

PICTURE OF ORAL HEALTH 2012

DENTAL EPIDEMIOLOGICAL SURVEY OF 5 YEAR OLDS 2011-12

Contents

	Page Number
Summary	3
Introduction	4
Preventable decay in Wales	4-6
Preventable decay in Local Health Boards	6-7
Preventable decay in Unitary Authorities	8
Active decay in Wales	8-9
Active decay in Local Health Boards	9-10
Active decay in Unitary Authorities	11
Designed to Smile	12-16
Inequalities in decay experience	17-18
Caveats	18-19
Appendices	20-22

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<http://www.cardiff.ac.uk/dentl/research/themes/appliedclinicalresearch/epidemiology/oralhealth/index.html>

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SUMMARY

Compared with 2007/08, the 2011/12 dental survey of five year olds shows a 6% decrease in the proportion of children with experience of dental decay in Wales (47.6% falling to 41.4%). This is mirrored by statistically significant reductions in all Wales mean decay experience and active decay levels. These results reflect small improvements (not statistically significant) in most local areas in Wales.

Dental disease levels in children are improving in Wales across all social groups. There is no evidence of widening inequalities. This is in contrast with previous surveys when improved decay levels were normally associated with widening inequality.

This is the first epidemiological survey to be undertaken following the introduction of the National Oral Health Improvement programme – “Designed to Smile”. It will take time for improvements to oral health from the Designed to Smile programme to be seen. The Designed to Smile programme was in the early stages of implementation for most areas across the Principality between 2007 and 2012, so many children surveyed in 2011/12 attending participating schools, will not have yet received the full benefits of the Designed to Smile programme. In addition, the measure used to record decay does not differentiate between new disease and existing disease again limiting any inferences that can be drawn about Designed to Smile at this time.

Analyses in this survey confirm that schools which have been targeted for the Designed to Smile Programme currently have greater baseline levels of dental disease, which is to be expected as they were targeted because of historically high disease levels associated with material deprivation.

Early data analyses suggest that dmft in children attending Designed to Smile Pilot schools is improving. However numbers included in the survey are small therefore apparent improvements are not yet statistically significant, as this epidemiological programme was not designed to sample participating schools, but rather to be nationally representative. When five year olds are surveyed in 2015/16 the full impact of Designed to Smile should be emerging.

INTRODUCTION

This summary report will be complemented by data tables which will be available on the Welsh Oral Health Information Unit [website](#) shortly.

This document on the NHS dental survey programme in Wales is the second produced since changes had to be made to the consent arrangements for dental examination of school Year 1 children (approximately 5-year-old); which now requires formal written parental consent.

When the changes were made in 2007/8 they had a large impact on survey participation rates across all quintiles of deprivation, but seemed to disproportionately affect children with decay. As a result, the data collected before 2006 cannot be compared with data collected after 2007/08. The bias introduced by the changed consent arrangements will never be fully understood because children were not examined if parental consent was not provided.

When the changed approach to consent was introduced there was a minor difference between the survey administration in Wales when compared with England. In Wales, a single mail out to parents was employed; this was intended to minimise additional bureaucracy for dental personnel and to match as closely as possible the arrangements before the changed consent approach. In England two mail shots were used in the hope that this would increase response rates when using a form of “positive consent”.

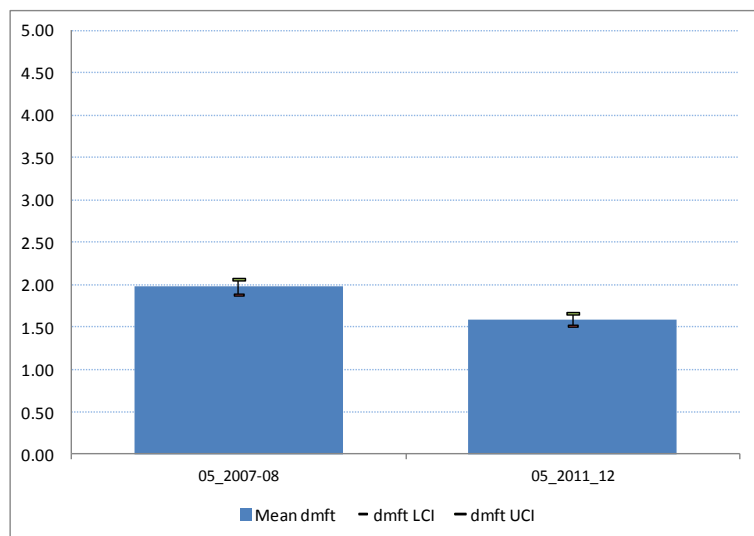
In this second “positive consent” survey in Wales dental personnel did undertake 2 mailings using differently coloured consent forms to allow the impact of the second mailing to be assessed. Analysis of this impact is ongoing, but it does appear that the responders to the second mailing have on average slightly more decay experience than responders to the first mailing. The decay levels reported here for 2011/12 are on those who responded to first and second mailings. ***Thus when decay trends are reported below, the reader should remember that the levels reported in 2007/8 in Wales are likely to underestimate (by less than 0.1 decayed teeth per child) the disease picture in 2007/08.***

PREVENTABLE DECAY IN WALES

The sum of decayed, missing and filled teeth (dmft) is a measure of the decay experience of the average child. It is therefore the burden of disease which theoretically could have been prevented and thus key data for evaluation of efforts to prevent decay.

Figure 1 shows the trend in the mean number of decayed, missing and filled teeth per child in Wales. Between 2007/08 and 2011/12 there has been a reduction in dmft from 1.98 to 1.59.

