Public Health England

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Local authority area variation in the oral health of five-year-olds

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Public Health England
Wellington House
133-155 Waterloo Road
London SE1 8UG
Tel: 020 7654 8000
www.gov.uk/phe
Twitter: @PHE_uk
Facebook: www.facebook.com/PublicHealthEngland

Prepared by: Dental Public Health
For queries relating to this document, please contact: PHE.enquiries@PHE.gov.uk

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Executive summary

Local authorities have a statutory role to provide or commission oral health promotion programmes to improve the health of the local population, to the extent that they consider appropriate in their areas. Whilst local authorities have a statutory lead role it is recognised that there are roles for oral health improvement across the health, education and voluntary sectors. The most recent survey of five-year-olds in England found that 23% of five-year-old children had experience of tooth decay, however, there was marked variation at a regional and local authority area level for both its prevalence and severity.

This report identifies variation in child oral health including;

- thirty local authority areas with the highest levels of dental disease in five-year-olds in England in 2017
- trends in the oral health of five-year-olds in these areas over a nine year period
- trends in the oral health of five-year-olds in the local authority statistical neighbours of the 30 areas

Whilst this report focuses on local authority area level data and the 30 areas with the poorest oral health, it is recognised that in all local authority areas there may be areas of significant variation and areas where the oral health of five-year-olds is poor. Amongst the 30 local authority areas identified as having the poorest oral health in five-year-olds; 10 showed a significant trend of improvement, 19 showed no change and one could not be classified due to missing data. In comparison with statistical neighbours, it could be seen that in the majority of areas, there was a similar matched area where significant improvements were being made. These areas may be able to offer peer support particularly to their statistical neighbours where there has been no change over the nine year period. In addition, case studies highlighting such progress can be found on the local government association website.

Public Health England have established a Child Oral Health Improvement Programme Board (COHIPB) which provides system leadership for a wide range of organisational partners who all have a role in improving child oral health. Public Health England have published a suite of tools and resources for child oral health improvement and, in addition, the specialist dental public health workforce (including consultants in dental public health), based within PHE centres, can provide local support and guidance.

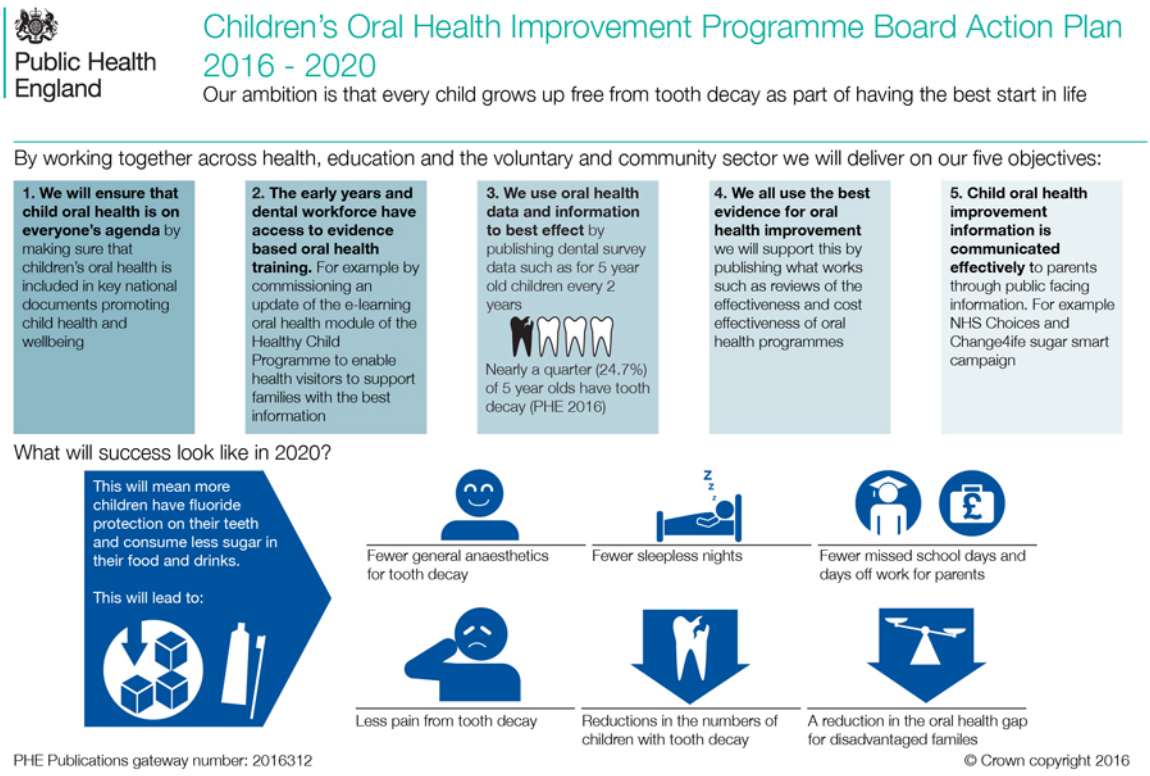
Health matters recently focused on child dental health and stated that improving this requires a whole-systems approach. Action is required across the sector, from national and local health policy, to healthcare, families and the food and drink industry.

