



# Health Survey for England 2016 Quick Guide

Published 13 December 2017

This report provides a brief introduction to the content and methodology of the Health Survey for England 2016. Full details are in the report Health Survey for England 2016: Methods.

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ISBN: 978-1-78734-099-2

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**ISBN 978-1-78734-099-2**

This report may be of interest to members of the public, policy officials, people working in public health and to commissioners of health and care services who wish to understand the content of the Health Survey for England, how the survey data have been collected and the statistical methods used.

## Introduction

### About this guide

This Quick Guide to the Health Survey for England 2016 is designed as a reference tool to introduce the survey and indicate where further information can be found.

### The Health Survey for England (HSE)

The HSE is a series of annual surveys, of which the 2016 survey is the twenty–sixth. The surveys provide regular information that cannot be obtained from other sources about the public’s health and health-related behaviour.

Each survey in the series includes core questions, covering general health; hypertension and diabetes; social care; health-related behaviours, including smoking and drinking alcohol; and measurements such as blood pressure, height and weight measurements and analysis of blood and saliva samples. In addition there are modules of questions 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 such boost in 2016.

For a more detailed introduction to the HSE 2016, see Section 1 of the report Health Survey for England 2016: Methods.

### Publications

The HSE 2016 is published online at <https://digital.nhs.uk/pubs/hse2016>. The published documents comprise the following:

- a summary of key findings
- six topic reports, each in PDF format, with supporting Excel tables<sup>1</sup>
  - Adult overweight and obesity
  - Kidney and liver disease
  - Physical activity in adults
  - Prescribed medicines
  - Social care for older adults
  - Well-being and mental health
- a report focusing on trends in children’s health
- a methods report, giving a full account of the technical aspects of the survey
- Excel tables showing true standard errors, confidence intervals and design effects for key survey measures
- documentation, including questionnaires, field materials and protocols for conducting survey measures.

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<sup>1</sup> All six of these HSE 2016 topic reports covered aspects of adults’ health.

In addition, tables showing trends among adults for key survey statistics, with an accompanying commentary, have been published. These cover the following health measures and lifestyle behaviours, shown by age, sex and survey year:

- blood pressure;
- mean height and weight;
- body mass index, prevalence of overweight and obesity;
- mean waist circumference;
- weekly alcohol consumption;
- maximum alcohol consumption on any day in the last week;
- cigarette smoking;
- fruit and vegetable consumption;
- general health, longstanding illness and acute sickness;
- prevalence of ischaemic heart disease (IHD) or stroke;
- prevalence of diabetes;
- levels of physical activity; and
- well-being.

Population estimates are available for some of the trend estimates for adults and children covering 2016 and past years. For adults, these comprise:

- body mass index categories;
- cigarette smoking;
- maximum alcohol consumption on any day in the last week;
- fruit and vegetable consumption; and
- levels of physical activity.

For children, population estimates are shown for:

- prevalence of overweight and obesity;
- fruit and vegetable consumption; and
- levels of physical activity.

## Availability of data sets

The HSE is a long survey and only some of the results are included in the reports and trend tables. Copies of the anonymised and disclosure controlled datasets can be made available for specific research projects through the UK Data Service at <https://www.ukdataservice.ac.uk/>. These cover answers to more questions than can be covered in the reports. Full documentation is available in the archive, including a list of all the variables and definitions for derived variables. For further information go to: <http://discover.ukdataservice.ac.uk/series/?sn=2000021>.

## Sample design

### Sample design

As with all previous surveys, the HSE 2016 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 9,558 addresses selected at random in 531 postcode sectors.

All HSE surveys cover the adult population aged 16 and over living in private households in England (up to a maximum of ten adults per household). From 1995, the survey has included children aged 2 to 15, and from 2001 infants aged under 2 have also been included. Up to four children per household were interviewed (up to two aged between 0 and 12, up to two aged between 13 and 15). Where there were three or more children in an age band, two of the children were selected at random to limit the respondent burden for parents.

For more detailed information about the sample design see Section 2 of the report Health Survey for England 2016: Methods.

The complex survey design and the method of weighting the data (see Sections 7 and 8 of the Methods report) 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 versions.

### Sample size

The achieved sample size for 2016 at the interview stage was 8,011 adults aged 16 and over and 2,056 children aged 0 to 15. 5,049 adults and 1,117 children had a nurse visit.

## Data collection and response

### Ethical approval

Ethical approval for the 2016 survey was obtained from the East Midlands Nottingham 2 Research Ethics Committee (Reference no 15/EM/0254).

### Data collection

Data collection involved both interviews and self-completion. The household interview included questions on household size, composition and relationships; type of dwelling, tenure, and the number of bedrooms; car ownership; smoking within the home; the economic status and occupation of the household reference person; and household income.

