

Supervised toothbrushing programmes in England: a national survey of current provision and factors influencing their implementation

Tom Broomhead,^{*1} Samantha Watt,¹ Sarab El-Yousfi,¹ Kara A. Gray-Burrows,² Hanin El Shuwihdi,² Kristian Hudson,³ Peter F. Day^{2,4} and Zoe Marshman¹

Key points

Summarises findings from a recent national survey in England on the variation in the current provision of supervised toothbrushing programmes.

Summarises how provision of supervised toothbrushing programmes in England has changed since 2022.

Summarises key barriers and facilitators to the implementation of supervised toothbrushing programmes.

Provides evidence to support the need for further exploration of the implementation of supervised toothbrushing programmes, as well as efforts to improve uptake and sustainability of these programmes.

Abstract

Introduction Supervised toothbrushing programmes (STPs) in nurseries and schools are effective at reducing inequalities in caries when targeted to areas of dental disease. Recent changes to government education and health policy have increased interest in STPs in England. This study aimed to establish the current level of provision of STPs in England, describe changes over time, understand associations with predictor variables, and summarise key barriers and facilitators to their implementation.

Methods A national survey was conducted at upper tier local authority level about the extent of a STP across England between December 2023 and April 2024. Quantitative data were analysed using descriptive statistics, with regression analyses examining associations with key predictor variables. Barriers and facilitators to implementation were analysed and summarised based on the Consolidated Framework for Implementation Research.

Results Data were received from 152 local authorities. Around 60% implemented a STP. Nearly one-third of programmes were commissioned by local authorities (28.9%) and most adopted a targeted approach (77.8%). Statistical analyses demonstrated significant and positive associations between dental caries prevalence and the number of children in STPs. Barriers to implementation included: 1) funding; 2) capacity; 3) pressures at settings; 4) logistics; and 5) lack of engagement. Facilitators included: 1) partnerships and connections; 2) available resources; 3) oral health expertise; 4) external policy and incentives; 5) shared knowledge; and 6) engagement.

Conclusions Provision of STPs in England has increased since 2022. Any future expansion of STPs should consider the barriers and facilitators identified to enable smooth implementation.

Introduction

Dental caries in children in England remains a major public health problem, with 23.7% of five-year-olds having experienced dental decay in 2022, with this figure increasing up to

46% in more deprived areas.¹ Children in the 20% most deprived areas were 2.5 times more likely to experience dental caries compared to children in the least deprived 20%. Dental caries causes considerable problems for children, including pain; problems with eating, sleeping and speaking; lower self-esteem and confidence; and missed time at school due to symptoms or dental appointments,^{2,3} as well as affecting school readiness.⁴ Life course research has demonstrated the importance of good oral health in early years for future trajectories.⁵

Brushing with fluoride toothpaste has been identified as a key behaviour for prevention of dental caries.⁶ However, oral health behaviour at home can vary, with a variety of factors influencing appropriate toothbrushing.⁷ Supervised

toothbrushing programmes (STPs) are typically delivered in early years settings, such as nurseries and schools, with children encouraged to brush their teeth daily with fluoride toothpaste. Staff are trained to facilitate toothbrushing sessions in accordance with cross-infection policy. STPs have been shown to reduce both the prevalence of dental caries and inequalities, while also being cost-effective, particularly when targeted to areas of deprivation.⁸

National STPs are already in place in Wales and Scotland, with robust evidence demonstrating the positive impact of these programmes.⁹ In England, the responsibility for oral health improvement rests with local authorities (LAs),¹⁰ where guidance recommended STPs and an aspiration of reaching 30% of 3–5-year-olds living

¹School of Clinical Dentistry, University of Sheffield, Sheffield, UK; ²School of Dentistry, University of Leeds, Leeds, UK; ³Improvement Academy, Bradford Institute for Health Research, Bradford, UK; ⁴Community Dental Service, Bradford District Care NHS Foundation Trust, Bradford, UK. *Correspondence to: Tom Broomhead
Email address: t.w.broomhead@sheffield.ac.uk

Refereed Paper.

