1 Design and Sample

1.1 Health Survey for England Report Structure

This Quick Guide to the Health Survey for England (HSE) 2011 is designed as a reference tool to introduce the main methods sections of the survey, and signpost the reader to where further information can be found.

Hard copies of the full HSE 2011 report will be available in April 2013. There will be three separate documents:
- Volume 1: substantive findings, with chapters on CVD, hypertension, diabetes, healthy foundations segmentation, chronic pain, adult & children’s anthropometric measures, social care, drinking patterns and the drinking diary results.
- Volume 2: methods and documentation, giving the full account of the technical aspects of the 2011 survey.
- A summary of key findings.

The full HSE 2011 report can also be found online at: www.ic.nhs.uk/pubs/hse11report

As well as a single Volume 1 online, each chapter is also presented as a separate pdf.

1.2 Brief Introduction to the HSE

The HSE is a series of annual surveys, of which the 2011 survey is the twenty-first. The surveys provide regular information that cannot be obtained from other sources on a range of issues related to the public’s health and many of the factors that affect health. Each survey in the series includes core questions, for example on smoking and drinking, and measurements such as blood pressure, anthropometric measurements and analysis of blood and saliva samples, as well as modules of questions or measurements on specific issues that vary from year to year. In some years, the core sample has also been augmented by an additional boosted sample from a specific population subgroup, such as minority ethnic groups, older people or children; there was no boost in 2011.

Data collection in 2011 involved an interview including a self-completion questionnaire and for adults a drinking diary. This was followed by a visit from a specially trained nurse for all those who agreed. Height and weight were measured during the interview, and the nurse visit included measurements and collection of blood and saliva samples, as well as additional questions.

For a more detailed introduction to the 2011 HSE see from p.11 (Section 1) of Volume 2 of the 2011 report, Methods and Documentation: www.ic.nhs.uk/pubs/hse11report
1.3 Availability of Data

As with previous years, only a proportion of the HSE results are included in the 2011 report and 2011 trend tables. A copy of the full HSE 2011 data will be deposited at the Data Archive at the University of Essex. Copies of the anonymised data files from 2011 and every other HSE year from 1993 can be made available for specific research projects through the Archive. Full documentation is available in the archive, including a list of all the variables and definitions for derived variables.
For further information go to: [www.esds.ac.uk/government/hse](http://www.esds.ac.uk/government/hse)

1.4 HSE 2011 Trend Tables

In addition to the full 2011 report, 2011 results are incorporated into trend tables which focus on key trends in the health of adults and children since 1993, or the earliest year for which comparable data are available.

Topics included in trend tables for **adults**:

<table>
<thead>
<tr>
<th>Topic</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood pressure</td>
<td>Fruit and vegetable consumption*</td>
</tr>
<tr>
<td>Mean height &amp; weight</td>
<td>General health</td>
</tr>
<tr>
<td>Body mass index*</td>
<td>Longstanding illness, acute sickness</td>
</tr>
<tr>
<td>Mean waist circumference</td>
<td>Prevalence of IHD or stroke</td>
</tr>
<tr>
<td>Estimated alcohol consumption*</td>
<td>Prevalence of diabetes</td>
</tr>
<tr>
<td>Self-reported cigarette smoking*</td>
<td>Levels of physical activity*</td>
</tr>
</tbody>
</table>

* Population number estimates are also available for these topics.

Topics included in trend tables for **children**:

<table>
<thead>
<tr>
<th>Topic</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean height &amp; weight</td>
<td>Fruit and vegetable consumption*</td>
</tr>
<tr>
<td>Body mass index</td>
<td>General health</td>
</tr>
<tr>
<td>Overweight and obesity prevalence*</td>
<td>Longstanding illness</td>
</tr>
<tr>
<td>Self-reported cigarette smoking</td>
<td>Acute sickness</td>
</tr>
<tr>
<td>Self-reported experience of alcohol</td>
<td>Levels of physical activity*</td>
</tr>
</tbody>
</table>

* Population number estimates are also available for these topics.

