Not applicable
Yes	10
No	0

Answered by those who did not have a planned caesarean

C3. During your labour, were you able to move around and choose the position that made you most comfortable?	
Yes, most of the time	10
Yes, sometimes	5
No	0
No, but this was not possible due to medical reasons	Not applicable

Answered by those who did not have a planned caesarean

C10. Did you have skin to skin contact (*baby naked, directly on your chest or tummy*) with your baby shortly after the birth?	
Yes	10
Yes, but I did not want this	0
No	0
No, but this was not possible for medical reasons	Not applicable
I did not want skin to skin contact with my baby	Not applicable

Answered by those who did not have a planned caesarean

C11. If your partner or someone else close to you was involved in your care during labour and birth, were they able to be involved as much as they wanted?	
Yes	10
No	0
They did not want to /could not be involved	Not applicable
I did not want them to be involved	Not applicable
I did not have a partner / companion with me	Not applicable

Answered by all

The staff caring for you

C12. Did the staff treating and examining you introduce themselves?	
Yes, all of the staff introduced themselves	10
Some of the staff introduced themselves	5
Very few / none of the staff introduced themselves	0
Don't know / can't remember	Not applicable

Answered by all

C14. Were you (and/or your partner or a companion) left alone by midwives or doctors at a time when it worried you? (Cross ALL that apply)	
Yes, during early labour	0
Yes, during the later stages of labour	0
Yes, during the birth	0
Yes, shortly after the birth	0
No, not at all	10

Answered by all

C15. If you raised a concern during labour and birth, did you feel that it was taken seriously?	
Yes	10
No	0
I did not raise any concerns	Not applicable

Answered by all

C16. If you needed attention during labour and birth, were you able to get a member of staff to help you within a reasonable time?	
Yes, always	10
Yes, sometimes	5
No	0
A member of staff was with me all the time	10
I did not want / need this	Not applicable
Don't know / can't remember	Not applicable

Answered by all

C17. Thinking about your care during labour and birth, were you spoken to in a way you could understand?	
Yes, always	10
Yes, sometimes	5
No	0
Don't know / can't remember	Not applicable

Answered by all

C18. Thinking about your care during labour and birth, were you involved enough in decisions about your care?	
Yes, always	10
Yes, sometimes	5
No	0
I did not want / need to be involved	Not applicable
Don't know / can't remember	Not applicable

Answered by all

C19. Thinking about your care during labour and birth, were you treated with respect and dignity?	
Yes, always	10
Yes, sometimes	5
No	0
Don't know / can't remember	Not applicable

Answered by all

C20. Did you have confidence and trust in the staff caring for you during your labour and birth?	
Yes, definitely	10
Yes, to some extent	5
No	0
Don't know / can't remember	Not applicable

Answered by all

POSTNATAL CARE REPORTS

Section D: Care in hospital after the birth (postnatal care)

D2. Looking back, do you feel that the length of your stay in hospital after the birth was…	
Too long	0
Too short	0
About right	10
Not sure / don't know	Not applicable

Answered by those who stayed in hospital after the birth

D3. On the day you left hospital, was your discharge delayed for any reason?	
Yes	0
No	10

Answered by those who stayed in hospital after the birth

D5. If you needed attention while you were in hospital after the birth, were you able to get a member of staff to help you within a reasonable time?	
Yes, always	10
Yes, sometimes	5
No	0
I did not want / need this	Not applicable
Don't know / can't remember	Not applicable

Answered by those who stayed in hospital after the birth

D6. Thinking about the care you received in hospital after the birth of your baby, were you given the information or explanations you needed?	
Yes, always	10
Yes, sometimes	5
No	0
Don't know / can't remember	Not applicable

Answered by those who stayed in hospital after the birth

D7. Thinking about the care you received in hospital after the birth of your baby, were you treated with kindness and understanding?	
Yes, always	10
Yes, sometimes	5
No	0
Don't know / can't remember	Not applicable

Answered by those who stayed in hospital after the birth

D8. Thinking about your stay in hospital, if your partner or someone else close to you was involved in your care, were they able to stay with you as much as you wanted? (Cross ALL that apply)	
Yes	10
No, as they were restricted to visiting hours	0
No, as there was no accommodation for them in the hospital	0
No, they were not able to stay for another reason	Not applicable
I did not have a partner / companion with me	Not applicable