Submitted 13 June 2024

Revised 15 July 2024

Accepted 23 July 2024

<https://doi.org/10.1038/s41415-024-7782-0>

in the most deprived areas by 2022.¹¹ Oral health has been identified as a key clinical area requiring improvement in the national NHS programme Core20PLUS5 for Children and Young People, with STPs given as an example of how dental caries can be reduced. The Core20PLUS5 programme aims to support an integrated and systems approach to improve health and reduce inequalities: 'Core20' refers to the most deprived 20% of the population, while 'PLUS' refers to specific populations and communities (minority ethnic groups, inclusion health groups, people with learning disabilities, coastal communities, people with multi-morbidities, protected characteristics), and '5' refers to the clinical focus areas (asthma, diabetes, epilepsy, oral health, mental health).¹² Oral health promotion is now part of the Department for Education's *Early years foundation stage (EYFS) statutory guidance*, which states that schools must promote good health ('including the oral health') of the children they look after,¹³ with supervised toothbrushing used by some settings to evidence compliance. Recently, STPs have gained political emphasis due to changes to government education and health policy, and wider discussions around the provision of these programmes.

As part of the BRUSH project (<https://arc-swip.nihr.ac.uk/research/projects/brush/>), an online survey was conducted in 2022, aimed at establishing the provision of STPs in England. The survey found considerable variation in implementation and obtained detailed data for individual LAs on the number of settings and participating children. The survey received information from 42% of the combined upper tier and lower tier LAs across England (n = 141/333), with nearly half of them implementing a STP and the majority adopting a targeted approach. In England, responsibility for local government services are sometimes split between county (upper tier) and district (lower tier) level (with some overlap), while in other areas, single-tier LAs (unitary, metropolitan, borough – all types of upper tier LAs) carry out all local government responsibilities.^{14,15} The data from the 2022 survey showed wide variation between LAs, for example, the number of settings involved per LA ranged from 11–201, and the number of children involved ranged from 254–8,689. There was also geographical variation between LAs in the provision and funding of toothbrushing programmes, and distinct regional clusters that appeared unrelated to caries prevalence.¹⁰

The aim of this study was to establish the current level of provision of STPs in England in

Table 1 Summary of variables used in the regression analyses

Variable	Data	Year
Outcome variable		
Supervised toothbrushing programme attendance	Number of children	2023–2024
Supervised toothbrushing programme status	Whether or not a LA has implemented a STP	2023–2024
Independent variables		
Dental caries	dmft in five-year-olds	2022 (2019, 2017, 2015)
Deprivation	Index of Multiple Deprivation	2019

2024 at upper tier LA level, with the following objectives:

- To describe changes in the provision of STPs between 2022–2024
- To understand associations with key predictor variables
- To summarise key barriers and facilitators to the implementation of STPs.

Methods

Ethical approval was provided by the University of Leeds Dental Research Ethics Committee (301121/KGB/338). A survey was developed including 16 questions which enquired about the following data for nurseries, schools and childminders: the number of children and sites in each LA; who commissioned the STPs; whether STPs were targeted to certain groups (and if so, which approach was used); how STPs were supported and funded; how long STPs had been running; and barriers and facilitators to implementation.

The survey was distributed by email in both Word and Excel format (the latter was for those reporting on multiple LAs) with an accompanying information sheet, as well as via a link to an online version (Online Surveys – <https://www.onlinesurveys.ac.uk/>). Consultants in dental public health, LA oral health leads and public health practitioners (identified via professional networks) were approached to complete the survey. Completion of the survey was taken as the participant consenting to participate in the study. Data collection began in December 2023 and finished in April 2024.

Data analysis

The quantitative data collected from the 2024 survey were analysed using descriptive statistics. A comparison of summary data from the 2022 survey and the 2024 survey was also conducted to assess how the provision of

STPs in England had changed. Responses on the status of a programme were based on the question: 'currently, is there a toothbrushing programme(s) operating in your area?'