The full Trend tables, population number estimate tables and commentary can be found online at: [www.ic.nhs.uk/pubs/hse11trends](http://www.ic.nhs.uk/pubs/hse11trends)

1.5 Sample Size

The achieved sample size for 2011 at the interview stage was 8,610 adults and 2,007 children. 5,715 adults and 1,257 children had a nurse visit. A total of 4,193 adults provided a blood sample.
1.6 Sample Design
As with all previous surveys, the 2011 HSE involved a multi-stage, stratified, random probability sample designed to be representative of the population living in private households in England. Those living in institutions (such as care homes) were outside the scope of the survey.

The sampling frame was the small user Postcode Address File (PAF). The very small proportion of households living in addresses not on PAF (less than 1%) was not covered. The sample consisted of 8,992 addresses selected at random from 562 postcode addresses.

All HSE surveys cover the adult population aged 16 and over living in private households in England. From 1995, the survey included children aged 2-15, and from 2001 infants aged under 2 have also been included. Where there were three or more children in a household, two of the children were selected at random to limit the respondent burden for parents.

For more detailed information about the sample design see from p.13 (Section 2) of Volume 2 of the 2011 report, Methods and Documentation: www.ic.nhs.uk/pubs/hse11report

The complex survey design, and the way of weighting the data (see Sections 3.1 and 3.2) mean that analysis and statistical tests for significance should be done in a package which takes the complex survey design into account, e.g. STATA or SPSS 15 or later.

2 Data Collection and Response

2.1 Ethical Approval
Ethical approval for the 2011 survey was obtained from the Oxford A Research Ethics Committee (reference number 10/H0604/56).

2.2 Topic Coverage
Data was collected using a number of different methods. Adults were asked to participate in a face to face interview lasting around 50-60 minutes which included a self-completion questionnaire; a drinking diary; and a nurse visit.

Further information about topic coverage can be found from p.15 (Section 3) of Volume 2 of the 2011 report, Methods and Documentation: www.ic.nhs.uk/pubs/hse11report

Figure A summarises the household and individual level questionnaire coverage:
# Figure A

## Health Survey For England 2011: Contents

### Household data
- Household size, composition and relationships
- Accommodation tenure and number of bedrooms
- Economic status/occupation of household reference person

### Household income
- Type of dwelling and area
- Smoking in household
- Car ownership

### Individual level information
- Age
- Interviewer visit
- General health, longstanding illness, limiting longstanding illness, acute sickness
- Personal care plans
- Self-reported height and weight
- Cardiovascular disease, including doctor-diagnosed hypertension and diabetes
- Chronic pain
- Dental health
- Social care
- Fruit and vegetable consumption
- Smoking
- Drinking (heaviest drinking day last week, regular drinking)
- Economic status/occupation, educational achievement
- Ethnic origin
- Height measurement
- Weight measurement
- Reported birth weight
- Consent to linkage to NHS Central Register/Hospital Episodes Statistics

### Self completion
- Attitudes to personal health and lifestyle
- Warwick Edinburgh mental well-being scale
- EQ-5D
- Happiness
- Perception of weight
- Sexual orientation, religion
- Strengths and difficulties, including parent perception of child’s weight

### Nurse visit
- Immunisations
- Prescribed medicines, vitamin supplements
- Nicotine replacement products
- Waist and hip circumference
- Blood pressure
- Saliva sample (cotinine)
- Blood sample

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<table>
<thead>
<tr>
<th>Age</th>
<th>0-1</th>
<th>2-3</th>
<th>4</th>
<th>5-7</th>
<th>8-10</th>
<th>11-12</th>
<th>13-15</th>
<th>16+</th>
</tr>
</thead>
<tbody>
<tr>
<td>General health, longstanding illness, limiting longstanding illness, acute sickness</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
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<tr>
<td>Personal care plans</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Self-reported height and weight</td>
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<td></td>
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<tr>
<td>Cardiovascular disease, including doctor-diagnosed hypertension and diabetes</td>
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<td></td>
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<tr>
<td>Chronic pain</td>
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</tr>
<tr>
<td>Dental health</td>
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<td></td>
</tr>
<tr>
<td>Social care</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fruit and vegetable consumption</td>
<td></td>
<td></td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td></td>
<td>•</td>
</tr>
<tr>
<td>Smoking</td>
<td>• a</td>
<td>• a</td>
<td>• a</td>
<td>• a</td>
<td>• b</td>
<td>• a</td>
<td>• a</td>
<td>• b</td>
</tr>
<tr>
<td>Drinking (heaviest drinking day last week, regular drinking)</td>
<td>• a</td>
<td>• a</td>
<td>• a</td>
<td>• a</td>
<td>• b</td>
<td>• a</td>
<td>• a</td>
<td>• b</td>
</tr>
<tr>
<td>Economic status/occupation, educational achievement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethnic origin</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Height measurement</td>
<td></td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Weight measurement</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Reported birth weight</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Consent to linkage to NHS Central Register/Hospital Episodes Statistics</td>
<td>•</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

This module was administered by self-completion.