Adults were asked to participate in a face-to-face interview which included a self-completion questionnaire. The content of the self-completion booklets varied with age: young adults aged 16 to 17 were asked about smoking and drinking behaviour as well

as other questions. Interviewers also had the option of using this booklet for those aged 18 to 24 if they felt that it would be difficult for anyone in this age group to give honest answers to the questions face-to-face with other household members present.

Children aged 0 to 15 were also interviewed and were eligible for a nurse visit. During the interview, those aged 13 to 15 answered on their own behalf while parents answered on behalf of children aged 0 to 12. In addition, children aged 8 and over answered questions on some sensitive topics within a self-completion questionnaire.

On the following pages of this guide, Table 1 summarises the interview topic coverage, and Table 2 summarises the questions included in the self-completion booklets.

Interviewers also measured the weight of all participants and the height of everyone aged 2 and over.

For both adults and children, the interview was followed by a nurse visit. This included questions about prescribed medicines and, for adults, folic acid and nicotine replacement products, including the use of aids and advice from health professionals. In 2016, adults were also asked about kidney and liver disease, and weight control. Nurses took waist and hip measurements for those aged 11 and over and measured the blood pressure of those aged 5 and over.

Adults were also asked to provide non-fasting blood samples<sup>2</sup> for the analysis of total cholesterol and HDL cholesterol, and glycated haemoglobin. In 2016, blood samples were also analysed for markers of kidney and liver disease.<sup>3</sup> Adult participants were asked for samples of urine, which were analysed for the albumin and creatinine ratio, an alternative indicator of kidney disease. Samples of saliva were taken from children aged 4 and over for the analysis of cotinine (a derivative of nicotine that shows recent exposure to tobacco or tobacco smoke). Written consent was obtained for these samples. Details of the analysis of these samples are provided in Section 9 of the report Health Survey for England 2016: Methods.

Further information about topic coverage can be found in Section 3 of the report Health Survey for England 2016: Methods.

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<sup>2</sup> For some blood sample analyses it is necessary for participants to fast for a period before the sample is taken as the composition of the blood sample is affected by recent intake of food or drink. However, for the analytes in the HSE, 'non-fasting' blood samples can be used and participants do not have to fast before the nurse visit.

<sup>3</sup> Serum creatinine and cystatin C were used as indicators of kidney disease; aspartate aminotransferase (AST) and alanine aminotransferase (ALT) were used as indicators of liver disease.

**Table 1: Content of interview by age group**

	Age in years				
	0-1	2-4	5-15	16-64	65+
General health, longstanding illness, limiting longstanding illness	•	•	•	•	•
Personal care plans				•	•
Self-reported height and weight				•	•
Doctor diagnosed hypertension and diabetes				•	•
Receipt of social care					•
Physical activity				•	•
Fruit and vegetable consumption			•	•	•
Smoking <sup>a</sup>				• <sup>a</sup>	•
Exposure to second-hand smoke	•	•	•		
Drinking <sup>a</sup>				• <sup>a</sup>	•
Height and weight measurements		•	•	•	•
Economic status, occupation				•	•
Educational attainment				•	•
Ethnic origin, national identity	•	•	•	•	•
Consent to link data to health records				•	•

<sup>a</sup> Questions about smoking and drinking were included in the self-completion questionnaires for young adults aged 16 to 17. Interviewers also had the option of using this booklet for those aged 18 to 24 if they felt that they would be inhibited from giving honest answers to the questions face-to-face with other household members present.

**Table 2: Content of self-completion booklets by age group**

	Age in years			
	8-12	13-15	16-17	18+
Smoking <sup>a</sup>	•	•	•	
Drinking <sup>a</sup>	•	•	•	
General Health Questionnaire (GHQ-12)		•	•	•
ONS measure of life satisfaction			•	•
Well-being (Warwick Edinburgh Mental Well-being Scale)			•	•
Gambling			•	•
Sexual orientation			•	•
National identity	•	•	•	
Religion	•	•	•	•
Perception of own weight	•	•	•	•
Perception of child's weight			•	•

<sup>a</sup> Interviewers had the option of using the booklet for 16 and 17 year olds for those aged 18 to 24 if they felt that they would be inhibited from giving honest answers to the questions about smoking and drinking face-to-face with other household members present.

## Fieldwork procedures, documents and protocols

Full details of the fieldwork procedures can be found in Sections 4 and 5 of the report Health Survey for England 2016: Methods.

Copies of the fieldwork documents and the protocols used for measurements and sample collection are available via <https://digital.nhs.uk/pubs/hse2016>.

