AN INSIGHT INTO CHILDSMILE

THE PREVENTATIVE PROGRAMME IMPROVING THE ORAL HEALTH OF CHILDREN IN SCOTLAND

BY JENNIFER RAE

Introduction

'Childsmile is reducing inequalities in oral health and ensuring access to dental services for every child across Scotland.'[1] The initiative is a complex set of preventative evidence-based interventions[2,3] providing support to children and families all over the nation to promote a healthy mouth and healthy living. This is based on three core programmes; the Childsmile Core programme, now referred to as the Childsmile Toothbrushing programme; Childsmile Community and Practice programme; and Childsmile Fluoride Varnish Programme. As the prevalence of dental caries in children grows, and healthcare inequalities exist, the need for preventative dentistry is essential.[4,5]

Development of Childsmile

In the early 2000s, The Scottish Government recorded Scotland's oral health to be one of the poorest in Europe.[6] An 'Action Plan for Modernising Dental Services in Scotland (2005)' was developed and revealed: the extent of the poor oral health in Scotland, particularly in children, and the need to address the current disease levels to ensure equity; ways of reducing healthcare inequalities by improving access; and that staff can be supported through the plan.[7] Aimed at the younger population of Scotland, the Government wanted to reconstruct and strengthen the level of preventative care delivered by dental services to provide the younger generations with reduced caries experiences by adulthood.[7] Childsmile developed from two national demonstration programmes detailed in the proposed action plan. The programme began its interim phase in 2008 and by 2011, the fully integrated model (toothbrushing, practice and community and fluoride varnish (FV) programme) was rolled out among all 14 NHS boards.[7,8] The Statement of Dental Remuneration now details the Childsmile programme and the expectations of all NHS practices to deliver these interventions.[8,9] In 2017, The Health Secretary Shona Robinson shared her opinion regarding Childsmiles' efforts on improving children's oral health:

"The Childsmile programme, with its emphasis on prevention, rather than treatment, has resulted in significant improvements in children's oral health across Scotland. Our aim is that every child has access to Childsmile.

Reducing inequalities in health is critical to achieving the Scottish Government's aim of making Scotland a better, healthier place for everyone, no matter where they live – and the expansion of Childsmile, through our Fairer Scotland Action Plan, provides a good illustration of this in practice."[10]

The Childsmile programme is delivered by a range of health professionals providing evidence-based interventions consisting of three main components to meet its aims: Toothbrushing, Community and Practice, and Fluoride Varnish.

Childsmile Toothbrushing Programme

The Childsmile Toothbrushing Programme is a preventative intervention model to support children in developing important lifelong skills with the aim of these early interventions reducing the prevalence of dental caries in children.[11] Instructions are simplified and, in line with the toothbrushing standards approved by Care Inspectorate and Public Health Scotland,[12] are delivered in targeted primary schools and all nurseries. Childsmile provide toothbrushes, toothbrush racks and fluoridated toothpaste for daily supervised brushing, ensuring every child has access to toothbrushing at least once per day.[13] Children also receive oral health messages on a minimum of six occasions by age five and babies aged one and under receive a free flow cup.[11] In the 2022/23 academic year, 2,270 pre-schools and 1,001 primary schools participated in the toothbrushing programme, an increase on the previous year when 1541 pre-schools and 565 primary schools participated.[14]

Childsmile Fluoride Varnish

Children who attend schools or nurseries participating in the Fluoride Varnish Programme receive two fluoride varnish applications (FVA) per year supplemented by two additional applications at dental practices, if considered applicable, in line with the Scottish Dental Clinical Effectiveness Programme (SDCEP).[15,16]

Participation in this programme is dependent on the number of children attending who live in areas of deprivation, using data from the Scottish Index of Multiple Deprivation (SIMD).[17] Financial constraints in healthcare mean health boards are forced to adopt a more focused and targeted

approach to healthcare to ensure that those who are most deprived are reached and supported. Fluoride toothpaste is recommended to patients.[18] Duraphat sodium fluoride varnish is licensed to be used in the Childsmile programme, it contains 22,600ppm sodium fluoride and once applied, the varnish provides a slow release of fluoride on the enamel and inhibits the progression of demineralisation, speeding up the process of remineralisation.[19,20] In the 2022/2023 academic year, 65% of targeted nursery children received at least one FVA, an increase of 7% on the previous year with 697 pre-schools participating: 76% of targeted school children received at least one FVA in the academic year 2022/2023, an 11% increase from the previous year, with 761 participating schools.[14]