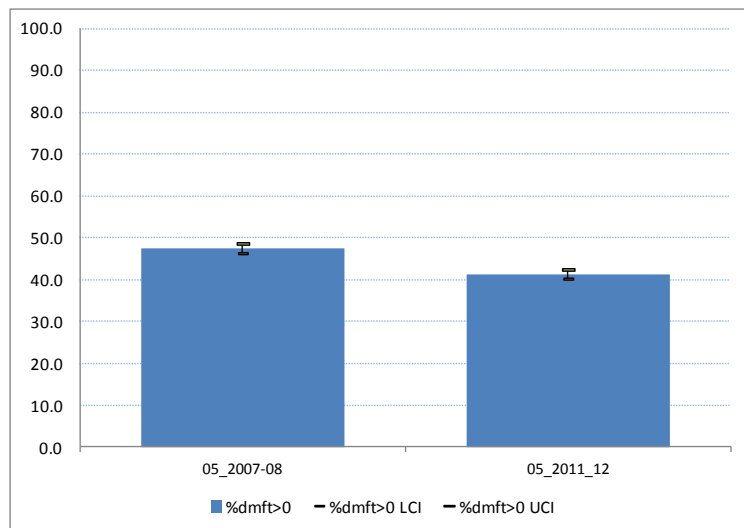
Figure 1 Trend in mean dmft for Wales



See Appendices 2 & 3 for data

Not all of the children examined had decay. Figure 2 shows a reduction in the proportion of children with decay in 2007/08 (47.6%) and 2011/12 (41.4%). It is encouraging that more children have no obvious decay experience by age 5. Thus in 2012 in a class of 30 children about 12 will have some decay experience compared with 14 in 2008.

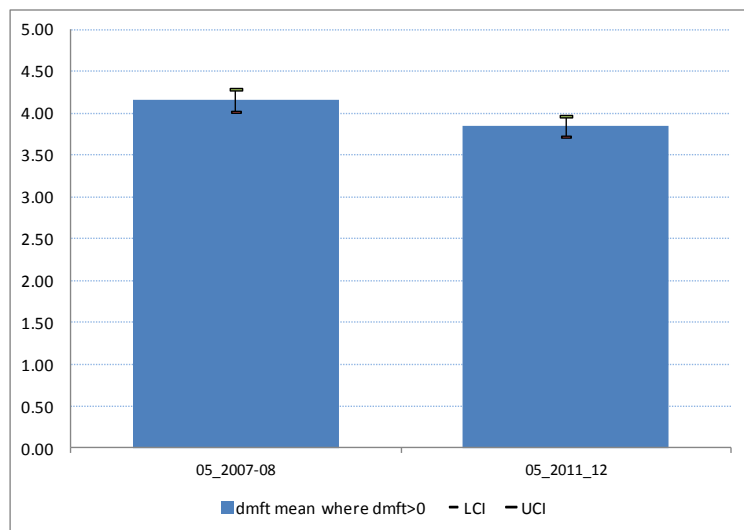
Figure 2 Percentage of children with caries (%dmft>0)



See Appendices 2 & 3 for data

Looking only at those children who have at least 1 decayed, missing or filled tooth starts to illustrate the stark differences between the children with decay and those without. The mean dmft for a child with at least one tooth so affected is shown in Figure 3: the reduction from 4.16 (95% LCI 4.02 – 95% UCI 4.29) to 3.85 (95%LCI 3.72 – 95% UCI 3.97) does suggest an improving position.

Figure 3 Mean dmft of those with decay experience (mean dmft of those with dmft>0)

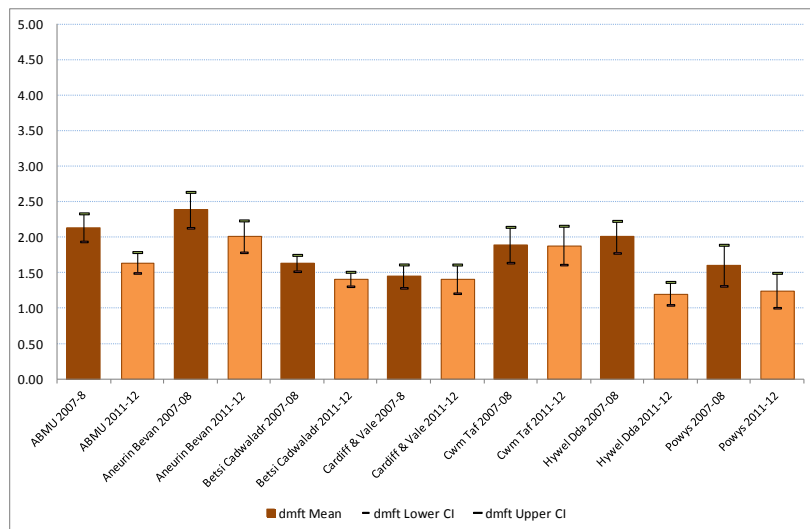


See Appendices 2 & 3 for data

Preventable decay in Local Health Boards

Mean dmft scores for 2007/08 and 2011/12 are presented in Figure 4 and have shown statistically significant reductions in the Abertawe Bro Morgannwg and Hywel Dda LHB areas. In 2011/12 they range from 2.01 in Aneurin Bevan LHB to 1.21 in Hywel Dda.

Figure 4 Average dmft per 5 year old by LHB

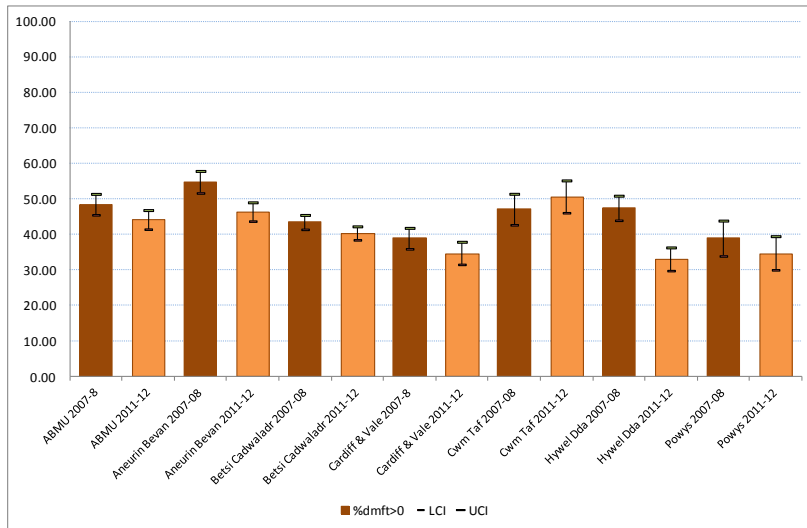


See Appendices 2 & 3 for data

Figure 5 illustrates the proportion of children with at least 1 decayed tooth (%dmft>0) by LHB in 2007/08 and 2011/12. Although there appears to be a general trend (with the exception of the Cwm Taf area) for a reduction in the proportion of children with decay experience, the changes only reaches statistical significance in Aneurin Bevan and Hywel

Dda LHB areas. The sum effect of these changes was previously shown in Figure 2 to be a statistically significant reduction in the percentage of 5 year old children with caries at all Wales level.