## 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. The median (average) interview length for a single adult was 41 minutes, and for two people (including at least one adult) median interview length was 64 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 35 minutes.<sup>4</sup>

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, for a single child aged 8 to 15 the median interview length was 17 minutes and the median length of the nurse interview was 16 minutes.

## Consents

Verbal consent was obtained for the following during the interview or nurse visit.

- Interview
- Completing self-completion booklet
- 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, urine and saliva samples
- Sending results from the nurse visit to the participant's GP
- Storing a small amount of the blood sample
- Data linkage of survey results to the Hospital Episodes Statistics and the NHS Central Register for mortality and cancer.

Fully informed consent requires a full explanation of the study and what is required of the participant. Once consent has been obtained from a parent, assent – seeking a child's agreement – requires a clear, age-appropriate explanation which is comprehensible rather than comprehensive.

Adults aged 16 and over gave informed consent for all stages of the interview and nurse visit. Parents gave written or verbal consent on behalf of their children aged 0 to 15, and children gave verbal assent for the interview, nurse visit and measurements. If children were able to, they gave written assent for the saliva sample and for their results being sent to their GP.

## Fieldwork period

Addresses were issued in 12 monthly batches from January to December 2016. Fieldwork was completed in March 2017.

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<sup>4</sup> The median is the value of a distribution which divides it into two equal parts such that half the cases have values below the median and half the cases have values above the median. It may be a better indicator of interview length than the mean, which can be disproportionately influenced by a relatively small number of cases with very high values (i.e. very long interviews). This can happen because of interruptions, because the respondent has a great deal of information to impart or because the pace of the interviewer is slower than usual, for example because the respondent has difficulties in comprehending questions or instructions.

## Response rate

A household response rate of 59% was achieved. A total of 8,011 adults aged 16 and over and 2,056 children aged 0 to 15 were interviewed. This is equivalent to an individual response rate of 55% of adults and 62% of children. Within co-operating households, 85% of adults and 90% of children were interviewed. 5,049 adults and 1,117 children had a nurse visit. Tables 3 and 4 show the response rates to the different survey elements for adults and children.

**Table 3: Response among all adults**

	Men	Women	All adults
	%	%	%
Interviewed	51	58	55
Height measured	44	50	47
Weight measured	43	48	46
Saw a nurse	32	37	34
Waist and hip measured	31	35	33
Blood pressure measured	31	36	34
Gave blood sample	25	28	26
Gave urine sample	28	32	30

**Table 4: Response among all children**

	Boys	Girls	All children
	%	%	%
Interviewed	62	63	62
Height measured	41	42	41
Weight measured	46	48	47
Saw a nurse	32	36	34

The response rate varied by age and sex as well as by region and type of dwelling.

For a more detailed description of the 2016 survey response, see Section 6 of the report Health Survey for England 2016: Methods.

## Analysis

### Weighting the data

Weighting is applied to HSE 2016 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 were multiple dwelling units or households at a selected address, in which case only one was selected at random.
- If there were more than two children aged between 0 and 12 and/or between 13 and 15 at the selected address, in which case two in each age band were 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 2016 data, and an interview weight was calculated. To account for sample attrition, further separate weights have been calculated for data from different stages of the survey (see below).

Further detail about how the weights were calculated and combined can be found in Section 7 of the report Health Survey for England 2016: Methods.

Note that the complex survey design and the method of weighting the data 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 version 15 or later.

### Selecting the appropriate weight

Different weights have been provided to be used as appropriate.

- Interview
- Nurse visit
- Blood sample (adults)
- Urine sample (adults)
- Cotinine (saliva) sample (children)
- Gambling questionnaire (within the self-completion questionnaires for adults)

If questions from different stages of the survey are combined in analysis, the weights for the latest stage of the survey should be used (that is, the latest in the list above). For instance, if blood sample results are being cross-tabulated with questions from the interview stage, the blood sample weight should be used; or if waist circumference results (from the nurse visit) are cross-tabulated with BMI data from the interview, the nurse visit weight should be used.

## Weighted data

All 2016 data in the topic reports and trend tables are weighted. Both weighted and unweighted bases are given in each table. The weighted numbers show the relative size of each group in the population, so that data from different columns can be combined in their correct proportions. The unweighted bases show the actual number of participants in each group.

## Accuracy and reliability of survey estimates

HSE, in common with other surveys, collects information from a sample of the population. The sample is designed to represent the whole population as accurately as possible within practical constraints, such as time and cost. Consequently, statistics based on the survey are estimates, rather than precise figures, and are subject to a margin of error, also known as a 95% confidence interval. For example the survey estimate might be 24% with a 95% confidence interval of (22% to 26%). A different sample might have given a different estimate, but we expect that the true value of the statistic in the population would be within the range given by the 95% confidence interval in 95 cases out of 100.