This module was administered by self-completion for those aged 16-17 and some aged 18-24.

This questionnaire was administered by self-completion to parents of children aged 4-15.

The drinking diary was left with participants aged 18 and over to complete in the week following the interview; young people aged 16-17 were asked to complete the diary retrospectively during the nurse visit.
2.3 Fieldwork Procedures, documents and protocols

Full details of the fieldwork procedures can be found from p.17 in Volume 2 of the 2011 report, Methods and Documentation: www.ic.nhs.uk/pubs/hse11report. Copies of the fieldwork documents are provided in Appendix A, and the protocols used for measurements and sample collection are in Appendix B of Volume 2.

2.4 Interview Length

Interviews could be conducted with between one and four persons per session; the most common session types were with one or two individuals. Interview length for a single adult averaged around 50 minutes, and for two people (including at least one adult) interview length averaged around 60 minutes. Nurse visits were conducted with a single individual at a time, and the nurse visit for adults who took part in all the measurements averaged 30 minutes.

Interviews with children were shorter than with adults, and the interview length varied with age as some modules were only asked of older children. When children were interviewed without adults, the average interview length was around 10-15 minutes for a single child aged 8-15, and around 20 minutes for two children of this age.

Further information about interview length can be found from p.18 (Section 4.5) of Volume 2 of the 2011 report, Methods and Documentation: www.ic.nhs.uk/pubs/hse11report

2.5 Consents

Verbal consent was obtained for the following during the interview or nurse visit:
- Interview
- Nurse visit
- Taking height and weight measurements
- Taking waist and hip measurements
- Taking blood pressure measurements

Written consent was obtained for the following during the interview or nurse visit:
- Collecting blood and saliva samples
- Sending results from the nurse visit to the GP
- Storing a small amount of the blood sample
- Data linkage of survey results to the Hospital Episode Statistics and the NHS Central Register and Cancer Register.

Adults aged 16 and over gave consent. Parents gave verbal or written consent for their children aged 0-15, and the children themselves gave verbal assent for the interview, nurse visit and measurements. If they were able to, they gave written assent for results being sent to their GP and giving a saliva sample.
2.6 Fieldwork Period
Addresses were issued over 12 months from January to December 2011, and fieldwork was completed by February 2012.

2.7 Response Rate
A household response rate of 66% (5,338 households) was achieved.

A total of 8,610 adults and 2,007 children were interviewed. This is an individual response rate of 59% of all eligible adults and 65% of all eligible children. Within co-operating households, 87% of all adults and 93% of selected children were interviewed.

A total of 5,715 adults and 1,275 children had a nurse visit. Tables 1 and 2 show the response rates for the different stages of the survey, both for all eligible adults and children, and for adults and children in co-operating households.

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Adult response rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>All eligible adults</td>
<td>Adults in co-operating households</td>
</tr>
<tr>
<td>Interviewed</td>
<td>%</td>
</tr>
<tr>
<td>Height measured</td>
<td>51</td>
</tr>
<tr>
<td>Weight measured</td>
<td>49</td>
</tr>
<tr>
<td>Saw a nurse</td>
<td>39</td>
</tr>
<tr>
<td>Waist and hip measured</td>
<td>38</td>
</tr>
<tr>
<td>Blood pressure measured</td>
<td>38</td>
</tr>
<tr>
<td>Gave blood sample</td>
<td>29</td>
</tr>
<tr>
<td>Gave saliva sample</td>
<td>37</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 2</th>
<th>Child response rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>All eligible children</td>
<td>Selected children in co-operating households</td>
</tr>
<tr>
<td>Interviewed</td>
<td>%</td>
</tr>
<tr>
<td>Height measured</td>
<td>65</td>
</tr>
<tr>
<td>Weight measured</td>
<td>45</td>
</tr>
<tr>
<td>Saw a nurse</td>
<td>50</td>
</tr>
</tbody>
</table>

