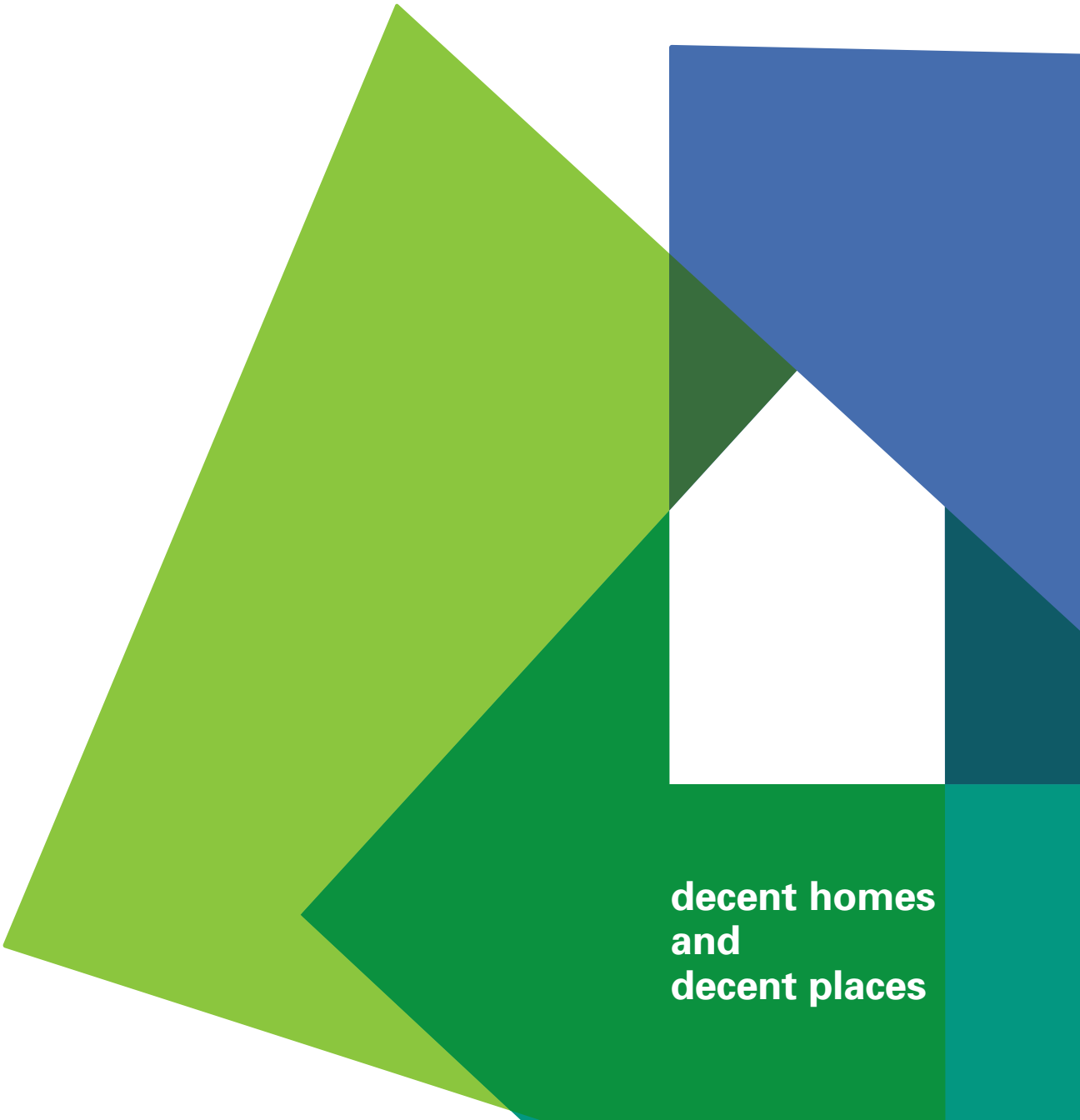
Communities and Local Government

English House Condition Survey

Technical Report (2004 Edition)



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Decent Homes and Decent Places

With effect of 5 May 2006 the responsibilities of the Office of the Deputy Prime Minister were passed to the Department for Communities and Local Government.

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Overview of the survey

1 This report sets out the methodological background to the English Housing Condition Survey (EHCS) Continuous Survey. It will be updated annually to reflect any changes to the way the survey is conducted.

The move to a continuous system

2 From April 2002 the EHCS has been run on a continuous basis with fieldwork conducted in four eight week periods throughout the year. Previously, the survey had been run on a five-yearly basis with the last quinquennial survey run in 2001. The survey methodology has remained largely unchanged from 2001, but there have been changes to the sampling structure which are discussed in Chapter 2.

3 The move to continuous fieldwork will enable Communities and Local Government to monitor the Government's targets relating to the provision of decent housing on an annual basis. The move also brings a number of other analytical advantages (once sufficient years' data are available). It will in the future provide an enhanced database as national and regional data from several years can be combined to support detailed analyses for small but key sub-sectors of stock.

4 Contractual and operational advantages are also being gained through cumulative investment in systems and staff leading to improvements in data quality and greater cost efficiency.

5 The survey is being managed on behalf of the Department by the Office for National Statistics (ONS) who are undertaking the interviews with householders as well as all sampling weighting and data validation. ONS are also responsible for the follow up interviews with private landlords and a desk based exercise to collect market valuations of the sampled properties.

6 ONS are working in partnership with Miller Mitchell Burley Lane who are responsible for undertaking the visual inspection of all the sampled properties each year. They employ a large field force of professional surveyors who work in close co-operation with the interviewers from ONS to maximise response to the survey and deliver high quality data.

7 The Building Research Establishment (BRE) continue to operate as a development partner for the EHCS. They are responsible for developing the physical survey questionnaire and surveyor training manuals, and delivering surveyor training sessions. They are also involved in validating and analysing the data, and are responsible for developing and running models to create analytical variables such as repair costs.

8 The survey is conducted for around 8,000 sampled addresses annually where a household interview (if occupied dwelling), a visual property inspection and a market valuation are completed.

9 Results from the continuous survey are being reported annually on a two-year rolling basis. The set of results reported on here (EHCS 2004) is based on data collected in the two years of fieldwork between April 2003 and March 2005. The next round of reporting (EHCS 2005) will cover the period April 2004 to March 2006, and so forth. This approach provides an increased sample and a more robust base for reporting.

10 Throughout this report, 2003-04 and 2004-05 denote the second and third years of continuous survey fieldwork, and 2004 denotes the dataset formed by combining the data from these two years.

Chapter 1

Survey methodology

Interview survey

1 The interview survey with householders was undertaken as the first stage in the sequence of EHCS surveys. ONS was responsible for managing the survey fieldwork, and the interviews were conducted by its own field force of interviewers. An important innovation, compared to previous EHCS, was the introduction of an appointment system for the physical survey. ONS interviewers had responsibility for making these appointments.

2 The interviews were conducted using computer-assisted personal interviewing (CAPI) which provided automatic routeing and range checks. Other checks were also built into the CAPI system to highlight possible errors whilst the interview was in progress and so allow clarification and correction to be sought from the respondent.

3 A small scale pilot was undertaken in February 2002 in order to test the questionnaire, data transmission and appointment systems. This led to a small number of amendments.

4 Before starting work on the survey all interviewers attended a one day briefing course. Interviewers who had worked on the EHCS in the previous year were required to work through a postal refresher pack. The briefing included background information on the purposes and uses of the survey to help interviewers explain and sell the survey on the doorstep.

5 Fieldwork was organised on a quarterly basis and took place in two months out of each quarter. In a slight change from previous years, interviewers had two periods of three weeks in which to undertake their quota of work. Advance letters were issued to interviewers which they posted to their sample addresses a few days before they expected to visit. Interviewers were also provided with information leaflets for respondents which included descriptions of the physical survey and space to record the date and time of the appointment and the name of the surveyor.

6 The contact procedures were based on those used for the 2001 EHCS but with the key change that interviewers had responsibility for dwelling identification and selection. Interviewers also provided 'first impressions' of the property and the neighbourhood; determined eligibility including sifting of owner-occupiers; and, collected information from neighbours about non-contacts and unoccupied addresses. They identified the primary household (the household responsible for the payment of rent/mortgage); where there were several primary households they selected one at random. Interviewers also identified the household reference person (HRP) before interviewing either the HRP or their partner.

7 The interview content was reviewed for each year to ensure it continued to reflect the information needs of Communities and Local Government and to reduce where possible the overall length of the interview. Changes during the period of this report include the addition of a small number of extra questions on respondents' views on their homes and neighbourhoods, and, in 2004-05, the inclusion of squatters as respondents, and removal of questions on walking distance to facilities and reasons for wanting to move.

8 The core questionnaire however remained largely unchanged from 2001, focusing on household characteristics, attitudes to the state of repair of the home, housing related costs, income, responsibility for maintenance and satisfaction with landlords. The average interview length was around 40 minutes compared to 45 minutes in 2001.

9 As part of the interview, private sector tenants were asked for permission to contact their landlord and to provide their landlord contact details. Those cases where this permission was given, and contacts could be successfully traced, form the sample for the EHCS Private Landlord Survey. This survey is used to determine the size and composition of different groups of landlords, their property portfolio, why they are involved in renting, how they approach the maintenance and management of their properties, their future plans and their views on a range of issues within the private sector market.

10 The 2003-04 Private Landlord Survey was conducted during September and October 2004; 624 interviews were achieved, representing 70% of the final eligible issued samples. The findings from this Private Landlord Survey form the subject of a separate EHCS report. Cases from the 2004-05 and 2005-06 main surveys will be combined to form the sample for a Private Landlord Survey to be conducted in 2006.

Physical survey

11 The new appointment system for the physical survey was a radical change for surveyors. In previous surveys they had been allocated a batch of addresses where an interview had been conducted and they had to make contact and seek permission for the survey.

12 A dedicated management structure was established by MMBL for the physical survey, with a Project Manager and 5 full-time Regional Managers (RMs) managing the fieldwork. This team was in place for the pilot. The geographical territories of the RMs were broadly based on Government Office Regions (GORs). Another change from previous EHCS is that RMs now undertake all the surveys of Houses in Multiple Occupation (HMO).

13 Due to high retention rates, 93% of all surveyors in 2003-04 and 2004-05 were experienced EHCS surveyors. These figures exclude the Project Manager and Regional Managers who were all experienced EHCS surveyors who acted as supervisors on the 2001 EHCS.

14 A training programme for new surveyors was devised by BRE. All new surveyors initially attend a 6 day intensive residential training course. This involves both desk based and practical sessions. In subsequent years surveyors attend 2 day refresher briefings.

15 Prior to attending the introductory briefing, surveyors were provided with the detailed surveyor manual, a training video and a set of exercises and asked to undertake some preparatory work.

16 Regional Managers were responsible for managing their region's surveyors and for carrying out appraisals of their individual surveyors' performances.

17 Rules were agreed on the maximum number of surveys any one surveyor could complete and the number that could be completed within any government office region. These were to address issues related to the impact of surveyor variability. The rules were designed to minimise the effect any one surveyor could have on the results of any one region or category of property. These rules therefore contributed to improving the statistical reliability of the survey and providing more robust measures of housing condition below the national level. Full details of the impact of surveyor variability on survey results are given in Chapter 3.

18 Surveyors were asked to try to undertake a full inspection at all addresses at which a successful interview took place and all addresses that were identified as vacant. Overall, 8,807 occupied and 992 vacant addresses were issued to surveyors for the 2003-04 survey, and 9,176 occupied and 926 vacant addresses for the 2004-05 physical survey.

19 Data collection continued to be paper based requiring surveyors to record details of the nature and type of each dwelling; the presence and condition of facilities and services; the condition of the internal and external building fabric; the presence and condition of shared facilities and services in blocks of flats or on estates and an assessment of the environment in which the dwelling was located.

20 In addition to the completed survey form photographs of the dwellings and the local environment were taken. Four digital photographs were taken of the dwelling and streetscape. The survey took approximately one hour on average.

21 Surveyors then sent the completed forms and photos to their RMs who undertook a visual inspection of the form based on an agreed set of criteria. Poor quality or incomplete forms were returned to surveyors and problems discussed. Acceptable forms were then sent to ONS for data entry and validation. All forms and disks containing the photos were bar coded.

22 As in 2001, up to 5 rooms could be reported on in detail and these were pre-specified (living rooms, bedroom, kitchen, bathroom and circulation space).

23 A method of measuring any shift in the way surveyors were assessing properties, based on a series of calibrated workbook exercises, was introduced. The workbooks are completed annually after the majority of fieldwork has been undertaken. Comparisons are made with the baseline established in 2001 to provide a robust means of identifying and measuring any shift in the way that surveyors record disrepair. To date, no significant shifts have been found. More details of the calibration workbook methodology are given in Chapter 3.

24 Surveyors were instructed to make every reasonable attempt to carry out full surveys, including at dwellings that were known to be vacant, and to complete the standard survey schedule. A total of 8,062 full surveys including 320 at vacant properties were achieved in 2003-04, and 8,440 full surveys, including 308, in 2004-05.

The market value survey

25 The market value survey was undertaken following completion of the physical survey. The Valuation Office Agency were contracted to value all dwellings for which a full physical survey had been achieved. In both 2003-04 and 2004-05, data were collected via a dedicated website set up and managed by ONS.

26 Valuers were provided with photographs and a brief description of the dwelling and repair work needed, taken from the physical survey, for each property. A range of checks were built into the web site to validate entries as they were made. Local valuers from across the country were allocated a quota of addresses and recorded two valuations for each property – the value of the property in current condition and the value if all necessary repairs were undertaken. For the 2003-04 survey the properties were valued as at 1st October 2003, and for the 2004-05 survey as at 1st October 2004.

27 Valuers were also asked to provide information on the nature of the housing and rental markets and the level of demand for accommodation in the locality of each sampled dwelling. This information contributes to analysis of the private rented sector and identification of properties considered to be in areas of low demand.

Chapter 2

Sample structure and weighting

Component surveys

1. The data reported as '2004 EHCS' are the combined results of two consecutive years of Continuous EHCS fieldwork, conducted in 2003-04 and 2004-05. As before, each comprised three separate but related surveys:

   - a household interview survey;
   - a physical survey of the dwellings of respondents to the household interview survey who were willing to participate further (a physical survey was also conducted when it was possible to identify and gain the co-operation of the owner of a property unoccupied at the time of the household interview survey);
   - a market value survey of dwellings at which a physical inspection was completed[1].

Requirements of the achieved sample

2. ODPM required an achieved core sample of 8,000 dwellings annually, of which a disproportionate number were to come from properties owned by local authorities and housing associations in order to provide sufficient information about these rarer tenures. Table 1 compares the annual target tenure distribution with the national stock.

Table 1: Tenure distribution of target achieved sample compared with the national stock

Tenure	Target achieved sample	Target achieved sample (%)	National stock[1] (%)
Owner-occupied	4,000	50	71
Private rented	1,000	12	11
Local authority	2,000	25	12
Registered social landlord	1,000	12	6
Total	**8,000**	**100**	**100**

[1] **Taken from Table S01 Trends in tenure, Survey of English Housing 2004**

3. An equal-probability sample of addresses in England would have had to be very large to ensure sufficient numbers of dwellings in the rarer tenure groups. It would also have collected unnecessarily large numbers of owner-occupied properties. As for previous surveys a random sample stratified by region and tenure was therefore adopted.

[1] In addition to the core surveys there are periodic surveys of landlords (see Chapter 1, paragraphs 9-10.

4. A feasibility study[2] had shown that tenure stratification could be cost-effectively achieved by using a sample of next-door neighbour addresses to properties included in the Survey of English Housing (SEH) in the previous year (the 'shadow sample'). The study showed that a strong relationship existed between the tenure type of the SEH sample property and that of its next-door neighbour. This approach was used for the first two years of the Continuous EHCS, in 2002-03 and 2003-04, with tenure data on the neighbour address being collected by the SEH interviewer. For 2004-05, the neighbour addresses were assumed to have the same tenure as the SEH cases if the SEH interview had been completed. If no interview data were available, the shadow address tenure was coded using the RESIDATA database maintained by BRE which codes the predominant tenure of any postcode into private, social or mixed.

The SEH shadow-sample

5. The SEH sample is selected from the small user version of the postcode address file (PAF). This version excludes 'large users' such as large businesses and institutions. A two-stage sample design is used with postcode sectors as the primary sampling units (PSUs).

6. The shadow sample was assembled by taking the next listed address in the PAF after an address selected for the SEH except where the SEH address was the last address in a postcode area in which case the first address in that postcode was taken. As part of the regular SEH fieldwork, responding households were asked to report the age and tenure of the shadow addresses. In addition, interviewers were asked to provide their own observations of all issued addresses[3].

7. Based on the results of the feasibility study, it was possible to use the distribution of true tenure for each predicted tenure to predict the tenure distribution of a sub-sampled shadow sample. It was also possible to predict the impact the sub-sampling has on effective sample sizes.

8. This methodology was changed somewhat in 2004-05. Information on the tenure of shadow addresses was no longer collected from SEH respondents or interviewers. Instead, if the SEH interview had been completed, the shadow address was predicted to have the same tenure as the SEH household. If no interview data were available, predicted tenure of the shadow address was assigned using the RESIDATA database, maintained by BRE, which codes the predominant tenure of any postcode into private, social or mixed.

9. Using a shadow sample generated by the SEH means that the EHCS is a multi-stage clustered sample using the SEH primary sampling units. As a result, the survey estimates will be less precise than a single-stage unclustered survey of the same size. For key survey measures, with the possible exception of some estimates related to the Market Values Survey, estimated design effects are modest and comparable to

[2] Pickering, P, Thomas, R, Lynn, P (2003) *Testing the Shadow Sample Approach for the English House Condition Survey*. London: National Centre for Social research.

[3] From 2002-03 onwards (i.e. the sample that was used for the 2003-04 EHCS) interviewer observations were collected only for non-responding SEH cases.

other housing-related surveys such as the SEH. However, the increased stratification power through the data collected by the SEH interviewers meant that a smaller EHCS sample could be issued than would otherwise be possible. That and the fact that fieldwork could be conducted within more compact areas resulted in considerable cost savings. Therefore, having weighed cost against precision, it was agreed that the shadow-sampling approach based on previous SEH samples should be adopted for the EHCS.

10. The first step in assembling the issued sample was an office-based sift of the SEH shadow sample to reduce the number of owner-occupied properties. Higher proportions of owner-occupied dwellings assessed to be either post-1944 or of unknown date were sifted out than those assessed to be older or only assessed as private sector, in order to retain more of the dwellings likely to be in poor condition. No dwellings assessed to be rented or of unknown tenure were sifted out. Table 2 shows the sampling strata and sub-sampling rates used in 2003-04 and 2004-05.

Table 2: Office sub-sampling from SEH shadow sample, 2003-04 and 2004-05 EHCS

	2003-04			2004-05		
Assessed tenure	Shadow sample (N)	Sub-sampling rate (%)	Issued EHCS sample	Shadow sample (N)	Sub-sampling rate (%)	Issued EHCS sample
Owner-occupied, built pre-1945	8,363	85	7,110	5,403	88	4,756
Owner-occupied, built 1945 or later	11,202	75	8,402	7,655	80	6,124
Owner-occupied, not known when built	21	75	14	12	83	10
Residata private				7,880	88	6,935
All other tenures[1]	**9,813**	**100**	**9,813**	**8,449**	**100**	**8,449**

Notes: 1. Other includes those where the original SEH address was not owner-occupied, where the RESIDATA code was social or mixed, or if neither SEH nor RESIDATA code was available.

Doorstep sifting of owner-occupied dwellings

11. In addition to the office-based sub-sampling, described above, a second stage of sub-sampling occurred on the doorstep. This was a sift-out of a random sample of issued, occupied, addresses that were found by the interviewer to be owner-occupied. This approach to reducing the number of owner-occupied properties in the achieved sample was preferred to a higher level of office sifting because the doorstep sift makes use of actual, rather than assumed, tenure. This leads to higher precision in the results than if only an office sift is used while avoiding the much higher costs of a full doorstep sift. All occupied properties of other tenures were retained in the sample at this stage, as were all unoccupied properties.

Shadow-sample to eligible sample

12. Table 3 presents details of address attrition from receipt of the whole SEH shadow sample through to interviewer contact with the sampled address.

