



BRITISH FLUORIDATION SOCIETY BRIEFING

Inequalities in Dental Health



How Fluoridated Water Overrides the Normal Link between Social Deprivation and Poor Dental Health

Many diseases affect the most socially deprived groups in society more than the better off. Tooth decay is no exception.

Generally speaking, children from poorer backgrounds are the most prone to tooth decay. This is because they and their families are less likely to eat a sugar-free or low sugar diet, less likely to be able to afford fluoride toothpaste, and

less likely to be registered with a general dental practitioner who can give advice on preventive measures and spot the early signs of potential problems.

So, all other things being equal, a District Health Authority with a higher than average proportion of social deprivation within its boundaries is likely to find that its children have a higher than average rate of tooth decay.

Nationwide survey

To compare the state of children's dental health in different District Health Authorities throughout the

country, specially trained dentists examine the mouths of thousands of children and record the number of teeth they find decayed, missing or filled. This is known as the dmft index.

League table

From this data it is possible to construct a national league table showing where dental health among children is best and worst. A survey of 5-year olds was carried out in 1993/94 across the whole of England. In total, nearly 171,000 children were examined.

The five-fold gap

In the best district (Bromsgrove and Redditch) the average child had 0.62 teeth decayed, missing or filled. In the worst district (Central Manchester) the average child had 3.45 teeth decayed, missing or filled.

Behind this more than five-fold difference lies a human story of more toothache, more sleepless nights and a much greater likelihood of having bad teeth taken out, often under a general anaesthetic.

For example, in Liverpool, about 20% of 5-year olds will already have had teeth extracted or filled under a general anaesthetic. Within the most deprived part of the city, the figure is as high as 35%.

How fluoride makes a difference

There is, however, a major factor which overrides the normal link between social deprivation and tooth decay. That factor is fluoridated water, which generally reduces decay rates by about 50%.

Consequently, many districts with high levels of social deprivation and fluoridated water have much better than expected children's dental health. This briefing contains the results of the 1993/94 survey in the form of a league table on page 5. This ranks districts in England from 1 to 175 according to their average five year old's number of decayed, missing and filled teeth. In addition, there is a chart on pages 2 and 3 which correlates this information on districts' dental health with their level of deprivation as measured by the Jarman index.

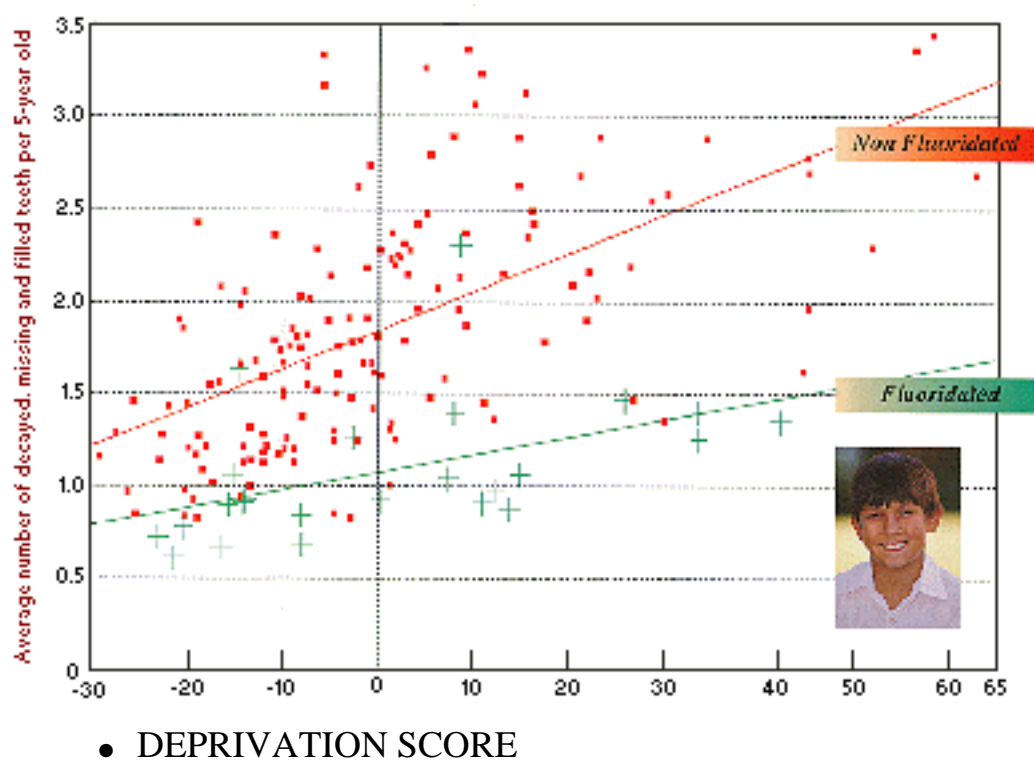
Is your District missing out?