Additionally, two exploratory statistical methods were used: negative binomial regression and binary logistic regression. The included variables are summarised in Table 1. The number of children attending STPs in each LA was used as the outcome variable. Two independent variables were included. The first independent variable was mean dental caries experience in primary teeth. This consisted of the average number of decayed (into dentine), missing due to dental caries and filled due to dental caries primary teeth (dmft) in five-year-olds. These data were taken from the 2022 National Dental Epidemiology Programme;¹ if data were not available for a given LA, this was supplemented with data from previous surveys in 2019, 2017 or 2015.^{16,17,18} In 2022, 23.7% of five-year-olds in England were recorded as having experienced caries, with a mean dmft score of 0.8.¹ The second independent variable was deprivation, based on estimates of the average Index of Multiple Deprivation (IMD) score for upper tier LAs for 2019.¹⁹ This multifactorial index consists of seven weighted domains related to the following aspects of deprivation: income; employment; health and disability; education, skills and training; barriers to housing and services; crime; and the living environment.

Negative binomial regression was used to test associations between the number of children attending STPs in 2024 in count data format (Poisson regression was not used due to the model variance being higher than the mean) and the independent variables. One of the key assumptions for negative binomial regression is independence of observations. As some STPs may have been part of wider schemes, two separate models were run: one for all individual LAs (LA model) and one which aggregated LAs that were potentially involved in a wider scheme,

while also including the remaining individual LAs (wider model), with results of the two models compared. Binary logistic regression was used to test whether there were differences in dental caries and deprivation between areas with and without STPs. Data analysis was conducted using SPSS (version 29).²⁰

Barriers and facilitators were analysed by assessing free-text responses to the respective categories submitted as part of the survey. This analysis was guided by the Consolidated Framework for Implementation Research (CFIR),²¹ with themes in the data being identified. This framework provides a structure for approaching complex real-world constructs across five domains (intervention characteristics, outer setting, inner setting, individuals involved, implementation process), and allows for the systematic identification of determinants of implementation, which can then inform tailored strategies to improve outcomes.

Results

Descriptive statistics

Responses were received from 152 out of 153 upper tier LAs in 2024, with around 60% (90/152) having a STP (Table 2). Just under one-third of programmes were commissioned by LAs (26/90; 28.9%), followed by those commissioned by the NHS (14/90; 15.6%). The majority of programmes adopted a targeted approach (70/90; 77.8%) with programmes most commonly targeted based on deprivation data. Deprivation was determined by the IMD, free school meals, pupil premium targets and local intelligence. Data on dental caries (both severity and prevalence) was the second most commonly used targeting approach, while additional targeting measures included the age of children (nursery and reception age), data on English as an additional language, use of hospital data on admissions for tooth extractions, and specific requests from schools to be included in a programme. A total of 12 LAs provided a universal programme.

STPs were delivered in a range of settings, including LA nurseries, private, voluntary and independent nurseries, childminders,

Table 2 Current provision of STPs across LAs in England (academic year 2023–2024)

Total response	152 (a + b)
Current provision of supervised toothbrushing programmes	
LAs with STPs (a)	90
LAs without STPs (b)	62
LAs with commissioned STPs	55
LAs with non-commissioned STPs	9
LAs with both commissioned and non-commissioned STPs	4
STPs with a targeted approach	70
STPs with a universal approach	12
STPs with both approaches – targeted for some settings	1
Setting characteristics (per LA)	
Total number of settings delivering STPs	3–211
Total number of children participating in STPs	70–10,170
Age range of children participating in STPs	0–19
Time STPs have been active	3 months to 20 years

mainstream primary schools and special educational schools. The total number of settings delivering supervised toothbrushing varied greatly between LAs, ranging from 3–211 settings, while the number of children participating in STPs ranged from 70–10,170. The programmes covered an age range of 0–19 years and had been running between three months to 20 years. A total of 33 LAs stated that although they did not currently have a programme, they were planning to start one in the future (in many cases, within the next year). Table 3 summarises the changes in STP provision in England between 2022 and 2024.