Answered by those who stayed in hospital after the birth

D9. Thinking about your stay in hospital, how clean was the hospital room or ward you were in?	
Very clean	10
Fairly clean	6.7
Not very clean	3.3
Not at all clean	0
Don't know / can't remember	Not applicable

Answered by those who stayed in hospital after the birth

Section E: Feeding your baby

E2. Were your decisions about how you wanted to feed your baby respected by midwives?	
Yes, always	10
Yes, sometimes	5
No	0
Don't know / can't remember	Not applicable

Answered by all

E3. Did you feel that midwives and other health professionals gave you consistent advice about feeding your baby?	
Yes, always	10
Yes, sometimes	5
No	0
I did not want / need any advice	Not applicable
I did not receive any advice	0
Don't know / can't remember	Not applicable

Answered by all

E4. Did you feel that midwives and other health professionals gave you active support and encouragement about feeding your baby?	
Yes, always	10
Yes, sometimes	5
No	0
I did not want / need this	Not applicable
Don't know / can't remember	Not applicable

Answered by all

Section F: Care at home after the birth

F1. Were you given a choice about where your postnatal care would take place? *(Postnatal care is any contact with a midwife or other health professional after leaving hospital)*	
Yes	10
No	0
Don't know / can't remember	Not applicable

Answered by all

F2. When you were at home after the birth of your baby, did you have a telephone number for a midwife or midwifery team that you could contact?	
Yes	10
No	0
Don't know / can't remember	Not applicable

Answered by all

F3. If you contacted a midwife were you given the help you needed?	
Yes, always	10
Yes, sometimes	5
No	0
No, as I was not able to contact a midwife	0
I did not contact a midwife	Not applicable

Answered by all

F7. Would you have liked to have seen a midwife…	
More often	0
Less often	0
I saw a midwife as much as I wanted	10

Answered by those who saw a midwife after the birth

F8. Did the midwife or midwives that you saw appear to be aware of the medical history of you and your baby?	
Yes	10
No	0
Don't know / can't remember	Not applicable

Answered by those who saw a midwife after the birth

F9. Did you feel that the midwife or midwives that you saw always listened to you?	
Yes, always	10
Yes, sometimes	5
No	0
Don't know / can't remember	Not applicable

Answered by those who saw a midwife after the birth

F10. Did the midwife or midwives that you saw take your personal circumstances into account when giving you advice?	
Yes, always	10
Yes, sometimes	5
No	0
This was not necessary	Not applicable
Don’t know / can’t remember	Not applicable

Answered by those who saw a midwife after the birth

F11. Did you have confidence and trust in the midwives you saw after going home?	
Yes, definitely	10
Yes, to some extent	5
No	0
Don’t know / can’t remember	Not applicable

Answered by those who saw a midwife after the birth

F13. Did a midwife or health visitor ask you how you were feeling emotionally?	
Yes	10
No	0
Don’t know / can’t remember	Not applicable

Answered by all

F14. Were you given enough information about your own physical recovery after the birth?	
Yes, definitely	10
Yes, to some extent	5
No	0
No, but I did not need this information	Not applicable
Don’t know / can’t remember	Not applicable

Answered by all

F15. In the six weeks after the birth of your baby did you receive help and advice from a midwife or health visitor about feeding your baby?	
Yes, definitely	10
Yes, to some extent	5
No	0
I did not need any	Not applicable
Don’t know / can’t remember	Not applicable

Answered by all

F16. If, during evenings, nights or weekends, you needed support or advice about feeding your baby, were you able to get this?	
Yes, always	10
Yes, sometimes	5
No	0
I did not need this	Not applicable
Don't know / can't remember	Not applicable

Answered by all

F17. In the six weeks after the birth of your baby did you receive help and advice from health professionals about your baby's health and progress?	
Yes, definitely	10
Yes, to some extent	5
No	0
I did not need any	Not applicable
Don't know / can't remember	Not applicable

Answered by all

F18. Were you given enough information about any emotional changes you might experience after the birth?	
Yes, definitely	10
Yes, to some extent	5
No	0
No, but I did not need this information	Not applicable
Don't know / can't remember	Not applicable

Answered by all

F19. Were you told who you could contact if you needed advice about any emotional changes you might experience after the birth?	
Yes	10
No	0
Don't know / can't remember	Not applicable

Answered by all

F20. Were you given information or offered advice from a health professional about contraception?	
Yes	10
No	0
I did not want / need any advice	Not applicable
Don't know / can't remember	Not applicable

Answered by all

F21. Did a midwife tell you that you would need to arrange a postnatal check-up of your own health with your GP? (Around 6-8 weeks after the birth)	
Yes	10
No	0
Don’t know / can’t remember	Not applicable

Answered by all

Appendix B: Calculating the trust score and category

Calculating trust scores

The question and section scores for each trust, for each of the three reports, were calculated using the method described below.