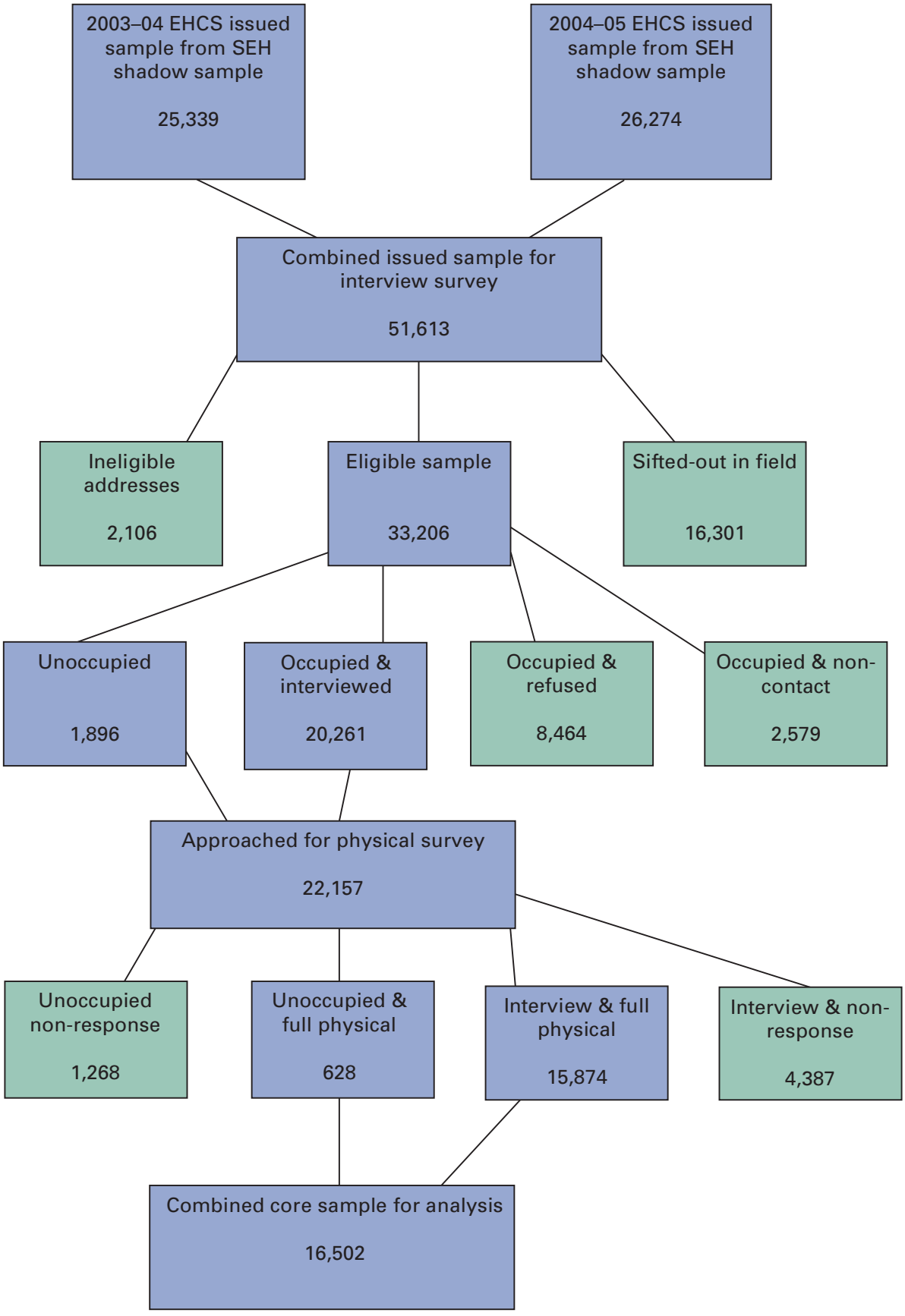
Table 3: Address attrition from shadow to eligible sample, 2003-04 and 2004-05 EHCS

	2003-04	2004-05
Addresses in SEH shadow-sample	29,399	29,399
Addressees sifted-out in office	4,060	3,125
Total addresses issued to interviewers	**25,339**	**26,274**
Sifted-out on doorstep	7,944	8,307
Other ineligible addresses[1]	1,048	1,051
Eligible sample of dwellings	**16,347**	**16,916**
Occupied dwellings	15,334	15,990
Unoccupied dwellings	1,013	926

[1] **Other ineligible addresses include addresses that were found to be commercial premises, second and holiday homes or demolished**

13. A simplified overview of the flow of cases in the combined two-year dataset (2003-04 and 2004-05) is shown in diagrammatic form in Figure 1. The core achieved sample (i.e. occupied dwellings at which both an interview and physical inspection of the dwelling was achieved plus unoccupied properties at which a physical survey was obtained) comprised 16,502 cases.

Figure 1: Sample structure of 2003-04 and 2004-05 EHCS



Grossing to national control totals

14. Before the results of this survey can give a picture of the national housing stock and the households living in it, the achieved sample needs to be grossed up to match national control totals.

15. This process involved three different components:

    adjustment for differential probabilities of selection arising from:

    - initial office sub-sampling of owner occupied properties;
    - field sifting of owner-occupied properties by interviewers; and
    - not all dwellings on the PAF having the same chance of being selected[4];

    adjustment for possible non-response bias at three different stages of the survey, i.e:

    - at initial contact by the interviewer;
    - response to initial contact; and
    - following interview response to the physical survey;

    to scale up the results by tenure to GOR and national totals.

16. The grossing was conducted separately for 2003-04 and 2004-05, with weights for the combined 2004 dataset being computed from those for the individual years.

Adjusting for different probabilities of selection

17. The first stage of the weighting determined the relative probability for each address of being sampled for the survey. The reciprocal of that probability was then used as the sampling or design weight.

18. The SEH shadow sample is an equal-probability sample of addresses from the PAF, but in using it for the EHCS some shadow sample cases were sifted out in the office according to their initial predicted tenure and, for owner occupied properties, assessed age. In addition, in 2004-05 the predicted tenure of some addresses was obtained from the Residata database.

19. Taking into account these factors, the probabilities of selection for assessed older and newer owner-occupied addresses, addresses coded as private sector by Residata and other addresses were calculated. The initial sampling weight was the reciprocal of this selection probability.

[4] There is not a 1:1 relationship between addresses listed on the PAF and dwellings. Some dwellings have a number of separate accommodation units listed on the PAF and had an increased chance of selection whilst other dwellings had a reduced chance of selection, e.g. where the original PAF address had been converted into 2 or more dwellings.

20. A further weight was calculated for cases that had been identified in the doorstep shift as owner-occupied and not sifted out. This was calculated as the reciprocal of the observed sift-rate. All cases not found to be owner-occupied at this stage were assigned a weight of 1.

21. A dwelling weight was also calculated from the information collected by the interviewer about the relationship between the issued address and the number of dwellings found at that address.

Adjusting for non-response

22. Non-contact and refusal to co-operate do not happen completely at random and the factors associated with these two processes are known to differ. Also, following an initial contact the interviewer can record extra information even if the occupant refuses to be interviewed. Therefore, it made sense to separate out these two processes when trying to model the overall response process to interview.

23. At the end of the interview respondents were invited by the interviewer to make an appointment for a surveyor to call-back at the property to conduct the physical survey. Non-response to the physical survey could occur at this stage or subsequently by non-response to the surveyor. However, as appointment conversion rates were high and preliminary analysis could not detect statistically significant differences by tenure or GOR it was decided to deal with non-response to physical as a single process.

24. For each of the 3 stages of response of interest, a dichotomous variable was created indicating whether or not response was achieved. This variable was then used as a dependent variable in a model built using the CHAID algorithm in the SPSS AnswerTree software. The CHAID algorithm seeks to successively partition the sample into groups (weighting classes) based on a series of candidate variables in order to describe as much variation in the response variable as possible. This enables the impact of non-response bias to be minimised.

25. The data available for independent variables for the models varied. Prior to interview (i.e. at initial contact and response following contact) this comprised fairly limited background information that was available for all cases, such as interviewer's assessment of general condition of building and neighbourhood, property type, tenure, and information about the area in which the property was located (e.g. IMD score, ACORN type, GOR). In contrast, for weighting the physical survey a wealth of data was available to model the differences between responders and non-responders. Main drivers of response at this stage included tenure, and economic factors such as the HRP's income level.

26. Separate models were run for the occupied and unoccupied dwellings in both 2003-04 and 2004-05 as the dynamics of response and non-response were different and because of differences in the explanatory variables available (eg there were generally less data for unoccupied cases).

27. At each stage of the process, responding cases were allocated to the appropriate weighting class and given a weight calculated as the reciprocal of the weighted response rate for all cases in that class. Non-responding cases were then excluded from further analysis.

Scaling to control totals

28. The previous stages attempt to reverse the sampling and response probabilities and thus the total weight within each tenure class gives an approximate estimate of the total size of that tenure class. However, this will differ from the true value because of sampling error, under-coverage of the frame, bias in predicting tenure, and inadequacies in capturing the non-response mechanisms. These can be compensated for by adjusting the weights so that the final weighted data are guaranteed to match certain control totals.

29. Housing statistics are available on the number of dwellings by tenure and region that can be used as control totals. These data are derived from the 2001 Census and rolled forward using administrative information on newly completed buildings, conversions and change of use. It was agreed that it was sensible on grounds of adjustment for non-response and sampling error and in terms of coherence with other departmental publications to weight to these totals.

30. This final stage of weighting for dwellings was carried out in two steps. First, the weights were calibrated to the tenure-by-region totals using Calmar. In practice, this meant scaling the weights in each tenure-by-region cell so that the weighted total for that cell equalled the control total of dwellings for that cell. Using the resulting weights, an estimate of the number of dwellings built in 1990 or later was derived. This total could not cover those dwellings built since the date of the PAF from which the sample was taken, so the known number of dwellings built between the PAF date and the reference date for the control data was used to augment this total. The revised total was then used as an extra control total when the calibration of the weights to tenure-by-region totals was rerun. This gave extra weight to dwellings built since 1990 so that these would represent those dwellings not covered by the sampling frame.

31. Following the creation of a final dwelling weight, a household weight was created for each core occupied case. Statistics are available for regional numbers of households, which could be used as control totals. In practice, however, the household weights cannot be calibrated to these totals while still maintaining the household to dwelling ratios derived from the EHCS itself. In consequence, household control totals were not used, so the grossed household data from the EHCS will not exactly match the corresponding SEH totals or the household estimates. Instead, actual numbers of households per occupied dwelling taken from the survey were averaged over region, tenure and whether house or flat, and these ratios were used to derive the household weights.

Creation of a combined weight for a two year combined dataset

32. Initially the single-year data sets were weighted to dwelling control totals as at 1st April at the beginning of their survey year (the reference date). Thus the reference date for the 2003-04 survey was 1st April 2003, and for 2004-05 it was 1st April 2004. It was agreed that the reference date for a merged two-year dataset would be the same as the reference date for the second of the two years.

33. To provide a consistent weight for a merged two-year dataset, the data for the first survey year are reweighted to the control totals used for the second year. At the same time, extra numbers of new builds were added to the new build control total for the first survey year to bring this up to the later reference date. The weights for the merged sample are then calculated as a weighted average of the revised weights for the first year and the original weights for the second year, with sample sizes used to provide the weighting.

Chapter 3

Data quality

1. This chapter outlines the main sources of error affecting the quality of results from the EHCS:

   - The impact of non-response and missing data.
   - Sampling and measurement error.
   - Between-surveyor variability.

Non-response and missing data

2. It is essential that the EHCS provides a representative picture of the condition of housing stock in England. The complex sampling structure was designed to provide such a picture.

3. Inevitably, not all of the addresses originally issued for the survey are retained in the final dataset. A few will prove not to be dwellings, and others will be lost due to non-response or incomplete data. In order to produce good quality, representative results from the survey, it is important to check whether valid but non-responding cases are typical of those that remain and if not, to counter any resulting response bias in the grossed data set.

4. Where non-response biases were found at any stage of the survey, adjustments were made to the responding cases in the grossing procedures for that stage. More information about this process was given in Chapter 2.

5. The 2004 EHCS data set reported on here comprises the core datasets from the 2003-04 and 2004-05 surveys, for which full surveys were obtained. As a result, it contains very few variables with incomplete data. Where this does occur, for the purposes of analysis the affected dwellings or households have been distributed proportionally among the unaffected cases.

Sampling and measurement error

6. Any sample survey will suffer from two types of error:

   sampling error, from using a sample of a population to draw conclusions about the whole population;

   measurement error, due to inaccuracies in individual measurements of survey variables because of the inherent difficulties of observing, identifying and recording what has been observed. Measurement error may occur randomly, or may reflect a problem experienced by most or all interviewers or surveyors.

Sampling error

7. Estimates of dwelling and household characteristics produced from a sample survey such as the EHCS may differ from the true population figures because they are based on a sample rather than a census. This difference is known as sampling error, and it is important to be able to estimate the size of this error when interpreting the survey results.

8. The size of the sampling error depends on the size of the sample; in general, sampling error is potentially larger in smaller samples. For example, a larger sampling error will be associated with estimates for converted flats than estimates for semi-detached or terraced houses, which are more numerous in the EHCS sample.

9. A frequently-used method of assessing the magnitude of sampling errors is to calculate a confidence interval for an estimate. This is an interval within which one can be fairly certain that the true value lies. The following section explains how to calculate 95% confidence intervals, using a method from standard statistical theory for large samples.

Confidence intervals for percentages

10. This method assumes that the sample in question is a simple random sample. The Continuous EHCS uses a clustered sample, but these standard confidence intervals are still useful to give a rough idea of the size of standard errors, particularly given that more accurate calculations are not quick to carry out.

11. The 95% confidence interval for a percentage estimate, p, is given by the formula:

    p+/-1.96*se(p)

    where se(p) represents the standard error of the percentage and is calculated by:

    se(p) = =(p(100-p)/n)

    where n is the unweighted sample size.

12. A 95 per cent confidence interval for a percentage may be estimated using Tables 1 and 2 in Annex 1 at the end of this chapter. The width of the confidence interval depends on the value of the estimated percentage and the sample size on which the percentage was based, as shown in Table 1. For percentages based on the whole core sample, the sample size, n, is the unweighted sample total; ie 16,502 dwellings or 15,874 households. Table 2 lists the unweighted sample sizes for selected subgroups. The confidence interval can be calculated by reading off the closest figure from Table 1, where the estimated percentages are shown as columns and the unweighted sample sizes as rows, and then adding and subtracting this figure from the estimated percentage.

13. Estimating standard errors for results based on a simple random sample (SRS), which has no stratification, is fairly straightforward, and examples are given below. However, the sample for the EHCS is not a *simple* random one, so standard errors calculated using the SRS method will only give a rough guide and more accurate standard errors need to be calculated using a sample design factor. The design factor is calculated as the ratio of the standard error for a complex sample design to the standard error that would have been achieved with a simple random sample of the same size. More information about this is given in the next section of this chapter.

Examples assuming a simple random sample:

i) The estimated number of non-decent dwellings is 6,312,000 or 29.2%. This percentage is based on the combined 2-year unweighted sample of 16,502 dwellings. The corresponding number from the fourth cell in the top row of Table 1 is 0.7%, giving a confidence interval of 28.5% to 29.9%.

ii) Over one-fifth of all dwellings were built before 1919 (see Table 2(c)), and of these, an estimated 42.4% are non-decent. These figures are based on an unweighted sample of 3,355 dwellings.

The corresponding number from the 11th row & 5th column of Table 1 is 1.8%, giving a confidence interval of 40.6% to 44.2%.

iii) Confidence intervals can be calculated more accurately by using the formula above. For example (ii),

se(p)==(42.4*57.6)/3355=0.853

so the confidence interval is 42.4 +/- 1.96*0.853, or 40.7% to 44.1%.

Comparisons with standard errors estimated using true EHCS sample design

14. In order to calculate standard errors more precisely, it is necessary to take account of the clustering used in drawing the sample of issued addresses, together with the grossing factors (weights) for each dwelling or household in the core sample. This is a process which needs to be carried out using a suitable computer package.

15. Some comparisons between standard errors and confidence intervals calculated using the SRS assumptions and those calculated using the actual sample design are given in Table 3 of Annex 1 to this chapter. For the variables shown, standard errors using the more precise method are mostly between 10% and 20% larger than those obtained using the SRS assumption, reflecting the clustering of the sample. This suggests that quick approximations to sampling errors for other variables may be obtained by increasing the values obtained using the SRS method by 20%.

Measurement error

16. There are rather more practical difficulties in assessing the condition of an individual dwelling than the characteristics of a household. These difficulties mainly stem from the technical problems in the diagnosis and prognosis of any defects found in the dwelling. Difficulties are found particularly in the assessment of unfitness because of the subjective nature of the fitness standard, but also in the assessment of the state of repair. As a consequence, it is quite possible that two surveyors inspecting a given dwelling may have different views on whether or not it is unfit and also on the extent and severity of disrepair and the work needed to remedy it. Assessments of the condition of the area surrounding the dwelling are also prone to subjective variation.

17. Estimates of unfitness or disrepair rates in the dwelling stock are based on individual surveyor assessments and are dependant on the 'average performance' of all the surveyors. However, individual surveyors will produce assessments which may vary from this average. Thus there is some uncertainty or error associated with such estimates, and the greater the variability between surveyors the greater is this error. It is therefore important to control this variability as much as possible and to understand the effect that any residual variability can have on the survey results.

Surveyor variability

18. Experience has shown that surveyor variability cannot be completely eliminated or even reduced to an insignificant level, but precautions are taken during the Continuous EHCS Survey to control its impact:

    - by using a large number of surveyors, and setting limits of 5% on the proportion of surveys any one surveyor can complete overall, and 3% of surveys within any one region;

    - by ensuring that the surveyors are provided with a rigorous and uniform 6-day briefing, designed to minimise subjectivity, which is backed up by survey manuals, supervision in the field, refresher briefings, and the use of calibration workbooks.

Calibration Workbooks

19. The EHCS uses calibration workbooks as a means of detecting any significant shift in surveyor marking, or 'surveyor drift', between surveys. The workbooks are completed by surveyors at the end of each year's fieldwork. The workbooks consist of descriptions and photographs of a number of dwelling faults, and surveyors are asked to record them on the current EHCS survey form. The faults are chosen to cover a range of dwelling elements, building types and levels of severity.

20. The workbooks are intended to measure the aspect of surveyor variability that arises from surveyors making different judgements about exactly the same information. Previous work has indicated that surveyors do tend to identify the same problems in a given dwelling, but that they often differ in the work that they specify to remedy these problems. For example, three surveyors looking at the same roof may agree that some slates have slipped and others are missing. However, one surveyor may say that because it is not leaking, no work is needed now but it should be replaced within ten

years; another may say that it should be repaired now and replaced within 15 years, and the third may say it should all be replaced now.

21. The surveyors' responses in the workbooks are used to devise a number of measures including: total estimated costs of all repairs required in the next 10 years specified across all examples, whether specific examples do not meet the Decent Homes criteria under modernisation and disrepair and the proportion of repairs marked as requiring urgent attention. These measures are then compared with those derived from calibration workbooks from previous years and statistical analysis is used to establish whether there have been any significant changes in these measures over time.

22. Comparison of the results of this exercise for 2002-03, 2003-04 and 2004-05 showed no significant difference overall in the surveyors' assessments since 2001, although a minority of surveyors did produce inconsistent results in the different years.

Measuring between-surveyor variability

23. Despite the rigorous surveyor training program, it is natural that a degree of personal judgement and subjectivity will still affect surveyors' assessments. As an example, some surveyors will be more likely, after weighing the evidence, to conclude that a particular dwelling is fit, whereas others will be more likely to conclude that the same dwelling is unfit. This between-surveyor variability is an additional source of variance in estimates from the physical survey data, and can be measured by estimating the correlated surveyor variance.

24. An experiment was conducted during the 2003-04 physical survey fieldwork to analyse the effects of systematic surveyor variability on the precision of estimates from the physical survey for the 2003-04 EHCS. This involved a call-back exercise in which 264 properties were re-surveyed by a second surveyor and the results were compared. The objectives of the study were to:

    a) compare the correlated surveyor variability with previous results to see whether the new EHCS survey design and contractor have had an impact and to estimate the impact of surveyor variability on standard errors for the survey;

    b) provide evidence for the reliability of the core survey measures, so that analysis of trends and comparisons may focus on the most reliable measures, and problematic measures can be improved through briefing or questionnaire design.

    The methodology of this study is explained in Annex 2 to this chapter.

25. The study found that:

a) overall, the levels of variability between surveyor judgements were low. However, where there is an appreciable level of error, the combined impact on the level of error surrounding the survey estimates can still be substantial.

b) in general, there was a high level of agreement between surveyors. For the 96 core survey measures tested there was, on average, 81% agreement between surveyors.

c) Kappa scores were used to measure the level of agreement after chance agreement has been excluded. 24 variables had Kappa scores that indicated 'poor' agreement. Ten had scores indicating 'very good' agreement.

d) multilevel modelling was used to calculate correlated surveyor variance. This measures the tendency of an individual surveyor to make assessments which are consistent for that surveyor but are different from the average assessment of all surveyors.

e) correlated surveyor variance was found to be substantially lower on average for derived composite variables, such as whether a dwelling met the decent homes standard, than for simple variables, taken straight from the survey questionnaire. The same result was found in the previous 2001 study.

f) the most problematic variables are those with high correlated surveyor variability and a low Kappa score. For this study these variables were all concerned with surveyor assessments of problems in the area. However high correlated surveyor variability or associated with assessments of 'no' or 'some' problems rather than assessments of 'major' problems in the area.

26. Due to differences in the design of the variability exercises, it is not possible to directly compare surveyor variability in 2001 and 2003. However there was no strong evidence of change in levels of surveyor variability since the introduction of the new EHCS design in 2002-03.

Taking account of between-surveyor variability

27. The standard error calculations described earlier, which take account of the complex design of the survey, only partly reflect the effect of between-surveyor variability. In consequence, they are biased downwards and the confidence intervals calculated from them are a little too narrow. Using the correlated surveyor estimates from the multilevel modelling, it is possible to estimate the size of these downward biases in the standard error estimates and make an adjustment.

28. First it is necessary to calculate the estimated bias in the variance using the formula shown below. This is then added to the variance of the estimate, calculated taking account of the survey design. The square root of this total gives the adjusted standard error.

29. The formula has three factors: a constant based on how the surveys are allocated to surveyors, the correlated survey variance for the variable category and the total measurement variance for the variable category.

The estimate of the bias is calculated as:

$\hat{bias}(\hat{V}(\bar{y})) \approx \bar{b}(1+c^2)\,ry$.

where $\bar{b}$ is the average proportion of the sample allocated to each surveyor;

c is the coefficient of variation of these proportions;

r is the estimated correlated surveyor variance and y is the total variance.

30. For the whole EHCS survey,

the total number of surveyors used in the survey was 212,

so the average proportion allocated to each surveyor was $\bar{b}$ = 1/212 = 0.0047, and

the value of (1+ c^2) = 1.32.

Therefore the value of the constant part of the bias equation is

$\bar{b}(1+c^2)$ = 0.0062

and the bias adjustment = 0.0062*ry.

Note that this is an *estimate* of the bias in the total variance and so is subject to a degree of variance itself. However, the fact that the estimates of correlated surveyor variance are similar to those found in the NCSR report suggests that the estimates are a reasonable indication of the additional variance.