9
The response rate varied by region and type of household dwelling, as well as the age and sex of the sample.

For a more detailed breakdown of the survey response and response analysis see from p.20 (Section 6) of Volume 2 of the 2011 report, Methods and Documentation: www.ic.nhs.uk/pubs/hse11report

3 Analysis

3.1 Weighting in the sample
Weighting is applied to HSE 2011 data to correct for probabilities of selection and to minimise bias from non-response.

Selection weights have been applied to HSE samples to correct for the probability of selection in two situations:
- If there are multiple dwelling units or households at a selected address, in which case only one will be selected at random
- If there are more than two children at the selected address, in which case two are selected at random.

From 2003 a non-response adjustment was also incorporated into the weighting strategy. Both selection and non-response weights were applied to HSE 2011 data.

Because of sample attrition at different stages of the survey, separate weights have been calculated for data from the nurse visit, the blood and saliva samples and the drinking diary.

Further detail about how the weights were calculated and combined can be found from p.24 (Section 7) of Volume 2 of the 2011 report, Methods and Documentation: www.ic.nhs.uk/pubs/hse11report

3.2 Weighting in the report
All 2011 data in the report are weighted, apart from the response tables. Both weighted and unweighted bases are given in tables in the 2011 report. The weighted numbers show the relative size of each group in the population. The unweighted bases show the actual number of respondents in each group.

Further information about weighting data in the 2011 report can be found from p.28 (Section 8.2) of Volume 2 of the 2011 report, Methods and Documentation: www.ic.nhs.uk/pubs/hse11report

A full discussion of the effects of non-response weighting can be found in the 2003 HSE report, Volume 3 Methodology and Documentation:
3.3 Data Analysis Conventions to Note

1. For most data analysis in the report, three standard analysis breakdowns have been used:

   **Strategic Health Authority (SHA) region**
   Both observed and age-standardised data are provided by SHA in the tables. Observed data can be used to examine actual prevalence or mean values within a region. Age-standardised data are required for comparisons between areas to exclude age-related effects. However the base sizes for SHAs are often relatively small, and caution should be exercised in examining regional differences.

   **Equivalised Household Income**
   This measure of income takes into account the number of persons in the household. More detail of how this is derived is provided in the Glossary, Appendix C of Volume 2 of the 2011 report, Methods and Documentation: [www.ic.nhs.uk/pubs/hse11report](http://www.ic.nhs.uk/pubs/hse11report)

   **Index of Multiple Deprivation**
   This Index combines a number of indicators, chosen to cover a range of economic, social and housing issues, into a single deprivation score for each small area in England. This allows each area to be ranked relative to others according to their level of deprivation.

   For further information see from p.29 (Section 8.4) of Volume 2 of the 2011 report, Methods and Documentation: [www.ic.nhs.uk/pubs/hse11report](http://www.ic.nhs.uk/pubs/hse11report)

2. Five different weights have been used, depending on the stage of the survey the data come from:

   - Interview stage
   - Nurse visit
   - Blood sample (adult only)
   - Saliva sample
   - Drinking diary (adult only)

   For further information on weighting see the Weighting section above.

3. Data for adults have been age-standardised
   Most adult tables in the report, apart from the age and sex tables, have been age-standardised. This allows comparisons between groups after adjusting for the effects of any difference in age distributions.

   It should be noted that all analyses in the report are presented separately for men and women. All age standardisation has been undertaken separately within each sex. When comparing data for the two sexes, it should be remembered that no age
standardisation has been introduced to remove the effects of the sexes’ different age distributions.

When comparing prevalence across regions by age the age-standardised values should be used. However when looking at actual prevalence within one region, the observed values should be used.

For further information see from p.29 (Section 8.3.3) of Volume 2 of the 2011 report, Methods and Documentation: www.ic.nhs.uk/pubs/hse11report

3.4 Table Conventions
For further information about the table conventions see p.9 (Notes) of Volume 2 of the 2011 report, Methods and Documentation: www.ic.nhs.uk/pubs/hse11report

3.5 Design Effects & True Standard Errors
HSE 2011 used a complex survey and weighting design. One of the effects of this is the standard errors for the survey estimates are generally higher than the standard errors that would be derived from an unweighted simple random sample of the same size.