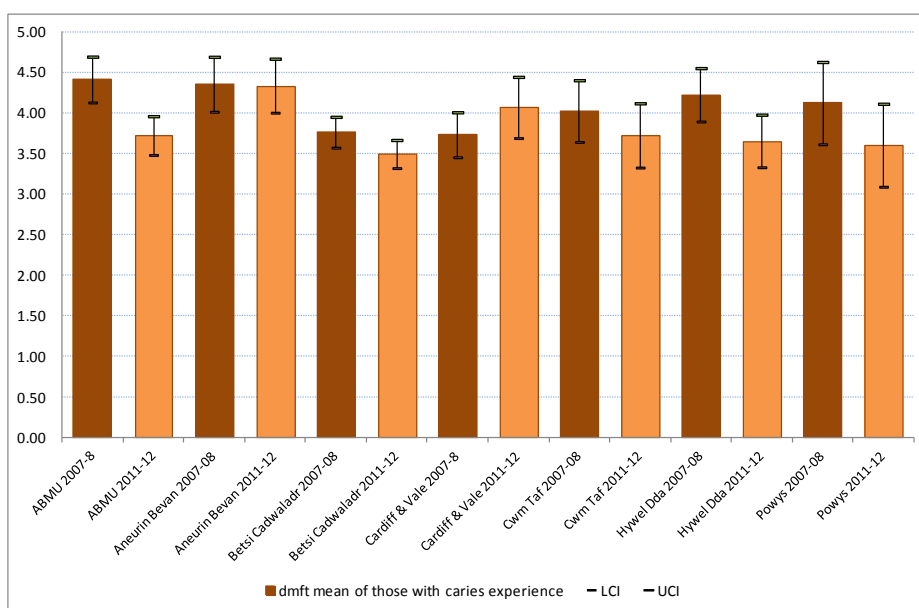
Figure 5 Percentage with caries (%dmft>0) among 5 year olds by LHB



See Appendices 2 & 3 for data

The average number of decayed teeth among the children with at least 1 decayed tooth is shown in Figure 6. Again while there is a general trend for a reduction in the mean scores (with the exception here of Cardiff and Vale). The changes shown only reach statistical significance in Abertawe Bro Morgannwg LHB, but the collective effect has contributed to a statistically significant reduction for this indicator at Wales level (as shown in Figure 3).

Figure 6 Mean dmft of those with decay experience (dmft (dmft>0)) by LHB



See Appendices 2 & 3 for data

Preventable decay by Unitary Authority

As Unitary Authorities have smaller populations than LHBs the sample size for the survey is smaller and findings from the survey are therefore less likely to demonstrate statistically significant changes.

The mean dmft by Unitary Authority is shown in Appendix 1 for 2007/08 and 2011/12. The only changes of statistical significance in reduced preventable decay were in Caerphilly, Carmarthenshire, Flintshire and Swansea. The reduction in Carmarthenshire is considerable, in 2007-8 the mean dmft was 2.25 (95%LCI 1.92 – 95%UCI 2.58) compared with 0.97 (95%LCI 0.76 – 95%UCI 1.18) in 2011-12. Assuming this is not down to a random effect of sampling in either survey it would be worthwhile to gain further understanding of what is happening here to contribute to such a large and rapid fall in caries.

Wider UK data

At the time of drafting this report wider UK data for mean dmft for 2011/2012 is not available. In due course access to this data should be available via links on the [British Association for the Study of Community Dentistry website](#).

ACTIVE DECAY IN WALES

The decayed teeth (dt) component as collected by dentists measures decay which the examining dentist believes to be active. Hard discoloured lesions are not included in the data reported here. Active decay puts the child at risk of pain, infection and suggests risk of decay of permanent successor teeth.

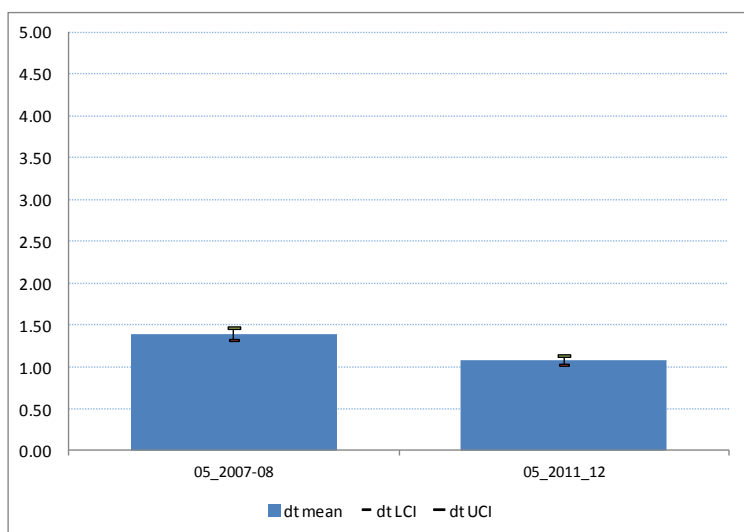
The dt component of preventable decay (dmft) has traditionally been regarded as untreated disease. The concept of needing to treat all decay in teeth which will be shed later by providing fillings and extractions is now being questioned¹. The alternative view is that many of these children need measures to empower control of sugar in the diet, improve access of teeth to fluoride and ensure removal of dental plaque, as opposed to operative dental procedures.

Thus decayed teeth data (dt) is now best regarded as a marker indicating children with need for support in managing this chronic dental disease.

All Wales

Figure 7 shows the trend in the mean number of decayed teeth per child in Wales. Between 2007/08 and 2011/12 there has been a reduction in dt from 1.40 to 1.08.