Statistical analyses

The results of the exploratory statistical analyses are presented in Table 4 and Table 5. The negative binomial regression demonstrated that dental caries was positively associated with the number of children in STPs, with an increase in dental caries being associated with an increase in the number of children in STPs in both the LA model (estimate = 2.80; 95% CIs = 1.31–6.01; $p < 0.05$) and the wider model (estimate = 2.65; 95%

CIs = 1.26–5.59; $p < 0.05$). Deprivation was not statistically significant in the LA model ($p = 0.08$) but was significant in the wider model ($p < 0.05$). Given these findings, caution should be taken in interpreting deprivation as a significant variable in its association with the number of children in STPs. Another reason for caution with the results of the negative binomial regression is the amount of missing data on the number of children in STPs. Results from the binary logistic regression demonstrated that LAs with and without STPs did not have statistically significant differences in their associations with dental caries and deprivation.

Barriers and facilitators

Free-text responses on the barriers and facilitators to the implementation of STPs were analysed. Analysis was guided by the CFIR and themes were identified (Table 6).

Barriers

Five barriers to implementation were found: 1) funding; 2) capacity; 3) pressures at settings; 4) logistics; and 5) lack of engagement.

Table 3 Changes in the provision of STPs in England between 2022–2024

Year	Number of children in STPs	Number of settings with STPs	'Yes', LAs with STPs	'No', LAs without STPs	'No, but planning to start a STP in future'	'No, no plans to start a STP in future'	'No, we tried a STP previously and it was stopped'
2022	106,273	2,325	74 (52.5%)	45 (31.9%)	22 (15.6%)	N/A	N/A
2024	143,200	2,978	90 (59.2%)	18 (11.8%)	33 (21.7%)	8 (5.3%)	3 (2%)
Change	+36,927	+653	+16	-27	+11	N/A	N/A

Table 4 Results of the negative binomial regression analysis (LA model and wider model)

Model	Variable	Std.error	B	95% CIs	Sig
LA	Dental caries	0.39	2.80	1.31–6.01	0.01
	Deprivation	0.02	1.03	0.10–1.07	0.08
Wider	Dental caries	0.38	2.65	1.26–5.59	0.01
	Deprivation	0.02	1.05	1.01–1.09	0.02

Table 5 Results of the binary logistic regression analysis

Variable	Std.error	B	95% CIs	Sig
Dental caries	0.56	2.34	0.78–7.00	0.13
Deprivation	0.03	1.02	0.97–1.07	0.39