Weights were calculated to adjust for any variation between trusts that resulted from differences in the age and parity groupings of respondents. A weight was calculated for each respondent by dividing the national proportion of respondents in their age/parity group by the corresponding trust proportion. The reason for weighting the data was that younger people tend to be more critical in their responses than older people and we have reason to believe parity may also influence responses to some questions. If a trust had a large population of young people, for example, their performance might be judged more harshly than if there was a more consistent distribution of age and parity of respondents.

Weighting survey responses

The first stage of the analysis involved calculating the national age/parity proportions. It must be noted that the term 'national proportion' is used loosely here as it was obtained from pooling the survey data from all trusts, and was therefore based on the respondent population rather than the entire population of England.

The questionnaire asked respondents to state their year of birth. The approximate age of each woman was then calculated by subtracting the year given from 2018. Parity was determined according to responses to question G3 ('How many babies have you given birth to before this pregnancy'). The respondents were then grouped according to the categories shown in Figure B1.

If a respondent did not fill in their year of birth on the questionnaire, this information was taken from the sample file. If information on a respondent's age was missing from both the questionnaire and the sample file, or if the respondent did not complete question G3 to provide information on parity, it was not possible to assign a weight and the woman was excluded from the analysis.

The national age/parity proportions relate to the proportion of women belonging to three age groups, split according to whether they have previously given birth to a child. As shown in Figure B1 example below, the proportion of respondents who were first time mothers (primiparous) aged 27 to 32 years is 0.209; the proportion of those who had previously had children (multiparous) and were aged 27 to 32 years is 0.162, etc.

Figure B1 National Proportions

Parity	Age Group	National proportion 2018
Primiparous	16-26	0.094
	27-32	0.209
	33 and over	0.189
Multiparous	16-26	0.040
	27-32	0.162
	33 and over	0.306

Note: All proportions are given to three decimals places for this example. The analysis included these figures to nine decimal places.

These proportions were then calculated for each trust, using the same procedure.

The next step was to calculate the weighting for each individual. Age/parity weightings were calculated for each respondent by dividing the national proportion of respondents in their age/parity group by the corresponding trust proportion.

If, for example, a lower proportion of primiparous women who were aged between 27 and 32 years within Trust A responded to the survey, in comparison with the national proportion, then this group would be under-represented in the final scores for the trust. Dividing the national proportion by the trust proportion results in a weighting greater than 1 for members of this group (Figure B2). This increases the influence of responses made by respondents within that group in the final score, thus counteracting the low representation.

Figure B2 Proportion and Weighting for Trust A

Parity	Age Group	National Proportion	Trust A Proportion	Trust A Weight (National/Trust A)
Primiparous	16-26	0.094	0.108	0.870
	27-32	0.209	0.099	2.111
	33 +	0.189	0.179	1.056
Multiparous	16-26	0.040	0.092	0.435
	27-32	0.162	0.175	0.926
	33+	0.306	0.299	1.023

Note: All proportions are given to three decimals places for this example. The analysis included these figures to nine decimal places

Likewise, if a considerably higher proportion of multiparous women aged 33 and over from Trust B responded to the survey (Figure B3), then this group would be over-represented within the sample, compared with national representation of this group. Subsequently this group would have a greater influence over the final scores for the trust. To counteract this, dividing the national proportion by the proportion for Trust B results in a weighting of less than 1 for this group.

