Care Quality Commission

Care Quality Commission (CQC)

Technical details – 2016 Community Mental Health Survey

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1. INTRODUCTION

This document outlines the methods used by the Care Quality Commission to score and analyse the trust level results for the 2016 Community Mental Health Survey, as available on the Care Quality Commission 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 done using a statistic called the **‘expected range’** (see section 5.3). 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: **www.cqc.org.uk/cmhsurvey**

The CQC webpage also contains a statistical release document containing England level results, alongside relevant national policy and comparisons with the results from the 2014 and 2015 surveys. Further information on the survey is available in the Quality and Methodology report.

A benchmark report is also available for each trust. Results displayed in the benchmark report are a graphical representation of the results displayed for the public on the CQC website (see further information section 6). These have been provided to all trusts and will be available on the survey co-ordination centre website at: **www.nhssurveys.org/surveys/981**. The tables in the back of each benchmark report also highlight any statistically significant changes in the trust score between 2016 and 2015.

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 5.1 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: ‘In the last 12 months, have you been receiving any medicines for your mental health needs?’) or those used for descriptive or information purposes (such as: When was the last time you saw someone from NHS mental health services?).

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 as completed by respondents. For example, the Community Mental Health Survey includes sections on ‘health and social care workers,’ ‘organising your care’ and ‘planning your care’ amongst others. The only exception to this is Q3 which is included in the ‘overall views of care and services’ section.

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

- Better
- About the same
- Worse

This analysis is done using a statistic called the **‘expected range’** (see section 5.3)

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, so that as well as meeting their needs, it presents the groupings of the trust results in a simple and fair way, to show 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 found from the A to Z link available at:
www.cqc.org.uk/cmhsurvey

Or by searching for a provider from the CQC home page, then clicking on ‘ Surveys’.

4. THE TRUST BENCHMARK REPORTS

Benchmark reports should be used by NHS trusts to identify how they are performing in relation to most other trusts that took part in the survey. Tables at the back of the report show if a score has significantly increased or decreased compared with the last survey in 2015. From this, areas for improvement can be identified. The reports are available from the Survey Co-ordination Centre website:
www.nhssurveys.org/surveys/981

The graphs included in the reports display the scores for a trust, compared with the full range of results from all other trusts that took part in the survey. Each bar represents the range of results for each question across all trusts that took part in the survey. In the graphs, the bar is divided into three sections:

- If a trust score lies in the orange section of the graph, the trust result is ‘about the same’ as most other trusts in the survey
- If a trust scores lies in the red section of the graph, the trust result 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 result is ‘better’ than expected when compared with most other trusts in the survey

A black diamond represents the score for this trust. The black diamond (score) is not shown for questions answered by fewer than 30 people because the uncertainty around the result would be too great.

5. INTERPRETING THE DATA

5.1 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 respondent’s experience could be improved. A score of 0 was assigned to all responses that reflect considerable scope

for improvement, whereas a response that was assigned a score of 10 referred to the most positive experience reported. Where a number of options lay between the negative and positive responses, they were placed at equal intervals along the scale. Where options were provided that did not have any bearing on the trust's performance in terms of peoples' experience, the responses were classified as "not applicable" and a score was not given. Where respondents stated they could not remember or did not know the answer to a question, a score was not given. The average score for all respondents within each trust is then presented, having applied standardisation (see 5.2 below).

5.2 Standardisation

Results are based on 'standardised' data. We know that the views of a respondent can reflect not only their experience of NHS services, but can also relate to certain demographic characteristics, such as their age and sex. For example, older respondents tend to report more positive experiences than younger respondents, and women tend to report less positive experiences than men. Because the mix of people using services varies across trusts (for example, one trust may serve a considerably older population than another), this could potentially lead to the results for a trust appearing better or worse than they would if they had a slightly different profile of people using services. 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. In most cases this will not have a large impact on trust results; it does, however, make comparisons between trusts as fair as possible.

The Community Mental Health Survey is standardised by **age and gender**.

5.3 Expected range

The better / about the same / worse categories are based on the 'expected range' that 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 to be made in terms of each trust's performance. This approach presents the findings in a way that takes account of all necessary factors, yet is presented in a simple manner.

As the 'expected range' calculation takes into account 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.