Childsmile Community and Practice

Depending on the level of deprivation, access to a wide range of healthcare may be difficult. The Childsmile Community and Practice programme aims to break down barriers and reduce inequalities by offering support to disadvantaged communities. Dental Health Support Workers (DHSW) provide additional support to families, and are a link to dental services, tailoring advice for families to encourage behavioural change.[21] Families requiring wider support can be given help accessing other services for their child's health improvement. This may include weaning groups, breastfeeding support services, financial support and food banks.[22] With the support of a DHSW, children and their families are helped by finding a local dental practice, if required, given advice on toothbrushing, and other oral hygiene advice, and a healthy diet.

From the Childsmile practice aspect of this programme, 89% of General Dental Services with an independent contractor were involved with the delivery of Childsmile interventions. In 2022/2023, 89% of 0-2 years olds received toothbrushing and diet advice in NHS dental practices; 55% 3–5-year-olds, received both toothbrushing and diet advice interventions.[14] These are just some of the positive statistics highlighting the effect Childsmile has had on children and families.

Clinical relevance

Preventing Early Childhood Caries

The National Dental Inspection Programme (NDIP) conducted by Public Health Scotland issued a report indicating that in 2005 the percentage of children with severe decay or suffering from an abscess prior to the toothbrushing programme was at 52.9% and more common in less advantaged areas amongst 5-year-olds.[23]

Dental caries affects 60-90% of school children worldwide. Although, with the correct evidence-based strategies, it is easily preventable.[24] Early intervention and oral health education is proven to be an effective preventive method, especially from a young age.[16] During the ages of 0-7, the developing brain is most impressionable.[25,26] Toothbrushing instructions can be embedded into school activities ultimately establishing a routine from a young age. Forming early lifelong habits, is likely to prevent dental issues ensuring exposure to the dental environment becomes a positive experience. With the rolling out of the National Supervised Toothbrushing Programme, it is evident that there has been progress in the reduction of dental decay in Scotland, more so in deprived areas and credit must be given to the toothbrushing programme.[27]

In addition to toothbrushing, fluoride varnish slows down the progression of demineralisation. A Cochrane review in 2013 of clinical trials of FVA asked the question: how effective is the use of FV for the prevention of caries in children? It was concluded that, based on 13 trials reviewed, those with permanent teeth experience, on average, a 43% reduction in decayed, missing and filled tooth surfaces and children with baby teeth experienced, on average, a 37% reduction following FVA.[28] FV has been proven to be an effective intervention method in reduction of caries in children.[29]

In 2019/20, NDIP recorded 73.5% of primary one (P1) children had no obvious decay experience (decayed, missing or filled teeth), an improvement from 2002/2003 which was 45% prior to the rolling out of the Childsmile programme.[30,31,32] The data recorded in the school year 2021/22 was limited due to the interruptions to normal practice by the COVID-19 outbreak. The majority (73.1%) of P1 children were recorded as having no obvious decay experience. However, children found to have severe decay or an abscess had increased from 6.6% to 9.7% in 2020.