Background

In 2013 the Health and Social Care Act (2012)[1] gave responsibilities to local authorities for health improvement, including oral health improvement, in relation to the people in their areas. In addition local authorities have a statutory role[2] to provide or commission oral health promotion programmes to improve the health of the local population, to the extent that they consider appropriate in their areas. Whilst local authorities have a statutory lead role in improving the oral health of their local population, it is recognised that there are roles for oral health improvement across the health, education and voluntary sectors.

In September 2016 Public Health England launched a Children's Oral Health Improvement Programme Board (COHIPB) to provide system leadership to improve child oral health. The board involves a wide range of organisational partners and stakeholders who all have a role in improving child oral health and they agreed an ambition that every child should grow up free from tooth decay as part of getting the best start in life (Figure 1). The board seeks to improve the oral health of all children and reduce the oral health gap for disadvantaged children.

Figure 1. COHIPB's Action Plan, Ambition and High Level Objectives



Whilst progress is being made overall challenges remain and the Child Oral Health Improvement Programme Board (COHIPB) wish to focus their on-going partnership work to support those areas where dental decay levels remain high.

Health matters recently focused on child dental health and stated that improving child dental health requires a whole-systems approach. Action is required across the sector, from national and local health policy, to healthcare, families and the food and drink industry.

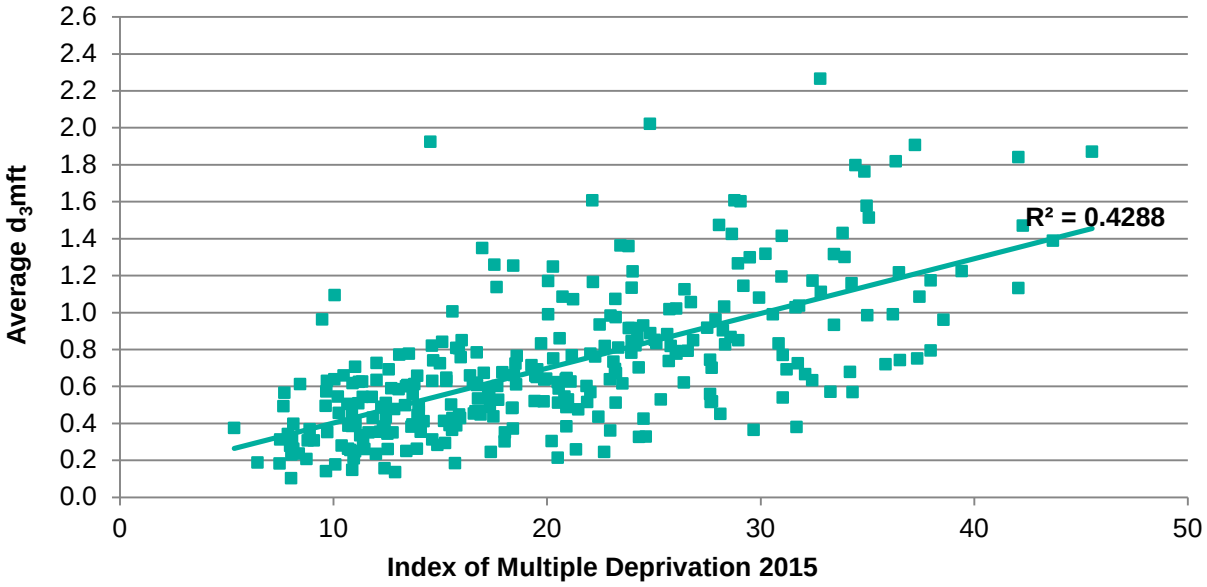
The data analysed in this report spans the period when the NHS and then local authorities had this lead role.