5.4 Conclusions made on performance

It should be noted that the data only shows performance relative to other trusts: we have not set out absolute thresholds for 'good' or 'bad' performance. Thus, a trust may score lowly relative to others on a certain question whilst still performing very well on the whole. This is particularly true on questions where the majority of trusts score very highly.

It is also important to remember that there is no overall indicator or figure for 'patient experience', so it is not accurate to say that a trust is the 'best in the country' or 'best

in the region' *overall*. Adding up the number of 'better' and 'worse' categories to find out which trust did better or worse overall will be misleading if the limitations are not recognised. The number of questions on each aspect of patient experience in the survey varies, and so will trusts' performance across these. So if you counted across all of the questions, some topics will have more influence on the overall average than others, when in fact some might not be so important. For more detailed scrutiny of performance, it is more comprehensive to look at trusts individual reports and assess performance by individual questions.

5.5 Comparing scores across survey years or within trusts

The expected range statistic is used to arrive at a judgement of how a trust is performing for each question that is able to be scored compared with most other trusts that took part in the survey.

If you want to use the scored data in another way, to compare scores across survey years, or between different trusts, you will need to undertake an appropriate statistical test to ensure that any changes are 'statistically significant'. 'Statistically significant' means that you can be very confident that any difference between scores is real and not due to chance.

If making comparisons between different survey years, please be aware that the survey questionnaire is continuously reviewed to ensure that it covers as many aspects about people's experiences of their care and treatment as is reasonable within a limited survey, and to ensure that it remains in line with current policy. This means that changes may have made to the questionnaire over time that will affect comparability, for example, questions and their response options may be modified and questions may be removed to allow new questions. Due to this, question numbering may also change so particular care should be taken to ensure that comparisons are made to the correct question.

Please note that due to redevelopment work, results from the 2016 survey are only comparable with the results from the 2014 and 2015 surveys[1].

The results for most questions from the 2016 survey are comparable with the 2015, and 2014 survey. Three questions included in the 2015 survey were removed, two questions added, a minor amendment made to one question and the title changed for one of the questionnaire sections.

For more details regarding the questionnaire changes please see the 'Development Report for the Community Mental Health Survey 2016' available here:
www.nhssurveys.org/survey/1730

For more information on which questions from 2016 are able to be compared with 2015, and 2014, please see appendix A of the statistical release available here:
www.cqc.org.uk/cmhsurvey

[1] Please note that the survey was also substantially redeveloped in 2010. This means that surveys carried out between 2010 and 2013 are comparable with each other but not with any other surveys

6. 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:
www.cqc.org.uk/cmhsurvey

The results from previous community mental health surveys that took place between 2004 and 2008,[2] and between 2010 and 2013 are available at the link below. Please note that due to redevelopment work, results from the 2016 survey are only comparable with 2015 and 2014[3]:
www.nhssurveys.org/surveys/290

Full details of the methodology for the survey, including questionnaires, letters sent to people who use services, instructions on how to carry out the survey and the survey development report, are available at:
www.nhssurveys.org/surveys/877

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

[2] In 2009 a survey of mental health inpatient services took place
[3] Please note that the survey was also substantially redeveloped in 2010. This means that results from the 2010 survey are not comparable with those from 2004-2008.

APPENDIX A: SCORING FOR THE 2016 COMMUNITY MENTAL HEALTH SURVEY RESULTS

The following describes the scoring system applied to the evaluative questions in the survey. Taking question four as an example (Figure A1), it asks respondents if the person or people that they saw listened carefully to them. The option of 'No' was allocated a score of 0, as this suggests that the respondents experiences needs to be improved. A score of 10 was assigned to the option 'Yes, definitely', as it reflects a positive experience. The remaining option, 'Yes, to some extent', was assigned a score of 5 as respondent did not feel fully listened to. Hence it was placed on the midpoint of the scale.

If the respondent did not know, this was classified as a 'not applicable' response, as this option was not a direct measure of the trust.