Table 6 Barriers and facilitators to implementing STPs

Free-text responses to the survey	
Barriers	
Funding	'Accessing long-term funding' 'Cost of resources eg replacement of new toothbrushes' 'No additional funding available to support delivery of the programme within settings, so will rely on settings prioritising this programme (funding available for training and resources only)'
Capacity	'Capacity of the OHI [oral health improvement] team are the barriers that are currently delaying the start of this initiative' 'Oral health workforce capacity and sustainability'
Pressures at settings	'Settings not participating tend to quote time/capacity as a barrier' '[Settings] with high SEN [special education needs] numbers have withdrawn due to the challenges they face' 'There is a high turnover of staff in some settings, so this requires repeated training at these places' 'Settings in the most deprived locations have so many pressures to deal with/a range of issues that introducing daily supervised toothbrushing is not always the highest priority' 'Schools that withdraw highlight Ofsted improvements as a challenge and staffing pressures'
Logistics	'Resource provision – delay in delivery' 'Not many companies stock resources so limited as to where to order cost-effective stock from which results in delay of stock delivery once ordered' 'Storage and cross contamination'
Lack of Engagement	'Responses/communication from settings can be slow and sometimes non-existent' 'Some schools think it will take up too much of their time and some head teachers have said it is not their responsibility to be brushing children's teeth with one saying, "it sets a dangerous precedent" as parents are responsible' 'Some staff don't feel it is their role to supervise these supervised toothbrushing clubs'
Facilitators	
Partnerships and connections	'Support from BRUSH team with established intelligence of other delivery models' 'Collaboration of key partners eg school nurses, quality assurance team' 'Oral health promotion services engagement with early years providers network facilitated by the local authority' 'LA engaging with us to send out invitation letters to settings; working with school nursing teams and others who work directly with day nurseries or schools to encourage engagement'
Available resources	'Resources that are bright and attractive, free home toothbrushing packs, "we're taking part" banners on school gates' 'Information from the BRUSH website'
Oral health expertise	'Support from consultants in dental public health' 'Oral health promotion service taking time to build rapport and connection with early years settings' 'The oral health improvement team are experts in their field and are very solution-focused in supporting settings to deliver the toothbrushing programme and overcome potential barriers'
External policy and incentives	'Delegation of dentistry and the integration agenda has put a spotlight on dentistry and issues around access to NHS dental care' 'Inclusion of oral health in EYFS framework' 'Recognition from statutory bodies that regulate schools' 'We are conscious that supervised toothbrushing is part of Labour health policy and we should be prepared for supporting the scheme locally if required' 'Awareness raised for risk of poor oral health care, links to obesity agenda and sugar reduction'
Shared knowledge	'We do try to link schools up to share good practice, achieving a supportive network' 'Shared knowledge with... how other settings implement schemes'
Engagement	'Schools willing to engage and recognise the importance of delivering the supervised tooth brushing programme'

Funding and financing STPs was a key barrier across several levels of implementation. Those currently operating programmes discussed the uncertainty of future funding and were concerned regarding the sustainability of their programmes which are funded on a non-recurrent basis. Some participants described withdrawal of funding for their oral health service, including STPs, highlighting loss of funding as a fundamental barrier to STP maintenance.

Additional barriers included capacity of oral health promotion teams and pressures in early years settings, such as staffing (shortages, turnaround and training) and providing adequate support to high numbers of children with special educational needs and/or disabilities.

Participants felt that settings, particularly in the most deprived areas, have a range of pressures and priorities and therefore introducing daily supervised toothbrushing was not always the highest priority. Regulatory responsibilities, such as Ofsted (Office for Standards in Education, Children's Services and Skills) (<https://www.gov.uk/government/organisations/ofsted>) improvements, with their focus on academic outcomes, were felt to be a competing priority and reduced capacity to implement STPs (Ofsted inspect services which provide education and skills training for all children and students). Logistical barriers included delays in the delivery of equipment (eg toothbrush racks and toothbrushes) and storage of equipment.

Lack of engagement from settings was found to be a further barrier to implementation with low response times or no responses reported. In addition, some participants felt that oral health was not the responsibility of the early years setting, and the implementation of a STP 'would set a dangerous precedent'.

Facilitators

Six key facilitators to implementation of STPs were identified: 1) partnerships and connections; 2) available resources; 3) oral health expertise; 4) external policy and incentives; 5) shared knowledge; and 6) engagement.

Having partnerships and connections across the system was discussed as a key facilitator. The importance of building rapport, making connections and collaborating, particularly with early years settings, was emphasised to enable successful implementation and maintenance of STPs. Also, establishing relationships with suppliers enabled timely delivery of resources, such as toothbrushes and toothbrush racks, improving the efficiency of STPs. By sharing knowledge, some areas were able to encourage further uptake of STPs and facilitate simpler implementation, which also helped areas establish supportive networks.

Participants highlighted available resources and their benefits for developing STPs. Local and national resources, such as the Public Health England *Improving oral health toolkit*²² and the BRUSH implementation toolkit (www.supervisedtoothbrushing.com), were identified as resources which enabled implementation of STPs. Other physical resources were discussed, such as large models of teeth, timers and music to make toothbrushing fun and interactive.