Current Picture of Oral Health in England

In the most recent survey of five-year-olds in England,[3] 23% of five-year-old children had experience of obvious dental decay with on average three to four teeth affected (at age five, children normally have 20 primary teeth). This is the fourth consecutive survey of five-year-olds in England which has shown nationally an overall improvement in the proportion of children who are free of obvious tooth decay.

The results, however, reveal marked variation at a regional and local authority area level for both prevalence and severity of dental decay. Deprivation, assessed by the Index of Multiple Deprivation (IMD 2015), explained 43% of the differences in the oral health of five-year-olds in the 2017 survey[3] (Figure 2). Differences were also reported according to region and ethnicity.

Figure 2. Correlation between Number of Decayed, Missing (Due to Decay) and Filled Teeth ($d_3$mft) among Five-Year-Old Children And Index Of Multiple Deprivation (IMD 2015) Score. Lower-Tier Local Authority Areas in England, 2017



The proportion of children with obvious decay was higher in the Chinese (41.5%) and Eastern European (49.4%) ethnic groups than for the remaining groups, which ranged from 40.9% to 19.6%. The regions with poorer oral health tend to be in the north (34% with tooth decay in the North West to 16% in the South East) and these differences were even greater at a local authority level with 47% of five-year-olds having tooth decay in Rochdale compared to 13% in Cambridgeshire. Stark inequalities exist with some of the most vulnerable, disadvantaged and socially excluded facing significant oral health problems.

Improving Oral Health

We have good evidence of what population programmes work to improve the oral health of five-year-olds and what the return on investment would be at five and ten years of investing in such programmes. The savings include those to the NHS in primary and secondary care but also the wider economy. These include, days lost at work for parents and carers taking their children to the dentist and to the hospital to have teeth taken out under general anaesthesia, and in days lost at school for the children. Oral health is an integral part of overall health. When children are not healthy, this affects their ability to learn, thrive and develop. Good oral health can contribute to school readiness. To benefit fully from education, children need to enter school ready to learn, to be healthy and prepared emotionally, behaviourally and socially. School readiness ensures that all children are able to participate fully in all school activities in order to be successful at school. Oral health is therefore an important aspect of overall health status and critical to children's school readiness

Aim

This report identifies local authority area variation in child oral health. It identifies areas of poor oral health of five-year-olds in England and where, over a nine year period, there have been significant improvements.

Objectives

The objective of this report is to:

- identify 30 local authority areas in England with the highest levels of dental disease in five-year-old children in the 2017 dental survey[3]
- identify trends in the oral health of five-year-old children according to local authority area in England over a nine year period (2008-2017)
- compare the trends in these 30 local authorities with their statistical neighbours[4]

This analysis examines dental decay levels at upper-tier local authority areas, throughout the report the term local authority refers to this level. Whilst this report focuses on local authority area level data and the 30 areas with the poorest oral health, it is recognised that within all local authority areas there may be areas of significant variation and areas where the oral health of five-year-olds is poor.

Purpose

This report provides, for the first time, information regarding trend data on the oral health of five-year-olds at a local area level. This adds to the existing information published biennially by Public Health England (PHE) on the dental decay levels of five-year-olds.[3, 5-7] and in both the Public Health Outcomes Framework (PHOF)[8] and the NHS Outcomes Framework.[9] It will allow local area based partners for oral health improvement to recognise progress and to identify where they may seek further support across the system if challenges remain. There is evidence of what works to improve oral health and the purpose of the report is to provide data that will support local investigation and appropriate action.