Health authority members, councillors, MPs, dentists, GPs and local residents may be interested to see how their district fares. The message is: non-fluoridated districts are missing out. Those which are missing out most are the most socially deprived.

How water fluoridation helps reduce dental health in equalities between better off and socially depived districts

Tooth Decay
High Rates

Tooth Decay
Very Low Rates



Relatively Affluent Average:neither affluent, nor deprived Relatively deprived Very Deprived

Jarman Index: 0=English Average; -30=affluent; +60=very deprived

Reading the chart

The position of each district shown on the chart is determined by two factors:

- i. the average number of decayed, missing and filled teeth per 5-year old child in that district (the dmft score); and
2. the level of social deprivation as measured by the Jarman score.

Green crosses and red dots

The positions of fluoridated districts are marked by green crosses.

Fluoridated districts are defined as those with artificially or naturally fluoridated water at a level of at least 0.7 parts per million (one part per million is the optimum) covering 50% or more of their resident populations.

All other districts are marked with red dots.

Measuring the average number of decayed, missing and filled teeth

The average number of decayed, missing and filled teeth per 5-year old child is shown on the vertical axis of the chart.

Measuring relative social deprivation

Along the bottom or horizontal axis of the chart is a ranking for social deprivation based on the well-known Jarman Index.

The average for English districts is a score of 0.

A very socially deprived district would be +50 to +60 on the scale (over on the right hand side of the chart).

A relatively affluent district would be -20 to -30 on the scale (over on the left hand side of the chart).

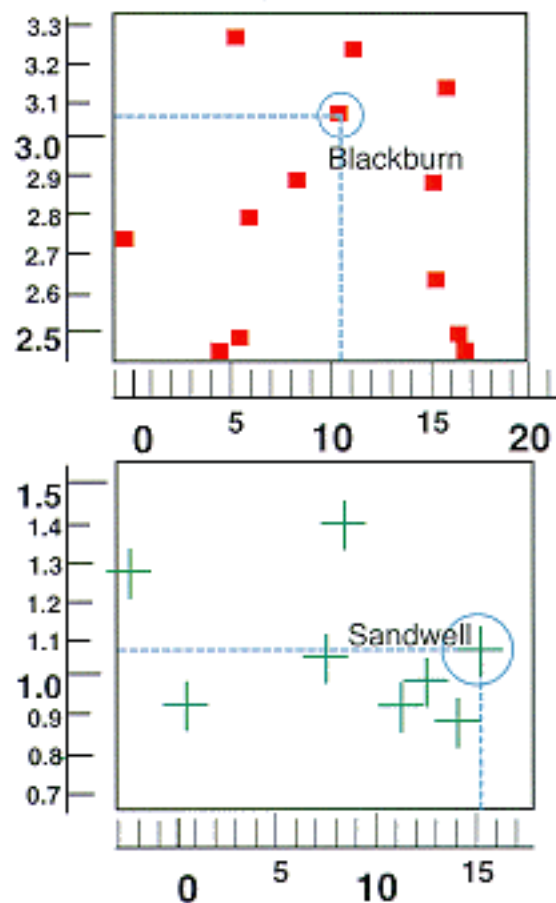


The impact of fluoridation

The green line shows, as it runs from left to right, the general trend among fluoridated districts. That line is not so steep as the red line, which shows the general trend among non-fluoridated districts.