Oral health expertise was suggested as a significant facilitator to STP implementation. This ranged from consultants in dental public

health who provided support throughout the commissioning cycle to dedicated oral health promotion teams who used their expertise to provide training, quality assurance and ongoing support to STPs. Engagement with settings was found to be key for a successful STP, with support and passion from individuals, such as headteachers, acknowledged as a facilitator.

External policy and incentives were found to be important facilitators to STPs, including delegation of the commissioning of dental services to integrated care boards (ICBs) (there are 42 of these NHS organisations in England, with responsibility for the planning of health services for local populations),²³ the inclusion of oral health in the EYFS framework and recognition of the role of STPs by statutory bodies that regulate schools, including Ofsted.

Discussion

Around 60% of LAs in England that responded in 2024 currently implement STPs with a variety of different delivery models. In 2024, as in 2022, there was wide variation in the provision of STPs between LAs, with the number of settings ranging from 3–211, and the number of children participating in these programmes ranging from 70–10,170. There has been an increase in the number of STPs and children participating in these programmes since 2022 and an increase in the number of LAs planning to start STPs in the future (in many cases, within the next year or so).

Currently, most programmes are targeted based on levels of deprivation or dental caries, which are closely linked. As expected, the exploratory regression analysis found that dental caries was positively associated with the number of children in STPs. This analysis, and the positive association between these two variables, suggests that toothbrushing programmes may be in the right places in terms of dental caries; although, it may also point to the need for larger programmes in LAs with higher levels of caries. It is also likely that other variables may be playing a role in this association though (such as the duration of the STP and/or other oral health programmes), which require further investigation. This result may also be due to dental caries being one of the more common ways of targeting.

Given the conflicting findings on deprivation in the LA and wider models, and significant differences in deprivation between LAs with and without data on the number of children, little weight should be given to variations in deprivation in this analysis overall. The lack of statistical significance for deprivation may partly

be explained by the use of upper tier LAs and relying on a LA average, which may mask the wide range of levels of deprivation observed within many LAs. It is also possible that the locations of STPs are based historically on where funding was available or that other schemes to reduce dental caries, such as fluoride varnish programmes, are in place in these deprived areas.

The results suggest there is room for both future growth in the number of new programmes but also in the size of existing programmes; although, significant barriers were identified. Funding was cited as a key barrier in this survey (and the previous survey),¹⁰ highlighting that without a sustainable, ideally recurrent, funding mechanism, it is not possible for some areas to implement a STP. Indeed, the commissioning arrangements for STPs have shown a shift since 2022 with 15.6% now commissioned by the NHS. The most likely cause of this shift is delegation of commissioning for dental services to ICBs. A systems approach could support further implementation of STPs, with national, regional and local partnerships and collaboration between LAs, ICBs and other organisations.

Responses to this survey also emphasised the number of pressures and competing priorities for settings that hindered the implementation of STPs. Interestingly, while generic regulatory responsibilities such as Ofsted improvements were cited as barriers by some, others viewed the inclusion of oral health in the EYFS framework and therefore in Ofsted inspections as a facilitator. Similarly, limited workforce capacity was discussed as a key barrier; however, suggested facilitators, such as shared knowledge to increase efficiency and partnership working, were felt to aid implementation. Oral health expertise from consultants in dental public health, dedicated oral health promotion teams and toolkits were identified as facilitators across different levels of implementation, such as developing a business case, procurement advice and quality assurance.

The main limitation of this study was the quality of the data collected. The quality and completeness of the data were limited and varied greatly between LAs. This should be borne in mind when considering the results. The strength of the study is that it allows for an understanding of the current provision of STPs in England, using the most up-to-date data on this topic. Moreover, this survey has collected data from almost all upper tier LA areas (n = 152/153). The 2022 survey included data from both upper and lower tier LAs, and this change in sampling has to be considered when comparing changes between the two surveys. There are also plans

for further surveys, which will allow the impact of the changing political landscape following the 2024 UK general election to be captured.

