Statement on the quality of the Adult Dental Health Survey 2009 - published March 2011
This document summarises key aspects of the data quality of the Adult Dental Health Survey 2009.

A. Accuracy
Standard errors for the majority of measures are included in an annex to the main publication.

Estimates for the prevalence of coronal caries in Wales from the survey suggest that the dentate adult population in Wales has particularly poor oral hygiene relative to adults in England and Northern Ireland. In addition, the prevalence of this oral outcome has increased in Wales only since the previous Adult Dental Health Survey 11 years ago.

As with any survey, there is a risk that results are skewed by sampling error, the weighting adopted or examiner bias.

An investigation of several methodological factors was conducted to establish if the ADHS methodology inadvertently biased the Welsh estimates. This included an investigation of:
   i. the household sample drawn for Wales
   ii. the interview and weighting strategy
   iii. possible examiner coding bias.

This investigative work is set out below, alongside an exploration of inter-examiner variability for other measures. Although an extensive calibration exercise was carried out as part of examiner training (see Foundation Report: Adult Dental Health Survey 2009 for more detail), the conditions of the dental examination were not ideal for precise identification of some clinical dental issues. More easily evidenced measures such as edentulousness and functional dentition would, of course, not be affected by examination conditions. However, for other clinical measures such as plaque, calculus or periodontal condition, it is possible that conditions introduce some uncertainty in their identification. In addition, a calibration exercise was not carried out for the assessment of periodontal condition, due to the intrusive nature of the assessment. An investigation of inter-examiner variability across English Strategic Health Authorities is also set out below.

1. Coronal caries in Wales

   i. Sampling methodology
   To ensure that the sample was not biased towards socio-economic areas (which typically have poorer oral health outcomes) checks were made of the Output Area Classification codes (OAC codes).

   The OAC system is a geo-demographic classification system which was created after the 2001 Census. Through an aggregation process the output areas can ultimately be classified into super-groups:
• Blue collar communities
• City living
• Countryside
• Prospering suburbs
• Constrained by circumstances
• Typical traits
• Multicultural.

At the super group level the OAC classifications of the 1,150 households sampled in Wales for the ADHS were compared to the OAC codes for the Annual Population Survey (APS) sample for Wales from January to December 2009. During this period, 16,400 households in Wales were randomly sampled for the APS, which is designed to provide as representative sample as possible for a survey.

Figure 1 presents the distribution of the OAC codes for both the Welsh APS and ADHS samples. Although the distribution of the OAC super groups in both samples are very similar, the lack of City Living population in the ADHS sample required further investigation. It may be expected that city dwellers have better dental health than a number of the other super groups.

![Figure 1: Distribution across super group](image)

<table>
<thead>
<tr>
<th>Distribution across super group</th>
<th>ADHS Wales</th>
<th>APS Wales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue collar communities</td>
<td>24.2</td>
<td>23.7</td>
</tr>
<tr>
<td>City living</td>
<td>0</td>
<td>2.1</td>
</tr>
<tr>
<td>Countryside</td>
<td>22.8</td>
<td>24.8</td>
</tr>
<tr>
<td>Prospering suburbs</td>
<td>17.4</td>
<td>18.7</td>
</tr>
<tr>
<td>Constrained by circumstances</td>
<td>11.4</td>
<td>11.3</td>
</tr>
<tr>
<td>Typical traits</td>
<td>21.4</td>
<td>18.7</td>
</tr>
<tr>
<td>Multicultural</td>
<td>2.8</td>
<td>0.7</td>
</tr>
<tr>
<td><strong>Total sample</strong></td>
<td><strong>100</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

The impact on the caries result was examined. The analysis for England was re-run, filtering out all in the City Living category. The impact was minimal - a 1 percentage point increase in the proportion of adults in England with caries.

Extrapolating this effect on to Wales, with a lower expected proportion of city dwellers, it would suggest that the absence of individuals from City Living households from the Welsh ADHS sample held the caries estimates down by, at most, 0.5 percentage points.