The reason for the difference is that fluoridation helps to close the gap in dental health between relatively affluent and socially deprived districts.

How to find your District



If you want to pinpoint your district on the chart, this is how you can do it:

First, look at the table below which ranks 175 English districts according to their five year olds' dental health. You look for the dmft score and the Jarman score and from then it is rather like finding a road on your A to Z street map.

Take Bromsgrove and Redditch, for example. Its Jarman score is -21.64. You look for that on the horizontal axis. Its dmft score is 0.62. So you look for that on the vertical axis.

You then plot an imaginary line from each of the two axes until the lines cross. At that point, you will find a green cross or red dot which represents your district.

Bromsgrove and Redditch is easy to find because its children have the lowest number of decayed, missing and filled teeth in the country. It is therefore represented by the lowest green cross on the chart.

The following two examples show how to look for Sandwell (dmft score 1.06 and Jarman score 15.03) and Blackburn (dmft score 3.06 and Jarman score 10.09).

How English Districts compare for the Dental Health of their 5-year olds

(Based on a survey coordinated by the British Association for the Study of Community Dentistry in 1993/4)

Districts are ranked according to their dmft score (the average number of decayed, missing and filled teeth per 5-year old child). Bromsgrove and Redditch, with a dmft of 0.62, is the best. Central Manchester, with a dmft of 3.45, is the worst.

The Jarman score in the right hand column indicates a relative measure of social deprivation affluence. A Jarman score of 0 is average. Scores with a minus in front of them indicate relative degrees of affluence. Mid-Surrey, with a score of -29.09, is classified as very affluent. Scores from 0 to 65 indicate relative degrees of social deprivation. Tower Hamlets, with a score of 62.83, is classified as very deprived.

Pos.	District	dmft	F status	% pop fluoridated	Jarman score ^a
1	Bromsgrove & Redditch	0.62	F	95	-21.64
2	S.E.Staffordshire	0.68	F	100	-16.69
3	Birmingham North	0.69	F	100	-7.85
4	Solihull	0.73	F	100	-23.24
5	S.Warwickshire ¹	0.78	F	65	-20.37
6	East Surrey	0.83		0	-19.00
	North East Essex ²	0.83		0	-2.89
8	Mid Essex ²	0.84		0	-20.50
9	Basingstoke & N.Hants	0.85		5	-25.32
	East Suffolk	0.85		0	-4.61
11	North Lincolnshire	0.86	F	76	-7.89
12	Coventry	0.89	F	80	13.91
13	N.Warwickshire	0.90	F	100	-15.91
14	South West Surrey	0.92		0	-19.34
	North Bedfordshire	0.92	F	76	-14.19

	Dudley	0.92	F	75	-13.68
	Birmingham South ^b	0.92	F	100	10.83
18	Walsall	0.93	F	90	0.10
19	North West Surrey	0.94		0	-14.43
20	Mid Staffordshire	0.97		44	-26.29
21	Winchester	0.98		0	-20.46
22	Hartlepool	0.99	F	100	12.38
23	Southend	1.00		0	-13.41
24	Bristol and District	1.01		0	1.08
25	Bromley	1.02		0	-17.28
26	North West Durham	1.05	F	100	7.32
27	Sandwell	1.06	F	100	15.03
28	Worcester	1.07	F	81	-15.32
29	West Essex ²	1.09		0	-18.48
30	Rugby ^{1,c}	1.13		19	-14.06
	North Derbyshire	1.13		19	-12.08
	Somerset	1.13		0	-8.64
33	W.Surrey & N.E.Hants	1.14		0	-23.05
	Kingston & Esher	1.14		0	-13.24
35	Mid Surrey	1.16		0	-29.09
36	Huntingdon	1.17		0	-19.09
37	South West Herts	1.18		0	-12.12
	Salisbury	1.18		0	-10.41
39	Gloucestershire	1.20		0	-9.79
	North Herts	1.20		0	-8.64
41	North West Herts	1.21		0	-19.97
	Harrogate	1.21		7	-14.02
43	Tunbridge Wells	1.22		0	-18.15
	Shropshire	1.22		0	-11.73