Who is The Document For?

This report will provide support to those with a role in oral health improvement including:

- local authority elected members and strategic leaders
- health and wellbeing boards
- directors of public health, consultants in dental public health and public health and commissioners in local authorities
- NHS England dental commissioners, local dental networks
- local oral health improvement and oral health promotion teams
- health care providers and children and young people workforce delivering population based oral health improvement programmes

Method

Data reporting caries levels of five-year-olds at local authority level for all areas for the national surveys undertaken in 2008,[5] 2012,[6] 2015[7] and 2017[3] were used in these analyses. These arise from standardised surveys which work to a national protocol, use nationally agreed standard criteria and a cascaded system of national and regional training and calibration of examiners.[10-12] This results in estimates of decay levels among children of this age group which can be compared between and within a variety of geographies, and over time. Decay levels are expressed as severity ($d_3$mft - the mean number of teeth affected by decay which reached the dentine layer or beyond)

and prevalence (the proportion of examined children who had one or more teeth affected by decay). A new baseline was established with the 2008 survey (with children examined under positive consent) and now the results of four surveys are available for analysis of trends.

The analysis sought to establish;

(a) 30 local authority areas with the highest levels of dental disease in five-year-olds using the 2017 data.

A previous analysis had been carried out on the 2015 five-year-old dental data to identify which single measure of dental decay consistently ranked local authorities from highest to lowest. Whilst the PHOF indicator focuses on prevalence of dental decay, using the mean $d_3$mft as the single measure ranked local authorities more consistently than the other measures investigated (i.e. prevalence of decay, extent of decay and early childhood caries).

This indicator ($d_3$mft) had previously been used in developing a methodology to support NHS England to identify 10 local authority areas with high levels of dental disease in children. This was as part of the 'Starting Well' initiative to promote preventive focused dental commissioning for children in 10 high need areas. This method identified 13 areas using the indicator $d_3$mft>1.5, on the 2015 data set.

A similar method was applied in this analysis with a set level of disease used to select approximately 30 areas. The 2017 data was used to select all those local authority areas that had mean caries severity levels above 1.08 $d_3$mft and, in addition, (in order to identify 30 local authority areas), that the local authority area had a prevalence of tooth decay above 30% amongst five-year-olds. These levels were specifically selected solely to identify 30 areas.

(b) Trends overtime (2008-2017).

A database was established which brought together the 2008, 2012, 2015 and 2017 survey results for all the identified 30 local authorities with highest levels of decay, including severity and prevalence measures, with their 95% confidence intervals. The Public Health England standard method of assessing trends was applied, using prevalence in the four surveys, to determine if a trend was present. The formula uses a chi-square test for trend and gives greater weight to more recent data. This resulted in a consistent method of classification whereby each local authority area was allocated into one of four categories of trend: 'improving', 'no change', 'deteriorating' and 'classification not possible due to missing data'. Natural variation in levels of measured decay between one survey and another in a fixed area would need to have exceeded the calculated trigger levels for them to be classified as having changed i.e. classed as improving or deteriorating. Where the variation did not reach the required levels the classification of 'no change' was applied.

(c) How these 30 local authority areas compared with their statistical neighbours.

Statistical neighbour models allow comparison of local authority areas deemed to have similar characteristics in terms of the socio-economic characteristics of their area. These designated local authorities are known as statistical neighbours. Those used in this analysis have been taken from the Children's Services Statistical Neighbour Benchmarking Tool,[4] specifically designed for children's services. Whilst areas with a greater degree of similarity might be expected to provide the best comparison it is advised that a comparison with more than one of the designated statistical neighbours will provide the most robust benchmark. In this analysis four statistical neighbours with the closest similarity are used and a fifth which is the closest statistical neighbour within the same region.

Results

When applying the methodology described, 30 local authority areas were identified (Table 1).

Table 1. Local Authorities with High Levels of Caries (a mean $d_3$mft of >1.08 and Prevalence >30.0%) among Five-Year-Olds as Measured in the 2017 Survey, with Classification of Status Over Time.