Figure B3 Proportion and Weighting for Trust B

Parity	Age Group	National Proportion	Trust B Proportion	Trust B Weight (National/Trust B)
Primiparous	16-26	0.094	0.101	0.931
	27-32	0.209	0.125	1.672
	33+	0.189	0.189	1
Multiparous	16-26	0.040	0.045	0.889
	27-32	0.162	0.207	0.783
	33+	0.306	**0.324**	0.944

Note: All proportions are given to three decimals places for this example. The analysis included these figures to nine decimal places

To prevent the possibility of excessive weight being given to respondents in an extremely under-represented group, the maximum value for any weight was set at 5. There was no minimum weight for respondents as applying very small weights to over-represented groups does not have the same potential to give excessive impact to the responses of small numbers of individual respondents.

Calculating question scores

The trust score for each question displayed on the website and in the benchmark reports was calculated by applying the weighting for each respondent to the scores allocated to each response.

The below is a working example of this process for the 'care in hospital after birth' section of the questionnaire which, for simplicity, uses three respondents.

The responses given by each respondent were entered into a dataset using the 0-10 scale described in section 5.1 and outlined in Appendix A. Each row corresponded to an individual respondent, and each column related to a survey question. For those questions that the respondent did not answer (or received a 'not applicable' score for) the relevant cell remained empty. Alongside these were the weightings allocated to each respondent (Figure B4).

Figure B4 Scoring for the 'Care in hospital after the birth' section of the Labour and birth report, 2018 Maternity survey, Trust B

Respondent	**Scores**					
	D2	**D5**	**D6**	**D7**	**D8**	**Weight**
1	0	10	0	6.7	10	0.931
2		5		0	0	1
3	10	0	10	3.3		0.783

Respondents' scores for each question were then multiplied individually by the relevant weighting, in order to obtain the numerators for the trust scores (Figure B5).

Figure B5 Numerators for the 'Care in hospital after the birth' section of the Labour and birth report, 2018 Maternity survey, Trust B

Respondent	Numerators					
	D2	D5	D6	D7	D8	Weight
1	0.000	9.31	0.000	6.238	9.31	0.931
2		5.000		0.000	0.000	1
3	7.83	0.000	7.83	2.584		0.783

Obtaining the denominators for each domain score

A second dataset was then created. This contained a column for each question, and again with each row corresponding to an individual respondent. A value of one was entered for the questions where a response had been given by the respondent, and all questions that had been left unanswered or allocated a scoring of 'not applicable' were set to missing (Figure B6).

Figure B6 Values for non-missing responses, for the 'Care in hospital after the birth' section of the Labour and birth report, 2018 Maternity survey, Trust B

Respondent	Values					
	D2	D5	D6	D7	D8	Weight
1	1	1	1	1	1	0.931
2		1		1	1	1
3	1	1	1	1		0.783

The denominators were calculated by multiplying each of the cells within the second dataset by the weighting allocated to each respondent. This resulted in a figure for each question that the respondent had answered (Figure B7). Again, the cells relating to the questions that the respondent did not answer (or received a 'not applicable' score for) remained set to missing.

Figure B7 Denominators for the 'Care in hospital after the birth' section of the Labour and birth report, 2018 Maternity survey, Trust B

Respondent	Denominators					
	D2	D5	D6	D7	D8	Weight
1	0.931	0.931	0.931	0.931	0.931	0.931
2		1		1	1	1
3	0.783	0.783	0.783	0.783		0.783

The weighted mean score for each trust, for each question, was calculated by dividing the sum of the weighted scores for a question (i.e. numerators), by the weighted sum of all eligible respondents to the question (i.e. denominators) for each trust.

Using the example data for trust B, we first calculated weighted mean scores for each of the five questions that contributed to the ‘care in hospital after the birth’ section of the questionnaire.

D2: $\frac{0.000 + 7.83}{0.931 + 0.783} = 4.568$

D5: $\frac{9.31+5+0.000}{0.931+1+0.783} = 5.273$

D6: $\frac{0.000+7.83}{0.931+0.783} = 4.568$

D7: $\frac{6.238+0.000+2.584}{0.931+1+0.783} = 3.250$

D8: $\frac{9.31+0.000}{0.931+1} = 4.821$

Calculating section scores

A simple arithmetic mean of each trust’s question scores was then taken to give the score for each section. Continuing the example from above, then, trust B’s score for the ‘Care in hospital after the birth’ section of the 2018 Maternity survey ‘Labour and Birth’ report would be calculated as:

(4.568+5.273+4.658+3.250+4.821) / 5 = 4.514

Appendix C: Calculation of the expected ranges

Z statistics (or *Z* scores) are standardized scores derived from normally distributed data, where the value of the *Z* score translates directly to a *p*-value. That *p*-value then translates to what level of confidence you have in saying that a value is significantly different from the mean of your data (or your 'target' value).