45	Barking, etc.	1.25	0	-4.61
	Eastbourne	1.25	0	-2.25
47	Bassetlaw ³	1.26	30	-9.47
	Great Yarmouth	1.26	0	1.84
	Birmingham Central ^b	1.26	F 100	33.83
50	Maidstone	1.27	0	-18.91
	Scunthorpe	1.27	F 67	-2.60
52	East Hertfordshire	1.28	0	-22.83
	York	1.28	0	-11.93
54	Wycombe	1.29	4	-27.39
55	South Derbyshire	1.30	3	-4.70
56	Merton & Sutton	1.31	0	1.09
57	South Lincolnshire	1.32	26	-13.39
58	Isle of Wight	1.34	0	1.31
59	Brighton	1.36	0	12.38
	Greenwich	1.36	0	30.18
	Birmingham West	1.36	F 100	42.10
62	Swindon	1.38	0	-7.72
63	North Tyneside	1.40	F 50	8.20
64	Birmingham East	1.41	F 100	33.78
65	Peterborough	1.42	0	-0.63
66	Southport & Formby	1.44	0	-22.18
67	E. Yorkshire	1.45	0	-20.31
	Hastings	1.45	0	11.16
69	Macclesfield	1.46	0	-25.69
70	Newcastle	1.47	F 100	25.84
	Haringey	1.47	0	26.75
72	Medway	1.48	0	-2.86
	Enfield	1.48	0	5.41

74	Central Nottingham ³	1.49	0	-10.02
75	Cornwall	1.50	0	-4.37
76	Bath	1.52	6	-9.97
	Basildon & Thurrock	1.52	0	-6.32
78	West Berkshire	1.55	2	-17.62
	Kettering	1.55	0	-7.37
80	Kidderminster	1.56	8	-16.86
81	Herefordshire	1.59	0	-11.97
	Canterbury & Thanet	1.59	0	7.04
83	Milton Keynes	1.61	0	-4.21
	South East Kent	1.61	0	0.08
85	South Bedfordshire	1.62	2	-0.49
86	Lambeth, etc	1.63	0	44.51
87	Crewe	1.64	F 53	-14.61
88	Cambridge	1.65	0	-14.39
	Exeter & North Devon	1.65	0	-7.16
90	Northampton	1.67	0	-10.09
	Croydon	1.67	0	-1.68
	Richmond, etc.	1.67	0	-0.90
93	Warrington	1.68	0	-12.87
94	East Cumbria	1.74	5	-10.30
95	Dorset ^d	1.75	0	-7.97
	West Suffolk	1.75	0	-7.88
97	Chester	1.76	3	-9.14
	N.Staffordshire	1.76	0	-4.07
99	Redbridge	1.78	0	-2.99
	Durham	1.78	25	-2.77
	Wolverhampton	1.78	32	17.46
102	West Norfolk & Wisbech	1.79	0	-10.91

	Portsmouth & SE Hants	1.79	0	-1.92
	Darlington	1.79	0	2.80
105	South Cumbria	1.81	0	-8.36
	Hillingdon	1.81	0	-0.15
107	Harrow	1.82	0	-7.23
108	East Berkshire	1.85	0	-8.84
109	Aylesbury Vale	1.86	0	-20.63
110	Grimsby	1.87	8	9.34
111	Chorley & S.Ribble	1.90	0	-21.01
	Wakefield	1.90	0	-5.10
	Hull	1.90	0	21.85
114	Airedale	1.91	0	-3.08
	Barnet	1.91	0	-1.18
116	Hounslow & Spelthorne	1.96	0	4.17
	Calderdale	1.96	0	8.51
118	Islington	1.97	0	45.29
119	Stockport	1.98	0	-14.44
120	Trafford	2.02	0	-7.08
	Riverside	2.02	0	22.92
122	Oxfordshire	2.03	9	-7.87
123	Norwich	2.06	0	-13.90
124	Huddersfield	2.07	0	6.13
125	Northallerton	2.08	0	-16.56
126	Hampstead	2.09	0	20.54
127	Sunderland	2.13	0	8.61
128	Scarborough	2.14	0	-4.96
129	Doncaster	2.15	1	3.07
	Sheffield	2.15	0	13.39
131	Waltham Forest	2.16	0	22.07