This comparison ratio to a simple random sample of the same size is known as a design factor or “deft”. It is the factor by which the standard error of an estimate from a simple random sample has to be multiplied to give the true standard error of the complex design. The true standard errors and defts for the HSE 2011 have been calculated using a Taylor Series expansion method. Both are shown in Tables 14-24 of Volume 2 for selected survey estimates presented in the topic chapters. For further information see p.30 (Section 8.5) of Volume 2 of the 2011 report, Methods and Documentation: www.ic.nhs.uk/pubs/hse11report

3.6 Significance Testing
Significance testing is carried out on the results in the 2011 report. The term ‘significant’ refers to statistical significance at the 95% level and is not intended to imply substantive importance.

The significance tests carried out in a cross tabulation, normally a variable nested within sex, cross-tabulated with a breakdown such as age, income or region. The test is for difference for the main effects only (using a Wald test), looking at the outcome measure across the categories/subgroups. It does not test whether the difference between each or any subgroup (e.g. the highest and lowest subgroups) may be statistically significant; and with a large number of subgroups, as in a variable like region, there will usually be some significant differences between the subgroups in the survey by chance, even if in reality there are no actual differences in the population.
A p-value is the probability of the observed result occurring due to chance alone. A p-value of less than 5% is conventionally taken to indicate a statistically significant result ($p < 0.05$). It should be noted that the p-value is dependent on the sample size, so that with large samples differences or associations which are very small may still be statistically significant.

Using this method of statistical testing, differences observed which are significant at the 5% level indicate that there is sufficient evidence in the data to suggest that the differences in the sample reflect a true difference in the population.

4 Biological Samples

4.1 Sample analytes

Blood samples were tested for total and HDL cholesterol and glycated haemoglobin ($\text{HbA}_{1c}$). Saliva samples were tested for cotinine, a derivative of nicotine.

4.2 Quality Control of Blood and Saliva Analytes

The overall conclusion for the data provided in the 2011 report is that methods and equipment used for the measurement of blood and saliva analytes produced internal quality control (IQC) and external quality assessment (EQA) results within expected limits. The results of the analyses for each of the main blood analytes and saliva cotinine levels were acceptable for the HSE 2011.

For details of procedures used in the collection, processing and transportation of the biological specimens see from p.31 (Section 9) and from p.175 (Appendix B) of Volume 2 of the 2011 report, Methods and Documentation: [www.ic.nhs.uk/pubs/hse11report](http://www.ic.nhs.uk/pubs/hse11report)

4.3 Internal Quality Control (IQC)

Internal Quality Controls help identify and prevent the release of any errors in an analytical run, as well as being used to monitor trends over time.

For each analyte or group of analytes, the laboratory obtains a supply of quality control materials. The results obtained by the laboratory are evaluated from replicate measurements (over several runs) in conjunction with target values provided by manufacturers of IQC materials, if available. IQC values are assessed against an acceptable range and samples are re-analysed if they do not meet the acceptable range.

For further information on Internal Quality Controls see from p.33 (Section 9.3), as well as Tables 26-30 of the results of the IQC (from p. 57), in Volume 2 of the 2011 report Methods and Documentation: [www.ic.nhs.uk/pubs/hse11report](http://www.ic.nhs.uk/pubs/hse11report)
4.4 External Quality Assessment (EQA)

EQAs allow the comparison of results between laboratories measuring the same analyte. An EQA scheme for an analyte or group of analytes distributes proportions of the same sample to participating laboratories, which are blind to the concentration of the sample received. This process is repeated with multiple samples over the course of a year. Results are returned to the scheme organisers including the mean values, measures of between laboratory precision and the bias of the results obtained by that laboratory.

EQA is a retrospective process of assessment of performance, especially of inaccuracy or bias related to mean values. Unlike Internal Quality Control it does not provide control of release of results at the time of analysis.

For further information see from p.34 (Section 9.4), as well as Tables 21-33 of the results of the EQA (from p. 61), in Volume 2 of the 2011 report Methods and Documentation: www.ic.nhs.uk/pubs/hse11report