Local Authority Area	% examined of those sampled in 2017	Average decayed, missing and filled teeth ($d_3$mft) 2017	% with decay experience ($d_3$mft>0) 2017	Trend classification using PHE analysis
Harrow	63.8	1.92	39.6	Not possible to classify due to missing data
Rochdale	47.9	1.90	47.1	No change
Manchester	62.4	1.87	43.0	No change
Blackburn with Darwen	45.7	1.82	42.6	No change
Bradford	49.5	1.80	39.8	Improving
Luton	52.3	1.61	37.6	No change
Slough	64.8	1.60	41.5	No change
Bolton	58.8	1.60	37.8	No change
Leicester	69.9	1.57	38.7	Improving
Salford	65.0	1.51	44.6	No change
Knowsley	50.3	1.47	42.3	No change
Oldham	40.8	1.43	34.8	No change
Waltham Forest	36.6	1.42	32.9	No change
St. Helens	57.1	1.41	38.2	No change
Liverpool	50.6	1.39	34.6	Improving
Brent	59.9	1.30	34.6	Improving
Lancashire*	53.2	1.27	34.0	Improving

Bedford	72.7	1.25	31.3	No change
Hillingdon	74.3	1.25	32.5	Improving
Tower Hamlets	40.4	1.22	31.1	Improving
Torbay	75.5	1.19	34.7	No change
Stoke-on-Trent	51.9	1.17	32.6	Improving
Tameside	53.8	1.17	34.1	No change
Wigan	63.9	1.16	37.6	No change
Middlesbrough	60.2	1.16	32.1	Improving
Kingston upon Hull, City of	60.6	1.13	32.8	No change
Leeds	56.3	1.12	31.1	Improving
Enfield	51.0	1.14	30.5	No change
Halton	55.0	1.08	30.4	No change
Herefordshire, County of	82.9	1.08	30.5	No change

Colour key to Tables 1 and 2:

	Indicates LA area with reducing levels of decay prevalence over 2008 - 2017
	Indicates LA area with no change in decay prevalence over 2008 - 2017
	Indicates LA area with increasing levels of decay prevalence over 2008 - 2017
	Indicates LA area missing data so not possible to classify trend over 2008 - 2017

* Not all lower-tier LAs were represented in this upper-tier LA estimate

Each of the 30 high caries local authority areas was then compared with their four statistical neighbours with regard to the trend in their data (Table 2).

Table 2. Thirty Local Authority Areas with their Statistical Neighbours in Order of Similarity, with Trends and Closeness Indicated

Local Authority Area	Closest national LA match 1	Closest national LA match 2	Closest national LA match 3	Closest national LA match 4	Closest LA match within same region
Harrow	Redbridge^{C}	Hounslow^{C}	Ealing^{C}	Hillingdon^{SC}	Redbridge^{C}
Rochdale	Oldham^{VC}	Middlesbrough^{VC}	Tameside^{VC}	Bolton^{VC}	Oldham^{VC}
Manchester	Nottingham^{C}	Bristol, City of^{SC}	Birmingham^{SC}	Greenwich^{SC}	Salford^{SC}
Blackburn with Darwen	Walsall^{C}	Bradford^{C}	Bolton^{C}	Rochdale^{C}	Bolton^{C}
Bradford	Rochdale^{C}	Blackburn with Darwen^{C}	Oldham^{C}	Kirklees^{C}	Kirklees^{C}
Luton	Birmingham^{VC}	Sandwell^{C}	Slough^{C}	Bradford^{SC}	Peterborough^{SC}
Slough	Hillingdon^{C}	Hounslow^{C}	Redbridge^{C}	Luton^{C}	Reading^{SC}
Bolton	Kirklees^{VC}	Derby^{VC}	Dudley^{VC}	Tameside^{VC}	Tameside^{VC}
Leicester	Slough^{SC}	Hounslow^{SC}	Wolverhampton^{SC}	Sandwell^{SC}	Nottingham^{NC}
Salford	Liverpool^{VC}	Middlesbrough^{VC}	Newcastle upon Tyne^{VC}	South Tyneside^{VC}	Liverpool^{VC}
Knowsley	South Tyneside^{VC}	Halton^{VC}	Middlesbrough^{VC}	Hartlepool^{VC}	Halton^{VC}
Oldham	Rochdale^{VC}	Bradford^{C}	Walsall^{C}	Tameside^{C}	Rochdale^{VC}
Waltham Forest	Enfield^{C}	Croydon^{C}	Haringey^{C}	Birmingham^{SC}	Enfield^{C}
St. Helens	Wigan^{EC}	County	Darlington^{VC}	Halton^{VC}	Wigan^{EC}