Conclusions

Although provision of STPs in England has increased since 2022, this still varies greatly from very small-scale programmes to those involving thousands of children. Statistical analysis demonstrated significant and positive associations between dental caries and the number of children in STPs, suggesting STPs may be in the right places in terms of dental caries; although, data quality and completeness should be borne in mind. Several barriers to implementation were reported, with issues related to funding being cited in this study and data from 2022. However, numerous facilitators to implementation were also identified, including partnerships and collaboration across organisations, and sharing of oral health expertise. Any future expansion of STPs should consider the barriers and facilitators identified to enable smooth implementation. Future work is planned to explore implementation further and undertake additional data collection on the provision of STPs in England.

Ethics declaration

The authors declare no conflicts of interest.

Ethical approval was provided by the University of Leeds Dental Research Ethics Committee (301121/KGB/338). Consent to participate was implied by completion of the survey.

Data availability

The data that support the findings of this study are available on reasonable request from the corresponding author.

Author contributions

Kara A Gray-Burrows, Zoe Marshman and Peter F. Day secured the funding and contributed to the conception and design of the study. Tom Broomhead, Sarab El-Yousfi, Samantha Watt and Zoe Marshman contributed to data acquisition, analysis and drafted the manuscript. Kara A. Gray-Burrows and Peter F. Day contributed to the ethics, interpretation of the data and critically revised the

manuscript. Kristian Hudson contributed to the analysis and critically revised the manuscript, and Hanin El Shuwihdi critically revised the manuscript. All authors gave final approval and agreed to be accountable for all aspects of the work.

Funding information

This report is independent research funded by the National Institute for Health and Care Research Applied Research Collaborations South West Peninsula and Yorkshire and Humber through the Children's Health and Maternity National Priority Programme. Four of the authors of this paper (Kara A Gray-Burrows, Peter F. Day, Kristian Hudson and Zoe Marshman) are supported by the NIHR Applied Research Collaborations Yorkshire and Humber (NIHR ARC YH) NIHR200166 (www.arc-yh.nihr.ac.uk). The views expressed in this publication are those of the author(s) and not necessarily those of the NIHR, the NHS or the Department of Health and Social Care.

Acknowledgements

Thank you to all local authorities who kindly provided information for this survey. Thank you also to Phil Mike Jones for his time and advice on the statistical analyses. Peter F. Day and Kara A. Gray-Burrows are also supported by Child Health Outcomes Research at Leeds (CHORAL), University of Leeds, Leeds. www.choralresearch.org.uk.