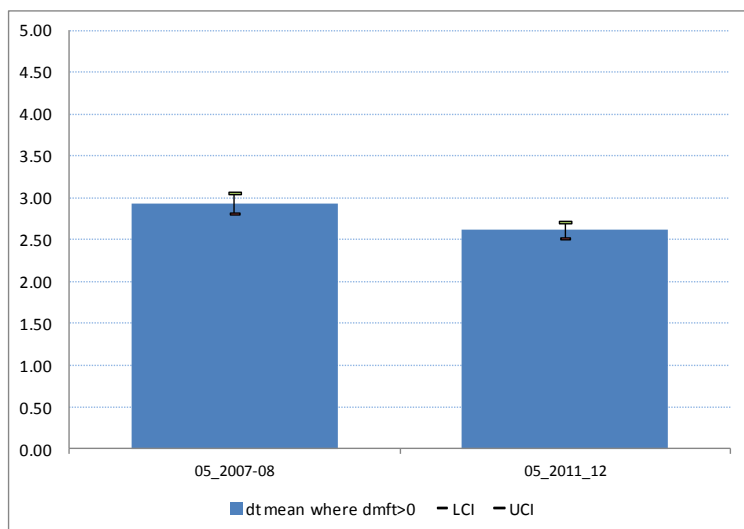
Figure 7 Average dt



See Appendices 2 & 3 for data

Figure 8 shows the trend in the mean number of decayed teeth for those children with decay experience in Wales. Between 2007/08 and 2011/12 there has been a reduction in this characteristic from 2.94 to 2.62.

Figure 8 Mean number of teeth with active decay per child with decay experience

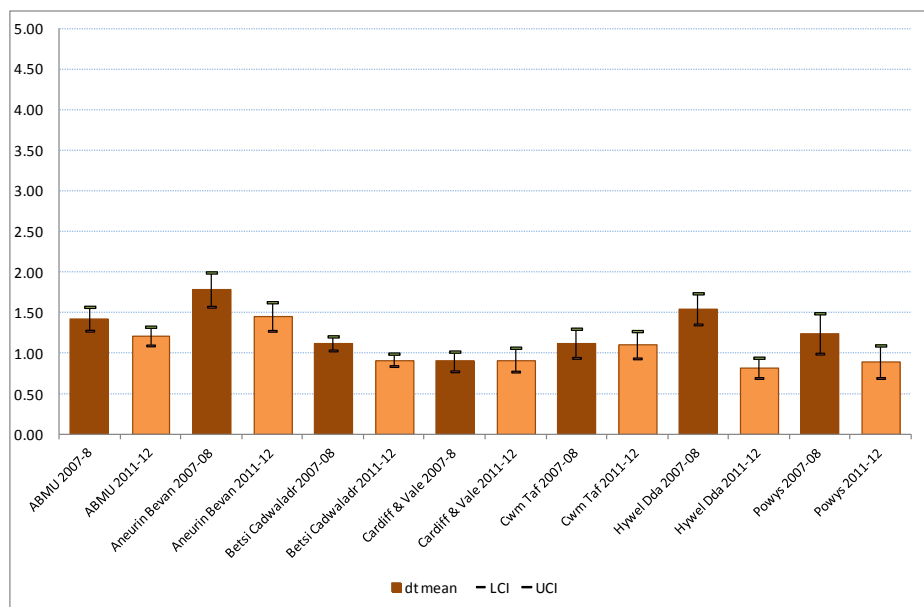


See Appendices 2 & 3 for data

Local Health Board

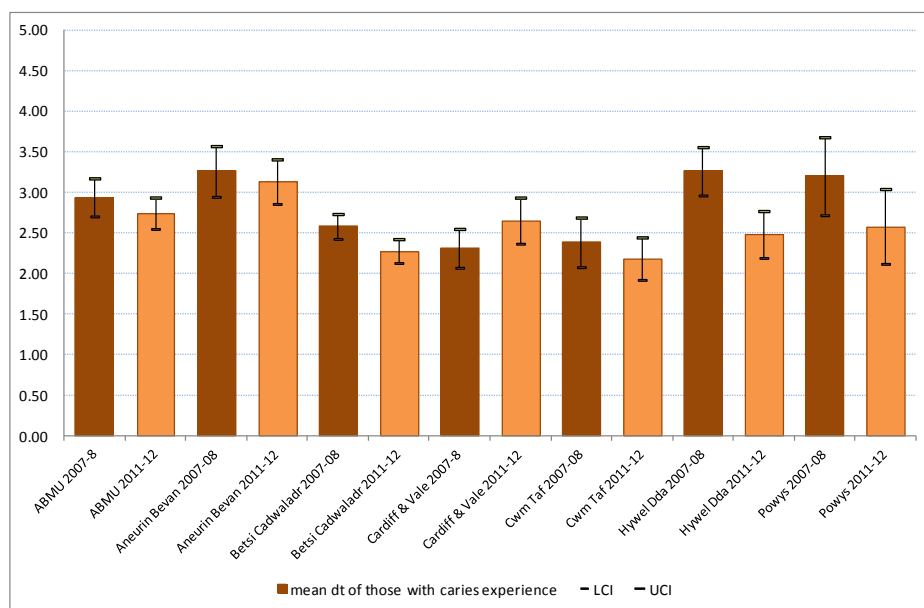
Mean dt scores for 2007/08 and 2011/12 are presented in Figure 9 and have shown statistically significant reductions in the Betsi Cadwaladr and Hywel Dda LHB areas. In 2011/12 they range from 1.45 in Aneurin Bevan LHB to 0.82 in Hywel Dda.

Figure 9 Average dt



See Appendices 2 & 3 for data

Figure 10 Mean number of teeth with active decay per child with decay experience



See Appendices 2 & 3 for data

Figure 10 shows the trend in the mean number of decayed teeth for those children with decay experience in Welsh Local Health Boards. There were notable reductions for this characteristic in Hywel Dda and Powys LHB areas. In 2011/12 they range from 3.13 in Aneurin Bevan LHB to 2.18 in Cwm Taf.

Unitary Authority

Decayed teeth data (both mean number of teeth with active decay for all children and mean number of teeth with active decay among children with decay experience) at unitary Authority level is included in appendices 2 for 2011/12 and 3 for 2007/8.

In Newport, Blaenau Gwent and the Vale of Glamorgan there were increases in the mean number of decayed teeth among children with decay experience in 2011/12 compared with 2007/08. Caries experience does not follow a bell shaped distribution curve, many children have only one or two decayed teeth. Mean dt for children with decay experience, appears greater where fewer children present with one or two decayed teeth. Thus the increase is not of concern in Newport where there was a large fall in the proportion of children with decay experience. By contrast the increases in the Vale of Glamorgan and Blaenau Gwent are not explained by a fall in the proportion of children with decay experience.

Wider UK data

At the time of drafting this report wider UK data on active decay for 2011/2012 is not available. In due course access to this data should be available via links on the [British Association for the Study of Community Dentistry website](#).