31. Values of the correlated surveyor variance and bias adjustment for selected survey variables are given in Table 7 at the end of Annex 2.

Examples of the different methods of estimating confidence intervals

32. The overall percentage of non-decent homes is 29.19%.

i) Treating the sample as if it were a simple random sample, the example in paragraph 13(i) gives an estimated confidence interval of 28.5% to 29.9%, using the simple look-up table in Annex 1, Table 1.

ii) Using the SRS assumption, the formulae in paragraph 11 together with Annex 1 Table 2c give:

se(p) ==(29.19*(100-29.19)/16502) = 0.354

and a more accurate confidence interval of 29.19 +/- 1.96x 0.354, ie 28.50 to 29.88 (see Annex 1 Table 3c).

An approximation which takes account of the clustered sample design can be obtained by increasing the above standard error by 20% to

0.354 x 1.20 = 0.425.

This gives an estimated confidence interval of 28.36 to 30.02.

iii) Annex 1 Table 3 takes full account of the sample design, giving a more accurate standard error of 0.420 and a confidence interval of 28.37 to 30.01.

iv) These estimates can be further refined by adjusting for between-surveyor variability.

The variance of the estimate of 29.19% non-decent dwellings is $(0.420)^2 = 0.177$.

The estimated correlated surveyor variance, r, is 0.0249 and the total variance y is 2,287, so the estimated bias in the variance is 0.0062 x 0.0249 x 2,287 = 0.354. Annex 2 Table 7 shows Kappa, correlated surveyor variance and corresponding bias adjustments for a range of survey measures.

Adding the estimated bias to the variance increases the variance to (0.177+0.354) = 0.531, or $(0.73)^2$. This gives an adjusted standard error for the estimated proportion non-decent of 0.73.

The adjusted confidence interval round the estimate of 29.19% of homes being non-decent is thus 29.19 +/- (1.96 x 0.73) = 27.76% to 30.62%.

In this example, the effect of between-surveyor variance on standard errors calculated using the actual sample design is to increase them by 72%. This proportion will vary considerably for different measures, and will be lower for derived measures than for those taken directly from the physical survey form.

These calculations are summarised in the following table:

Table 1: Summary of confidence interval calculations

Estimated percentage of non decent dwellings	**29.19**	
	Confidence Interval	
Confidence interval method	**Lower**	**Upper**
Assuming SRS, using lookup table	28.5	29.9
Assuming SRS, using formula	28.50	29.88
Adding 20% for complex sample design	28.36	30.02
Using actual sample design	28.37	30.01
Including surveyor variability	27.76	30.62

Note: if used with variances of a proportion rather than a percentage, the measurement variance y will be 100^2 times smaller so the bias adjustment will also need to be scaled down by 100^2 or 10,000.

Annex 1

Data quality tables

Table 1: Look-up table for calculating 95 per cent confidence intervals for a percentage

Sample size	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	95%
16,648	0.3	0.5	0.6	0.7	0.7	0.8	0.7	0.7	0.6	0.5	0.3
14,000	0.4	0.5	0.7	0.8	0.8	0.8	0.8	0.8	0.7	0.5	0.4
12,000	0.4	0.5	0.7	0.8	0.9	0.9	0.9	0.8	0.7	0.5	0.4
10,000	0.4	0.6	0.8	0.9	1.0	1.0	1.0	0.9	0.8	0.6	0.4
9,000	0.5	0.6	0.8	0.9	1.0	1.0	1.0	0.9	0.8	0.6	0.5
8,000	0.5	0.7	0.9	1.0	1.1	1.1	1.1	1.0	0.9	0.7	0.5
7,000	0.5	0.7	0.9	1.1	1.1	1.2	1.1	1.1	0.9	0.7	0.5
6,000	0.6	0.8	1.0	1.2	1.2	1.3	1.2	1.2	1.0	0.8	0.6
5,000	0.6	0.8	1.1	1.3	1.4	1.4	1.4	1.3	1.1	0.8	0.6
4,000	0.7	0.9	1.2	1.4	1.5	1.5	1.5	1.4	1.2	0.9	0.7
3,000	0.8	1.1	1.4	1.6	1.8	1.8	1.8	1.6	1.4	1.1	0.8
2,000	1.0	1.3	1.8	2.0	2.1	2.2	2.1	2.0	1.8	1.3	1.0
1,000	1.4	1.9	2.5	2.8	3.0	3.1	3.0	2.8	2.5	1.9	1.4
900	1.4	2.0	2.6	3.0	3.2	3.3	3.2	3.0	2.6	2.0	1.4
800	1.5	2.1	2.8	3.2	3.4	3.5	3.4	3.2	2.8	2.1	1.5
700	1.6	2.2	3.0	3.4	3.6	3.7	3.6	3.4	3.0	2.2	1.6
600	1.7	2.4	3.2	3.7	3.9	4.0	3.9	3.7	3.2	2.4	1.7
500	1.9	2.6	3.5	4.0	4.3	4.4	4.3	4.0	3.5	2.6	1.9
400	2.1	2.9	3.9	4.5	4.8	4.9	4.8	4.5	3.9	2.9	2.1
300	2.5	3.4	4.5	5.2	5.5	5.7	5.5	5.2	4.5	3.4	2.5
200	3.0	4.2	5.5	6.4	6.8	6.9	6.8	6.4	5.5	4.2	3.0
100	4.3	5.9	7.8	9.0	9.6	9.8	9.6	9.0	7.8	5.9	4.3

Table 2: Sample sizes of main variables for calculating confidence intervals

(a) households

Variable	No. of households (weighted) (thousands)	Percentage of households (weighted)	Sample size (unweighted)
All Households	**20,724**	**100.0**	**15,950**
Tenure			
owner-occupied	14,870	71.8	8,070
privately rented	1,966	9.5	2,099
local authority (LA)	2,338	11.3	3,478
registered social landlords (RSL)	1,550	7.5	2,303
Dwelling age			
pre 1919	4,277	20.6	3,283
1919-1944	3,876	18.7	2,929
1945-1964	4,302	20.8	3,736
1965-1980	4,612	22.3	3,537
post 1980	3,657	17.6	2,465
Dwelling type			
terraced house	5,982	29.3	4,908
semi-detached house	5,860	28.7	4,166
bungalow or detached house	5,350	26.2	3,326
all houses	17,192	83.0	12,400
all flats	3,532	17.0	3,550
Type of area			
city or other urban centre	5,034	24.3	4,304
suburban	11,370	54.9	8,573
rural	4,321	20.8	3,073
Broad Regional area			
northern regions	6,009	29.0	4,864
south east regions	6,370	30.7	4,823
rest of England	8,345	40.3	6,263
Whether household lives in decent dwelling			
decent	14,452	69.7	10,692
non-decent	6,272	30.3	5,258
Reasons for non-decency			
fail thermal comfort only	3,732	18.0	3,097
fail fitness, repair or modernisations	2,540	12.3	2,161
decent	14,452	69.7	10,692
Reasons for not meeting thermal comfort criterion			
heating only	840	4.1	718
insulation only	3,436	16.6	2,860
insulation and heating	313	1.5	274

(a) households (continued)

Variable	No. of households (weighted) (thousands)	Percentage of households (weighted)	Sample size (unweighted)
SAP rating			
less than 30	1,858	9.0	1,559
30 or more	18,866	91.0	14,391
Liveability indicators			
poor quality environments	3,291	15.9	2,823
utilisation problems	453	2.2	451
traffic problems	1,596	7.7	1,260
upkeep problems	2,101	10.1	1,894
Ethnic identity			
white	19,098	92.2	14,644
all ethnic minorities (other)	1,626	7.8	1,306
Disadvantaged or at risk households			
any household member with long			
term illness or disability	6,135	29.6	5,362
lowest quintile income group	4,119	19.9	4,285
workless	2,778	13.4	2,933
lone parent with dependent child(ren)	1,515	7.3	1,667
households with any children	6,184	29.8	4,987
households with any infants	2,681	12.9	2,206
households with anyone 60+	7,098	34.2	5,450
households with anyone 75+	2,600	12.5	2,153
Length of residence			
Less than 1 year	2,167	10.5	1,964
one year	1,144	5.5	1,003
two years	1,431	6.9	1,213
3–4 years	2,441	11.8	1,946
5–9 years	3,719	17.9	2,883
10–19 years	4,588	22.1	3,277
20–29 years	2,570	12.4	1,755
30+ years	2,666	12.9	1,909
NRF88			
NRF districts	8,346	40.3	6,860
other districts	12,378	59.7	9,090

(a) households (continued)

Variable	No. of households (weighted) (thousands)	Percentage of households (weighted)	Sample size (unweighted)
IMD deciles			
most deprived 10% of areas	2,033	9.8	2,218
2nd	2,040	9.8	1,958
3rd	2,234	10.8	1,889
4th	2,075	10.0	1,630
5th	1,919	9.3	1,452
6th	2,182	10.5	1,550
7th	2,053	9.9	1,407
8th	2,084	10.1	1,362
9th	2,154	10.4	1,327
least deprived 10% of areas	1,950	9.4	1,157
Level of Demand			
negligible to limited	2,086	10.1	2,078
moderate	10,513	50.7	8,061
high	8,125	39.2	5,811
Serious disrepair			
in serious disrepair	2,072	10.0	1,682
not in serious disrepair	18,652	90.0	14,268

(b) private households (owner occupied and privately rented)

Variable	No. of households (weighted) (thousands)	Percentage of households (weighted)	Sample size (unweighted)
All Private Sector Households	**16,836**	**100.0**	**10,169**
Tenure groups			
own with mortgage	8,892	52.8	4,873
own outright	5,978	35.5	3,197
privately rent	1,966	11.7	2,099
Dwelling age			
pre 1919	4,011	23.8	2,913
1919-1944	3,348	19.9	2,116
1945-1964	3,009	17.9	1,745
1965-1980	3,501	20.8	1,893
post 1980	2,968	17.6	1,502
Dwelling type			
terraced house	4,831	28.9	3,130
detached, semi-detached or bungalow	10,107	60.4	5,725
all houses	14,938	88.7	8,855
all flats	1,898	11.3	1,314
Type of area			
city or other urban centre	3,727	22.1	2,495
suburban	9,225	54.8	5,301
rural	3,884	23.1	2,373
Regional area			
northern regions	4,711	28.0	2,860
south east regions	5,168	30.7	3,173
rest of England	6,957	41.3	4,136
Whether household lives in decent dwelling			
decent	11,895	70.7	6,887
non-decent	4,941	29.3	3,282
Reasons for non-decency			
thermal comfort only	2,907	17.3	1,853
fitness, repair or modernisation	2,034	12.1	1,429
decent	11,895	70.7	6,887
Reasons for not meeting thermal comfort criterion			
heating only	672	4.0	463
insulation only	2,667	15.8	1,715
insulation & heating	265	1.6	203

(b) private households (owner-occupied and privately rented)

Variable	No. of households (weighted)	Percentage of households (weighted)	Sample size (unweighted)
Vulnerable households			
vulnerable	2,839	16.9	1,889
not vulnerable	13,997	83.1	8,280
Neighbourhood Renewal Fund districts			
NRF districts	6,175	36.7	3,750
other districts	10,662	63.3	6,419
IMD deciles			
most deprived 10% of areas	960	5.7	656
2nd	1,225	7.3	773
3rd	1,657	9.8	1,040
4th	1,675	9.9	1,024
5th	1,606	9.5	987
6th	1,945	11.6	1,185
7th	1,863	11.1	1,109
8th	1,951	11.6	1,151
9th	2,057	12.2	1,176
least deprived 10% of areas	1,898	11.3	1,068
Level of demand			
neglible or limited	1,220	7.2	757
moderate	8,558	50.3	5,067
high	7,058	41.5	4,211

(c) dwellings

Variable	No. of dwellings (weighted) (thousands)	Percentage of dwellings (weighted)	Sample size (unweighted)
All dwellings	**21,484**	**100.0**	**16,648**
Tenure			
owner-occupied	15,201	70.8	8,261
privately rented	2,205	10.3	2,306
local authority (LA)	2,457	11.4	3,663
registered social landlords (RSL)	1,621	7.5	2,418
Vacant dwellings			
vacant	836	3.9	698
occupied	20,648	96.1	15,950
Dwelling age			
pre 1919	4,544	21.1	3,499
1919-1944	3,981	18.5	3,023
1945-1964	4,439	20.7	3,886
1965-1980	4,752	22.1	3,689
post 1980	3,769	17.5	2,551
Dwelling type			
terraced house	6,233	29.0	5,131
semi-detached house	5,981	27.8	4,267
bungalow or detached house	5,458	25.4	3,408
flat	3,812	17.7	3,842
all house	17,672	82.3	12,806
all flats	3,812	17.7	3,842
Dwelling Size			
under $50m^2$	2,790	13.0	2,792
$50m^2$ up to $70m^2$	5,874	27.3	4,994
$70m^2$ up to $90m^2$	6,343	29.5	4,832
$90m^2$ up to $110m^2$	2,800	13.0	1,815
over $110m^2$	3,677	17.1	2,215
Type of area			
urban	5,325	24.8	4,588
suburban	11,705	54.5	8,879
rural	4,453	20.7	3,181
Regional area			
northern regions	6,278	29.2	5,123
south east regions	6,567	30.6	5,010
rest of England	8,639	40.2	6,515

(c) dwellings (continued)

Variable	No. of dwellings (weighted)	Percentage of dwellings (weighted)	Sample size (unweighted)
Whether dwelling is decent			
decent	14,790	68.8	11,010
non-decent	6,694	31.2	5,638
Reasons for non-decency			
fail thermal comfort only	3,885	18.1	3,241
fail fitness repair of modernisations	2,809	13.1	2,397
decent	14,790	68.8	11,010
Reasons for not meeting thermal comfort criterion			
heating only	917	4.3	786
insulation only	3,610	16.8	3,021
insulation & heating	353	1.6	308
SAP rating			
less than 30	2,032	9.5	1,702
30 - 49	7,420	34.5	5,403
50 - 70	9,465	44.1	7,326
more than 70	2,567	11.9	2,217
Heating system			
gas fired system	18,250	84.9	13,474
oil fired system	815	3.8	533
solid fuel fired system	430	2.0	403
electrical system	1,989	9.3	1,743
Cavity wall insulation			
insulated cavity wall	5,334	24.8	4,155
uninsulated cavity wall	9,357	43.6	7,086
no cavity wall	6,793	31.6	5,407
Loft insulation			
loft with less than 100mm ins	6,695	31.2	4,743
100mm ins or more	12,497	58.2	9,613
no loft	2,291	10.7	2,292
Security			
not fully secure windows and doors	9,808	45.7	8,123
secure windows and doors	11,676	54.3	8,460
Neighbourhood Renewal Fund districts			
NRF districts	8,740	40.7	7,233
other districts	12,744	59.3	9,415

(c) dwellings (continued)

Variable	No. of dwellings (weighted)	Percentage of dwellings (weighted)	Sample size (unweighted)
IMD Deciles			
most deprived 10% of areas	2,182	10.2	2,392
2nd	2,125	9.9	2,050
3rd	2,341	10.9	1,984
4th	2,149	10.0	1,693
5th	1,996	9.3	1,515
6th	2,237	10.4	1,596
7th	2,107	9.8	1,448
8th	2,148	10.0	1,414
9th	2,206	10.3	1,368
least deprived 10% of areas	1,992	9.3	1,188
Level of demand			
negligible or limited	2,244	10.4	2,230
moderate	10,879	50.2	8,312
high	8,361	38.6	5,949

Table 3: Comparing standard errors and confidence intervals for SRS and actual sample designs

a) households	Assuming SRS			Using actual sample design			
	Estimated % non-decent	Standard error	95% confidence interval	Standard error	95% confidence interval		Design factor = ratio of SEs
Non-decent	30.26	0.364	29.55 30.98	0.443	29.39	31.13	1.22
Failing thermal comfort only	18.01	0.304	17.41 18.61	0.371	17.28	18.74	1.22
Failing on other criteria*	12.25	0.260	11.74 12.76	0.309	11.64	12.86	1.19
All Non-decent							
Vulnerable	35.74	0.611	34.54 36.94	0.724	34.32	37.16	1.18
Non-vulnerable	28.19	0.454	27.30 29.08	0.516	27.18	29.20	1.13
Failing thermal comfort only							
Vulnerable	20.32	0.513	19.31 21.33	0.618	19.11	21.53	1.20
Non-vulnerable	17.13	0.381	16.39 17.88	0.434	16.28	17.99	1.14
Failing on other criteria*							
Vulnerable	15.42	0.461	14.52 16.32	0.556	14.33	16.51	1.21
Non-vulnerable	11.06	0.317	10.43 11.67	0.350	10.37	11.74	1.11

b) private sector households	Assuming SRS			Using actual sample design			
	Estimated % non-decent	Standard error	95% confidence interval	Standard error	95% confidence interval		Design factor = ratio of SEs
Non-decent	29.35	0.452	28.46 30.23	0.509	28.35	30.34	1.13
Failing thermal comfort only	17.27	0.375	16.53 18.00	0.424	16.43	18.10	1.13
Failing on other criteria*	12.08	0.323	11.45 12.71	0.352	11.39	12.77	1.09
All non-decent							
Vulnerable	37.20	1.112	35.02 39.38	1.199	34.85	39.55	1.08
Non-vulnerable	27.75	0.492	26.79 28.72	0.540	26.70	28.81	1.10
Failing thermal comfort only							
Vulnerable	19.38	0.909	17.60 21.16	0.996	17.42	21.33	1.10
Non-vulnerable	16.84	0.411	16.03 17.64	0.456	15.94	17.73	1.11
Failing on other criteria*							
Vulnerable	17.82	0.880	16.09 19.54	0.935	15.98	19.65	1.06
Non-vulnerable	10.92	0.343	10.24 11.59	0.366	10.20	11.63	1.07

Table 3: Comparing standard errors and confidence intervals for SRS and actual sample designs (continued)

c) dwellings	Assuming SRS			Using actual sample design			
	Estimated % non-decent	Standard error	95% confidence interval	Standard error	95% confidence interval		Design factor = ratio of SEs
Non-decent	31.16	0.359	30.45 31.86	0.441	30.29	32.02	1.23
Thermal comfort only	18.08	0.298	17.50 18.67	0.365	17.37	18.80	1.22
All renewal	13.07	0.261	12.56 13.59	0.314	12.46	13.69	1.20
All non-decent							
private	30.19	0.447	29.32 31.07	0.505	29.20	31.18	1.13
social	35.28	0.613	34.08 36.48	0.714	33.88	36.68	1.17
Thermal comfort only							
private	17.37	0.369	16.65 18.10	0.420	16.55	18.20	1.14
social	21.12	0.523	20.09 22.14	0.606	19.93	22.30	1.16
Failing on other criteria*							
private	12.82	0.325	12.18 13.46	0.354	12.12	13.51	1.09
social	14.16	0.447	13.29 15.04	0.542	13.10	15.22	1.21
Dwelling age: All non-decent							
pre-1919	43.59	0.838	41.94 45.23	0.974	41.68	45.50	1.16
1919-45	35.53	0.870	33.82 37.23	0.955	33.65	37.40	1.10
1945-64	32.58	0.752	31.10 34.05	0.875	30.86	34.29	1.16
1965-80	29.07	0.748	27.60 30.53	0.907	27.29	30.85	1.21
post 1980	12.52	0.655	11.23 13.80	0.707	11.13	13.90	1.08

*Other criteria include fitness, repair or modernisations.

Annex 2

Surveyor Variability Study

Objectives

1. The surveyor variability study addressed two main objectives:

   - to compare the level of between-surveyor variability with previous results (from the 2001 EHCS) to assess whether the new EHCS survey design and contractor have had an impact on the quality of results and to estimate the impact of surveyor variability on standard errors for the survey;

   - to provide evidence for the reliability of the core survey variables, so that analyses of trends and comparisons may focus on the most reliable variables, and problematic variables can be improved through briefing or questionnaire design.

General conclusion

2. Due to the difference in survey designs between the 2001 EHCS and the continuous EHCS introduced from April 2002, different models were used to obtain estimates of surveyor variability in each case. A direct comparison of results is therefore not valid. However, the results from the two studies are, in many respects, similar, and there is good correlation between them, indicating that:

   - the change in survey design has not had a major impact on the quality of results; and

   - surveyor variability remains a relatively small source of error in the EHCS.

Survey methodology

3. The previous study of EHCS surveyor variability in 2001 used an interpenetrating design where a subset of 160 surveyors were paired and randomly allocated a tranche of around 50 addresses. Addresses within each surveyor pair in each tranche were assigned at random between the two surveyors.

4. Following the introduction of the continuous survey in April 2002 it was decided to include a surveyor variability experiment in the second year (2003-04). Changes in the survey design meant that an interpenetrated study would incur high costs and/or a risk to the main fieldwork. Instead, a call-back study was assessed to be the most cost-effective approach with a reduced potential to disrupt fieldwork. A target of 250 dwellings was set to provide estimates of sampling errors of sufficient accuracy. Call-back addresses were randomly assigned to a random set of surveyors apart from in a few cases where a surveyor closer to the address was chosen as the distance needed to travel would threaten non-response rates.

5. In order to satisfy the underlying assumptions for the experiment, it was important to ensure that the surveyors were behaving in a similar way in the call-backs as in the original surveys, and that the original survey did not influence the call-back. This was achieved by presenting the call-back addresses to the surveyors in the same way as the original addresses, with no extra information supplied from the first survey. The survey contractors' helpline team made arrangements for the call-back visit on the successful completion of the initial survey.

6. Surveyors were briefed that a small proportion of dwellings would be re-visited during the survey year but were not informed whether or not they would be participating in the study. To reduce the risk that the second surveyor approached the dwelling differently from any other property inspected, households were asked (by the Helpline team and in confirmation letter) not to alert the second surveyor about the dwelling having been previously inspected.