A standard *Z* score for a given item is calculated as:

$$z_i = \frac{y_i - \theta_0}{s_i} \quad (1)$$

where: s_i is the standard error of the trust score[1],
y_i is the trust score
θ_0 is the mean score for all trusts

Under this banding scheme, a trust with a *Z* score of < -1.96 is labeled as 'Worse' (significantly below average; *p* <0.025 that the trust score is below the England average), -1.96 < *Z* < 1.96 as 'About the same', and *Z* > 1.96 as 'Better' (significantly above average; *p*<0.025 that the trust score is above the England average) than what would be expected based on the distribution of trust scores for England.

However, for measures where there is a high level of precision in the estimates (the survey sample sizes average around 400 to 500 per trust), the standard *Z* score may give a disproportionately high number of trusts in the significantly above/ below average bands (because s_i is generally so small). This is compounded by the fact that all the factors that may affect a trust's score cannot be controlled. For example, if trust scores are closely related to economic deprivation then there may be significant variation between trusts due to this factor, not necessarily due to factors within the trusts' control. In this situation, the data are said to be 'over dispersed'. That problem can be partially overcome by the use of an 'additive random effects model' to calculate the *Z* score (we refer to this modified *Z* score as the Z_D score). Under that model, we accept that there is natural variation between trust scores, and this variation is then taken into account by adding this to the trust's local standard error in the denominator of (1). In effect, rather than comparing each trust simply to one target value for England, we are comparing them to an England distribution.

The Z_D score for each question and section was calculated as the trust score minus the England mean score, divided by the standard error of the trust score plus the variance of the scores between trusts. This method of calculating a Z_D score differs from the standard method of calculating a *Z*-score in that it recognizes that there is likely to be natural variation between trusts which one should expect, and accept. Rather than comparing each trust to one point only (i.e. the England mean score), it compares each trust to a distribution of acceptable scores. This is achieved by adding some of the variance of the scores between trusts to the denominator.

The steps taken to calculate Z_D scores, based on the method presented in Spiegelhalter et al. (2012), are outlined below.

[1] Calculated using the method in Appendix D.

Winsorising Z-scores

The first step when calculating Z_D is to 'Winsorise' the standard Z scores (from (1)). Winsorising consists of shrinking in the extreme Z-scores to some selected percentile, using the following method:

1. Rank cases according to their naive Z-scores.

2. Identify Z_q and $Z_{(1-q)}$, the 100q% most extreme top and bottom naive Z-scores. For this work, we used a value of q=0.1

3. Set the lowest 100q% of Z-scores to Z_q, and the highest 100q% of Z-scores to $_{(1-q)}$. These are the Winsorised statistics.

This retains the same number of Z-scores but discounts the influence of outliers.

Estimation of over-dispersion

An over dispersion factor $\hat{\phi}$ is estimated for each indicator which allows us to say whether the data for that indicator are over dispersed or not:

$$\hat{\phi} = \frac{1}{I}\sum_{i=1}^{I} Z_i^2 \quad (2)$$

where *I* is the sample size (number of trusts) and z_i is the *Z*-score for the *i*th trust given by (1). The Winsorised *Z*-scores are used in estimating $\hat{\phi}$.

An additive random effects model

If *I* $\hat{\phi}$ is greater than (*I* - 1) then we need to estimate the expected variation between trusts. We take this as the standard deviation of the distribution of θ_i (trust means) for trusts, which are on target, we give this value the symbol $\hat{\tau}$, which is estimated using the following formula:

$$\hat{\tau}^2 = \frac{I\hat{\phi} - (I-1)}{\sum_i w_i - \sum_i w_i^2 \Big/ \sum_i w_i} \quad (3)$$

where $w_i = 1 / s_i^2$ and $\hat{\phi}$ is from (2). Once $\hat{\tau}$ has been estimated, the Z_D score is calculated as:

$$Z_i^D = \frac{y_i - \theta_0}{\sqrt{s_i^2 + \hat{\tau}^2}} \quad (4)$$

References

Spiegelhalter, D., Sherlaw-Johnson, C., Bardsley, M., Blunt, I., Wood, C., & Grigg, O. (2012). Statistical methods for healthcare regulation: Rating, screening and surveillance. *Journal of the Royal Statistical Society (Series A)*, *175*(1), 1-47.