		Durham[EC]			
Liverpool	Salford[VC]	South Tyneside[VC]	Knowsley[VC]	Newcastle upon Tyne[VC]	Salford[VC]
Brent	Ealing[C]	Waltham Forest[SC]	Croydon[SC]	Haringey[SC]	Ealing[C]
Lancashire[*]	Nottinghamshire[EC]	Calderdale[EC]	Derbyshire[EC]	Bury[VC]	Bury[VC]
Bedford	Kent[VC]	Northamptonshire[VC]	Swindon[VC]	Derby[VC]	Hertfordshire[VC]
Hillingdon	Hounslow[C]	Redbridge[C]	Slough[C]	Barnet[C]	Hounslow[C]
Tower Hamlets	Newham[NC]	Camden[NC]	Westminster[NC]	Islington[NC]	Newham[NC]
Torbay	Isle of Wight[VC]	Plymouth[VC]	Southend-on-Sea[VC]	Rotherham[VC]	Plymouth[VC]
Stoke-on-Trent	Kingston upon Hull, City of[VC]	Middlesbrough[VC]	Doncaster[VC]	North East Lincolnshire[VC]	Walsall[VC]
Tameside	Rotherham[VC]	Doncaster[VC]	St. Helens[VC]	North East Lincolnshire[VC]	St. Helens[VC]
Wigan	St. Helens[EC]	Rotherham[EC]	Barnsley[VC]	Doncaster[VC]	St. Helens[EC]
Middlesbrough	Salford[VC]	Stoke-on-Trent[VC]	Hartlepool[VC]	Rochdale[VC]	South Tyneside[VC]
Kingston upon Hull, City of	Stoke-on-Trent[VC]	Middlesbrough[VC]	Blackpool[VC]	Hartlepool[C]	North East Lincolnshire[C]
Leeds	Sheffield[VC]	Darlington[VC]	Calderdale[VC]	Stockton-on-Tees[VC]	Sheffield[VC]
Enfield	Waltham Forest[C]	Croydon[C]	Greenwich[C]	Birmingham[C]	Waltham Forest[C]
Halton	Hartlepool[VC]	St. Helens[VC]	North East Lincolnshire[VC]	Redcar and Cleveland[VC]	St. Helens[VC]
Herefordshire, County of	Shropshire[EC]	Somerset[EC]	Devon[C]	Cornwall and Isles of Scilly[VC]	Shropshire[EC]

EC=Extremely Close; VC=Very Close; C=Close; SC=Somewhat Close NC=Not Close
* Not all lower-tier LAs were represented in this upper-tier LA estimate

Discussion

A method to define and identify 30 local authority areas with the highest levels of dental disease and consider trends in the oral health of five-year-olds over a nine year period is described.

Amongst those 30 areas identified with the highest levels of dental decay 10 showed a trend of improvement, 19 demonstrate no change, whilst one could not be classified because of missing data. In comparison with statistically matched neighbours it can be seen that for all areas except Tameside and Wigan there are peer local authority areas where progress is being made.

Whilst these significant improvements are encouraging it is important that this progress is maintained as these areas have amongst the highest levels of dental disease in five-year-olds in England. By identifying areas where progress has been made as well as

those where there has been no change within local authority area statistical neighbours groupings, we can learn and gain peer support from similar areas where significant improvement has been made. In those areas where there has been no change over a nine year period this data may prompt local discussion and appropriate action.