7. Call-back surveys were successfully achieved with 264 dwellings which represented 65% of those approached to participate.

Analysis Methodology

8. Both descriptive and multilevel analysis of the data were performed. The *descriptive analysis*, using the percentage level of agreement between the two surveyors and the level of inter-rater agreement (Kappa score) is based on a subset of core variables selected as most important for the survey and focuses on the total variance between surveyors. In total, 112 core variables were analysed, of which 12 were 'complex derived variables' created by the SAP, repair costs and decent homes models.

9. This analysis looks at whether surveyors were in agreement over their response to variables. For many variables the analysis looked at bands of surveyor judgements. Even if surveyors disagreed by only one band the analysis assessed this as being in disagreement. This should be taken into account when considering the levels of disagreement for these banded variables.

10. Individual response categories were combined for some variables to focus the analysis on surveyor variability between the most distinct groupings for each question. Decisions on combinations were made on a variable by variable basis.

11. The *multilevel model-based analysis* seeks to estimate the correlated surveyor variance, and concentrates on the same core variables as the descriptive analysis. However, the multilevel modelling involves analysing each variable by individual response category. In total, 374 (non zero) categories were analysed.

Descriptive methodology

12. Two sets of descriptive summary statistics were used to judge the reliability of core survey variables:

    - the percentage of agreement between the two surveyors;

- the level of inter-rater agreement, or Kappa score (this is the level of agreement after chance has been excluded).

13. If Oa is the observed count of agreements; Ea is the expected count of agreements; and N is the total number of respondent pairs, then:

    percentage agreement = Oa/N

14. Kappa (K) is the proportion of agreements after chance agreement has been excluded and is calculated for each core survey variable as a whole. It is the ratio of the difference between the observed and the expected agreement to the maximum possible agreement and is calculated as:

    K = (Oa - Ea)/(N - Ea)

15. These two statistics have been used together to judge the reliability of the core survey variables. The percentage agreement is very much dependent on the extent to which the question discriminates between different categories. If the value of a variable falls in one category for the majority of cases, then the percentage agreement between surveyors will tend to be relatively high, and mask the level of disagreement for dwellings where there is a real choice for surveyors.

16. The Kappa score can be interpreted as shown in Table 1.

Table 1: Interpreting the Kappa scores

Value of Kappa	Strength of agreement between surveyors
< 0.20	Poor
0.21 – 0.40	Fair
0.41 – 0.60	Moderate
0.61 – 0.80	Good
0.81 – 1.00	Very good

17. In order to properly judge the impact of surveyor variability, the percentage agreement and Kappa score need to be considered together. A low percentage agreement combined with a low Kappa score indicates that surveyors are disagreeing over a substantial number of marginal cases.

Results of Descriptive Analysis

Percentage agreement

18. For the 112 core survey variables tested there was, on average, 81% agreement between surveyors. This ranged from 32%, for surveyors' estimates of number of dwellings in the area, to 100% (whether dwelling is a house or a flat). 31 variables showed more than 90% agreement, while 22 showed less than 70% agreement.

Kappa scores

19. The average Kappa score was 0.39 with the scores ranging from –0.013 to 1.00. A value of 1 indicates total agreement between surveyors. Out of the 96 variables

tested, 24 had Kappa scores below 0.2, indicating poor agreement. Ten had scores above 0.8, indicating very good agreement.

20. As may be expected, basic dwelling classificatory variables had higher Kappa scores than those where surveyors were assessing conditions. Variables with the highest Kappa scores were related to the type and tenure of the property, its heating system etc, Table 2. Variables with the lowest Kappa scores were those concerned with specific aspects of dwelling and environmental conditions (Table 3):

Table 2: Core survey variables with highest non-random levels of surveyor agreement

Measure	% agreement	chance % agreement[1]	Kappa	level of agreement
Main heating fuel	94.3	64.1	0.842	Very good
No. of vacant flats in module	95.8	73.4	0.844	Very good
Attic/basement present	97.0	78.6	0.858	Very good
Type of roof structure	98.1	84.7	0.876	Very good
Tenure	95.5	35.3	0.930	Very good
Mains gas supply present	98.5	75.7	0.938	Very good
Main heating system	98.9	70.1	0.962	Very good
No. of floors above ground	99.2	53.5	0.984	Very good
Dwelling type (house/flat)	100.0	73.8	1.000	Very good

[1] 'Chance % agreement' is the percentage agreement that would be obtained by chance. It is measured by calculating the expected distribution of responses that would be obtained if surveyor 1 and surveyor 2 made their judgements on a random basis, constrained by the overall distribution of responses.

Table 3: Core survey variables with lowest non-random levels of surveyor agreement

Measure	% agreement	chance % agreement[1]	Kappa	level of agreement
Decent homes: modernisations criterion	95.5	95.5	–0.018	Poor
Fitness: lighting	97.7	97.7	–0.006	Poor
Problems in local area: intrusive industry	78.4	78.4	0.002	Poor
Exterior wall structure: urgent repair	92.8	92.7	0.021	Poor
Problems in local area: scruffy/neglected buildings	57.6	56.5	0.025	Poor
Fitness: structural stability	90.9	90.6	0.029	Poor
Problems in local area: non-conforming uses	85.2	84.3	0.058	Poor
Problems in local area: railway/aircraft noise	68.9	67.0	0.059	Poor
Exterior wall finish: urgent repair	83.7	82.3	0.078	Poor

[1] 'Chance % agreement' is the percentage agreement that would be obtained by chance. It is measured by calculating the expected distribution of responses that would be obtained if surveyor 1 and surveyor 2 made their judgements on a random basis, constrained by the overall distribution of responses.

21. Two variables, 'decent homes: modernisations criterion' and 'fitness: lighting', have negative Kappa scores which indicate that surveyor agreement was actually worse than if surveyors had chosen values randomly. However the negative values are only marginally less than 0 and are likely to be due to chance given the large number of variables tested. The percentage agreement for these questions was very high, indicating that the poor agreement was confined to a relatively small number of marginal cases.

22. The variable with the lowest percentage agreement was 'problems in the local area: scruffy/neglected buildings'. This indicates that surveyors fail to agree on almost half of cases, and even after taking account of this low level of chance agreement, agreement between surveyors is relatively poor.

23. Ten key variables on the survey were identified and the Kappa scores and percentage agreement are given in Table 4 below:

Table 4: Percentage agreement and Kappa for key variables

Measure	% agreement	chance % agreement[1]	Kappa	level of agreement
Main heating system	98.9	70.1	0.962	Very good
Dwelling age	79.9	21.3	0.745	Good
Decent homes: thermal comfort criterion	87.9	61.6	0.684	Good
Decent homes standard	79.5	54.0	0.555	Good
Energy efficiency rating (SAP)	50.4	19.4	0.384	Fair
Fitness assessment: overall	70.8	59.1	0.286	Fair
Loft insulation: presence and thickness	47.0	16.0	0.274	Fair
Poor quality environment	87.9	84.0	0.245	Fair
Decent homes: repair criterion	87.1	82.2	0.227	Fair
Decent homes: moderisations criterion	97.3	97.4	–0.013	Poor

[1] 'Chance % agreement' is the percentage agreement that would be obtained by chance. It is measured by calculating the expected distribution of responses that would be obtained if surveyor 1 and surveyor 2 made their judgements on a random basis, constrained by the overall distribution of responses.

24. Of these variables, 'decent homes: modernisation criterion' causes the most concern as it has a very low Kappa score. Given the high percentage agreement score we can conclude that there was very poor agreement amongst surveyors regarding the relatively small proportion of individual properties failing this criterion.

Estimating correlated surveyor variance

Overview

25. The correlated surveyor variance refers to the tendency of an individual surveyor to make assessments which are consistent for that surveyor but different from the average assessment of all surveyors. For example, a particular surveyor may be more likely on average to assess a particular dwelling as fit for habitation than other surveyors.

26. Multilevel model-based analysis was carried out to calculate this variance in order to:

- compare the estimates with previous results;
- to see whether the new EHCS survey design and contractor have had an impact; and
- to estimate the impact of surveyor variance on survey standard errors.

27. The multilevel model allows for correlated surveyor variance to be estimated separately from other sources of variation.

28. It is important to emphasise that the multilevel modelling provides estimates for the correlated surveyor variance for each individual ***response category*** of a variable, not for the variable as a whole as with the descriptive analysis. For example, where a variable has possible responses of 'none' and 'some', variance estimates are produced for each of these responses.

29. Correlated surveyor variance is a ratio, so it can take any value between 0 and 1: 0 implies that individual surveyors are likely to make, on average, assessments which are in line with the average assessments for all surveyors; whereas 1 is a theoretical limit which would be attained only if all observed differences between measures were due to systematic differences between surveyors.

30. Multilevel modelling assesses whether there is disagreement between surveyors but does not provide a measure of the extent of disagreement between surveyors, ie it can only assess where there was disagreement, not how different the responses from different surveyors were.

Identifying problematic variables

31. The variables that display the greatest amount of total variation or correlated surveyor variance can be targeted for improvements, possibly via surveyor briefings and/or form design. By reducing the amount of surveyor variability, whether uncorrelated (ie random) or correlated, the size of the survey errors will be reduced.

32. Problematic variables can be identified by looking at the Kappa score for the whole variable in conjunction with the individual correlated surveyor variances for its categories. The two estimates should not be looked at in isolation when making a judgement about a measurement. The following should be used as a guide:

- A low correlated surveyor variance and a high Kappa score indicates that there are relatively few/no problems in taking the measurement. Surveyors have a high level of agreement across all categories and they are less likely to make assessments that are different to the average of other surveyors.
- Low correlated surveyor variance and a low Kappa score indicates some problems in taking the measurement. Such variables typically have a small number of categories, with nearly all dwellings falling into the same category. As a result there is a high level of agreement between surveyors and little scope for correlated surveyor variability.

However, where there is disagreement between surveyors about which dwellings are exceptional, ie fall into the less common categories, then a low Kappa score results. This provides warning that a variable does not discriminate well between categories.

- High correlated surveyor variance and a low Kappa score indicates that a measure is problematic. The level of agreement between surveyors is low and surveyors are likely to consistently make assessments that are different to other surveyors.

Results of estimating correlated surveyor variance

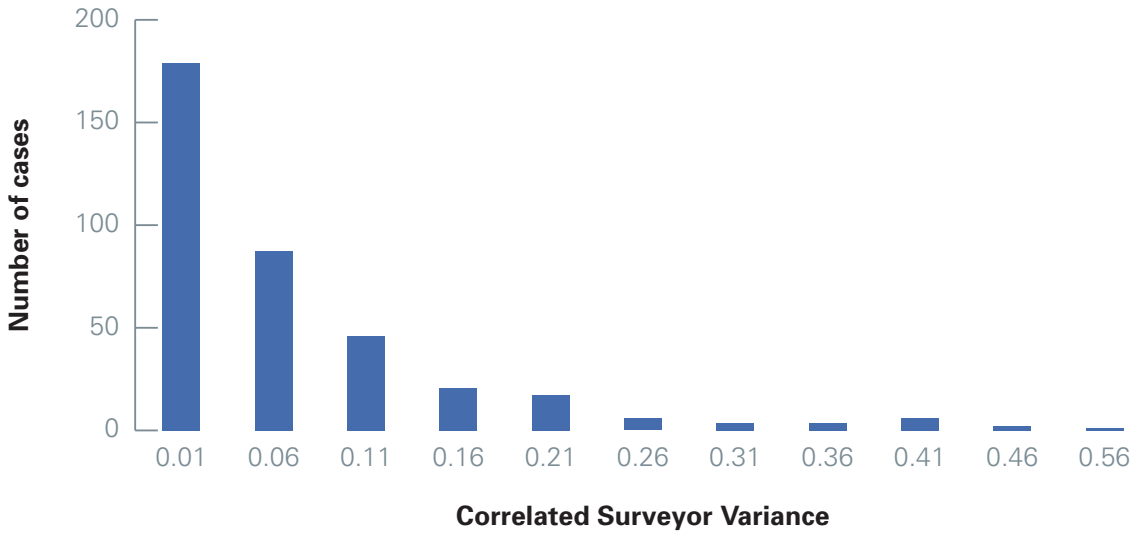
33. This section describes the key findings from the multilevel modelling and describes the correlated surveyor estimates and also comments on the bias adjustment estimates. This section also highlights which variables are problematic.

Correlated surveyor variance

34. The correlated surveyor variance (τ) refers to the tendency of an individual surveyor to make assessments which are consistent for that surveyor but different from the average assessment of all surveyors.

35. Results for estimated correlated surveyor variances of a range of survey measures, shown at the end of this annex, range from 0 to 0.477 with mean and standard deviation of 0.0594 and 0.0905 respectively. The distribution of these estimates is displayed in Figure 1 and shows that, for the vast majority of cases, correlated surveyor variance is low.

Figure 1: Distribution of the correlated surveyor variance



Highest and lowest correlated surveyor variances

36. The ***response categories*** with the highest correlated surveyor variance are from surveyor assessments of the local area, Table 5. They tend to relate to the response categories indicating 'no' or 'some' problems rather than the response categories indicating major problems – the latter having significantly lower levels of correlated surveyor variance (see Table 7 below). These ***variables as a whole*** also have low Kappa values which suggests the variability in surveyors' assessments revolves primarily around areas with 'no' or 'few' problems.

Table 5: Variables with the 10 highest values for correlated surveyor variance

Measure	response catagory	Kappa	Correlated Surveyor Variance (r)
Problems in local area: ambient air quality	'none'	0.207	0.477
Problems in local area: ambient air quality	'some'	0.207	0.460
Problems in local area: scruffy/neglected buildings	'none'	0.025	0.429
Problems in local area: scruffy/neglected buildings	'some'	0.225	0.380
Problems in local area: condition of dwellings	'none'	0.121	0.410
Problems in local area: intrusive industry	'none'	0.002	0.376
Problems in local area: intrusive industry	'some'	0.002	0.402
Problems in local area: railway/aircraft noise	'none'	0.059	0.387
Problems in local area: railway/aircraft noise	'some'	0.059	0.360
Problems in local area: non-conforming uses	'none'	0.058	0.384

37. The correlated surveyor variances for the response categories of key measures are shown in Table 6 below. All categories of these key variables have low correlated surveyor variance values, where measurable.

Table 6: Correlated surveyor variance for response categories of key variables

Measure	Response category	Correlated Surveyor Variance (τ)
Dwelling age	pre-1919	0.0092
	1919-1944	0.0211
	1945-1964	0.0370
	1965-1980	0.0046
	post-1980	0.0063
Energy efficiency (SAP)	less than 20	0.0544
	20 or over but less than 30	0.0000
	30 or over but less than 40	0.0036
	40 or over but less than 50	0.0203
	50 or over but less than 60	0.0000
	60 or over but less then 70	0.0000
	70 or above	0.0537
Decent homes	decent	0.0218
	non-decent	0.0249
Decent homes: thermal comfort criterion	pass	0.0117
	fail	0.0154
Decent homes: fitness criterion	pass	0.0445
	fail	0.0485
Decent homes: modernisations criterion	pass	0.0000
	fail	*
Decent homes: repair criterion	pass	0.0600
	fail	*
Heating system	central heating	0.0000
	storage heaters	0.0000
	room heaters	0.0209
Loft insulation thickness	no insulation	0.0000
	50mm or less	0.0773
	75mm	0.0194
	100mm	0.0147
	125 to 150mm	0.0357
	150mm or more	0.0064

* too few cases to analyse

38. Correlated surveyor variance was found to be substantially lower on average for derived composite variables such as decent homes and the energy efficiency (SAP) rating than for simple variables taken straight from the survey questionnaire. The same result was found in the previous 2001 study.

39. A list of Kappa scores and correlated surveyor variances for selected variables, together with their associated bias adjustments, is given in Table 7 below. The bias adjustments shown are calculated for estimates expressed as percentages. If, instead, estimates are expressed as proportions (between 0 and 1), the bias adjustments will need to be scaled down by a factor of 100^2 or 10,000.

Comparison of the correlated surveyor variability estimates for 2001 and 2003 EHCS

40. Due to the difference in survey designs between the 2001 EHCS and the Continuous Survey, different models were used to obtain estimates of surveyor variability in each case. A direct comparison of results is therefore not valid. However, the results from the two studies are, in many respects, similar, and there is good correlation between them, indicating that the change in survey design has not had a major impact on the quality of results.

Table 7: Correlated surveyor variances and bias adjustments for response catorgories of selected variables

Measure	Response category	Kappa score	Correlated surveyor variance (τ)	Bias adjustment
dwelling characteristics:				
dwelling type	house	1.000	0.0000	negligible
	low rise flat	1.000	0.0000	negligible
	high rise flat	1.000	0.0000	negligible
	all flats	1.000	0.0000	negligible
dwelling age	pre-1919	0.745	0.0092	0.085
	1919-1944	0.745	0.0211	0.221
	1945-1964	0.745	0.0370	0.460
	1965-1980	0.745	0.0046	0.049
	post-1980	0.745	0.0063	0.039
tenure	owner occupied	0.930	0.0000	negligible
	private rented	0.930	0.0000	negligible
	local authority	0.930	0.0214	0.255
	RSL	0.930	0.0000	negligible
dwelling conditions and standards:				
decent homes	decent	0.555	0.0218	0.311
	non-decent	0.555	0.0249	0.354
decent homes: repair criterion	pass	0.277	0.0600	0.332
	fail	0.277	*	negligible
decent homes: modernisations criterion	pass	–0.018	0.0000	0.000
	fail	–0.018	*	negligible
decent homes: thermal comfort criterion	pass	0.684	0.0117	0.140
	fail	0.684	0.0154	0.183
decent homes: fitness criterion	pass	0.333	0.0445	0.181
	fail	0.333	0.0485	0.192
energy efficiency (SAP)	Less than 20	0.384	0.0544	0.093
	20 or over but less than 30	0.384	0.0000	negligible
	3 or over but less than 40	0.384	0.0036	negligible
	40 or over but less than 50	0.384	0.0203	0.256
	50 or over but less than 60	0.384	0.0000	0.000
	60 or over but less than 70	0.384	0.0000	0.000
	70 or above	0.384	0.0537	0.356
repair costs (£/m^2)	zero	0.105	0.0571	0.452
	up to £1000	0.105	0.0096	negligible
	£1001 to £2000	0.105	0.0350	0.180
	£2001 to £3000	0.105	0.0000	0.000
	£3001 to £4000	0.105	0.0000	0.000
	£4001 to £5000	0.105	0.0245	0.092
	over £5000	0.105	0.0806	1.056
mains gas supply	present	0.938	0.0000	negligible
	not present	0.938	*	*
heating system	Central heating	0.882	0.0000	negligible
	Storage heaters	0.882	0.0000	negligible
	Room heaters	0.882	0.0209	0.045
loft insulation	no insulation	0.274	0.0000	0.000
	50mm or less	0.274	0.0773	0.506
	75mm	0.274	0.0194	0.120
	100mm	0.274	0.0147	0.177
	125 to 150mm	0.274	0.0357	0.325
	150mm or more	0.274	0.0064	negligible
cavity wall insulation	present	0.368	0.0090	0.119
	not present	0.368	0.0558	0.840

Table 7: Correlated surveyor variances and bias adjustments for response catorgories of selected variables

Measure	Response catagory	Kappa score	Correlated Surveyor Variance (τ)	Bias adjustment
area:				
nature of area	city and other urban	0.465	0.1593	1.792
	centres suburban	0.465	0.1010	1.569
	residential rural	0.465	0.0613	0.705
environmental problems:				
litter	no problems	0.267	0.1852	2.883
	some problems	0.267	0.1398	2.170
	major problems	0.267	0.0800	0.102
graffiti	no problems	0.349	0.1940	2.276
	some problems	0.349	0.1365	1.502
	major problems	0.349	0.0488	0.067
vandalism	no problems	0.243	0.1967	2.430
	some problems	0.243	0.1688	2.009
	major problems	0.243	*	*
dog/other excrement	no problems	0.185	0.2363	3.441
	some problems	0.185	0.2219	3.204
	major problems	0.185	*	*
condition of dwellings	no problems	0.121	0.4098	5.981
	some problems	0.121	0.3570	5.096
	major problems	0.121	*	*
vacant sites	no problems	0.087	0.2047	5.981
	some problems	0.087	0.1981	5.096
	major problems	0.087	*	*
intrusive industry	no problems	0.002	0.3765	2.497
	some problems	0.002	0.4020	2.448
	major problems	0.002	0.0763	0.053
non-conforming uses	no problems	0.058	0.3835	1.862
	some problems	0.058	0.3062	1.396
	major problems	0.058	*	*
vacant/boarded-up buildings	no problems	0.291	0.1307	0.051
	some problems	0.291	0.1363	0.051
	major problems	0.291	*	*
ambient air quality	no problems	0.207	0.4768	5.939
	some problems	0.207	0.4599	5.704
	major problems	0.207	*	*
heavy traffic	no problems	0.357	0.1134	1.556
	some problems	0.357	0.0670	0.852
	major problems	0.357	0.0207	0.051
motorways/arterial roads	no problems	0.137	0.3290	1.556
	some problems	0.137	0.2608	0.852
	major problems	0.137	0.0569	0.051
railway/aircraft noise	no problems	0.059	0.3869	3.577
	some problems	0.059	0.3595	2.587
	major problems	0.059	0.1029	0.091
street parking	no problems	0.141	0.2087	3.241
	some problems	0.141	0.1853	2.845
	major problems	0.141	0.0684	0.319
scruffy gardens	no problems	0.176	0.3023	4.640
	some problems	0.176	0.2310	3.509
	major problems	0.176	0.0672	0.078
scruffy/neglected buildings	no problems	0.025	0.4295	5.647
	some problems	0.025	0.3795	4.786
	major problems	0.025	*	*

* Correlated surveyor variance estimated as zero, but from too few cases to be reliable.
** Estimates cannot be obtained for this variable

Chapter 4

The decent homes criteria and their application in the EHCS

Decent homes – definition

1. This chapter gives a detailed definition of the four criteria that a decent home is required to meet, and explains how they are applied to the EHCS data. In brief, the criteria are that the dwelling should:

   - be above the current statutory minimum standard for housing;
   - be in a reasonable state of repair;
   - provide reasonably modern facilities and services;
   - provide a reasonable degree of thermal comfort.