Where differences are commented on in the topic reports and trend commentary, these reflect the same degree of certainty that these differences are real, and not just within the margins of sampling error. These differences can be described as statistically significant.<sup>5</sup>

Confidence intervals are quoted for key statistics within this report and are also shown in more detail in the Excel tables accompanying the report Health Survey for England 2016: Methods.<sup>6</sup> Confidence intervals are affected by the size of the sample on which the estimate is based. Generally, the larger the sample, the smaller the confidence interval, and hence the more precise the estimate.

## Design effects and true standard errors

The HSE 2016 used a complex survey and weighting design. One of the effects of this is that standard errors and confidence intervals for survey estimates are generally larger than those that would be derived from an unweighted simple random sample of the same size.

The ratio of the standard error of the complex sample to that of a simple random sample of the same size is known as the design factor. 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.

True standard errors and defts are shown for key survey estimates in the Excel tables accompanying the report Health Survey for England 2016: Methods.<sup>6</sup>

## Survey limitations

The HSE is a cross-sectional survey of the population. It examines associations between health states, personal characteristics and behaviour. However, such associations do not necessarily imply causality. In particular, associations between

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<sup>5</sup> Statistical significance does not imply substantive importance; differences that are statistically significant are not necessarily meaningful or relevant.

<sup>6</sup> Available via <https://digital.nhs.uk/pubs/hse2016>.

current health states and current behaviour need careful interpretation, as current health may reflect past, rather than present, behaviour (for instance, current liver disease may reflect previous heavy drinking, although no alcohol is currently consumed). Similarly, current behaviour may be influenced by advice or treatment for particular health conditions (for instance, not smoking currently because of advice relating to lung disease caused by previous smoking).

## Standard breakdowns

For most data analysis in the topic reports, three or four standard analysis breakdowns have been used. See Section 8 of the report Health Survey for England 2016: Methods.

### Age

For adults, 10-year age groups have been used in the trend tables and topic reports, from 25 to 34 upwards (with 16 to 24 as the youngest age group). Where numbers allow, the oldest age group reported is 85 and over.

The age groups shown for children vary, as pragmatic decisions have been taken to make the results as meaningful as possible. The age groups used are a compromise between providing detailed age-specific data while ensuring sufficient bases for each analysis.

### Region

Analysis by region is provided throughout the topic reports. The former Government Office Regions have been used.

Both observed and age-standardised data are provided by region 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 regions to exclude age-related effects.

Base sizes for regions can be relatively small, and caution should be exercised in examining regional differences.

### Equivalent 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 B of the report Health Survey for England 2016: Methods.

### Index of Multiple Deprivation (IMD)

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. Quintiles (fifths) of IMD are used in the tables.

### Age-standardisation

Most adult tables have been age-standardised. This allows comparisons between groups after adjusting for the effects of any difference in age distributions.

Analyses for adults are generally 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 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.

## Table conventions

For further information about the table conventions see the notes at the beginning of the Excel tables for each report, available via <https://digital.nhs.uk/pubs/hse2016>.

For further information about the data analysis and reporting of HSE 2016, see Section 8 of the report Health Survey for England 2016: Methods.

## Biological samples

### Sample analytes

Blood samples were tested for total and HDL cholesterol and glycated haemoglobin (HbA<sub>1c</sub>), and, in 2016, for aspartate aminotransferase (AST), alanine aminotransferase (ALT), creatinine and cystatin C. Urine samples were tested for sodium, potassium, creatinine and albumin. Saliva samples were tested for cotinine, a derivative of nicotine.

### Quality control of blood and saliva analytes

The overall conclusion for the 2016 data is that methods and equipment used for the measurement of blood, urine 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, urine and saliva cotinine levels were acceptable for the HSE 2016.

For details of procedures used in the collection, processing and transportation of the biological specimens see Section 9 of the report Health Survey for England 2016: Methods, and the accompanying documentation.

### Internal Quality Control (IQC)

ICQs 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 are not within the acceptable range.

For further information on IQC see Section 9 of the report Health Survey for England 2016: Methods. Full tables are provided in Appendix A of that report.

## 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 aliquots (sub-samples) of the same samples 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, who provide a laboratory-specific report 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 IQC it does not provide control of release of results at the time of analysis.

There was no external quality control scheme available in 2016 for cotinine analysis but ABS Laboratories participates in inter-laboratory split analyses to ensure comparable results.

For further information on IQC see Section 9 of the report Health Survey for England 2016: Methods. Full tables are provided in Appendix A of that report.

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ISBN 978-1-78734-099-2

This publication may be requested  
in large print or other formats.

**Published by NHS Digital, part of the  
Government Statistical Service**

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