Public Health England and NICE have published evidence and resources[13, 14] that may be helpful and they have provided links to these through the pages of Health Matters. The Local Government Association have published case studies in Blackpool, Brent and Middlesbrough that highlight evidence based action by local authorities. In addition, the specialist dental public health workforce (including consultants in dental public health) are based within Public Health England centres. They have a key role to support local authorities to deliver their oral health improvement functions.

This report focusses on the local authority areas with high levels of dental decay in five-year-olds at a district level, however, it is recognised that in all local authority areas there may be wide variation and sectors where the oral health of children is poor. Analysis of all local authority areas reveals that 43% (64) show a trend of improvement and 43% (64) showed no change. For the remaining 22 local authority areas no trend could be identified due to missing data. Details of these findings will be provided in the Dental Health Profiles which will be provided for each local authority area.[15]

Conclusion

This data analysis has enabled identification of 30 areas in England where child oral health is poor. However, the data shows that ten of these local authority areas have made clear improvements in the decay levels among five-year-olds and have demonstrated this within a nine year period. This data provides a basis for local discussion and further understanding of the local context and interpretation of the data is required.

References

1. The stationery Office. *Health and Social Care Act 2012*. c.7. 2006 [cited 03/05/18]; Available from: http://www.legislation.gov.uk/ukpga/2012/7/contents/enacted
2. NHS Bodies and Local Authorities (Partnership Arrangements, Care Trusts, and Public Health and Local Healthwatch), *Regulations Statutory Instrument SI3094*. 2012: United Kingdom.
3. Public Health England. *National Dental Epidemiology Programme for England: oral health survey of five-year-old children 2017. A report on the inequalities found in prevalence and severity of dental decay* 2018; Available from: www.nwph.net/dentalhealth/.
4. Department for Education. *Children's Services Statistical Neighbour Benchmarking Tool.*; Available from: www.gov.uk/government/publications/local-authority-interactive-tool-lait.
5. Rooney E, et al. *NHS Dental Epidemiology Programme for England, Oral Health Survey of five-year-old Children 2007 / 2008*. 2009; Available from: www.nwph.net/dentalhealth/ and www.bascd.org.
6. Public Health England, *National Dental Epidemiology Programme for England: oral health survey of five-year-old children 2012*. 2012.
7. Public Health England. *National Dental Epidemiology Programme for England: oral health survey of five-year-old children 2015*. 2016.
8. Public Health England. *Public Health Outcomes Framework*. Last updated February 2018 [cited 14/03/18]; Available from: https://fingertips.phe.org.uk/profile/public-health-outcomes-framework.
9. *NHS Outcomes Framework 2016-2017 Policy Paper*. [cited 20/04/18]]; Available from: www.gov.uk/government/publications/nhs-outcomes-framework-2016-to-2017.
10. Pine CM, Pitts NB, and Nugent ZJ, *British Association for the Study of Community Dentistry (BASCD) guidance on the statistical aspects of training and calibration of examiners for surveys of child dental health. A BASCD co-ordinated dental epidemiology programme quality standard* Community Dental Health, 1997 (14 (Supplement 1)): p. 18-29.
11. Pine CM, Pitts NB, and Nugent ZJ, *British Association for the Study of Community Dentistry (BASCD) guidance on sampling for surveys of child dental health. A BASCD coordinated dental epidemiology programme quality standard.* Community Dental Health, 1997 (14 (Supplement 1)): p. 10-17.
12. Pitts NB, Evans DJ, and Pine CM, *British Association for the Study of Community Dentistry (BASCD) diagnostic criteria for caries prevalence surveys – 1996/97.* Community Dental Health, 1997. **14 (Supplement 1)**: p. 6-9.
13. Public Health England, *Commissioning better oral health for 0-5 year olds: a stocktake of programmes commissioned by local authorities*. 2018.
14. The National Institute for Health and Care Excellence. *Oral Health Improvement for Local Authorities and their Partners: PH55*. 2014; Available from: https://www.nice.org.uk/guidance/ph55.
15. *Local Authority Profiles – dental health of five-year-old children*. Available from: www.nwph.net/dentalhealth/5yearProfiles.aspx.