132	Southampton & SW Hants	2.18	0	-1.24
133	Parkside	2.19	0	26.51
134	Rotherham	2.20	0	1.76
135	Wirral	2.23	0	1.29
136	Plymouth & Torbay	2.24	0	2.34
137	Barnsley	2.25	0	2.20
138	Northumberland	2.28	35	-6.34
	West Cumbria ⁴	2.28	0	-0.03
	South West Durham	2.28	7	3.26
141	City & Hackney	2.30	0	51.89
142	Nottingham	2.31	0	2.82
	Gateshead	2.31	F 100	8.68
144	Ealing	2.35	0	15.86
145	Dartford & Gravesend	2.36	0	-10.93
146	North Tees	2.37	0	1.51
	Leeds	2.37	0	9.25
148	Pontefract	2.42	0	4.06
	South Tyneside	2.42	0	16.51
150	West Lancashire	2.46	0	-17.89
151	South Sefton	2.48	0	5.03
152	Oldham	2.49	0	16.22
153	Liverpool	2.55	0	28.85
154	Bradford	2.58	0	30.60
155	Blackpool Wyre & Fylde	2.62	0	-2.15
156	South Tees	2.63	0	14.96
157	Preston	2.68	0	21.13
158	Tower Hamlets	2.69	0	62.83
159	Newham	2.70	0	45.29
160	Halton	2.74	0	-0.94

161	Bloomsbury	2.78	0	45.29
162	Lancaster	2.79	0	5.46
163	South Manchester	2.88	0	34.70
164	Tameside & Glossop	2.89	0	8.00
	Dewsbury	2.89	0	14.90
	Salford	2.89	0	23.27
167	Blackburn Hyndburn etc.	3.06	0	10.09
168	Rochdale	3.13	0	15.54
169	Wigan	3.17	0	-5.59
170	Burnley, Pendle etc	3.23	0	10.72
171	St.Helens & Knowsley	3.26	0	4.95
172	Bury	3.33	0	-5.76
173	Bolton	3.36	0	9.38
	North Manchester	3.36	0	56.65
175	Central Manchester	3.45	0	58.24

Source:

- Pitts N B and Palmer J D (1995). The dental caries experience of 5-year old children in Great Britain. Surveys coordinated by the British Association for the Study of Community Dentistry in 1993/94. *Community Dental Health* **12**, 52-58
- Jones *et al* (1997) Jarman underprivileged are scores, tooth decay and the effect of water fluoridation. *Community Dental Health* **In press**

Notes:

DEFINITION OF FLUORIDATED DISTRICT

For the purpose of this briefing, where the impact of fluoridated water on the teeth of 5-year old children is assessed, a district is classed as fluoridated where at least 50% of this age group are likely to have received water with fluoride (either naturally occurring or adjusted) at 0.7 ppm or more since birth.

- I. SOUTH WARWICKSHIRE, RUGBY - Blended supplies resulting in variable fluoride levels between 0.3 to 0.9ppm (natural and artificial).

- 2. NORTH EAST ESSEX, MID ESSEX, AND WEST ESSEX - Naturally occurring fluoride levels varying between 0.21 and 1.05 ppm - difficult to quantify accurately, therefore not listed as fluoridated.

- 3 BASSETLAW AND CENTRAL NOTTINGHAM - With the exception of approximately one third of the population of Bassetlaw, fluoridation ceased in 1991 for plant refurbishment. Fluoridation was reinstated around late 1994/early 1995, but remains intermittent. Central Nottingham is therefore classed as non-fluoridated for the purpose of this briefing on 5-year-olds.

- 4 WEST CUMBRIA - Fluoridation ceased in 1989 for plant refurbishment, and was fully reinstated in December 1994, since when 87% of the population have received optimally fluoridated water. West Cumbria is therefore classed as non-fluoridated for the purpose of this briefing on 5-year-olds.