2. The decent home definition provides minimum decency conditions for dwellings. Landlords and owners doing work on their properties may well find it appropriate to take the dwellings above this minimum level, for example, through environmental work to the estates, security improvements or provision of disabled persons' adaptations. The work carried out should ensure that dwellings will not fall below the decent homes threshold again for a number of years, as recommended in Communities and Local Government's guidance.

Criterion A: the dwelling meets the current statutory minimum standard for housing

3. The current minimum standard for housing is the Fitness Standard (s604 of the Housing Act 1985 amended by Schedule 9 of the 1989 Local Government and Housing Act). Dwellings unfit under this legislation fail this criterion. Under the Fitness Standard, a dwelling is fit for human habitation unless, in the opinion of the local housing authority, it fails to meet one or more of various requirements. These are listed in the Glossary.

Criterion B: the dwelling is in a reasonable state of repair

4. A dwelling satisfies this criterion unless:

   - one or more key building components are old *and*, because of their condition, need replacing or major repair; or
   - two or more other building components are old *and*, because of their condition, need replacement or major repair.

BUILDING COMPONENTS

5. Building components are the structural parts of a dwelling (e.g. wall structure, roof structure), other external elements (eg roof covering, chimneys) and internal services and amenities (eg kitchens, heating systems).

6. *Key* building components are those which, if in poor condition, could have an *immediate* impact on the integrity of the building and cause further deterioration in other components. They are the external components plus internal components that have potential safety implications and include:

   - external walls;
   - roof structure and covering;
   - windows/doors;
   - chimneys;
   - central heating boilers;
   - gas fires;
   - storage heaters;
   - electrics.

7. If *any* of these components are old and need replacing, or require immediate major repair, then the dwelling is not in a reasonable state of repair and remedial action is required.

8. *Other* building components are those that have a less immediate impact on the integrity of the dwelling. Their combined effect is therefore considered, with a dwelling not in a reasonable state of repair if *2 or more* are old and need replacing or require immediate major repair.

'OLD' AND IN 'POOR CONDITION'

9. A component is defined as 'old' if it is older than its expected or standard lifetime. The component lifetimes used are consistent with those used for resource allocation to local authorities and are listed later in this chapter.

10. Components are in 'poor condition' if they need major work, either full replacement or major repair. The definitions used for different components are as listed at the end of this chapter.

11. One or more key components, or two or more other components, must be both old *and* in poor condition to render the dwelling non-decent on grounds of disrepair. Components that are old but in good condition or in poor condition but not old would not, in themselves, cause the dwelling to fall below the threshold. Thus for example a bathroom with facilities which are old but still in good condition would not trigger failure on this criterion.

12. Where the disrepair is of a component affecting a block of flats, the flats that are classed as non-decent are those directly affected by the disrepair.

Criterion C: The dwelling has reasonably modern facilities and services

13. A dwelling is considered not to meet this criterion if it lacks three or more of the following facilities:

    - a kitchen which is 20 years old or less;
    - a kitchen with adequate space and layout;
    - a bathroom which is 30 years old or less;
    - an appropriately located bathroom and wc;
    - adequate noise insulation;
    - adequate size and layout of common entrance areas for blocks of flats.

14. The ages used to define the 'modern' kitchen and bathroom are lower than those for the disrepair criterion. This is to take account of the modernity of kitchens and bathrooms, as well as their functionality and condition.

15. There is some flexibility inherent in this criterion, in that a dwelling has to fail on three of these tests to be regarded as failing the modernisation criterion itself. Such a dwelling does not have to be fully modernised for this criterion to be passed: it would be sufficient in many cases to deal with only one or two of the facilities that are contributing to the failure.

16. These tests are used in the national assessment of decent homes and have been measured by the English House Condition Survey (EHCS) for many years. For example, in the EHCS:

    - a kitchen failing on adequate space and layout would be one that was too small to contain all the required items (sink, cupboards, cooker space, worktops etc.) appropriate to the size of the dwelling;
    - an inappropriately located bathroom or wc is one where the main bathroom or wc is located in a bedroom or accessed through a bedroom (unless the bedroom is not used or the dwelling is for a single person). a dwelling would also fail if the main wc is external or located on a different floor to the nearest wash hand basin, or if a wc without a wash hand basin opens on to a kitchen in an inappropriate area, for example next to the food preparation area;

- inadequate insulation from external airborne noise would occur where there are problems with, for example, traffic (rail, road or aeroplanes) or factory noise. reasonable insulation from these problems should be ensured through installation of double glazing;

- inadequate size and layout of common entrance areas for blocks of flats would occur where there is insufficient room to manoeuvre easily, for example where there are narrow access ways with awkward corners and turnings, steep staircases, inadequate landings, absence of handrails, low headroom etc.

Criterion D: the dwelling provides a reasonable degree of thermal comfort

17. The definition requires a dwelling to have both:

    - efficient heating; and

    - effective insulation.

18. Under this definition, efficient heating is defined as any gas or oil programmable central heating or electric storage heaters / programmable solid fuel, or communal heating or LPG central heating or similarly efficient heating systems[1]. Heating sources which provide less energy efficient options do not meet this decent home criterion.

19. Because of the differences in efficiency between gas/oil heating systems and the other heating systems listed, the level of insulation that is appropriate also differs:

    - **For dwellings with gas/oil programmable heating,** cavity wall insulation (if there are cavity walls that can be insulated effectively) or at least 50mm loft insulation (if there is loft space) is an effective package of insulation under the minimum standard set by the Department of Health;

    - **For dwellings heated by electric storage heaters/programmable solid fuel or LPG central heating** a higher specification of insulation is required to meet the same standard: at least 200mm of loft insulation (if there is a loft) and cavity wall insulation (if there are cavity walls that can be insulated effectively).

Applying the Decent Homes criteria in the EHCS

CRITERION A: FITNESS

20. Surveyors are asked to assess the fitness of the dwelling against the requirements set out in the fitness standard. Failure on any of these requirements leads to the dwelling being assessed as unfit.

CRITERION B: STATE OF REPAIR

21. The determination of whether dwellings in the EHCS meet this criterion depends on the assessment both of the ages of key and other building components and of their condition.

22. The age of each building element is derived from information recorded by the surveyors. Where windows are not original, surveyors are asked to estimate their age in years. Where age is unknown it is assumed to be the same as the dwelling age. In a small proportion of cases, where components are the 'same age as dwelling' it is necessary to calculate the probability that they have exceeded their lifetime, because age of dwelling is recorded in relatively wide bands rather than as a single year.

23. For example, windows in houses are assumed to have exceeded their lifetime if they are more than 40 years old (see Table 1 below). For most, but not all, dwellings built in 1945-64 which still had their original windows, these windows were over 40 years old at the time of the survey. A simple and robust approach is used, assuming that roughly equal numbers of dwellings were built in each year of this ageband. Dwellings built between 1945 and 1962 represent 18 years out of the 20 year age band, so all original windows in dwellings built in 1945-64 are given a probability of 0.9 of being over 40 years old in 2003.

24. For most dwellings, the assessment of whether or not they satisfy the disrepair criterion is clear cut. For the remainder, for each building component which is in poor condition, the probabilities of being beyond the normal lifetime are combined to give a total probability, taking into account the split into major and minor elements. If this total is greater than 0.5, the dwelling is classed as non-decent due to disrepair.

25. Table 1 shows the lifetimes of building components used to assess whether the components are 'old' in the terms of the disrepair criterion. These lifetimes are used to construct the national estimates of the number of dwellings that are decent and those that fail.

Table 1: Component lifetimes used in the disrepair criterion

Building components (key components marked *)	Houses and bungalows	All flats in blocks of below 6 storeys	All flats in blocks of 6 or more storeys
Wall structure *	80	80	80
Lintels *	60	60	60
Brickwork (spalling) *	30	30	30
Wall finish *	60	60	30
Roof structure *	50	30	30
Roof finish *	50	30	30
Chimney *	50	50	N/A
Windows *	40	30	30
External doors *	40	30	30
Kitchen	30	30	30
Bathrooms	40	40	40
Heating – central heating gas boiler *	15	15	15
Heating – central heating distribution system	40	40	40
Heating – other *	30	30	30
Electrical systems *	30	30	30

26. Table 2 sets out the definitions used within the disrepair criterion to identify whether building components are 'in poor condition'. These are consistent with EHCS definitions and will be used to monitor progress nationally through the EHCS. The general approach used in the EHCS is that, where a component requires some work, repair should be prescribed rather than replacement unless:

- the component is sufficiently damaged that it is impossible to repair;
- the component is unsuitable, and would be even if it were repaired, either because the material has deteriorated or because the component was never suitable;
- (for external components) even if the component were repaired now, it would still need to be replaced within 5 years.

Table 2: Definition of 'in poor condition' used in EHCS

	Definition of 'in poor condition' used in EHCS
Wall structure	Replace 10% or more, or repair 30% or more
Wall finish	Replace/repoint/renew 50% or more
Chimneys	1 chimney needing partial rebuilding or more
Roof structure	Replace 10% or more or strengthen 30% or more
Roof covering	Replace or isolated repairs to 50% or more
Windows	Replace at least one window or repair/replace sash or member to at least two (excluding easing sashes, reglazing, painting)
External doors	Replace at least one
Kitchen	Major repair or replace 3 or more items out of 6 (cold water drinking supply, hot water, sink, cooking provision, cupboards, worktop)
Bathroom	Major repair or replace 2 or more items (bath, wash hand basin, WC)
Electrical system	Replace or major repair to system
Central heating boiler	Replace or major repair
Central heating distribution	Replace or major repair
Storage heaters	Replace or major repair

CRITERION C: MODERN FACILITIES AND SERVICES

27. The method of assigning age probabilities described above is also used to determine whether kitchens and bathrooms have exceeded their lifetimes as specified in the modernisation criterion. The probabilities of being non-decent on these two components are added to results on the other modernisation measures in to determine whether the dwelling should be classed as non-decent.

CRITERION D: THERMAL COMFORT

28. The application of the thermal comfort criterion to the survey data is quite complex, and is explained in detail in Chapter 5.

Chapter 5

Using EHCS data to model Decent Homes Thermal Comfort

Background

1. Classifying EHCS sample dwellings as passing or failing the decent homes thermal comfort criterion involves the assessment of the relationship between an array of survey information related to insulation, heating and structural properties. These assessments are made through a modelling process developed by BRE. This process also includes the use of data imputation modules to cater for cases with varying amounts of missing data.

2. The thermal comfort criterion was originally developed by ODPM following exploratory analysis based on the 1996 EHCS dataset. Following consultation, the thermal comfort criterion was defined on the basis of a combination of type of heating and level of insulation (see Chapter 4). The number of decent homes is monitored annually against a provisional baseline figure established using the 2001 survey data. Refinements have been made to the thermal comfort modelling approach since the 2001 EHCS report, both to reflect the extension of the criterion to the private sector stock and to improve some of the assumptions within the model. This section outlines what changes to the model have been made and the impact these have had on the 2001 baseline.

3. It is important to note that, because of these refinements to the thermal comfort model and revisions to the grossing factors, decent homes baseline figures quoted in the original EHCS 2001 Report will differ slightly from those quoted in all subsequent reports. The thermal comfort figures are affected most – baseline figures for 2001 unfitness, disrepair and modernisation remain almost unchanged from the 2001 Report.

Reasons for change in methodology and revisions to published 2001 figures

4. The analysis used to develop the definition of the decent homes thermal comfort criterion used 1996 EHCS data and examined the relationships between a number of different variables. These included: type of heating system, heating fuel, amount of loft insulation, cavity wall insulation, double glazed windows, SAP rating and fuel poverty. The final definition of the thermal comfort criterion (as published) was based on data collected in the 2001 EHCS and developed largely for application to the local authority stock.

Form changes

5. Minor changes were made to the EHCS physical survey form for 2002-03 and subsequent years to try to match the data collected more closely with the published requirements for thermal comfort. The main changes were to:

   - provide additional response categories for amount of loft insulation. The 1996 and 2001 form had had categories '50 mm or under' and 'over 150 mm'. These did not match up with the critical values in the published criterion of '50mm or more' and '200mm or more';
   - collect information about the amount of loft insulation for all houses and top floor flats. In the 1996 and 2001 surveys these data were only collected for houses built up to 1980 (apart from a few cases where surveyors had mistakenly recorded it);
   - improve the recording of heating systems.

6. The surveyor training in 2002-03 and subsequent years also focussed more heavily on heating systems and how to identify the presence of cavity wall insulation. Additional written guidance and photographs were also provided.

Implications for the 2001 Baseline

7. The changes to the form and the way in which the 2001 baseline was initially estimated have two very important ramifications:

   - it is not possible to exactly replicate the 2001 method and rules for modelling thermal comfort for 2002-03 or later years;
   - there are problems in translating a criterion which was devised with a conventional two-storey local authority house in mind to other dwelling types and other sectors. Applying this criterion to the whole dwelling stock requires detailed consideration of how to treat dwellings where, for example, external walls are partly of cavity construction and partly solid brickwork, and where loft conversions, flats and non-traditional forms of construction exist. Many older dwellings in the private and RSL sectors have been extended and have a variety of wall types and about 1 million have loft conversions. About 1.5 million homes are of non-traditional construction. The thermal comfort model therefore needed to be reviewed and refined to cater for these additional situations.

Detailed description of methodological issues

Dealing with the changes in recording the amount of loft insulation

8. The table below illustrates the differences between the categories used to record the amount of loft insulation in 1996, 2001 and later years.

Table 1: Depth of loft insulation recorded by survey year

1996 and 2001	2002-03 and later
None	None
	25mm
50mm or under	
	50mm
75mm	75mm
100mm	100mm
	125mm
150mm	150mm
Over 150mm	200mm
	300mm
	Over 300mm

9. In 2002-03, surveyors were instructed to round to the nearest number so the '50mm' category will include all real thicknesses between about 40-60mm. However, in practical terms the vast majority will be 50mm because mineral wool or fibreglass sheets have been, and are currently, supplied in thickness increments of 25mm and 50mm. All dwellings coded as '50mm' in 2002-03 and later are assumed to be exactly 50mm.

10. In 1996 and 2001, the '50mm and under' category will include dwellings with 50mm exactly and those with less (almost always 25mm because this is the only standard sheet thickness under 50mm). In the original 2001 modelling these were all set to fail the loft insulation criterion. Analysis of 2002-03 data has indicated that only 30% of dwellings coded as either 25mm or 50mm fell into the 25mm category, i.e. most were 50mm rather than less than 50mm. Analysis of dwelling characteristics and amount of loft insulation in 2002-03 have indicated, for dwellings with no or fairly low amounts of loft insulation (0-100mm), dwelling age is the characteristic most strongly related to amount of insulation. Historically, Building Regulations specify that all dwellings built after 1974 with lofts should have been built with at least 50mm of loft insulation. It has therefore been assumed that all dwellings built after 1964 with "50mm and under" of loft insulation have 50mm exactly and those built before this date with "50mm and under" recorded have less than 50mm.

11. At the other end of the scale, a new approach to treating the 'over 150mm' category in 1996 and 2001 was devised. In the original 2001 modelling, these were all assumed to indicate at least 200mm. After analysis of the 2002-03 data and consideration of technical issues, it was agreed to retain the assumption that these are all at least 200mm. This is for the following reasons:

    - there are no data on the likely frequency of 175mm of loft insulation, either from EHCS or other sources;

    - 175 mm is not a very likely thickness to be applied in practice because it does not occur in Building Regulations and it can only be practically achieved by adding a 150mm roll to 25mm;

- There is only a very small difference in thermal characteristics between around 175mm and 200mm of loft insulation.

Summary: 1996 and 2001 figures were revised to reflect new assumptions about properties with 50mm or less or with over 150mm of loft insulation.

Dealing with loft conversions

12. Where the surveyor codes the loft as a 'room with permanent stairs', no data is collected on the amount of loft insulation. To all intents and purposes they are treated in the same way as dwellings with flat roofs. The 1996 and 2001 modelling, however, assigned an amount of loft insulation to all loft conversions based on the Building Regulations at the time of the conversion or, where this was unknown, the original date of construction. This has 3 key problems:

    - these dwellings no longer have a loft space;
    - EHCS does not try and collect data on the amount or type of any insulation behind the lining because in most cases this cannot be seen without drilling holes in the lining sheets;
    - applying insulation retrospectively to loft conversions is problematic and expensive. Probably the easiest solution would be to line with insulated plasterboard. However, the thermal comfort criterion does not require dry-lining to be installed to solid 9" brick walls, so there is a good argument for saying that it should not have to apply to loft conversions either.

13. To overcome this problem the model has been amended. Dwellings are taken to have loft conversions if this is indicated in the loft section or the alterations section of the EHCS survey form. It is now assumed that loft conversions do not require loft insulation even where the surveyor has actually entered a thickness.

    Summary: 1996 and 2001 figures have been revised so that any dwellings with loft conversions are no longer considered to need loft insulation.

Establishing whether the dwelling is a top floor flat

14. If a flat is not on the top floor of the block then it cannot have a loft and therefore does not require loft insulation. There are considerable problems in identifying these dwellings from the 1996, 2001 and 2002-03 surveys because data on floor levels from different parts of the form are not always consistent. To overcome this issue, an extra question was added to the EHCS survey form in 2003-04 asking surveyors to indicate whether a dwelling was a top floor flat. After sensitivity testing, the rules for deciding whether a flat is on the top floor for 2002-03 and earlier (and for dealing with any missing data in 2003-04 onwards) were amended as follows:

    - The floor level of the flat is based on the following data in order of precedence:
        - flat levels and no of floors in flat as given in dimensions section;

- room levels as given in room by room section;
- entry floor to dwelling proper and no of floors in flat from dimensions section.

- All floor levels of flat or module of 50 or over are set to unknown.
- Where the top floor of the flat is equal to or higher than the top floor of module, assume top floor flat.
- Where floor level cannot be derived, assume not top floor flat.

Summary: 1996 and 2001 figures were revised to reflect changes to the way in which top floor flats were identified from the survey data.

Identifying flats with flat roofs

15. This is mainly an issue for the 2001 data because surveyors did not have to fill in the loft section of the form for flats. However, it affects some cases in 2002-03 and later years where information on loft type is missing.

16. Roof structure information from the exterior section of the survey form is used in the thermal comfort model to determine what proportion of the roof structure is pitched and what proportion is flat. If 50% or more of the roof is flat, it is assumed to be a flat roof and no loft insulation is required. Note that this does not overwrite cases where the surveyor has filled in loft type information in 2002-03 and later but is just used to fill missing cases in these years.

    Summary: The effect of this change has been to reduce the number of flats with lofts present and therefore the potential to fail on loft insulation.

Assigning an amount of loft insulation where data are missing

17. A simpler and more robust method for estimating the likely amount of loft insulation present was developed. Regression analysis indicated that the key predictors of amount of loft insulation were dwelling age, tenure and broad regional location. Where the dwelling has a loft that can be insulated and the amount of insulation is missing, the mean value for a dwelling of that age, tenure and broad region is used.

    Summary: Method of imputing missing loft insulation data refined, resulting in changes in 1996 and 2001 figures.

Dealing with missing information on heating type

18. The issues for the 2001 survey are slightly different from those for later years.

19. 2002-03 and later: If the type of heating is missing and other criteria are met, the boiler code is used to assign heating type. Where the boiler code is missing or invalid, and mains gas supply is present, mains gas heating is assumed. Otherwise, electric heating is assumed.

20. 2001: The model was amended to first establish whether the dwelling has both central and programmable heating systems present or programmable heating only. If central heating is definitely present but the type of heating is missing, the same rules are used as for 2002-03 and later, as above, to assign heating type. Otherwise, if the type of programmable heating is missing but the data on heating controls indicates that overnight charge control is present and the dwelling has off-peak electric supply, storage heaters are assumed.

    Summary: The net effect of this change has been to slightly increase the number of homes with storage heaters rather than gas central heating.

Dealing with anomalous data on storage heaters

21. In all years, there are some cases where the surveyor had indicated that storage heaters were present but that an off-peak electricity supply was not present. These cases have been assumed to have storage heaters. Although surveyors sometimes have problems deciding if heaters are storage heaters, on balance, they are more likely to get this right than the off-peak supply question. However, if storage heaters are recorded as present and both the off-peak electric supply and overnight charge control are both recorded as "no", then the heating type is amended to fixed electric heaters.

    Summary: 1996 and 2001 modelling assumptions changed.

Dealing with more than one type of heating in 2001 and earlier

22. Where both central and programmable heating are definitely present (see above) the 'best' system from a thermal comfort viewpoint has to be established. If electric or solid fuel central heating is present together with gas programmable, the heating type is set to gas programmable. If electric floor/ceiling central heating is present alongside storage heaters, the heating type is set to storage heaters. This means that dwellings with floor/ceiling systems and storage heaters do not automatically fail as before.