It seems highly likely that there was no impact of the Welsh estimates as a result of the absence of adults from City living households in the sample.

ii. Weighting strategy
In terms of the examination weighting strategy, slightly more adults in Wales
who self-reported that they had good oral health did not participate in the examination. However the weighting strategy for the examination explicitly accounted for this (as well as other factors).

iii. Examiner bias
With only a small number of examiners operating within Wales, there is a risk of examiner bias affecting the results of the clinical examination. Of course, this is not an issue for the easily evidenced measures of edentulousness and functional dentition. Unlike some other clinical measures (such as plaque or calculus), it is relatively straightforward to diagnose the presence of coronal caries – we would not expect any examiner bias to be present for this measure.

Figure 2 below shows the distribution of the proportion of individuals examined with coronal caries, for each ADHS examiner. The Wales examiners are highlighted.

FIGURE 2 – Distribution of coronal caries rate by examiner

Although not necessarily conclusive, the fact that the Wales examiners are largely bunched together (around the 40-50% figure) suggests that examiner bias is not an issue for the Wales coronal caries figure.

iv. Conclusion
It would seem unlikely that the clinical estimates for Wales have been biased by any methodological flaws and that these estimates are likely to be reliable. Note that it is not possible to test the accuracy of the 1998 estimates.

2. Periodontal condition – inter-examiner variability
Table 1.3.1 of *Oral health and function – a report from the Adult Dental Health Survey 2009* shows a breakdown of periodontal health by English Strategic Health Authority.

An extract of table 1.3.1 is shown as figure 3 below, illustrating some variability across English SHAs, particularly in the periodontally healthy category:
Figure 3

<table>
<thead>
<tr>
<th>English Strategic Health Authority</th>
<th>Periodontally healthy and no calculus or bleeding</th>
<th>Periodontally healthy with calculus and/or bleeding</th>
<th>Pocketing and LoA of 4mm or more</th>
</tr>
</thead>
<tbody>
<tr>
<td>North East</td>
<td>18</td>
<td>34</td>
<td>48</td>
</tr>
<tr>
<td>North West</td>
<td>13</td>
<td>38</td>
<td>49</td>
</tr>
<tr>
<td>Yorkshire &amp; The Humber</td>
<td>15</td>
<td>37</td>
<td>48</td>
</tr>
<tr>
<td>East Midlands</td>
<td>10</td>
<td>41</td>
<td>50</td>
</tr>
<tr>
<td>West Midlands</td>
<td>9</td>
<td>32</td>
<td>59</td>
</tr>
<tr>
<td>East of England</td>
<td>36</td>
<td>26</td>
<td>38</td>
</tr>
<tr>
<td>London</td>
<td>15</td>
<td>37</td>
<td>48</td>
</tr>
<tr>
<td>South East Coast</td>
<td>29</td>
<td>18</td>
<td>53</td>
</tr>
<tr>
<td>South Central</td>
<td>15</td>
<td>41</td>
<td>44</td>
</tr>
<tr>
<td>South West</td>
<td>11</td>
<td>24</td>
<td>65</td>
</tr>
</tbody>
</table>

To explore this issue further, the distribution of each examiner's results for periodontal health was analysed. Figure 4 below shows, for each examiner, the percentage of examinations recorded as periodontally healthy in four SHAs. East Midlands and West Midlands SHAs both have low levels of reported periodontal healthy sextants whereas South East Coast SHA and East of England SHA have high scores for this measure.

Figure 4

Percentage of examinations recorded as periodontally healthy - by examiner

Note the two examiners with relatively high proportions of examinations in this category. Clearly, these examiners' results have a significant impact on the SHA total. This could provide evidence of differing diagnosis patterns but no firm conclusion can be made – it may be that these examiners actually saw individuals with better periodontal health. Although no firm conclusion can be drawn about examiner variability, it is important to consider this issue when making comparisons between SHAs for measures of periodontal health.
B. Relevance
The 2009 Adult Dental Health Survey is the fifth in a series of national dental surveys that have been carried out every decade since 1968.

A cross-specialisation steering group oversaw the design of the survey, with an aim to retain as much continuity with previous surveys as possible, whilst ensuring that the survey was as valuable as possible to clinicians, policy makers and public alike. The main purpose of the survey is to get a picture of the dental health of the adult population and how this has changed over time.

The aims of the survey were to:
- establish the condition of the natural teeth and supporting tissues
- investigate dental experiences, knowledge about and attitudes towards dental care and oral hygiene
- examine changes over time in dental health, attitudes and behaviour
- monitor the extent to which dental health targets set by the Government are being met.