DESIGNED TO SMILE

Designed to Smile is the National Oral Health Improvement Programme for Wales. This is a targeted oral health promotion programme which is focussed on preventing dental decay in children in pre-school and primary school settings. The pilot programme commenced in 2008 in 2 geographic areas. Work to roll the programme out across Wales was commenced in 2010. Further information is available from the [Welsh Oral Health Information Unit](#).

The 2007/8 and 2011/12 BASCD survey samples included 5 year old children from schools involved in the initial Designed to Smile pilot and from schools that are now being included in the Designed to Smile programme as it is rolled out. It also surveyed children who are not taking part in Designed to Smile.

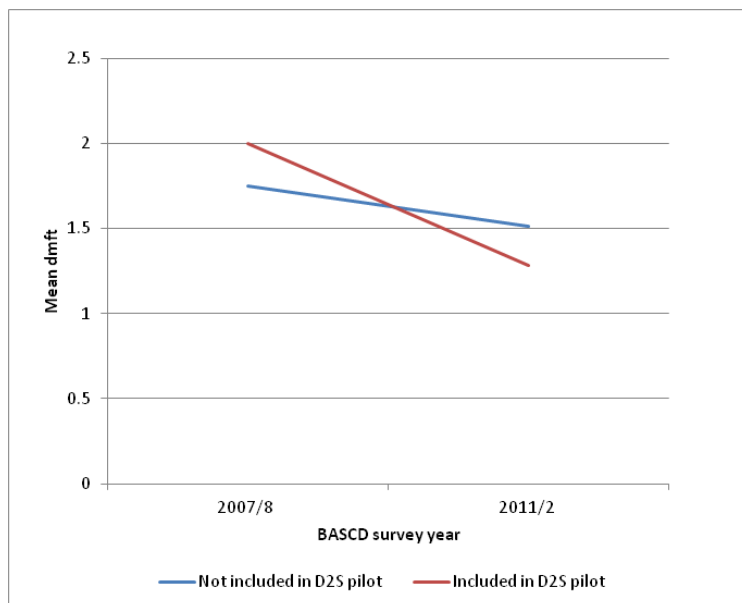
BASCD 2007/8 survey findings from the Designed to Smile pilot schools represent a pre-pilot baseline. The 2007/8 BASCD sample included 204 children attending Designed to Smile pilot schools, this represented 2.9% of the total BASCD sample for the year.

The 2011/12 BASCD sample captured 179 children attending Designed to Smile pilot schools, this represented 2.3% of the BASCD sample for the year.

Designed to Smile Pilot

Analyses show a reduction in mean dmft in both Designed to Smile pilot schools and non-Designed to Smile pilot schools between 2007/8 to 2011/12. Mean dmft reduced from 2 to 1.28 in the Designed to Smile pilot schools, a reduction of 0.72 dmft (Figure 11). This reduction was greater than for non-Designed to Smile schools which showed a reduction of 0.24 dmft.

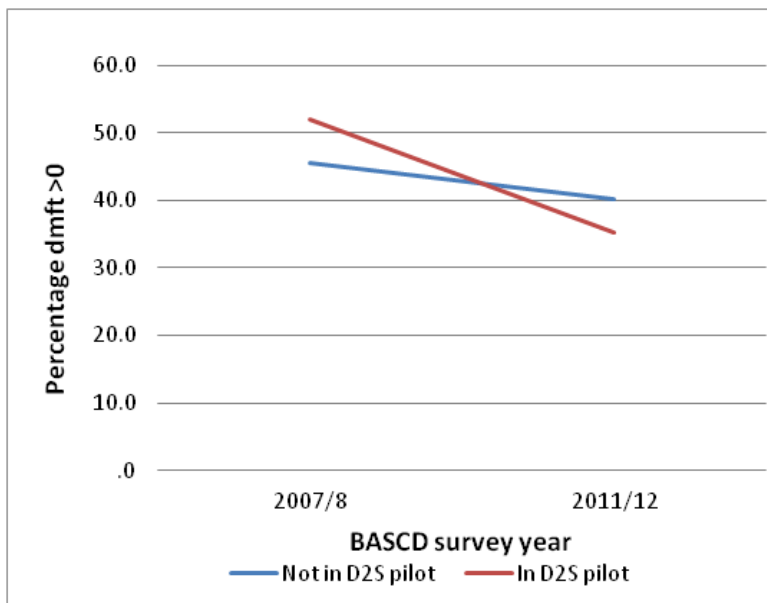
Figure 11 Mean dmft in 2007/8 and in 2011/2 for Designed to Smile and non Designed to Smile pilot schools



At the outset of the Designed to Smile pilot, the percentage of children with dental disease experience (dmft>0) was greatest in the Designed to Smile schools. This was expected, as the programme was targeted at schools in the most deprived areas with the higher levels of dental disease. In Designed to Smile pilot schools, the percentage of children who had dental disease experience, dmft>0 reduced between 2007/8 and 2011/12 from 52% to 35% (Figure 12). This represented a 17% reduction in disease. A 5% reduction in disease was seen over the same timeframe in non-Designed to Smile pilot schools. In 2011/12, 65% of children at the pilot schools had no experience of dental decay.

Although promising, these figures are not statistically significant because of the small sample of children in the survey from the pilot schools.

Figure 12 % of children with dmft>0 in BASCD survey by Designed to Smile Pilot and Non Designed to Smile Pilot Sites



Schools involved in Designed to Smile programme

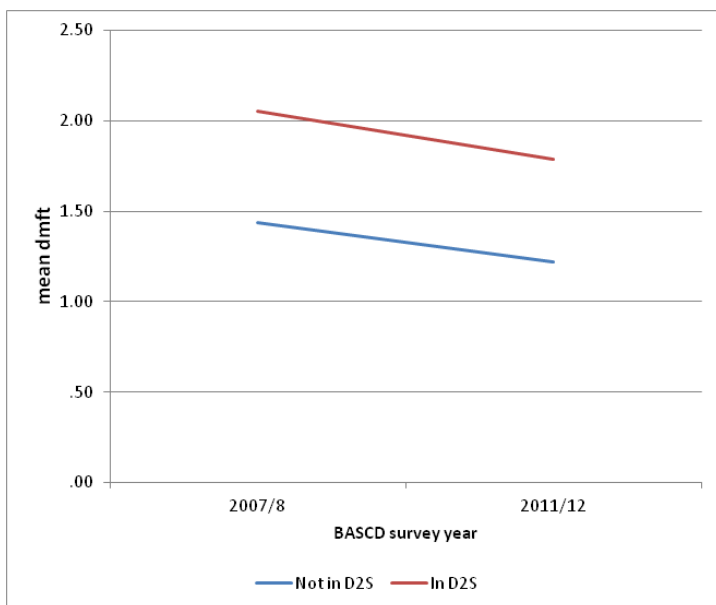
The Designed Smile programme is currently being rolled out to target schools across Wales. The programme has been expanding over time. Although some of the schools have been in the Designed Smile programme since the pilot, many more have been included more recently.