JARMAN SCORE

- a. Unless otherwise stated, Jarman score is based on District Health Authority boundaries for 1991, and Jarman Scores based on the 1991 Census. (From the 1995 Public Health Common Data Set.)

- b. Jarman score from 1991 Public Health Common Data Set.

- c. Jarman score from 1992 Public Health Common Data Set.

- d. Jarman score from 1990 Public Health Common Data Set.

- e. Jarman score for Camden and Islington from 1995 Public Health Common Data Set.

Commentary on the Wide Differences in Dental Health between Districts

Five-fold difference between districts with the worst and best dental health

The average 5-year old in one of the worst districts for dental health has more than five times as much tooth decay as the average child in one of the best districts.

Examples: Central Manchester is the worst district in the country with 3.45 teeth decayed, missing or filled per child. This contrasts with North Birmingham and Solihull, which are among the very best and have between 0.69 and 0.73 teeth affected per child respectively.

The worst districts

The worst districts for children's teeth are those where social deprivation is high and the natural fluoride level in water is too low to offer any protection against tooth decay. Such districts get the worst of all worlds.

Examples: Manchester, Salford, Liverpool and Bradford, - all major cities with very high levels of tooth decay and very low water fluoride levels.

The best districts

Most of the best districts for children's teeth (irrespective of their level of social deprivation) are those which receive water where the natural fluoride has been topped up sufficiently to give a significant degree of protection against tooth decay.

Examples: South Birmingham, Coventry, North West Durham, Walsall and Sandwell - which have all had their water fluoride level topped up and have all seen significant improvements to dental health.

The impact of social deprivation on dental health in non-fluoridated districts

The most socially deprived non-fluoridated districts tend to have much worse children's teeth than socially better off non-fluoridated districts.

Examples: Blackburn, Oldham, South Tees, Tower Hamlets and City and Hackney - all are districts with high levels of deprivation and all with high levels of tooth decay. By contrast, East Surrey, Basingstoke, Northants and North West Surrey are all better off districts with low levels of tooth decay.

How fluoridation reduces the impact of social deprivation on dental health

Socially deprived fluoridated districts tend to have better children's teeth than the majority of non-fluoridated districts, whatever their level of deprivation.

Examples: Fluoridated Newcastle and Central Birmingham have high rates of deprivation and low rates of tooth decay. By contrast, Norwich, West Lancashire and Aylesbury Vale - all non-fluoridated and comparatively much better off socially but all with much higher rates of tooth decay.

How fluoridation irons out inequalities

The state of children's teeth in fluoridated districts is more uniform than in non-fluoridated districts. Fluoridation helps to iron out the health inequalities normally associated with social deprivation.

Examples: An average 5-year old in Solihull, which is one of the least socially deprived districts, has only 0.7 fewer teeth decayed, missing and filled than the average 5-year old in East Birmingham, which is one of the most deprived districts. Both receive fluoridated water.

How non-fluoridated districts are missing out

In 98 out of 151 non-fluoridated districts, the average child has more than 1.5 teeth decayed, missing or filled. The differences in dental health between better off and socially deprived non-fluoridated districts are much greater than they are between better off and socially deprived fluoridated districts.

Examples: The best and the worst non-fluoridated districts range from an average of 0.83 teeth decayed, missing and filled per child (East Surrey) to 3.45 teeth decayed, missing and filled per child (Central Manchester) - a difference of 2.62.

How fluoridation keeps tooth decay levels low

In 22 out of 24 fluoridated districts, the average child has less than 1.5 teeth decayed, missing or filled. Indeed, in over half of all fluoridated districts, the average child has less than one tooth decayed, missing or filled.

Examples: The best and the worst in fluoridated districts range between an average of 0.62 (Bromsgrove and Redditch) and 2.31 teeth decayed, missing and filled (Gateshead) - a difference of 1.69.

See also:

- Jones CM, Taulor CO, Whittle JG, Evans D and Trotter DP (1997): Water Fluoridation, tooth decay in 5 year olds, and social deprivation measured by the Jarman score: analysis of data from British dental surveys. *British Medical Journal* **315** 514-517.

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