Figure A1 Scoring example:
Question 4 (2016 Community Mental Health Survey)

4. Did the person or people you saw listen carefully to you?	
Yes, definitely	10
Yes, to some extent	5
No	0
Don't know / can't remember	Not applicable

Where a number of options lay between the negative and positive responses, they were placed at equal intervals along the scale. For example, question 10 asks how well the person who is in charge of organising their care organises the care and services they receive (Figure A2). The following response options were available:

- Very well
- Quite well
- Not very well
- Not at all well

A score of 10 was assigned to the option 'Very well', as this represents best outcome in terms of peoples' experiences. A response of 'not at all well' was given a score of 0. The remaining two answers were assigned a score that reflected their position in terms of quality of experience, spread evenly across the scale and shown in Figure A2 below.

Figure A2 Scoring example:
Question 10 (2016 Community Mental Health Survey)

10. How well does this person organise the care and services you need?	
Very well	10
Quite well	6.7
Not very well	3.3
Not at all well	0

Details of the method used to calculate the scores for each trust and for individual questions, are available in Appendix B. This also includes an explanation of the technique used to identify scores that are better, worse or about the same as most other trusts.

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: **www.nhssurveys.org/surveys/944**

As part of the cleaning process, responses are removed from any trust that has fewer than 30 respondents to a question. This is because the uncertainty around the result is too high, and very low numbers would risk respondents being recognised from their responses.

Please also note that as part of the data cleaning process, responses are removed from the following questions:

Q9 and Q10:
Q9 *Do you know how to contact this person if you have a concern about your care?*
Q10 *How well does this person organise the care and services you need?*
Respondents who stated at Q8 that their GP is in charge of organising their care and services have been removed from the base for these questions. This is because results will not be attributable to the mental health trust.

Q14:
In the last 12 months have you had a formal meeting with someone from NHS mental health services to discuss how your care is working?
As the question specifies a time period of ‘the last 12 months’ respondents who stated at Q2 they had been in contact with mental health services for less than a year have been removed from the base for this question. This is because it is not fair to penalise trusts for not having reviewed a person’s care, if they have not been in contact with services for long enough to have reasonably expected them to have had a care review.

Q15 and Q16:
Q15 *Were you involved as much as you wanted to be in discussing how your care is working?*
Q16 *Did you feel that decisions were made together by you and the person you saw during this discussion?*
This year we have revised the analysis rules for Q15 and Q16, to be consistent with that applied to Q14.

This new approach also removes respondents who stated at Q2 they had been in contact with mental health services for less than a year from the results for Q15 and Q16 because we cannot be certain that respondents were referring to a care review.

The results from the 2015 survey for these questions have been rerun to match the revised approach. This means that the 2015 responses to Q15 and Q16 published in the tables section of the benchmark report may be slightly different to those published in the 2015 benchmark report.

Section 1: Health and social care workers

4. Did the person or people you saw listen carefully to you?	
Yes, definitely	10
Yes, to some extent	5
No	0
Don't know / can't remember	Not applicable

Answered by all

5. Were you given enough time to discuss your needs and treatment?	
Yes, definitely	10
Yes, to some extent	5
No	0
Don't know / can't remember	Not applicable

Answered by all

6. Did the person or people you saw understand how your mental health needs affect other areas of your life?	
Yes, definitely	10
Yes, to some extent	5
No	0
Don't know / can't remember	Not applicable

Answered by all

Section 2: Organising Your Care

7. Have you been told who is in charge of organising your care and services? (This person can be anyone providing your care, and may be called a "care coordinator" or "lead professional".)	
Yes	10
No	0
Not sure	Not applicable

Answered by all

9. Do you know how to contact this person if you have a concern about your care?	
Yes	10
No	0
Not sure	Not applicable

Answered by those who had been told who was in charge of organising their care
Note: respondents whose GP is in charge of their care and service are excluded

10. How well does this person organise the care and services you need?	
Very well	10
Quite well	6.7
Not very well	3.3
Not at all well	0

Answered by those who had been told who was in charge of organising their care
Note: respondents whose GP is in charge of their care and service are excluded

Section 3: Planning your care

11. Have you agreed with someone from NHS mental health services what care you will receive?	
Yes, definitely	10
Yes, to some extent	5
No	0

Answered by all

12. Were you involved as much as you wanted to be in agreeing what care you will receive?	
Yes, definitely	10
Yes, to some extent	5
No, but I wanted to be	0
No, but I did not want to be	Not applicable
Don’t know / can’t remember	Not applicable