Half of the children in the 2007/8 BASCD survey and the 2011/12 BASCD survey attended schools that have been included in the Designed to Smile Programme at some point since its commencement.

Mean dmft in schools selected for inclusion in the Designed to Smile programme is greater than for the schools which have not been involved in the programme (Figure 13). This confirms that the programme is being targeted at schools with greater disease experience.

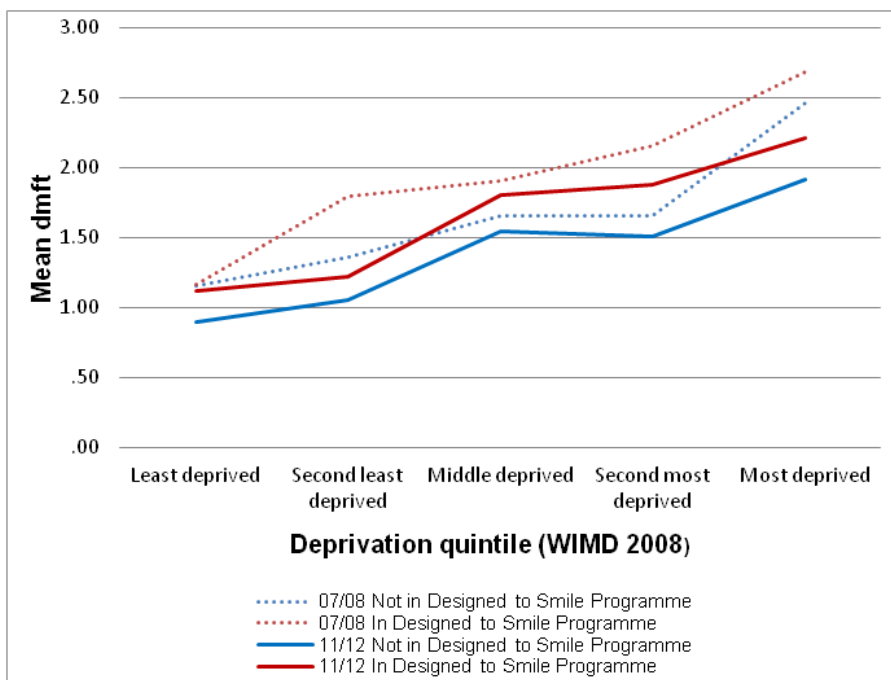
Since 2008, mean dmft has reduced in all schools. The reduction in mean dmft is slightly greater in Designed to Smile Schools but this is not statistically significant. Children attending schools that entered the Designed to Smile programme recently will not have had sufficient time in the programme for any benefit to be achieved. A reduction in dmft is now being seen for schools that commenced the pilot programme in 2008. It is therefore likely that it will take 3 years from the point of Designed to Smile commencement, for improvements in dmft to be seen. Many schools have only recently joined the programme.

Figure 13 Mean dmft in BASCD survey 2007/8 and 2011/12 for schools involved in Designed to Smile and Schools not involved in Designed to Smile



Mean dmft has reduced in all socio-economic groups. Although mean dmft is greatest in children from the most deprived schools, there is no widening of the inequality gap and dmft is improving in children from deprived areas (Figure 14).

Figure 14 Mean dmft for in 07/08 and 11/12 in Designed to Smile and Non Designed to Smile Programme Schools by deprivation quintile



Children that were included in the initial Designed to Smile pilot will be 12 in 2015. BASCD surveys are undertaken for 12 year olds on a 4 yearly basis and so protocols and baseline data trends for this age group are already established.

Beyond simply looking for improved dental health at age 5 in deprived quintiles it may be possible to explore the effects of the Designed to Smile programme on the dmft of the 12 year old population in 2015. However, in order to assess these benefits, any epidemiological work to compare dmft for children who attended Designed to Smile pilot schools with those who did not attend pilot schools would need to be planned carefully. Children would no longer be attending their original primary schools and so data collection and recording would need to be planned with this in mind.

INEQUALITIES IN DECAY EXPERIENCE

Looking at inequality from a socio-economic perspective, there is still a strong relationship between mean decay levels and quintile of deprivation as shown in Figures 15 and 16.

Figure 15 Inequalities and caries

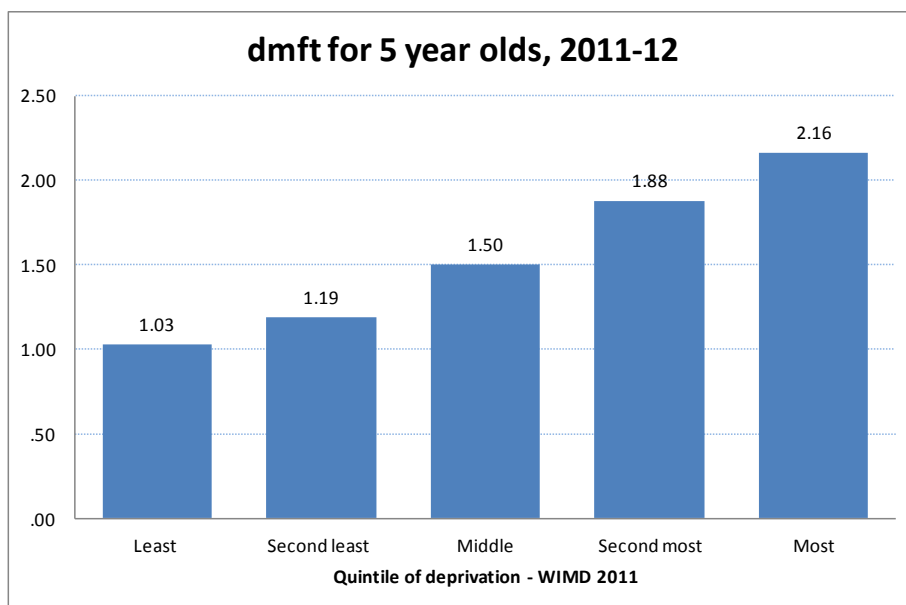
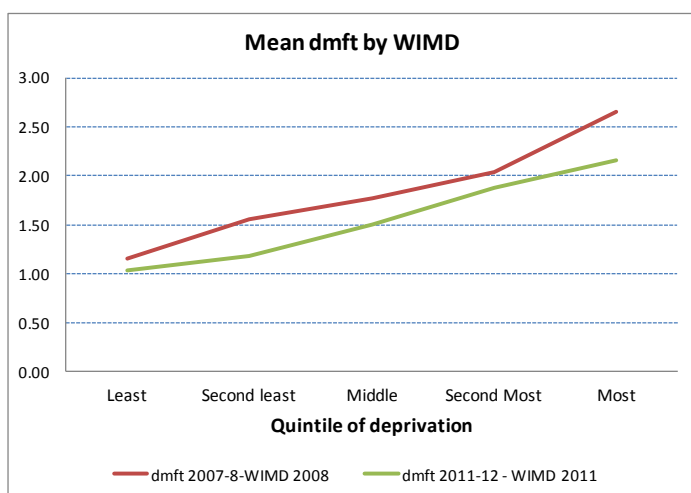