Establishing under what circumstances cavity walls can be insulated

23. This is an important issue because the changes implemented above for flats with flat roofs and loft conversions will effectively reduce the number of dwellings with lofts, which means that cavity wall insulation becomes a key consideration for more dwellings. The published guidance simply says:

    '…cavity wall insulation (if there are cavity walls that can be insulated effectively)…'

24. Having examined the technical issues, feasibility and costs for non-traditional types of construction, the model has been amended to assume that none of these can be classed as having cavity walls for the purposes of thermal comfort. The main reasons for this are:

    - the reference in the guidance to 'cavity walls that can be insulated effectively' should be taken to mean dwellings where one would apply the same basic job and specification of work as for a 2 storey house traditional house of boxwall brick/block cavity construction. Where there is additional work required to prevent cold bridging (e.g. in concrete frame structures) this is no longer a simple job as it involves external insulation and/or dry lining together with additional external detailing. The decent homes criterion does not require this for 9" solid brick walls so we should not be expecting it to be installed for other types;

- the modelling assumptions should not require cavity wall insulation to be installed in circumstances where there are technical concerns or where it may negate buildings insurance or affect future saleability. This is particularly relevant for timber-framed dwellings and some concrete systems;

- dwellings that are 'made decent' by having cavity wall insulation installed should see a significant improvement to their thermal performance (SAP rating). Installing cavity wall insulation to non-traditional dwellings could lead to them being classified as 'hard to treat', or failing on the cold homes part of HHSRS or developing serious condensation problems as a result of cold bridging. This is particularly relevant for cross-wall types of construction and in-situ concrete frame structures.

25. In practice this means that only dwellings where the surveyor has indicated that the predominant construction type is masonry boxwall (cavity or solid) can possibly be classed as having cavity walls for thermal comfort purposes.

Dealing with dwellings with mixed wall types

26. This is an important issue because many dwellings (especially older private sector homes) have a mix of wall types with one or more extensions added at different times. An improved method for calculating the proportion of cavity wall has been devised using actual wall areas and splitting the building up into its 4 faces. This is a better approach than the previous approximations using views or simply tenths of area. Only dwellings classed as predominantly cavity wall under 2.9 and where at least 50% of the total external wall area is cavity brickwork are classed as 'cavity walls' for thermal comfort modelling.

Establishing whether cavity walls need insulation

27. This issue is mostly likely to arise with older cavity wall dwellings where the original cavity walls are not insulated but new extensions have been added which were built with cavity wall insulation. Only those dwellings with 50% or more of all cavity area remaining uninsulated are classed as requiring cavity wall insulation.

Dealing with newer energy efficient homes that technically fail the thermal comfort criterion

28. Analysis of 1996 data indicated a few serious anomalies in applying the thermal comfort criterion (as written in the original guidance) to newer homes. Some 56% of RSL flats built after 1980 appeared to fail the thermal comfort criterion in 1996. For 1996 and 2001 original published figures, this anomaly was dealt with by assuming that all dwellings built after 1980 would automatically pass the criterion. After more detailed consideration of the technical issues and Building Regulations, the model has been amended so that only dwellings built after 1990 should automatically pass. This is because it was only in the 1990s that Building Regulations took a more holistic approach to energy conservation (i.e. specified the heat loss to be achieved rather than precisely how this should be done in terms of insulating roofs, floors etc.). Installing 200mm of loft insulation also did not become standard practice until the 1990s. Throughout most of the 1980s 50mm or 100mm loft insulation was most commonly used.

Table 2: Thousands of dwellings failing thermal comfort and decent homes overall by sector

	private		social		all dwellings	
	thermal comfort	decent homes	thermal comfort	decent homes	thermal comfort	decent homes
2001 (original)	4,302	5,419	1,258	1,574	5,560	6,993
2001 (revised)	4,199	5,416	1,321	1,647	5,520	7,063
2003	3,826	5,255	1,054	1,439	4,880	6,694

Chapter 6

Estimated costs to make decent

1. These are the estimated costs of all work required to make the dwelling fully decent. They are based on the items that the dwelling currently fails on and therefore do not take account of work that may arise in the future due to ageing components.

Thermal Comfort

2. The costs for thermal comfort represent the most economic way of achieving the standard. For example if a dwelling has storage heaters and less than 200mm of loft insulation, the cost to improve the loft insulation is used rather than the cost to replace the heating system with mains gas. Where dwellings fail on thermal comfort because they have no suitable heating system, the work costed is normally to install gas central heating (together with any necessary improvements to insulation). However, where dwellings do not have a gas supply, the costs are those to install storage heaters and the higher insulation package. The costs used for heating are derived from the Major Repairs Allowance (MRA) costs used at Office of the Deputy Prime Minister (ODPM – now The Department for Communities and Local Government). These were produced by the Valuation Office using information from price books, actual spending on work and professional experience. They were produced for stereotype local authority dwellings so, where appropriate, these costs are scaled to reflect the actual size of the survey dwelling. For example, the cost for installing gas central heating for a bungalow is based on a dwelling with a floor area of 51m^2 as this is the average for LA owned bungalows. For a bungalow with a floor area of 80m^2 this cost would be multiplied by 80/51 = 1.57. The costs for insulation were derived from price books, crosschecked against other Building Research Establishment (BRE) data, and applied to the relevant quantity of that element (area of loft or area of cavity wall as calculated in the dimensions model – see Chapter 8.

Disrepair

3. The costs for dealing with disrepair are the full comprehensive repair costs derived from the repair cost model (see Chapter 8 for details) rather than just the costs to replace those elements that currently fail. The costs therefore reflect the work needed to deal with all aspects of current disrepair including the replacement of any elements that the surveyor judged had less than 10 years remaining life.

Modernisation

4. Where dwellings fail the modernisation component, the costs include work to remedy all items that currently fail. Technically speaking, where a dwelling failed on 3 items fixing just one of them would make the dwelling decent. The costs here include remedying all items – if it fails on 3 items, the costs include fixing all 3 of them. The costs to modernise kitchens and bathrooms are based on ODPM's costs for the MRA; only the kitchen costs were scaled by dwelling size. The costs to install double glazing

were also based on the MRA prices and scaled by the total window area of the dwelling. The costs for other works were specified and derived at BRE using information from price books, actual spending on work and professional experience.

Unfitness

5. Where dwellings are unfit, the costs to make fit (as described under *Repair Costs* in the Glossary) are used. Where a problem causes failure under more than one heading, e.g. kitchen requires replacing due to both disrepair and modernisation aspects, any double-counting of costs is removed.

6. The costs are intended to represent the likely required expenditure so, where appropriate, access costs are added to reflect additional costs of scaffolding or cradles. These access costs are not applied to any of the MRA-based costs as these are already built in to the prices. Economies of scale and regional factors are applied in the same way as the repair cost model (see Chapter 8).

Chapter 7

Assessing disparities for households

1. Chapter 3 of the EHCS Technical Report sets out the sources of error and the methods used to calculate confidence intervals around the survey's results. One of the key requirements of the survey is to monitor and assess progress and trends over time in any disparities of living conditions between groups of households of interest and a reference group. The EHCS Annual Report looks at trends in access to decent homes: firstly, for disadvantaged and at risk groups relative to all households; and secondly (along with Chapter 3), for vulnerable private sector and all social sector households relative to 'other' households (ie private sector non-vulnerable households).[1]

2. As Table 1 below indicates, the confidence intervals around successive survey estimates generally make it difficult to conclude much about relative change over time (one group compared to another) from the estimates themselves.

Table 1: Non-decency for 'disadvantaged', 'at risk' and 'target' households – survey estimates and confidence intervals

	1996			2001			2003			2004		
	% living in non-decent	sample cases	95% CI (+/–)	% living in non-decent	sample cases	95% CI (+/–)	% living in non-decent	sample cases	95% CI (+/–)	% living in non-decent	sample cases	95% CI (+/–)
'disadvantaged' groups:												
low income	55.0	3,337	1.69	43.7	4,499	1.45	39.1	4,285	1.46	36.8	4,137	1.47
ethnic minority	52.6	781	3.50	39.1	1,243	2.71	34.9	1,306	2.58	32.8	1,283	2.57
older (60+)	47.6	4,630	1.44	35.5	6,047	1.21	32.9	5,450	1.25	30.3	5,596	1.20
elderly (75+)	49.7	1,804	2.31	39.1	2,337	1.98	35.8	2,153	2.02	33.3	2,191	1.97
children (0-15)	40.9	4,543	1.43	28.6	5,570	1.19	26.6	4,987	1.23	24.7	4,766	1.22
lone parents	47.8	1,370	2.65	33.0	1,753	2.20	31.1	1,667	2.22	29.0	1,545	2.26
all households	***44.1***	***13.131***	***0.85***	***32.8***	***16,750***	***0.71***	***30.4***	***15,950***	***0.71***	***28.4***	***15,874***	***0.70***
'target' groups:												
vulnerable private households	57.1	1,312	2.68	42.7	1,74-0	2.32	37.2	1,889	2.18	34.3	1,963	2.10
social tenants	52.3	6,039	1.26	38.3	6,893	1.15	34.3	6,081	1.19	30.2	5,385	1.23
other private sector households	***39.0***	***5,780***	***1.26***	***29.2***	***8,117***	***0.99***	***27.9***	***8,280***	***0.97***	***26.6***	***8,526***	***0.94***

Base: all households in each group, 1996 to 2004.

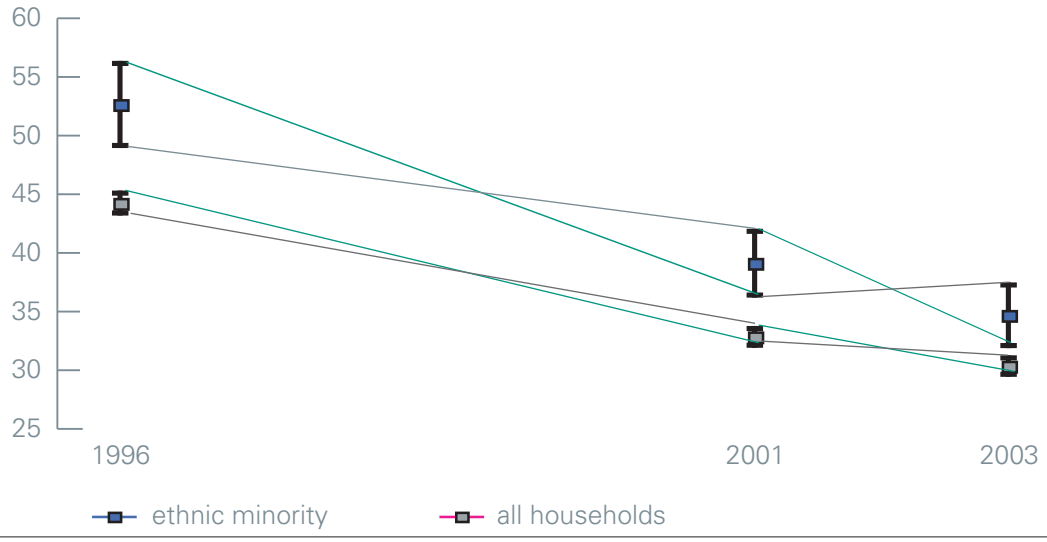
Note: the calculation of the 95% confidence interval (CI) assumes a simple random sample and therefore ignores other factors influencing the total survey error for the estimates. The CI for each group in this table therefore under-estimates the actual level of error for the survey.

[5] The focus here is on the relative progress and disparities for disadvantaged, vulnerable and PSA targeted households in ***decent homes*** because this is a key area for Government policy in improving the living conditions of people and because longer term results from the survey are available. Trends in other aspects of people's living conditions will be assessed as successive survey results allow.

3. This is readily illustrated by the example of ethnic minority households. Once the confidence intervals around the estimate for ethnic minority and all households for each survey have been taken into consideration, it is not possible to conclude anything from successive survey results about the relative progress of ethnic minority households, Figure 1.

4. The rate of progress is indicated by the slope of the line. The lowest possible rate of progress between each year that falls within the 95% confidence intervals around the estimates is shown by the red line, the best possible rate of progress by the green line. In this case the alternative possible conclusions of narrowing or widening disparities between ethnic minority households and the national average are both consistent with the estimates of successive surveys once confidence intervals are taken into account. Simply resorting to using the actual estimate without considering the confidence interval can result in unwarranted conclusions that can alter radically year on year: for example, the data may apparently show the 'gap' between one group and a reference group to be widening one year, narrowing the next and so on, reflecting sampling variability rather than any real change.

Figure 1: Rate of progress for ethnic minority and all households, 1996 to 2003



Base: all households in each group, 1996 to 2003.

Note: the green lines indicate the maximum rate of progress within the 95% confidence intervals for each estimate; the red lines indicate the minimum rate of progress.

5. The central problem here is that the measures used to assess both the rate of progress and trends in disparities between groups tend to be very sensitive to relatively small variations in results for individual years – variations that are typically well within the actual confidence limits of the survey findings.

6. To address these problems an approach has been taken which models trends using all possible results from the survey. For 2004, this includes the 1996, 2001, 2002/3, 2003/4 and 2004/5 results. Individual 12 month results from the continuous fieldwork introduced from April 2002 are used in preference to the combined 24 months fieldwork employed in overlapping samples to provide standard annual results because this has net benefits in the modelling procedure despite a smaller sample being used for each year's independent result.

7. The approach underpinning conclusions in the Annual Report involves the following procedure:

   a) using weighted least squares (WLS) regression to determine:

      i) the adequacy of representing change over time for each group as a linear progression;

      ii) the actual rate of change (the coefficient or slope of the best fit regression line for the group of interest and for the reference group);

   b) using dummy regression to test whether the slopes for the two groups are significantly different (and therefore indicating a different rate of progress between the two groups).

8. WLS regression is employed because there are substantial differences in the size of the samples involved and this procedure takes these differences into consideration.

9. Although there are advantages to maintaining a consistent approach to assessing disparities, this particular model needs to be evaluated with successive results to determine its appropriateness (particularly in terms of whether the rates of progress can best be assumed to be linear in the model).

10. The results of the approach for key household groups identified in the 2004 EHCS Annual Report are summarised in Table 2. This indicates a very high degree of linearity in the survey results over time to date (columns 1 and 2), justifying the use of a linear regression approach.

Table 2: Statistical results of the regression, 1996-2004

	Linear fit		Coefficients				
	(1)	(2)	(3)	(4)	(5)	(6)	Significant narrowing of disparity
	fit (R^2)	significance of fit	constant	slope	difference from ref. group	significance of difference	
reference group 1 – all households:	***0.984***	***0.999***	***43.7***	***–1.97***			
low income	0.999	1.000	55.1	–2.28	–0.374	0.817	no
ethnic minority	0.979	1.000	52.2	–2.53	–0.572	0.755	no
older (60+)	0.985	0.999	47.3	–2.17	–0.296	0.766	no
elderly (75+)	0.995	1.000	49.6	–2.04	–0.071	0.174	no
children (0-15)	0.969	0.998	40.3	–2.02	–0.058	0.182	–
lone parents	0.960	0.997	47.0	–2.38	–0.425	0.713	no
reference group 2 – private sector non-vulnerable households:	***0.956***	***0.996***	***38.3***	***–1.57***			
private sector vulnerable	0.998	1.000	57.0	–2.80	–1.24	0.991	yes
social tenants	0.985	0.999	52.2	–2.66	–1.09	0.993	yes

Notes for Table 2:

Column (1): the degree to which the survey estimates of the percentage of the group living in non-decent homes follow a linear progression (0.0 = no linear trend, 1.0 = perfectly linear trend).

Column (2): the probability that the trend is linear (greater than 0.95 = 95% or more degree of confidence that the estimates can be represented as a linear series).

Column (3): the modelled percentage of the group living in non-decent homes in 1996.

Column (4): the coefficient or slope which is the percentage point reduction in the proportion of the group living in non decent homes each year since 1996 ie the rate of pregress.

Column (5): the difference of the coefficient (slope) for the group from that for the relevant reference group – 'all households' for disadvantaged and at risk groups and 'non-vulnerable (private sector) households' for private sector vulnerable households and social tenants. A positive number indicates a faster rate of progress for the group compared with its reference group.

Column (6): the probability that the slope for the group is different from its reference group (greater than 0.95 = 95% or more degree of confidence that the slopes are different).

11. The regression results suggests there are differences in the annual rate of progress for different groups of interest (column 4) from disparate starting points (column 3). But it is only for the comparison of private sector vulnerable (averaging a reduction of over 2.8 percentage points each year) and social sector households (2.7 percentage points) that this rate is significantly different from their particular reference group (non-vulnerable private sector households averaging 1.6 percentage points). In the case of the range of disadvantaged and at risk groups, while there has been a substantial reduction in the incidence of non-decency for each, any differences in the rate of progress is not currently statistically significantly from the national average for all households (although for some groups these differences may become significant as further years' findings are included in the model).

12. In some respects this conclusion is not surprising. Private sector vulnerable households and social tenants, comprising almost one third of all households, form the effective 'target' of Communities and Local Government's Public Service Agreement (PSA) on decent homes. Most of these private sector vulnerable households are also eligible for grant support for any energy efficiency improvements required through DEFRA's Warm Front programme to tackle fuel poverty and which also contributes towards making homes decent. There is therefore a substantial level of support for these particular households.

13. The detailed results of the regression modelling for each group are set out in four tables below (Tables 3 to 6), looking separately at disadvantaged and at risk households on the one hand and decent homes 'target' groups on the other. The tables provide the survey estimates and the modelled measures of progress for each group since 1996 and the trend in any disparity between that group and its reference group – all households or 'other' (private sector non-vulnerable) households.

14. Given the high level of linearity of the survey estimates to date it is not surprising that there are no substantial departures between individual estimates for any given year and the parallel output from the model.

15. The general intention is to use the survey estimates for reporting the percentage of the group living in non decent homes in any given year, but to use the modelling for indicating trends in the rate of progress and any disparities with reference groups (as indicated through the emboldened figures in the tables). This does mean the (modelled) indicators of progress and disparity will be subject to revision with the addition of new findings into the modelling in subsequent years but which should have the overall benefit of improving the accuracy and precision of the trends.

Table 3: Disadvantaged and at risk households in non-decent homes – progress, 1996 to 2004

	percentage of group living in non-decent homes				difference from 1996				ratio to 1996			
	1996	2001	2003	2004	1996	2001	2003	2004	1996	2001	2003	2004
survey estimates:												
all households	***44.2***	***32.8***	***30.3***	***28.4***	*0.0*	*–11.4*	*–13.8*	*–15.7*	*1.00*	*0.74*	*0.69*	*0.64*
low income	**55.0**	**43.7**	**39.1**	**36.8**	0.0	–11.4	–15.9	–18.2	1.00	0.79	0.71	0.67
ethnic minority	**52.6**	**39.1**	**34.6**	**32.8**	0.0	–13.5	–18.0	–19.8	1.00	0.74	0.66	0.62
older (60+)	**47.6**	**35.5**	**32.9**	**30.3**	0.0	–12.1	–14.7	–17.3	1.00	0.75	0.69	0.64
elderly (75+)	**49.7**	**39.1**	**35.9**	**33.3**	0.0	–10.7	–13.8	–16.4	1.00	0.79	0.72	0.67
children (0-15)	**40.9**	**28.6**	**26.4**	**24.7**	0.0	–12.3	–14.5	–16.2	1.00	0.70	0.65	0.60
lone parents	**47.8**	**33.0**	**31.0**	**29.0**	0.0	–14.8	–16.8	–18.8	1.00	0.69	0.65	0.61
modeled results:												
all households	*43.8*	*33.7*	*29.7*	*28.8*	***0.0***	***–10.0***	***–14.0***	***–15.0***	***1.00***	***0.77***	***0.68***	***0.66***
low income	55.0	43.8	39.3	36.9	**0.0**	**–11.2**	**–15.7**	**–18.1**	**1.00**	**0.80**	**0.71**	**0.67**
ethnic minority	52.1	39.5	34.5	32.8	**0.0**	**–12.6**	**–17.6**	**–19.3**	**1.00**	**0.76**	**0.66**	**0.63**
older (60+)	47.2	36.5	32.3	29.9	**0.0**	**–10.7**	**–14.9**	**–17.3**	**1.00**	**0.77**	**0.68**	**0.63**
elderly (75+)	49.5	39.6	35.6	33.3	**0.0**	**–9.9**	**–13.9**	**–16.2**	**1.00**	**0.80**	**0.72**	**0.67**
children (0-15)	40.5	29.8	25.6	24.1	**0.0**	**–10.6**	**–14.8**	**–16.4**	**1.00**	**0.74**	**0.63**	**0.60**
lone parents	47.1	34.9	30.0	28.0	**0.0**	**–12.2**	**–17.1**	**–19.1**	**1.00**	**0.74**	**0.64**	**0.59**

Table 4: Disadvantaged and at risk households in non-decent homes – disparity from the national average, 1996 to 2004

	percentage of group living in non-decent homes				difference from national average				ratio to national average			
	1996	2001	2003	2004	1996	2001	2003	2004	1996	2001	2003	2004
survey estimates:												
all households	***44.2***	***32.8***	***30.3***	***28.4***	*0.0*	*0.0*	*0.0*	*0.0*	*1.00*	*1.00*	*1.00*	*1.00*
low income	**55.0**	**43.7**	**39.1**	**36.8**	10.9	10.9	8.7	8.4	1,25	1.33	1.29	1.29
ethnic minority	**52.6**	**39.1**	**34.6**	**32.8**	8.4	6.3	4.5	4.4	1.19	1.19	1.15	1.15
older (60+)	**47.6**	**35.5**	**32.9**	**30.3**	3.4	2.7	2.5	1.9	1.08	1.08	1.08	1.07
elderly (75+)	**49.7**	**39.1**	**35.9**	**33.3**	5.5	6.3	5.4	4.9	1.13	1.19	1.18	1.17
children (0-15)	**40.9**	**28.6**	**26.4**	**24.7**	–3.3	–4.2	–3.8	–3.7	0.93	0.87	0.88	0.87
lone parents	**47.8**	**33.0**	**31.0**	**29.0**	3.6	0.2	0.8	0.5	1.08	1.01	1.02	1.02
modeled results:												
all households	*43.8*	*33.7*	*29.7*	*28.8*	***0.0***	***–10.0***	***0.0***	***0.0***	***1.00***	***1.00***	***1.00***	***1.00***
low income	55.0	43.8	39.3	36.9	**11.2**	**–11.2**	**9.6**	**8.1**	**1.26**	**1.30**	**1.32**	**1.28**
ethnic minority	52.1	39.5	34.5	32.8	**8.3**	**–12.6**	**4.8**	**4.0**	**1.19**	**1.17**	**1.16**	**1.14**
older (60+)	47.2	36.5	32.3	29.9	**3.4**	**–10.7**	**2.5**	**1.1**	**1.08**	**1.08**	**1.08**	**1.04**
elderly (75+)	49.5	39.6	35.6	33.3	**5.7**	**–9.9**	**5.9**	**4.5**	**1.13**	**1.17**	**1.20**	**1.16**
children (0-15)	40.5	29.8	25.6	24.1	**–3.3**	**–10.6**	**–4.1**	**–4.7**	**0.92**	**0.88**	**0.86**	**0.84**
lone parents	47.1	34.9	30.0	28.0	**3.3**	**–12.2**	**0.2**	**–0.8**	**1.08**	**1.03**	**1.01**	**0.97**