Answered by those who had agreed with someone from NHS mental health services what care they will receive

13. Does this agreement on what care you will receive take your personal circumstances into account?	
Yes, definitely	10
Yes, to some extent	5
No	0
Don’t know / can’t remember	Not applicable

Answered by those who had agreed with someone from NHS mental health services what care they will receive

Section 4: Reviewing your care

14. In the last 12 months have you had a formal meeting with someone from NHS mental health services to discuss how your care is working?	
Yes	10
No	0
Don't know / can't remember	Not applicable

Answered by all
Note: respondents who have been in contact with NHS mental health services for less than a year are excluded

15. Were you involved as much as you wanted to be in discussing how your care is working?	
Yes, definitely	10
Yes, to some extent	5
No, but I wanted to be	0
No, but I did not want to be	Not applicable
Don't know / can't remember	Not applicable

Answered by those who had a formal meeting with someone from NHS mental health services to discuss how their care is working in the last 12 months
Note: respondents who have been in contact with NHS mental health services for less than a year are excluded

16. Did you feel that decisions were made together by you and the person you saw during this discussion?	
Yes, definitely	10
Yes, to some extent	5
No	0
I did not want to be involved in making decisions	Not applicable
Don't know / can't remember	Not applicable

Answered by those who had a formal meeting with someone from NHS mental health services to discuss how their care is working in the last 12 months
Note: respondents who have been in contact with NHS mental health services for less than a year are excluded

Section 5: Changes in who you see

18. Were the reasons for this change explained to you at the time?	
Yes, completely	10
Yes, to some extent	5
No	0
No explanation was needed	Not applicable

Answered by those for whom the people they see for their care or services had changed in the last 12 months
Note: new question 2016.

19. What impact has this had on the care you receive?	
It got better	10
It stayed the same	10
It got worse	0
Not sure	Not applicable

Answered by those for whom the people they see for their care or services had changed in the last 12 months
Note: due to a change in the response options at Q17 (not scored) which routes respondents to this question based on their answer, this question is not comparable with previous years

20. Did you know who was in charge of organising your care while this change was taking place?	
Yes	10
No	0
Not sure	Not applicable

Answered by those for whom the people they see for their care or services had changed in the last 12 months
Note: due to a change in the response options at Q17 (not scored) which routes respondents to this question based on their answer, this question is not comparable with previous years

Section 6: Crisis care

21. Do you know who to contact out of office hours if you have a crisis? This could be a person or a team within NHS mental health services.	
Yes	10
No	0
Not sure	Not applicable

Answered by all

23. When you tried to contact them, did you get the help you needed?	
Yes, definitely	10
Yes, to some extent	5
No	0
I could not contact them	0

Answered by those who knew who to contact out of office hours in the event of a crisis, and who had tried to contact this person or team in the last 12 months

Section 7: Treatments

25. Were you involved as much as you wanted to be in decisions about which medicines you receive?	
Yes, definitely	10
Yes, to some extent	5
No, but I wanted to be	0
No, but I did not want to be	Not applicable
Don’t know / can’t remember	Not applicable

Answered by those who had been receiving medicines for their mental health needs in the last 12 months

27. The last time you had a new medicine prescribed for your mental health needs, were you given information about it in a way that you were able to understand?	
Yes, definitely	10
Yes, to some extent	5
No	0
I was not given any information	0

Answered by those prescribed any new medicines for their mental health needs in the last 12 months

29. In the last 12 months, has an NHS mental health worker checked with you about how you are getting on with your medicines? (That is, have your medicines been reviewed?)	
Yes	10
No	0
Don’t know / can’t remember	Not applicable

Answered by those who have been receiving medicines for their mental health needs for 12 months or longer

31. Were these treatments or therapies explained to you in a way you could understand?	
Yes, completely	10
Yes, to some extent	5
No	0
No explanation was needed	Not applicable

Answered by those who have received any treatments or therapies that do not involve medicines in the last 12 months
Note: new question 2016

32. Were you involved as much as you wanted to be in deciding what treatments or therapies to use?	
Yes, definitely	10
Yes, to some extent	5
No, but I wanted to be	0
No, but I did not want to be	Not applicable
Don't know / can't remember	Not applicable

Answered by those who have received any treatments or therapies that do not involve medicines in the last 12 months