Figure 16 illustrates the relationship between dmft and the Welsh Index of Multiple deprivation (WIMD) for the 2 survey years 2007-08 and 2011-12. While decay has reduced for all quintiles the improvement for the most deprived quintile is the greatest – see also the Designed to Smile section above. There were changes in/improvements to the WIMD indicator between 2008 and 2011. The full impact of these changes to WIMD is the subject of further analyses. Given problems with applying WIMD retrospectively and potential for further changes to WIMD it is proposed that decay data will always be reported using the contemporaneous version of WIMD.

Figure 16 Mean dmft by Welsh Index of Multiple Deprivation



FURTHER ANALYSIS

More robust analysis is proposed for the following:

- Impact of changing WIMD indicators
- Impact of second mailing consent

ADDITIONAL INFORMATION

Data from previous Welsh surveys is available from the Welsh Oral Health Information Unit [website](#).

CAVEATS

Decay levels generated from surveys of this age group, i.e. 5 year olds, are recognised as an underestimation of the true experience for three main reasons:

1. Missing deciduous incisors are not included in these calculations because in a few children they may have naturally exfoliated by age 5. All missing incisors are assumed to have been naturally exfoliated although some will in fact have been extracted. Thus the reported decay levels at age 5 are always a slight underestimation of the true decay experience of those children examined in a survey.
2. These surveys employ a visual examination of the child's mouth, no radiographs are taken. This is another factor which means that reported decay levels underestimate the true disease level.

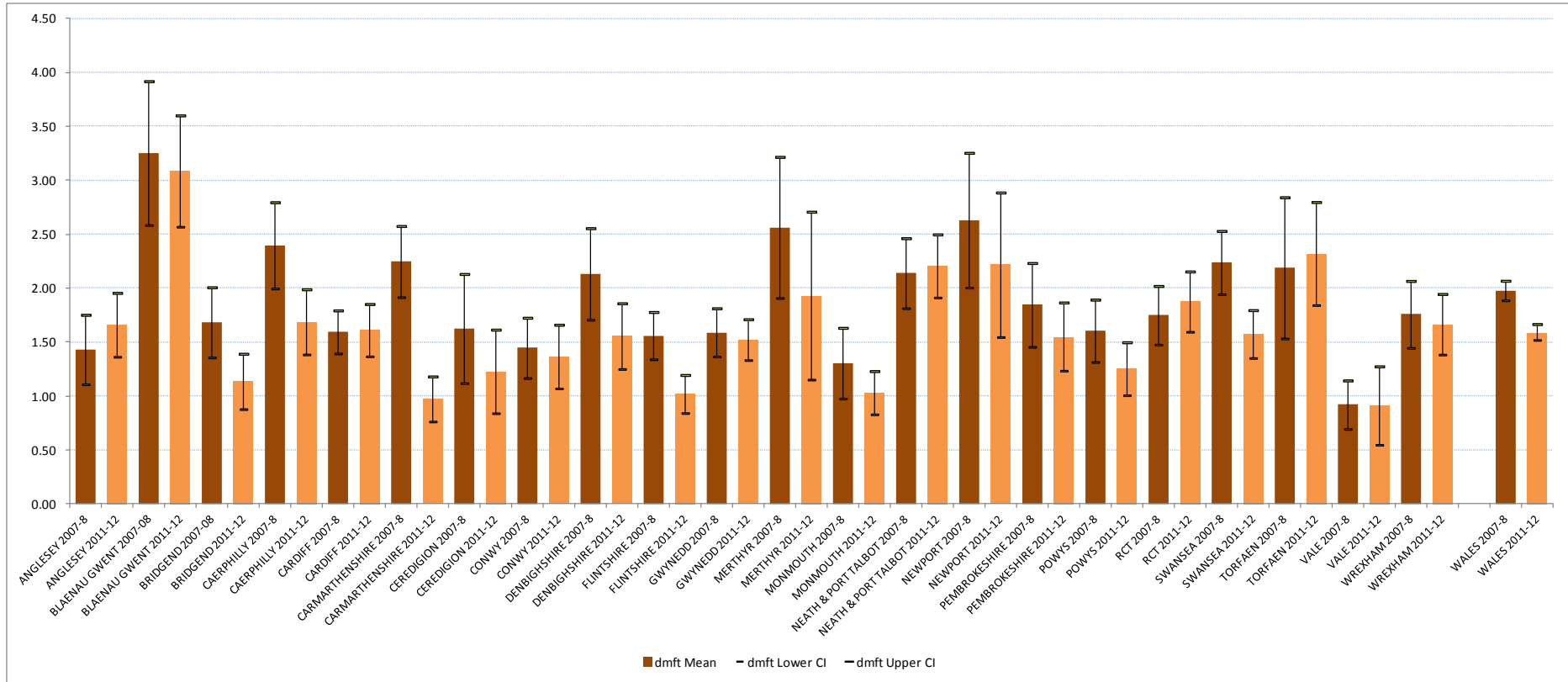
3. Furthermore, previous research suggests that children who do not participate in the dental surveys are likely to have more decay than those participating,

Thus the mean decay levels in children reported here and in previous surveys are likely to under estimate the true decay experience of children age 5 in Wales.