Table 5: 'Target' households in non decent homes – progress, 1996 to 2004

	percentage of group living in non-decent homes				difference from 1996				ratio to 1996			
	1996	2001	2003	2004	1996	2001	2003	2004	1996	2001	2003	2004
survey estimates:												
non-vulnerable private households	***39.0***	***29.2***	***27.8***	***26.6***	*0.0*	*–9.8*	*–11.2*	*–12.3*	*1.00*	*0.75*	*0.71*	*0.68*
vulnerable private households	**57.1**	**42.7**	**37.2**	**34.5**	0.0	–14.4	–19.9	–22.6	1.00	0.75	0.65	*0.60*
social tenants	**52.3**	**38.3**	**34.2**	**30.3**	0.0	–14.0	–18.0	–22.0	1.00	0.73	0.65	*0.58*
modeled results:												
non-vulnerable private households	*38.3*	*30.5*	*27.4*	*25.8*	***0.0***	***–7.8***	***–11.0***	***–12.5***	***1.00***	***0.80***	***0.71***	***0.67***
vulnerable private households	57.0	43.0	37.4	34.6	**0.0**	**–14.0**	**–19.6**	**–22.4**	**1.00**	**0.75**	**0.66**	**0.61**
social tenants	52.2	38.9	33.6	31.0	**0.0**	**–13.3**	**–18.6**	**–21.3**	**1.00**	**0.75**	**0.64**	**0.59**

Table 6: 'Target' households in non-decent homes – disparity from non vulnerable private sector households, 1996 to 2004

	percentage of group living in non-decent homes				difference from 1996				ratio to non vulnerable			
	1996	2001	2003	2004	1996	2001	2003	2004	1996	2001	2003	2004
survey estimates:												
non-vulnerable private households	***39.0***	***29.2***	***27.8***	***26.6***	*0.0*	*0.0*	*0.0*	*0.0*	*1.00*	*1.00*	*1.00*	*1.00*
vulnerable private households	**57.1**	**42.7**	**37.2**	34.5	18.1	13.5	9.4	7.8	1.47	1.46	1.33	1.29
social tenants	**52.3**	**38.3**	**34.2**	30.3	13.3	9.1	6.5	3.6	1.34	1.31	1.23	1.14
modeled results:												
non-vulnerable private households	*38.3*	*30.5*	*27.4*	*25.8*	***0.0***	***0.0***	***0.0***	***0.0***	***1.00***	***1.00***	***1.00***	***1.00***
vulnerable private households	57.0	43.0	37.4	34.6	**18.7**	**12.5**	**10.0**	**8.8**	**1.49**	**1.41**	**1.37**	**1.34**
social tenants	52.2	38.9	33.6	31.0	**13.7**	**8.5**	**6.3**	**5.2**	**1.36**	**1.28**	**1.23**	**1.20**

Chapter 8

Estimating repair costs

Calculating Base Repair Costs

1. The EHCS uses 4 types of information to calculate base repair costs:

   - surveyors' assessments of the type of repair needed and its extent (see Box 1 for details);
   - the surveyor's description, for external items, of the materials from which the element is constructed;
   - building dimensions and configuration derived from surveyors' measurements and observations;
   - unit prices for different types of job from the 1996 National Schedule of Rates (NSR), adjusted for inflation using the BICS national price index.

Box 1: Types of work included in and excluded from repair costs

Included:

- all work to the external fabric of the building, chimneys, roof, roof and soil drainage, windows, doors, dormers, bays, porches, balconies, damp proof course, treatment of inappropriate gradients/levels of ground adjacent to the dwelling;
- additional work to deal with structural instability: e.g. underpinning, tying in of walls, treatment of fungal or insect infestation, replacement of cavity wall ties, etc;
- work to the internal fabric: ceilings, floors, internal and partition wall surfaces, internal doors and stairs;
- work to amenities and services inside the dwelling: kitchen, bathroom, WC, electrical wiring, plumbing, gas pipes, heating, and water heating;
- work to common areas and access ways in blocks of flats: floors, walls, ceilings, doors, screens, windows, lighting and balustrades;
- work to shared facilities on estates: All stores and common rooms, communal parking facilities, surfaces and fences and common services.

Excluded:

- work to fences and boundary walls;
- work to underground drainage;
- hidden work to structure or foundations;
- work to plant associated with shared facilities, e.g. lift motors, communal boilers, washing machines in laundry rooms, etc.

2. The surveyor makes the assessment element by element, usually surveying the interior first, and then the exterior of the dwelling. Internally an assessment of a sample of representative rooms is made – typically, a living room and a bedroom plus hall, kitchen and bathroom. The work identified as needed in the sample of rooms is scaled up to reflect the total number of rooms in the dwelling. All the internal facilities and services are surveyed individually.

3. For the common areas in blocks of flats, surveyors select only part of the common areas to survey and these are taken as representative of the whole of the common areas and scaled up accordingly.

4. Externally the surveyor considers each element in turn looking at the building from 2 vantage points ('views') which between them encompass the whole building.

5. Surveyors' assessments are based on the following assumptions and instructions:

   - dwellings have an indefinite life;
   - surveyors to treat work as a programme of actions stretching into the future. Where replacement of elements or major work can be delayed by immediate less drastic repairs, this is to be done;
   - to repair rather than replace unless:
   - this is impossible;
   - it means that the element will still need replacing within 5 years;
   - the element needs replacing for other reasons, e.g. element is unsuitable for intended purpose;
   - standard of work should result in element being fully functional without any allowance for modernisation, upgrading or purely cosmetic improvements;
   - not to employ economies of scale when deciding on how much of an element to treat.

6. The surveyor describes how much work is needed by assessing:

   - the proportion of elements needing work, in tenths, for elements treated as areas, eg walls, roofs;
   - the number of units needing work, for elements which can be treated as individual entities, e.g. doors, windows, baths;
   - linear metres of work to elements not measurable by area.

7. For the last two the quantity given is multiplied by the unit cost for doing the job specified. For the elements where the work is specified as a proportion this is first converted to a quantity from the dimensions taken of the dwelling/building and then the quantity is multiplied by the cost/sq m for the type of work specified. In all cases it is assumed that a like for like replacement is undertaken and the costs selected reflect the materials from which the element is currently constructed, e.g. a slate roof is always replaced with a slate roof.

8. The cost calculated is for the individual dwelling so in the case of flats, the cost of works to the common areas and exterior, recorded for the whole building, is divided by the number of flats and this is added on to the interior, amenities and services costs for the individual dwelling.

9. If the work recommended by the surveyor to any element exceeds the cost of totally replacing that element, the latter is used as the cost.

Dealing with Missing Data

10. The cases included in the physical survey database are those for which a full survey was conducted, but even where the form was completed fully the surveyor may have omitted to provide some information needed for the assessment of disrepair.

11. Imputation to deal with this missing data is carried out in a 4 stage process as below:

Dwelling dimensions

Dimensions may be implausible or simply missing. For flats there can be inconsistencies between the size of the module surveyed and the number of dwellings reported in the module. Where possible, errors are identified and corrected by cross correlating data from different parts of the survey schedule and checking against the distribution of dimensions of dwellings of similar type. If this process does not produce an acceptable result, the dimensions are set to the average dimensions for dwellings of that type and age.

Missing components of an element within a single view

For example, a roof might be recorded as 5/10th pitched and 5/10th flat but only the work required to the pitched part has been filled in. Here it is assumed that the proportion in need of treatment in the component with no data is the same as that in the components with data.

Missing views within an element

This is where an element (e.g. roof covering) has data in one view, but missing data in the other view. The missing view is treated as needing the same proportion of work as the observed view.

Whole missing elements

If work to an entire element (e.g. windows) is missing, the repair cost for the element is estimated by averaging over those elements for which data is available.

Any further missing data

Any dwellings that are still missing costs after this stage use the average cost for dwellings of a similar age and type.

Add-ons, Uplifts, Prelims and Modifications to Base Costs

12. In addition to the base costs described above there are more complex factors to account for in calculating realistic repair cost measures. These are:

    - preliminaries required before the work can commence;
    - access equipment such as scaffolding to get safely to where the work is needed;
    - corrections to model the economies of scale.

13. In practice the price that is paid for a job to be done will vary in relation to the scale of the contract under which the work is carried out and also the region in which the work is undertaken. In terms of scale, the cost of any one job will depend on how much more work is being done to the dwelling at that time, or whether the work is being carried out to more than one dwelling. For example, re-roofing a house in a contract of 50 similar jobs will cost less than if it is done as a one-off. Prices paid vary depending on the region of England and regional price factors are included in the cost model.

The Two Types of Cost Measure

14. Information about repair costs is used for 2 basic purposes:

    - a measure of the extent of disrepair so we can investigate whether parts of the stock tend to be in better or worse state of repair than others – standardised costs;
    - a measure of how much it would cost to carry out the specified work to the dwelling to give some idea of the likely level of investment needed – required expenditure.

15. These 2 different cost measures are constructed as follows:

Standardised costs

These are costs in £ per square metre (£/sq m) based on prices for the East Midlands region. It is assumed that all work is undertaken by contractors on a block contract basis. The size of the contract is assumed to be five dwellings.

Required expenditure

These are total costs per dwelling in pounds (£) and represent the best estimate of what the specified work would actually cost. These costs take into account regional variations in prices and assume different project sizes for work to houses in different tenures. In the owner occupied and private rented sectors, the contract size for work to houses is taken as one. In the social rented sector, the contract size is taken as being the number of dwellings on the estate, unless the dwelling is not on an estate, in which case the contract size is assumed to be one For flats, the contract size for exterior works is the size of the block regardless of tenure. In all cases it is assumed that the work is carried out by a building contractor. These costs should not be used for assessing differences in condition between different tenures or dwelling types as they vary according to dwelling size, tenure and location.

Urgent Repairs, Repairs and Replacements and Comprehensive Repairs

16. D.16 The extent of the work required in a given timescale depends on the assumptions made by the surveyor about the timing of that work as repair costs are presented with reference to three different time frames.

Urgent repairs

D.17 Where surveyors had recorded that work was needed to an exterior building element, they indicated whether work specified was urgent; defined as works needed to remove threats to health, safety, security and comfort of the occupants and to forestall further rapid deterioration of the building. This is a measure of serious and immediate problems in the dwelling and includes all interior work.

Repairs and replacements (basic repairs)

All works identified by the surveyor as needing to be done within 5 years, including any urgent work as described above. These do not include replacement of building elements nearing the end of their life where the surveyor recorded that this action could be delayed by more than 5 years, often by short term patch repairs.

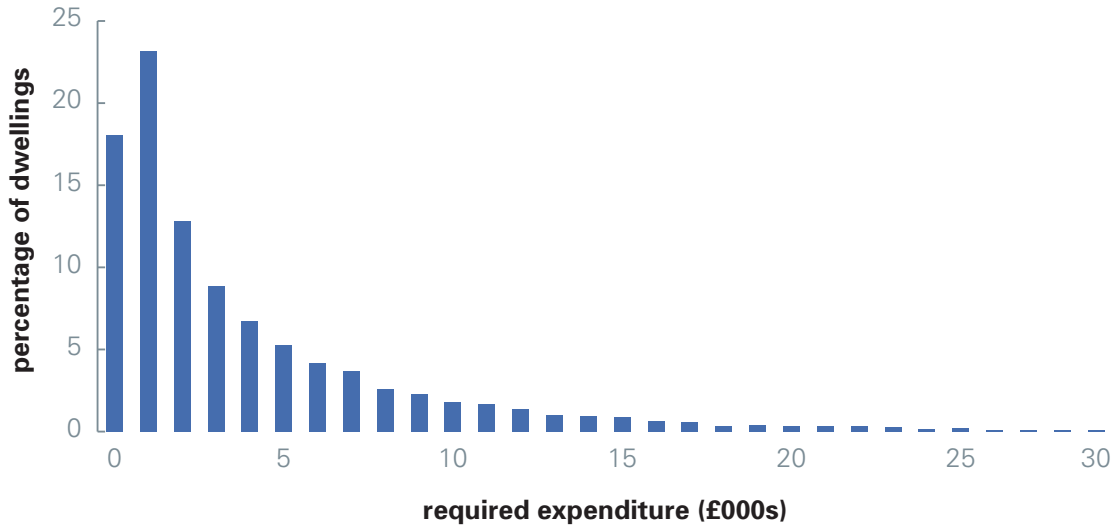
Comprehensive repair

This includes all repairs as specified above together with any replacements the surveyor has assessed as being needed in the next 10 years. Replacement periods are only defined for external elements and are given whether or not any repair work has been identified as needed. The replacement period is given as the number of years before the element needs replacing either following specified repair work or simply as the remaining life expectancy. This measure provides a better basis for identifying work which would form part of a planned programme of repair by landlords.

Distributions and Average Values

17. Distributions of any repair cost variables are not statistically normal (Gaussian) and correspond more closely to a log-normal distribution as shown below for total required expenditure (comprehensive costs).

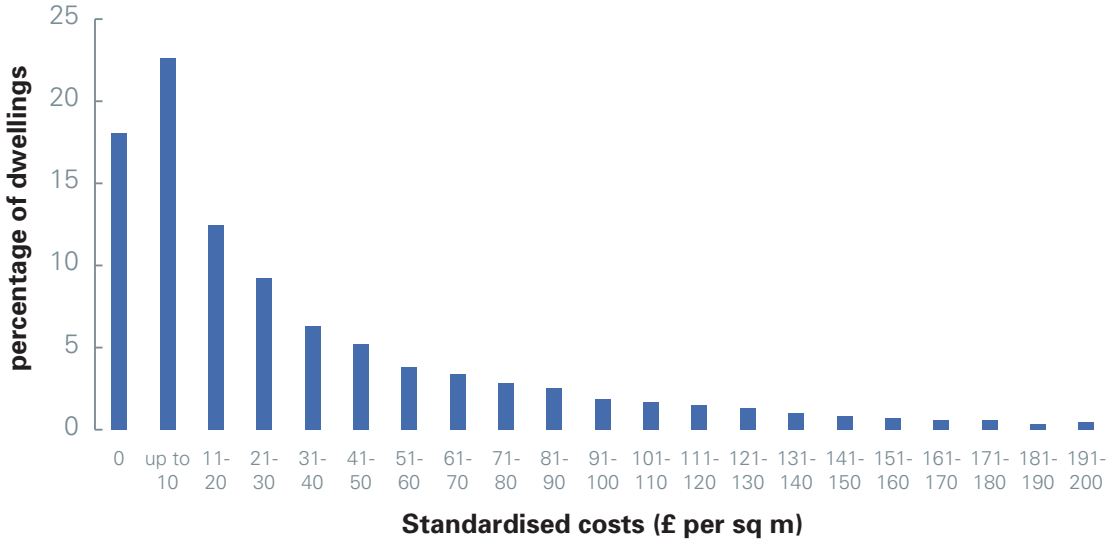
Figure 1: Distribution of required expenditure on repairs and replacements for the whole stock, 2003



18. 18% of cases have zero costs and 23% have costs between £1 and £1,000; a very small number have very high costs. The effect of this is that the 'average', as represented by the mean, is £3,785 which is closer to the 75th percentile than the median. The mean values can be used, together with the number of dwellings, to give some idea of the total repair bill for a group of dwellings but they do not represent the 'typical' case for that group of dwellings. This typical case is best represented by the median value which in this case is £1,633.

19. The same is true for the distribution of standardized costs (in £ per sq m) where the mean value of £41 per sq m is considerably higher than the median value of £17 per sq m.

Figure 2: Distribution of standardized costs for repairs and replacements for the whole stock, 2003



Chapter 9

Treatment of incomes

Modelling of incomes for 2003-04 and 2004-05 data sets

1. Household net income in this report refers to the annual net income of the Household Reference Person (HRP) and any partner from wages, pensions, savings and benefits. It does not include any council tax benefit, housing benefit, Income Support Mortgage Interest (ISMI) or any payments made under a Mortgage Payment Protection Insurance policy (MPPI). This net income is modelled from raw data collected on gross incomes with missing data imputed as described below.

2. The interview survey collected information on the main components of income for the HRP and any partner. These include:

   - earnings from main job as employee or as self-employed;
   - earnings from other work;
   - earnings from Government schemes;
   - state benefits including state pensions;
   - occupational pensions, private pensions and annuities;
   - income from savings and investments;
   - any other regular income such as rent from lodgers, maintenance payments etc.

3. The data were thoroughly checked for inconsistencies and errors although data were only corrected where it was totally implausible. Where respondents said that they were in receipt of benefits but were unable to specify the amount, an estimate was inserted using basic allowances where possible. Households were only allocated income from benefits that they said that they received. If they were entitled to other benefits but were not claiming them, then estimates for these were not included. Where respondents were working and amounts were missing, data from ASHE; the Annual Survey of Hours and Earnings (previously known as the New Earnings Survey) on average incomes by sex, age and socio-economic group were used to fill these missing values. Where such respondents were receiving a private or occupational pension, mean amounts from respondents who did provide data were calculated by age, sex and socio-economic group and used to fill in missing data.

4. For the first 2 quarters of 2003-04, the CAPI program did not record whether households were receiving the new tax credits (working tax credit and child tax credit). Segmentation and regression techniques using data on receipt of these benefits for quarters 3 and 4 were used to develop a model of which of the potentially eligible households were likely to be claiming. This model was applied to the data from quarters 1 and 2, and estimated amounts of tax credits were attributed to the relevant households. The problem was not present in the 2004 CAPI programme.

5. Tax and national insurance payable was calculated, where appropriate, and these amounts were deducted to give total net annual household income. Where the calculated annual net income was lower than the household's basic calculated income support, the amount was changed as follows. Where these households were receiving one or more of the main benefits (excluding child benefit) they were allotted their basic income support plus any disability premiums that they might qualify for. Where they were not in receipt of any of these benefits, their income was reset to missing (as it was assumed key components had been missed or seriously under-reported). For households where income data were missing, these data were filled in using the mean for households as defined by working status, socioeconomic group and whether HRP had a partner. Table 1 illustrates the number and percentage of cases having different types of data imputed.

Table 1: Type of imputation used in EHCS income modelling

	Frequency	Percent
None, all data OK	10,929	68.8
Some private sources imputed	382	2.4
Some benefit amounts imputed or changed	1,773	11.2
Some private and some benefits imputed	118	0.7
Household total imputed using group mean	1,033	6.5
Was below basic IS – imputed using group mean	263	1.7
Was below basic IS – imputed using basic IS	1,218	7.7
Was below basic IS – imputed using basic IS plus disability premiums	158	1.0
Total	15,874	100.0

6. Information was also collected on savings for HRP and partner. Some 8.2% of cases had missing information on savings. A model developed using segmentation analysis of 2001 data and updated using the latest 2004 data was applied to attribute missing amounts. Information was also collected on the total income of any additional benefit units in the household and on housing benefit, council tax benefit, ISMI and MPPI, but none of these are included in the income variable described in this report.

Comparisons with data from other sources

7. Comparisons carried out with incomes reported in the Expenditure and Food Survey (EFS) showed close agreement apart from households containing additional adults (Table 2). For these households, the EHCS incomes used in this report are lower because the amount assessed as household income just includes that of the HRP and any partner, whereas the EFS household income includes all household members. Other differences in the definition used do exist, for example treatment of Winter Fuel Payment, however, where EHCS incomes include other benefit units in the households, the figures are much closer.

Table 2: Comparisons between EHCS and EFS net weekly income

	EFS 2004 weekly disposable income (£)	EHCS 2004 income of HRP and partner (£)
Household Composition		
One adult	240	242
One adult, one child	259	234
One adult, two or more children	292	253
One man and one woman	513	479
Two men or two women	503	315
One man, one woman, one child	639	601
One man, one woman, two children	669	652
One man, one woman, three children	655	594
Two adults, four or more children	602	542
Three adults	725	463
Three adults, one or more children	814	552
Four or more adults	924	427
Four or more adults, one or more children	777	444
Total	489	427
Tenure		
Owner Occupied	563	491
Private Rented	428	363
Local Authority	250	208
RSL	258	218
Total	489	427
HRP Age		
Less than 30	447	358
30 to 49	594	527
50 to 64	548	446
65 to 74	317	310
75 and over	245	234
Total	489	427

Chapter 10

Energy cost rating (SAP)

SAP rating

1. The Standard Assessment Procedure (SAP) is the Government's recommended system for home energy ratings. SAP ratings allow comparisons of energy efficiency to be made, and can show the likely improvements to a dwelling in terms of energy use. The building Regulations require a SAP assessment to be carried out for all new dwellings and conversions. Local authorities, housing associations, and other landlords also use SAP ratings to estimate the energy efficiency of existing housing. The current version is SAP 2001, effective from April 2002 in England and Wales. This is the version used throughout this report.

2. The SAP ratings give a measure of the annual unit energy cost of space and water heating for the dwelling under a heating regime, assuming specific heating patterns and room temperatures. The fuel prices used are averaged over the previous three years across the regions in the UK. The SAP takes into account a range of factors that contribute to energy efficiency, which include:

   - thermal insulation of the building fabric;
   - the shape and exposed surfaces of the dwelling;
   - efficiency and control of the heating system;
   - the fuel used for space and water heating;
   - ventilation and solar gain characteristics of the dwelling.