Section 8: Support and wellbeing

33. In the last 12 months, did NHS mental health services give you any help or advice with finding support for physical health needs (this might be an injury, a disability, or a condition such as diabetes, epilepsy, etc.)?	
Yes, definitely	10
Yes, to some extent	5
No, but I would have liked help or advice with finding support	0
I have support and did not need help / advice to find it	Not applicable
I do not need support for this	Not applicable
I do not have physical health needs	Not applicable

Answered by all

34. In the last 12 months, did NHS mental health services give you any help or advice with finding support for financial advice or benefits?	
Yes, definitely	10
Yes, to some extent	5
No, but I would have liked help or advice with finding support	0
I have support and did not need help / advice to find it	Not applicable
I do not need support for this	Not applicable

Answered by all

35. In the last 12 months, did NHS mental health services give you any help or advice with finding support for finding or keeping work?	
Yes, definitely	10
Yes, to some extent	5
No, but I would have liked help or advice with finding support	0
I have support and did not need help / advice to find it	Not applicable
I do not need support for this	Not applicable
I am not currently in or seeking work	Not applicable

Answered by all

36. Has someone from NHS mental health services supported you in taking part in an activity locally?	
Yes, definitely	10
Yes, to some extent	5
No, but I would have liked this	0
I did not want this / I did not need this	Not applicable

Answered by all

37. Have NHS mental health services involved a member of your family or someone else close to you as much as you would like?	
Yes, definitely	10
Yes, to some extent	5
No, not as much as I would like	0
No, they have involved them too much	0
My friends or family did not want to be involved	Not applicable
I did not want my friends or family to be involved	Not applicable
This does not apply to me	Not applicable

Answered by all

38. Have you been given information by NHS mental health services about getting support from people who have experience of the same mental health needs as you?	
Yes, definitely	10
Yes, to some extent	5
No, but I would have liked this	0
I did not want this	Not applicable

Answered by all

39. Do the people you see through NHS mental health services help you with what is important to you?	
Yes, always	10
Yes, sometimes	5
No	0

Answered by all

Note: It is not clear if the change in the result for this question in 2016 was caused by a change in the ordering of the questions, with a question asked in 2015 removed. Therefore this question is not comparable with 2015 or 2014.

Section 9: Overall views of care and treatment

3. In the last 12 months, do you feel you have seen NHS mental health services often enough for your needs?	
Yes, definitely	10
Yes, to some extent	5
No	0
It is too often	Not applicable
Don't know	Not applicable

Answered by all
Note: this question is included in the 'overall experiences' section in the trust results on the CQC website, and in the benchmark report for each trust.

41. Overall in the last 12 months, did you feel that you were treated with respect and dignity by NHS mental health services?	
Yes, always	10
Yes, sometimes	5
No	0

Answered by all

Section 10: Overall experiences

40. Overall…	
I had a very poor experience	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
I had a very good experience	10

Answered by all

APPENDIX B: CALCULATING THE TRUST SCORE AND WEIGHT

Calculating trust scores

The scores for each question and for each section in each trust 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 gender groupings of respondents. A weight was calculated for each respondent by dividing the England proportion of respondents (based on all respondents to the survey) in their age/sex group by the corresponding trust proportion. The reason for weighting the data was that younger people and women tend to be more critical in their responses than older people and men. If a trust had a large population of young people or women, their performance might be judged more negatively than if there was a more consistent distribution of age and sex of respondents.

Weighting survey responses

The first stage of the analysis involved calculating the 'England proportion'. These were based on all respondents across all trusts. It must be noted that the term 'England proportion' in this context refers to the respondent population rather than the entire population of England as it was obtained from pooling the survey data from all trusts.. More detail on the rationale for this is provided in the Quality and Methodology report, available from the CQC website (see section 6).

The questionnaire asked respondents to state their year of birth. The approximate age of each respondent was then calculated by subtracting the figure given from 2016. The respondents were then grouped according to the categories shown in Figure B1.

If a respondent did not fill in their year of birth or sex on the questionnaire, this information was inputted from the sample file. If information on a respondent's age and/or sex was missing from both the questionnaire and the sample file, the respondent was excluded from the analysis as it is not possible to assign a weight.