References

1. Kidd E (2012) Should deciduous teeth be restored? Reflections of a cariologist. *Dent Update* **39(3)**:159-62, 165-6

Appendix 1 – Mean dmft trends by Unitary Authority, 2007-8 to 2011-12



Appendix 2 Selected epidemiological variables from the survey of 5 year olds 2011-12

AREA1	AREA2	mean dmft	%dmft>0	mean dmft of those with caries experience	mean dt	mean dt of those with caries experience	Treatment index - ((mt+ft)/dmft)*100
AB	BLAENAU GWENT	3.08	64.2	4.80	2.52	3.92	18.3
AB	CAERPHILLY	1.69	43.5	3.88	1.09	2.51	35.2
AB	MONMOUTH	1.03	30.0	3.44	0.78	2.60	24.3
AB	NEWPORT	2.22	45.4	4.88	1.56	3.45	29.4
AB	TORFAEN	2.32	53.9	4.31	1.72	3.19	25.8
ABMU	BRIDGEND	1.13	35.5	3.20	0.68	1.91	40.1
ABMU	NEATH & PORT TALBOT	2.20	51.7	4.27	1.62	3.14	26.5
ABMU	SWANSEA	1.57	44.2	3.56	1.25	2.82	20.8
BC	ANGLESEY	1.66	45.6	3.64	0.96	2.11	42.1
BC	CONWY	1.36	39.0	3.50	0.89	2.29	34.4
BC	DENBIGHSHIRE	1.55	41.3	3.76	1.01	2.45	34.7
BC	FLINTSHIRE	1.02	34.5	2.95	0.70	2.04	31.0
BC	GWYNEDD	1.52	41.8	3.64	1.03	2.48	32.0
BC	WREXHAM	1.66	44.7	3.72	1.04	2.34	37.2
CT	MERTHYR	1.93	51.8	3.73	0.89	1.72	53.7
CT	RCT	1.87	50.4	3.72	1.16	2.31	38.0
CV	CARDIFF	1.61	38.4	4.19	1.01	2.64	37.0
CV	VALE	0.91	25.3	3.60	0.69	2.71	24.6
HD	CARMARTHENSHIRE	0.97	30.6	3.18	0.59	1.94	39.0
HD	CEREDIGION	1.23	28.7	4.27	0.86	2.99	29.9
HD	PEMBROKESHIRE	1.55	38.8	3.99	1.14	2.94	26.8
P	POWYS	1.25	34.8	3.60	0.90	2.58	28.4
Abertawe Bro Morgannwg UHB		1.64	44.2	3.72	1.21	2.74	26.3
Aneurin Bevan LHB		2.01	46.4	4.34	1.45	3.13	27.8
Betsi Cadwaladr UHB		1.41	40.4	3.49	0.92	2.28	34.9
Cardiff and Vale UHB		1.41	34.7	4.07	0.92	2.65	34.8
Cwm Taf LHB		1.89	50.7	3.72	1.11	2.18	41.4
Hywel Dda LHB		1.21	33.1	3.66	0.82	2.48	32.3
Powys LHB		1.25	34.8	3.60	0.90	2.58	28.4
WALES		1.59	41.4	3.85	1.08	2.62	32.0

Appendix 3 Selected epidemiological variables from the survey of 5 year olds 2007-08

AREA1	AREA2	mean dmft	%dmft>0	mean dmft of those with caries experience	mean dt	mean dt of those with caries experience	Treatment index - ((mt+ft)/dmft)*100
AB	BLAENAU GWENT	3.25	63.1	5.15	2.24	3.56	30.9
AB	CAERPHILLY	2.40	55.2	4.34	1.80	3.27	24.8
AB	MONMOUTH	1.30	35.4	3.69	1.18	3.35	9.6
AB	NEWPORT	2.63	60.7	4.33	1.92	3.16	27.1
AB	TORFAEN	2.19	53.8	4.06	1.67	3.12	23.3
ABMU	BRIDGEND	1.68	45.2	3.72	1.01	2.23	39.8
ABMU	NEATH & PORT TALBOT	2.14	49.1	4.36	1.53	3.12	28.4
ABMU	SWANSEA	2.24	48.8	4.58	1.45	2.97	35.1
BC	ANGLESEY	1.43	40.6	3.52	0.86	2.12	39.7
BC	CONWY	1.45	40.6	3.56	1.12	2.76	22.6
BC	DENBIGHSHIRE	2.13	50.5	4.22	1.43	2.83	32.9
BC	FLINTSHIRE	1.56	41.8	3.72	1.10	2.62	29.7
BC	GWYNEDD	1.59	42.9	3.70	1.10	2.56	30.9
BC	WREXHAM	1.76	46.0	3.82	1.12	2.43	36.4
CT	MERTHYR	2.56	52.3	4.90	1.59	3.04	38.0
CT	RCT	1.75	45.9	3.81	1.02	2.22	41.6
CV	CARDIFF	1.59	41.7	3.82	0.99	2.37	38.0
CV	VALE	0.92	28.3	3.25	0.57	1.99	38.4
HD	CARMARTHENSHIRE	2.25	53.2	4.22	1.68	3.16	25.2
HD	CEREDIGION	1.62	35.7	4.55	1.26	3.54	22.2
HD	PEMBROKESHIRE	1.84	44.9	4.10	1.50	3.32	19.1
P	POWYS	1.60	38.9	4.12	1.24	3.20	22.5
Abertawe Bro Morgannwg UHB		2.14	48.5	4.41	1.43	2.94	33.4
Aneurin Bevan LHB		2.38	54.8	4.35	1.78	3.26	25.2
Betsi Cadwaladr UHB		1.64	43.4	3.76	1.12	2.58	31.5
Cardiff and Vale UHB		1.45	38.9	3.73	0.90	2.31	38.1
Cwm Taf LHB		1.89	47.1	4.02	1.12	2.39	40.7
Hywel Dda LHB		2.00	47.4	4.22	1.55	3.26	22.9
Powys LHB		1.60	38.9	4.12	1.24	3.20	22.5
WALES		1.98	47.6	4.16	1.40	2.94	29.3