References

- UK Government. National Dental Epidemiology Programme (NDEP) for England: oral health survey of 5-year-old children 2022. 2023. Available at <https://www.gov.uk/government/statistics/oral-health-survey-of-5-year-old-children-2022/national-dental-epidemiology-programme-ndep-for-england-oral-health-survey-of-5-year-old-children-2022> (accessed June 2023).
- Sheiham A. Dental caries affects body weight, growth and quality of life in pre-school children. *Br Dent J* 2006; **201**: 625–626.
- Watt S, Dyer T A, Marshman Z, Jones K. Does poor oral health impact on young children's development? A rapid review. *Br Dent J* 2024; **237**: 255–260.
- Giles E, Relins S, Gray-Burrows K, Baker S R, Day P F. Dental caries and school readiness in 5-year-olds: a birth cohort data linkage study. *Community Dent Oral Epidemiol* 2024; **52**: 723–730.
- Broadbent J M, Thomson W M, Poulton R. Trajectory Patterns of Dental Caries Experience in the Permanent Dentition to the Fourth Decade of Life. *J Dent Res* 2008; **87**: 69–72.
- Walsh T, Worthington H V, Glenny A-M, Marinho V C, Jeronic A. Fluoride toothpastes of different concentrations for preventing dental caries. *Cochrane Database Syst Rev* 2019; DOI: 10.1002/14651858.CD007868.pub3.
- Aliakbari E, Gray-Burrows K A, Vinall-Collier K A et al. Facilitators and barriers to home-based toothbrushing practices by parents of young children to reduce tooth decay: a systematic review. *Clin Oral Investig* 2021; **25**: 3383–3393.
- Anopa Y, McMahon A D, Conway D I, Ball G E, McIntosh E, Macpherson L M D. Improving Child Oral Health: Cost Analysis of a National Nursery Toothbrushing Programme. *PLoS One* 2015; DOI: 10.1371/journal.pone.0136211.
- Kidd J B R, McMahon A D, Sherriff A et al. Evaluation of a national complex oral health improvement programme: a population data linkage cohort study in Scotland. *BMJ Open* 2020; DOI: 10.1136/bmjopen-2020-038116.
- Gray-Burrows K A, Day P F, El-Yousfi S, Lloyd E, Hudson K, Marshman Z. A national survey of Supervised Toothbrushing Programmes in England. *Br Dent J* 2023; DOI: 10.1038/s41415-023-6182-1.
- UK Government. Advancing our health: prevention in the 2020s – consultation document. 2019. Available at <https://www.gov.uk/government/consultations/advancing-our-health-prevention-in-the-2020s/advancing-our-health-prevention-in-the-2020s-consultation-document> (accessed May 2024).
- NHS England. Core20PLUS5 – an approach to reducing health inequalities for children and young people. Available at <https://www.england.nhs.uk/about/equality/equality-hub/national-healthcare-inequalities-improvement-programme/core20plus5/core20plus5-cyp/> (accessed July 2024).
- UK Government. Early years foundation stage statutory framework for group and school-based providers: setting the standards for learning, development and care for children from birth to five. 2023. Available at https://assets.publishing.service.gov.uk/media/65aa5e42ed2ca001327b2c7/EYFS_statutory_framework_for_group_and_school_based_providers.pdf (accessed July 2024).
- House of Commons. Local government in England: structures. 2024. Available at <https://researchbriefings.files.parliament.uk/documents/SN07104/SN07104.pdf> (accessed July 2024).
- UK Government. Local government structure and elections. 2023. Available at <https://www.gov.uk/guidance/local-government-structure-and-elections> (accessed July 2024).
- Public Health England. Oral health survey of 5-year-old children 2019. 2020. Available at <https://www.gov.uk/government/statistics/oral-health-survey-of-5-year-old-children-2019> (accessed June 2023).
- Public Health England. Oral health survey of 5-year-old children 2017. 2018. Available at <https://www.gov.uk/government/statistics/oral-health-survey-of-5-year-old-children-2017> (accessed June 2023).
- Public Health England. Oral health survey of 5-year-old children 2015. 2016. Available at <https://www.gov.uk/government/statistics/oral-health-survey-of-5-year-old-children-2014-to-2015> (accessed June 2023).
- UK Government. English indices of deprivation 2019. 2019. Available at <https://www.gov.uk/government/statistics/english-indices-of-deprivation-2019> (accessed June 2023).
- IBM Corp. IBM SPSS Statistics for Windows, Version 29.0.0. Armonk: IBM Corp, 2023.
- Damschroder L J, Reardon C M, Winderquist M A O, Lowery J. The updated Consolidated Framework for Implementation Research based on user feedback. *Implement Sci* 2022; **17**: 1–16.
- Public Health England. Improving oral health: supervised tooth brushing programme toolkit. 2016. Available at <https://www.gov.uk/government/publications/improving-oral-health-supervised-tooth-brushing-programme-toolkit> (accessed May 2024).
- NHS England. What are integrated care systems? 2022. Available at <https://www.england.nhs.uk/integratedcare/what-is-integrated-care/> (accessed July 2024).



Open Access.

This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0>.

© The Author(s) 2025.