Appendix D: Calculation of standard errors

To calculate statistical bandings from the data, it is necessary for CQC to have both trusts' scores for each question and section and the associated standard error. Since each section is based on an aggregation of question mean scores that are based on question responses, a standard error needs to be calculated using an appropriate methodology.

For the patient experience surveys, the z-scores are scores calculated for section and question scores, which combines relevant questions making up each section into one overall score, and uses the pooled variance of the question scores.

Assumptions and notation

The following notation will be used in formulae:

X_{ijk}	is the score for respondent *j* in trust *i* to question *k*
Q	is the number of questions within section *d*
w_{ij}	is the standardization weight calculated for respondent *j* in trust *i*
Y_{ik}	is the overall trust *i* score for question *k*
Y_{id}	is the overall score for section *d* for trust *i*

Associated with the subject or respondent is a weight w_{ij} corresponding to how well the respondent's age/parity is represented in the survey compared with the population of interest.

Calculating mean scores

Given the notation described above, it follows that the overall score for trust *i* on question *k* is given as:

$$Y_{ik} = \frac{\sum_j w_{ij} X_{ijk}}{\sum_j w_{ij}}$$

The overall score for section *d* for trust *i* is then the average of the trust-level question means within section *d*. This is given as:

$$Y_{id} = \frac{\sum_{k=1}^{Q} Y_{ikd}}{Q}$$

Calculating standard errors

Standard errors are calculated for both questions and sections.

For questions, the variance of the trust score is estimated with the Taylor series linearization method (see e.g. Lee & Forthofer, 2006; Lumley, 2004). The standard error of the trust score, s_i, is the square root of the Taylor series estimate of variance.

For sections, the variance within trust *i* on question *k* is given by:

$$\hat{\sigma}_{ik}^2 = \frac{\sum_j w_{ij}\left(X_{ijk} - Y_{ik}\right)^2}{\sum_j w_{ij}}$$

This assumes independence between respondents.

For ease of calculation, and as the sample size is large, we have used the biased estimate for variance.

The variance of the trust-level average question score, is then given by:

$$V_{ik} = Var(Y_{ik}) = Var\left(\frac{\sum_j w_{ij} X_{ijk}}{\sum_j w_{ij}}\right)$$

$$= \frac{Var\left(\sum_j w_{ij} X_{ijk}\right)}{\left(\sum_j w_{ij}\right)^2}$$

$$= \frac{\hat{\sigma}_{ik}^2 \sum_j w_{ij}^2}{\left(\sum_j w_{ij}\right)^2}$$

Covariances between pairs of questions (here, *k* and *m*) can be calculated in a similar way:

$$COV_{ik.im}. = Cov(Y_{ik}, Y_{im}) = \frac{\hat{\sigma}_{ikm} \sum_j w_{ij}^2}{\left(\sum_j w_{ij}\right)^2}$$

Where $\hat{\sigma}_{ikm} = \frac{\sum_j w_{ij}(X_{ijk} - Y_{ik})(X_{ijm} - Y_{im})}{\sum_j w_{ij}}$

Note: w_{ij} is set to zero in cases where patient *j* in trust *i* did not answer both questions *k* and *m*.

The trust-level variance for the section score *d* for trust *i* is given by:

$$V_{id} = Var(Y_{id}) = \frac{1}{Q^2}\left\{\sum_{k=1}^{Q} V_{ik} + 2\sum_{k=2}^{Q}\sum_{m=1}^{k-1} COV_{ik,im}\right\}$$

The standard error of the section score is then:

$$SE_{id} = \sqrt{V_{id}}$$

This simple case can be extended to cover sections of greater length.

References

Lee, E. S., & Forthofer, R. N. (2006). *Analyzing complex survey data* (2nd ed.). Thousand Oaks, CA: Sage. http://dx.doi.org/10.4135/9781412983341

Lumley, T. (2004). Analysis of complex survey samples. *Journal of Statistical Software*, *9*. doi: 10.18637/jss.v009.i08