3. SAP is not affected by the individual characteristics of the household occupying the dwelling or by the geographical location.

SAP scale

4. The SAP[1] rating is expressed on a logarithmic scale, which normally runs from 1 (very inefficient) to 120 (very efficient). In extreme cases, however, the formula that defines the rating can result in figures outside this range and when applied to the EHCS sample produces some negative values and some values greater than 120. In practice when issuing SAP ratings the negative values would be reset to 1 and those values greater than 120 to 120. For the purpose of this report, the values produced by the SAP formula that fall outside the defined scale have been retained so as not to distort the profiles of energy efficiency within the housing stock.

[6] 2001 version.

Calculation of SAP ratings from 3 EHCS data

5. A computerised version of the SAP 2001 methodology is used to calculate the SAP rating for each dwelling included in the 2003 EHCS physical survey. Most of the data required for the calculation of the SAP are available from the survey, either directly from the questions asked or as a result of further modelling. Those data items that are not collected have very little impact on the final calculated rating. Where data items are missing these are dealt with using default information based on information from dwellings of the same age, built form, tenure, number of floors and size.

Chapter 11

Liveability: poor quality environments

1. The liveability problems from the survey are based on the professional surveyors' assessments of problems in the immediate environment of the home on a scale of 1 ('no problems') to 5 ('major problems'). These assessments are based on observed problems (in some cases verified with the resident) rather than any specialised measurement instruments or recourse to other environment data. In all sixteen specific environmental problems (separately assessed by the surveyors) are grouped together into three types of liveability problems, see box 1.

Box 1: Different types of poor quality environments

'Upkeep' problems associated with the upkeep and misuse of public and private building and space include:

Litter and rubbish dumping	Scruffy/neglected buildings
Scruffy gardens	Dog or other excrement
Graffiti	Condition of dwellings
Vandalism	Nuisance from street parking

'Traffic' problems associated with traffic and other transport issues include:

Ambient air quality	Railway/aircraft noise
Heavy traffic	Intrusion from motorways/arterial roads

'Utilisation' problems associated with abandonment or intrusive use of property for non-residential purposes include:

Vacant sites	Non-conforming uses
Intrusive industry	Vacant/boarded up buildings

2. These groups of problems were identified through content and a factor analysis, of all sixteen measures. The results of the factor analysis are shown below. The analysis was repeated using 1996 and 2001 data to validate the conclusions and similar results were produced.

SPSS output of factor analysis (grossed to households, 02/03 combined sample). Highlighted cells indicate which factor the measures have been identified as aligning with most strongly.

Rotated Component Matrix(a)

	Component		
	1	2	3
Litter rubbish	**.769**	.154	.109
Graffiti	**.712**	.102	.269
Vandalism	**.721**	.072	.318
Dog other excrement	**.645**	.206	.081
Condition of dwellings	**.704**	.228	.296
Vacant sites	.373	.061	**.722**
Intrusive industry	.086	.402	**.657**
Non-conforming uses	.175	.248	**.672**
Vacant boarded-up buildings	.442	-.061	**.664**
Ambient air quality	.272	**.731**	.194
Heavy traffic	.141	**.713**	.157
Intrusion from motorways arterial roads	.043	**.715**	.207
Railway aircraft noise	.148	**.565**	-.002
Nuisance from street parking	**.436**	.439	-.011
Scruffy gardens landscaping	**.762**	.209	.177
Scruffy neglected buildings	**.726**	.184	.330

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

a Rotation converged in 6 iterations.

3. The only measure which did not have an obvious association was 'nuisance from street parking' which appeared to align equally with factors 1 and 2. Measures under factor 1 ('upkeep problems') are most likely to be influenced by local initiatives/schemes and for this reason 'problems with street parking' should be within this group. Measures under factor 2 ('traffic problems') are affected by wider DfT/Highways Agency policies which are not limited to the local area.

4. A home is regarded as having a liveability problem of a given type if it is assessed to have 'significant' or 'major' problems (codes 4 and 5 of the scale) in respect of any of the specific environmental problems assessed and grouped under that type. The overall assessment is based on whether the home has any of the three types of liveability problems. It has not been possible to retrospectively provide fully comparable findings on liveability problems for 1996 and 2001 because of differences in the environmental data collected.

Glossary of definitions and terms

age/construction date of dwelling

The age of the dwelling refers to the date of construction of the oldest part of the building.

basic amenities

Dwellings lack basic amenities where they do not have all of the following:

- kitchen sink;
- bath or shower in a bathroom;
- a wash hand basin;
- hot and cold water to the above;
- inside WC

correlated surveyor variability

This is a measure of the extent to which individual surveyors tend to make assessments which, although consistent for that surveyor, are different from the average of those made by all surveyors. It is measured on a scale of 0 to 1, where 0 indicates that individual surveyors' assessments are consistent with the average assessments for all surveyors; and 1 indicates that individual surveyors will consistently assess dwellings in a way which is different from how other surveyors would assess them.

cost to make decent/fit

See 'repair costs'

decent homes

A decent home is one that satisfies all of the following four criteria:

- it meets the current statutory minimum standard for housing – at present this is the fitness standard;
- it is in a reasonable state of repair;
- it has reasonably modern facilities and services ;
- it provides a reasonable degree of thermal comfort.

double glazing

This covers factory made sealed window units only. It does not include windows with secondary glazing or external doors with double or secondary glazing (other than double glazed patio doors which count as 2 windows).

dwelling

A dwelling is a self-contained unit of accommodation (normally a house or flat) where all the rooms and amenities (ie kitchen, bath/shower room and WC) are for the exclusive use of the household(s) occupying them. In rare cases, amenities may be located outside the front door but provided they are for the exclusive use of the occupants, the accommodation is still classed as a dwelling.

For the most part a dwelling will be occupied by one household but may contain none (vacant dwelling) or may contain more than one (HMO).

energy efficiency

The main measure of energy efficiency used in the report is the energy cost rating as determined by the Government's Standard Assessment Procedure (SAP). This is an index based on calculated annual space and water heating costs for a standard heating regime and is expressed on a scale of 1 (highly energy inefficient) to 120 (highly energy efficient).

Energy inefficient homes are those with a SAP rating of 30 or below.

equity

The estimated value of the property minus the total amount outstanding on all mortgages/loans secured against the home.

fitness

The Fitness Standard is defined by the 1989 Local Government and Housing Act:

section 604: under Section 604 covering all the stock a dwelling is fit for human habitation unless in the opinion of the local housing authority it fails to meet one or more of the following requirements and by reason of that failure is not reasonably suitable for occupation: it is free from disrepair; it is structurally stable; it is free from dampness prejudicial to the health of the occupants (if any); it has adequate provision for lighting, heating and ventilation; it has an adequate piped supply of wholesome water; it has an effective system for the draining of foul, waste and surface water; it has a suitably located WC for the exclusive use of the occupants; it has for the exclusive use of the occupants (if any) a suitably located bath or shower and wash-hand basin, each of which is provided with a satisfactory supply of hot and cold water; and there are satisfactory facilities in the dwelling home for the preparation and cooking of food, including a sink with a satisfactory supply of hot and cold water;

section 352: in addition to the requirements for dwellings laid down in Section 604, the additional requirements for an HMO as laid down in Section 352 are: there are satisfactory facilities for the storage, preparation and cooking of food including an adequate number of sinks with a satisfactory supply of hot and cold water; it has an adequate number of suitably located water-closets for the exclusive use of the occupants; it has, for the exclusive use of the occupants, an adequate number of suitably located fixed baths or showers and wash hand basins each of which is provided with a satisfactory supply of hot and cold water; there are adequate means of escape; and there are adequate other fire precautions.

floor space

The usable internal floor area of the dwelling as measured by the surveyor, rounded to the nearest square metre. It excludes integral garages, balconies, stores accessed from the outside only and the area under partition walls.

heating system

central heating system: a heating system with a distribution system sufficient to provide heat in at least one room in addition to the room or space containing any boiler (including programmable gas convector heaters);

storage heaters: electric storage heaters which run on off-peak electricity;

fixed heaters: other individual heaters/fires, either fixed to the fabric of the building or not readily moved;

non-fixed heaters: individual heaters/fires which are not fixed or wired into a fused spur which can be easily carried by a single person from room to room.

homes not fully secure

These are homes without secure windows and doors.

household

One person living alone or a group of people who have the address as their only or main residence and who either share one meal a day or share a living room.

household groups

children 0-15: includes persons aged under 16;

elderly 75+: includes at least one person aged 75 or over;

ethnic minorities: where the respondent defines their ethnicity as something other than white.

Illness or disability: whether anybody in the household has a long-tern illness or disability. The respondent assesses this and long-term is defined as anything that has troubled the person, or is likely to affect them, over a period of time;

lone parents: lone parent with dependent children: single parent with dependent child/children (i.e. persons aged under 16, or single persons aged 16 to 18 and in full-time education);

low income: A household with income in the lowest 20 per cent of all households income;

older people 60+: includes at least one person aged 60 or over;

workless: A household in which no adult of working age works. Workless individuals are those who are economically inactive (that is, neither employed nor seeking work).

household reference person (HRP)

This is the person in whose name the dwelling is owned or rented or who is otherwise responsible for the accommodation. In the case of joint owners and tenants, the person with the highest income is taken as the HRP. Where incomes are equal, the older is taken as the HRP. This procedure increases the likelihood that the HRP better characterises the household's social and economic position.

houses in multiple occupation (HMO)

An HMO is a dwelling or a converted residential building which is occupied by more than one household. This is a very wide definition used for research purposes that uses the following classification of HMOs:

- *bed-sit houses, or traditional HMOs:* houses (and flats) which have been converted to provide flatlets, bedsitters and rooms, each occupied by a separate household. Within these houses, two or more households will share one or more facilities (e.g. bathrooms) or will have common circulation space between the rooms that are for their exclusive use;

- *shared houses:* dwellings occupied on a shared basis, typically by students or other groups of people who club together to rent a house or flat. Only those dwellings occupied by two or more non-related adults who are not partners, are included in this definition. Individuals buying a house together are excluded;

- *households with lodgers:* households catering for lodgers on a small scale, and not living as part of the main household. Lodgers would share one or more facilities with the main household without having the facilities to prepare their own food independently. Meals are usually provided;

- *purpose built HMOs:* this group is similar to category (I) but units have been purpose built to this specification. They are often sheltered accommodation with private rooms, but shared kitchens and bathrooms. Includes student halls of residence and nurses homes;

- *self-contained converted flats:* dwellings which are (converted to) fully self-contained with all amenities behind their own front door, but which were originally constructed as one house.

A further group of HMOs can be included in the definition but are not covered by this report because they provide commercially based accommodation:

- *hostels, guest houses, boarding houses, B&Bs:* these HMOs provide accommodation on a commercial basis, most often meals are with accommodation, but some provide kitchen facilities and are self catering.

income

This is the annual net income of household reference person and any partner from wages, pensions, savings and benefits. It does not include council tax benefit, housing benefit, Income Support Mortgage Interest or any payments made under a Mortgage Payment Protection Insurance policy.

indices of deprivation (IMD) 2004

This is a super output area (SOA) level measure of multiple deprivation and is made up of seven domain indices. The domains relate to Income deprivation, Employment deprivation, Health deprivation and disability, Education, skills and training deprivation, Barriers to housing and services, Living environment deprivation and Crime. They replace the Indices of Deprivation 2000 (ID2000).

Super Output Areas: They are a statistical geography. Their key aspects are stability and uniformity of size. In general SOAs should be seen as building bricks from which other areas can be built up, rather than as socially distinct areas in their own right. There are 32,482 in England.

'limited or negligible' demand

See 'market conditions'.

liveability

The liveability problems from the survey are based on the professional surveyors' assessments of problems in the immediate environment of the home on a scale of 1 ('no problems') to 5 ('major problems'). These assessments are based on observed problems (in some cases verified with the resident) rather than any specialised measurement instruments or recourse to other environment data. In all sixteen specific environmental problems (separately assessed by the surveyors) are grouped together (through content and factor analysis) into three types of liveability problems related to:

- *'upkeep'* – the upkeep, management or misuse of the private and public space and buildings (specifically, the presence of: scruffy or neglected buildings, poor condition housing; graffiti; scruffy gardens or landscaping; litter, rubbish or dumping; vandalism; dog or other excrement, nuisance from street parking);

- *'traffic'* – road traffic and other forms of transport (specifically the presence of: intrusive motorways and main roads; railway or aircraft noise; heavy traffic; and ambient air quality);

- *'utilisation'* – abandonment or non residential use of property (specifically, vacant sites; vacant or boarded up buildings; intrusive industry; or non conforming use of a residential area);

- *'poor quality environment'* – The overall assessment (providing the estimate of 3.3 million households with liveability problems) is based on whether the home is in an area with any of the three types of liveability problems.

A home is regarded as having a liveability problem of a given type if it is assessed to have 'significant' or 'major' problems (codes 4 and 5 of the scale) in respect of any of the specific environmental problems assessed and grouped under that type. It has not been possible to retrospectively provide fully comparable findings on liveability problems for 1996 and 2001 because of differences in the environmental data collected.

market conditions

Assessments are made of the demand for property in general within the locality assessed; not the demand for the particular property being surveyed. Localities are assessed using the following categories:

Negligible Demand: This is the extreme case where there is simply no demand for properties, when properties become empty they are very difficult to sell or let. There will typically be a large number of long-term voids and abandoned properties.

Limited Demand: A less extreme and more common situation is a locality with a limited market for properties. Typically there are low value properties – below average and/or falling.

Moderate Demand: Although there may be isolated cases of properties that are less popular, there is demand for properties in these locations.

High Demand: Properties in this locality are rapidly sold and let and there is unmet demand.

market value

the market value survey asks experienced professional valuers to provide a market value for each case in the survey. The valuers are given photographs and details of the property including information such as the number of bedrooms, type of garden, parking provision, visual appearance of the area, and a list of the repairs needed to the property. From this information and their own intelligence of the local market, the valuers estimate the price that the property would sell for to an owner-occupier on the open market. For the social sector properties, this is the price that the sitting tenant would expect to pay before any discount is applied. The valuers also provide an assessment of the relative demand for housing in the area, using the categories 'high', 'moderate', 'limited' and 'negligible'. For this report, 'limited' and 'negligible' are combined. Neither 'limited' nor 'negligible' demand equate to the ODPM estimate of low demand but seek to identify the general popularity of certain neighbourhoods in comparison to others.

mean

Simple average, equal to the sum of all values divided by the number of values.

median

One type of average, found by arranging the values in order and then selecting the one in the middle. The median is a useful number in cases where the distribution has very large extreme values which would otherwise skew the data

neighbourhood renewal funded (NRF) areas

The Neighbourhood Renewal Fund (NRF) aims to enable England's most deprived local authorities to improve services, narrowing the gap between deprived areas and the rest of the country. 88 local authorities receive NRF funding.

not fully secure

Homes without secure windows and doors. See 'secure windows and doors'.

parking

Adequate street parking: street parking is generally available outside or adjacent to the house/module. The road should be sufficiently wide to allow easy passage of traffic.

Inadequate street parking: it is difficult to park outside the survey house/module. This might be due to the volume of cars competing for spaces or due to legal restrictions on parking, or the street being too narrow.

poor quality environment

See 'liveability'.

predominant age

Estimate the age of the majority of dwellings in the area. This will not necessarily include the surveyed dwelling since it may not be part of the majority of dwellings.

predominant built tenure

This assessed by the surveyor in the field. This classification ignores current tenure characteristics of the area (e.g. changes that might have arisen from Right to Buy or large scale transfers of formerly local authority stock) and the tenure of the property surveyed. If there is no clear predominant tenure then the area is classified as 'mixed'.

predominant residential built type

This relates to the current built form of the majority of dwellings in the area. This will not necessarily include the surveyed dwelling since it may not be part of the majority. These dwelling types are split broadly into houses, flats, and mixed houses and flats.

regional areas

Northern regions: includes the following Government Office Regions: North East, North West, and Yorkshire and the Humber;

South east regions: includes the following Government Office Regions: London, South East;

Rest of England: includes the following Government Office Regions: East Midlands, West Midlands, South West, East of England.

repair costs

Faults: a fault is any problem which is not of a purely cosmetic nature and which either represents a health or safety hazard, or threatens further deterioration to the specific element or any other part of the building.

Comprehensive repairs: includes any currently required repairs plus any the surveyor assessed as falling due over the next 10 years. For all exterior elements, whether work was specified or not, they recorded the replacement period of that element – the number of years before it would need replacing. This measure provides a better basis for identifying work that would form part of a planned programme of repair by landlords.

Standardised repair costs: these are costs (in pounds per square metre (£/m^2) based on prices for the East Midland region) of undertaking comprehensive repairs. It is assumed that all work is undertaken by contractors on a block contract basis. For flats, the size of the contract is assumed to be the whole block and for houses it is taken as a group of 5 dwellings. As such, the costs are more closely associated with those which may be incurred by a landlord organising the work on a planned programme basis. By reducing costs to a £/m^2 basis the effect of the size of buildings on the amount of disrepair recorded is omitted, otherwise the extent of the disrepair measured is substantially driven by the size of the building. The common price base

and contract type eliminate other price variations. These costs should not be used as an indication of the expenditure required to remedy.

Costs to make decent: are the costs of making the dwelling fully decent. They represent the required expenditure (i.e. take into account regional and tenure variations in building prices).

SAP

See 'energy efficiency'.

secure windows and doors

Homes with secure windows and doors have both of the following:

- main entrance door is solid or double glazed; the frame is strong; it has an auto deadlock or standard Yale lock plus mortise lock;
- all accessible windows (ground floor windows or upper floor windows in reach of flat roofs) are double glazed, either with or without key locks.

serious disrepair

This is defined for households only, and identifies the 10% of households whose dwellings have the highest repair costs per sq m.

tenure

Four categories are used for most reporting purposes:

owner-occupied: includes all households who own their own homes outright or buying them with a mortgage/loan; also includes shared-ownership schemes;

private rented or private tenants: includes all households living in privately owned property which they do not own. Includes households living rent free, or in tied homes. Includes un-registered housing associations tenants;

local authority: includes all households who rent from a local authority or (former) new town;

registered social landlord (RSL): includes all households living in the property of registered housing associations.

Alternative categories include:

homeowner with mortgage: includes all households who have bought their home with a mortgage/loan;

homeowner no mortgage/outright owner: includes all households who own their homes outright.

traffic

See 'liveability'.

type of dwelling

Dwellings are classified, on the basis of the surveyors' inspection, into the following categories:

small terraced house: a house less than 70m^2 forming part of a block where at least one house is attached to two or more other houses;

medium/large terraced house: a house 70m^2 or more forming part of a block where at least one house is attached to two or more other houses;

semi-detached house: a house that is attached to one other house;

detached house: a house where none of the habitable structure is joined to another building (other than garages, outhouses etc.);

bungalow: a house with all of the habitable accommodation on one floor. This excludes chalet bungalows and bungalows with habitable loft conversions, which are treated as houses;

purpose built flat, low rise: a flat in a purpose built block less than six storeys high. Includes cases where there is only one flat with independent access in a building which is also used for non-domestic purposes;

purpose built flat, high rise: a flat in a purpose built block of at least six storeys high;

converted flat: a flat resulting from the conversion of a house or former non-residential building. Includes buildings converted into a flat plus commercial premises (typically corner shops).

unfitness

See 'fitness'.

upkeep

See 'liveability'.

Urban/rural

City or other urban centre includes:

City centre: this is an area around the core of towns and small cities, and also older urban areas which have been swallowed up by a metropolis;

Urban/other urban centre: this is the outer area of towns or cities, characterised by large planned housing estates;

Suburban includes:

Suburban residential: this is the outer area of towns or cities; characterised by large planned housing estates;

Rural includes:

Rural residential: these are the suburban areas of villages, often meeting the housing needs of people who work in nearby towns and cities;

Village centre: these are traditional villages or the old heart of villages which have been suburbanised;

Isolated rural: these areas are predominantly rural e.g. agricultural with isolated dwellings or small hamlets.

utilisation

See 'liveability'.

vacant dwellings

The assessment of whether or not a dwelling was vacant was made at the time of the interviewer's visit. Clarification of vacancy was sought from neighbours. Surveyors were required to gain access to vacant dwellings and undertake full inspections.

vulnerable household

A household where the HRP and/or any partner is in receipt of any of the following benefits: Income support, Income-based Job seekers' allowance, Housing Benefit, Council Tax Benefit, Working Families Tax Credit, Disabled person's Tax Credit, Disability living allowance – Care component, Disability Living Allowance – mobility component, Industrial injuries disablement Benefit, War Disablement Pension and Attendance Allowance.

In 2003-04 Working Families Tax Credit and Disabled person's Tax Credit were replaced by Working Tax Credit and Child Tax Credit. The Child Tax Credit is effectively a replacement for the children's tax credit tax allowance and can be paid to households with incomes of up to about £58,000 per year. Clearly these much better off households receiving tax credits should not be included within the definition of 'vulnerable households'. Instead, the approach taken by DEFRA in assessing eligibility for Warm Front Grants has been followed. Where households are receiving tax credits but none of the other benefits above, only those with a gross assessable income of less than £14,200 per year are classed as 'vulnerable'. A household's gross assessable income is the same as that used for tax credit purposes. Briefly, it includes all income from wages, pensions, savings and benefits except for: Working Tax Credit, Child Tax Credit, Child Benefit, Maternity Allowance (to a maximum of £100 per week), Statutory Sick Pay (to a maximum of £100 per week), Disability Living Allowance (care component), Disability Living Allowance (mobility component), Industrial Injuries Disablement Benefit, War Disablement Pension, Severe Disablement Allowance and Attendance Allowance.