The England age/sex proportions relate to the proportion of men and women within different age groups. As shown in Figure B1 below, the proportion of respondents who were male and aged 51 to 65 years is 0.113; the proportion who were women and aged 51 to 65 years is 0.136, etc.

Figure B1 England Proportions

Sex	Age Group	England proportion 2016
Men	≤35	0.055
	36-50	0.097
	51-65	0.113
	66+	0.174
Women	≤35	0.088
	36-50	0.118
	51-65	0.136
	66+	0.219

Note: All proportions are given to three decimals places for this example for simplicity. 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/sex weightings were calculated for each respondent by dividing the England proportion of respondents in their age/sex group by the corresponding trust proportion.

If, for example, a lower proportion of men who were aged between 51 and 65 years within Trust A responded to the survey, in comparison with the England proportion, then this group would be under-represented in the final scores for the trust. Dividing the England proportion by the trust proportion results in a weighting greater than one 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

Sex	Age Group	England proportion 2016	Trust A Proportion	Trust A Weight (England/Trust A)
Men	≤35	0.055	0.036	1.528
	36-50	0.097	0.071	1.366
	51-65	0.113	0.094	1.202
	66+	0.174	0.189	0.921
Women	≤35	0.088	0.092	0.957
	36-50	0.118	0.114	1.035
	51-65	0.136	0.168	0.810
	66+	0.219	0.236	0.928

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

Likewise, if a considerably higher proportion of women aged between 36 and 50 from Trust B responded to the survey (Figure B3), then this group would be over-represented within the sample, compared with England representation of this group. Subsequently this group would have a greater influence over the final scores for the trust. To counteract this, dividing the England proportion by the proportion for Trust B results in a weighting of less than one for this group.

Figure B3 Proportion and Weighting for Trust B

Sex	Age Group	England proportion 2016	Trust B Proportion	Trust B Weight (England/Trust B)
Men	≤35	0.055	0.032	1.719
	36-50	0.097	0.058	1.672
	51-65	0.113	0.124	0.911
	66+	0.174	0.188	0.926
Women	≤35	0.088	0.068	1.294
	36-50	0.118	0.207	0.570
	51-65	0.136	0.112	1.214
	66+	0.219	0.211	1.038

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 five. 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 'health and social care workers' 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 'Health and Social Care workers' section, 2016 Community Mental Health survey, Trust B

Respondent	**Scores**			**Weight**
	Q4	**Q5**	**Q6**	
1	5	.	10	1.719
2	10	10	5	0.570
3	5	0	0	0.926

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 'Health and Social Care workers' section, 2016 Community Mental Health survey, Trust B

Respondent	Scores			Weight
	Q4	Q5	Q6	
1	8.595		17.190	1.719
2	5.700	5.700	2.850	0.570
3	4.630	0.000	0.000	0.926

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, 'Health and Social Care workers' section, 2016 Community Mental Health survey, Trust B

Respondent	Scores			Weight
	Q4	Q5	Q6	
1	1	.	1	1.719
2	1	1	1	0.570
3	1	1	1	0.926

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 'Health and Social Care workers' section, 2016 Community Mental Health survey, Trust B

Respondent	Scores			Weight
	Q4	Q5	Q6	
1	1.719		1.719	1.719
2	0.570	0.570	0.570	0.570
3	0.926	0.926	0.926	0.926

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 three questions that contributed to the 'health and social care workers' section of the questionnaire.

Q4: $\frac{8.595 + 5.700 + 4.630}{1.719 + 0.570 + 0.926} = 5.886$

Q5: $\frac{5.700 + 0.000}{0.570 + 0.926} = 3.810$

Q6: $\frac{17.190 + 2.850 + 0.00}{1.719 + 0.570 + 0.926} = 6.233$

Calculating section scores

A simple arithmetical mean of each trust's question scores was then taken to give the score for each section. Continuing the example from above, Trust B's score for the 'health and social care section' section of the Community Mental Health Survey would be calculated as:

(5.886 + 3.810 + 6.233) / 3 = 5.310

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:

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

where: s_i is the standard error of the trust score[4],
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 are outlined below.

[4] 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:

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

APPENDIX D: CALCULATION OF STANDARD ERRORS

In order 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/sex 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 sections and questions.

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.