The full report is made up of the following sub-reports and themes:
- Foundation Report (a technical report)
- Executive Summary
- England summary
- Wales summary
- Northern Ireland summary
- Detailed themes
  - Oral health and function
  - Disease and related disorders
  - Urgent conditions
  - Complexity and maintenance
  - Preventive behaviour and risks to oral health
  - Service considerations
  - Outcome and impact
  - Access and barriers to care

C. Comparability
The survey conducted on behalf of the Department of Health in England, the Welsh Assembly Health Department, and the Department of Health, Social Services and Public Safety in Northern Ireland. The survey was carried out in England, Wales and Northern Ireland only: Scotland decided not to participate in the 2009 survey.

The main value of the survey is the picture it offers of changes to public dental health over time. With this in mind, a key driver for the survey was to retain continuity with previous surveys. The steering group reviewed all previous questions, removing any that were no longer relevant, adding a number of new questions to reflect changes in dental practice and interest in new areas. However where ever possible, the aim was to remain consistent with previous surveys.
Where sample size allows, all measures show comparisons across the three countries, with a time series available for a small number of report outcomes.

Included within the report are a small number of figures for Scotland. The steering group ensured that some comparison with the Scottish equivalent were possible, to provide a fuller picture of dental health across the United Kingdom.

**D. Timeliness**

Data collection for the survey took place between October 2009 and April 2010, and the final household interview response rate was 60 per cent.

The sample size for the survey was 13,400 households (1,150 in each English Strategic Health Authority, 1,150 in Wales, and 750 households in Northern Ireland).

A first release was published in December 2010 to provide a timely view of the survey results. The full final report was published in March 2011.

**E. Accessibility**

All reports are accessible via the NHS IC internet as PDF documents.

From around June 2011, around 3 months after publication of the full final report, data will be available to registered users through the UK Data Archive.

**F. Burden**

The consortium considered alternative approaches to data collection, such as the use of mobile clinics or establishing examination centres in convenient locations. These were however rejected on the grounds that they did not provide any improvement to data quality or any reduction in cost. The consortium considered the approach to data collection with reference to the National Statistics Code of Practice on Managing Respondent Load which seeks to reduce respondent burden and recognises that, while some respondents may welcome the opportunity to participate others may perceive surveys as an imposition. In particular, the code influenced practice on where the dental examination took place aiming to avoid the transfer the burden of response from the survey organisation to the respondent.

Field interviewers conducted a questionnaire interview with all adults in the sampled household and then co-ordinated a second appointment with a qualified examiner who then conducted a dental examination with eligible adults. The questionnaire was designed to utilise Computer Assisted Personal Interviewing (CAPI). Primarily the questionnaire was interviewer-administered but included an element of self-completion (using Computer Assisted Self-Interviewing – CASI) for questions of a sensitive or personal nature.

**G. Confidentiality**

The consortium who carried out the survey are experienced in working in accordance with strict data management protocols within the health data field and
are adhere to the best possible standards of data protection, privacy and ethical practice.

In the field all interviewers’ laptops were encrypted and addresses were combined with survey responses only during the interview. At all other times the address and survey information were stored separately on the laptop and all files password protected. Each completed interview was held in a separate zipped file, which was password protected.

Interviewer laptops did not have internet access or email - therefore all transmissions were made by directly dialling into the host organisation. Interviewers were instructed to transmit daily, minimising the amount of data (completed interviews) on their laptop at any time. The data sent back was password protected.

Once the data was received it was processed and stored on access restricted drives. Address information was stored separately from the interview data. ONS servers use fault-tolerant systems with regular backup. All confidential data and documents are destroyed when no longer required.

Participation in the surveys was based on informed consent of survey respondents. The voluntary nature of the survey was emphasised and potential respondents given the opportunity to refuse to take part. Those who agreed to participate were made aware that they were entitled to refuse to answer any question and to withdraw completely from the survey at any stage (including post-interview requests that their data be destroyed). Likewise, informed consent was also obtained for the clinical dental examination and the same principles were upheld for that part of the survey.

Respondent consent for data linkage to administrative data as well as for follow up, longitudinal study was also obtained. The consortium have extensive experience in issues of data linkage and obtaining consent on a range of social surveys. Ethical approval was gained in June 2009 through the Oxfordshire Research Ethics Committee (B), part of the National Research Ethics Services.