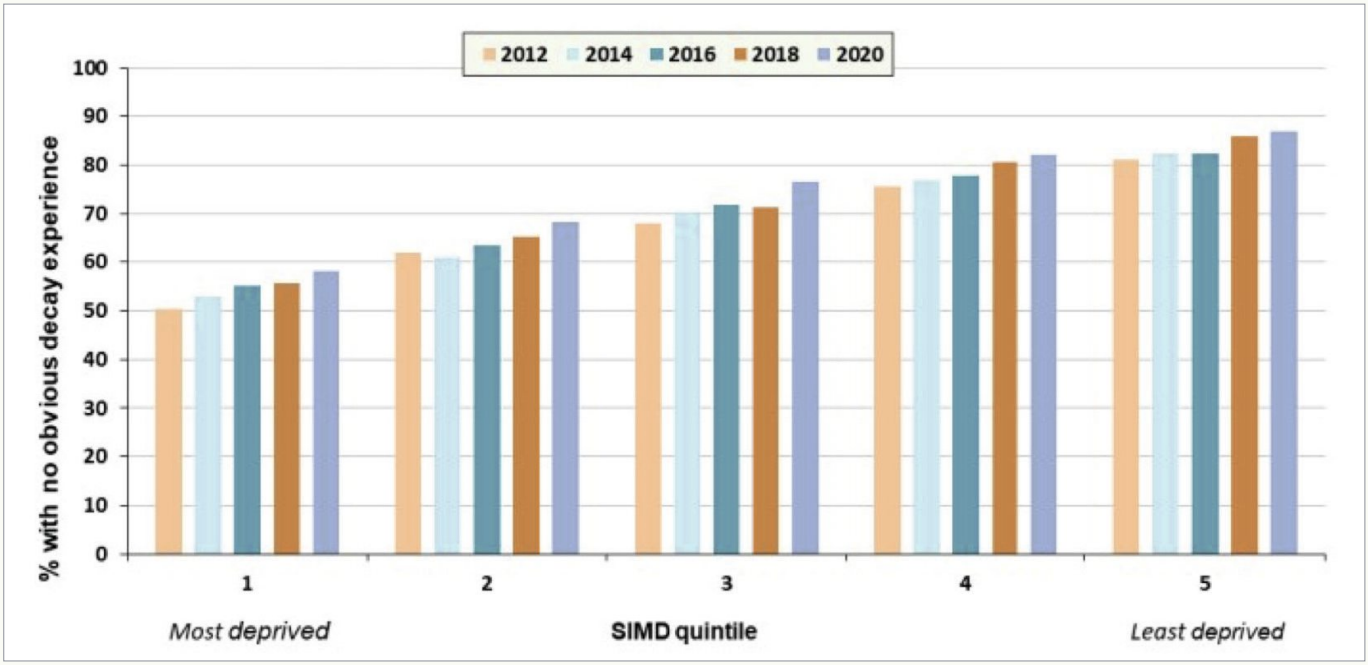
The latest publication from NDIP records inspection data of P7 children in the school year 2022/23 revealed that 81.9% of P7 children had no obvious signs of decay experience in their permanent teeth. Patterns in research data show dental caries is reducing and early interventions, education and developing dexterity all positively affect the permanent dentition. However, dental decay is still too prevalent and dental inequalities still exist: dietary habits, poor oral hygiene and environment factors or socioeconomic issues all have a role to play.

Reducing inequalities

The World Health Organization defines health equity as: "absence of unfair, avoidable or remediable differences among groups of people, whether those groups are defined socially, economically, demographically, geographically or by other dimensions of inequality."[33] Health inequalities can be identified from several economic and social factors and not only mean lack of access to care but also having to make unavoidable decisions due to financial restrictions.[33,34] This has an impact on public health, and children in particular, often moulding their future.[34,35] Childsmile aims to reduce inequalities in the public's dental health.

The Scottish Index of Multiple Deprivation (SIMD) identifies areas in Scotland that are most deprived. The index measures: income; employment; education; health; access to services; crime; and housing as its seven domains and divides the populations into quintiles with SIMD quintile 1 being most deprived and SIMD quintile 5 least.[36] SIMD allows various programmes, like Childsmile, to identify those who are in need and provide support for proportionate universalism. Figure 1 shows the percentage of children with

Figure 1: **Change in the percentage of P1 children in Scotland with no obvious decay experience; by SIMD quintile.[37]**



no obvious decay experience by SIMD quintile.

The concept of proportionate universalism argues for everyone to have equal access to healthcare regardless of their background and barriers.[38] However, there is a particular focus on marginalised groups through 'affirmative action', creating opportunities and equity.[39]

Childsmile follows the upstream, downstream approach by Watt et al. produced to highlight the downstream interventions favoured currently in oral disease prevention (Fig.3).[41,42] This includes clinical prevention, school, and chairside dental health education. However, these downstream interventions target smaller populations, whereas larger, upstream interventions are required to have a greater impact on inequalities.[42] This involves legislations and regulations.

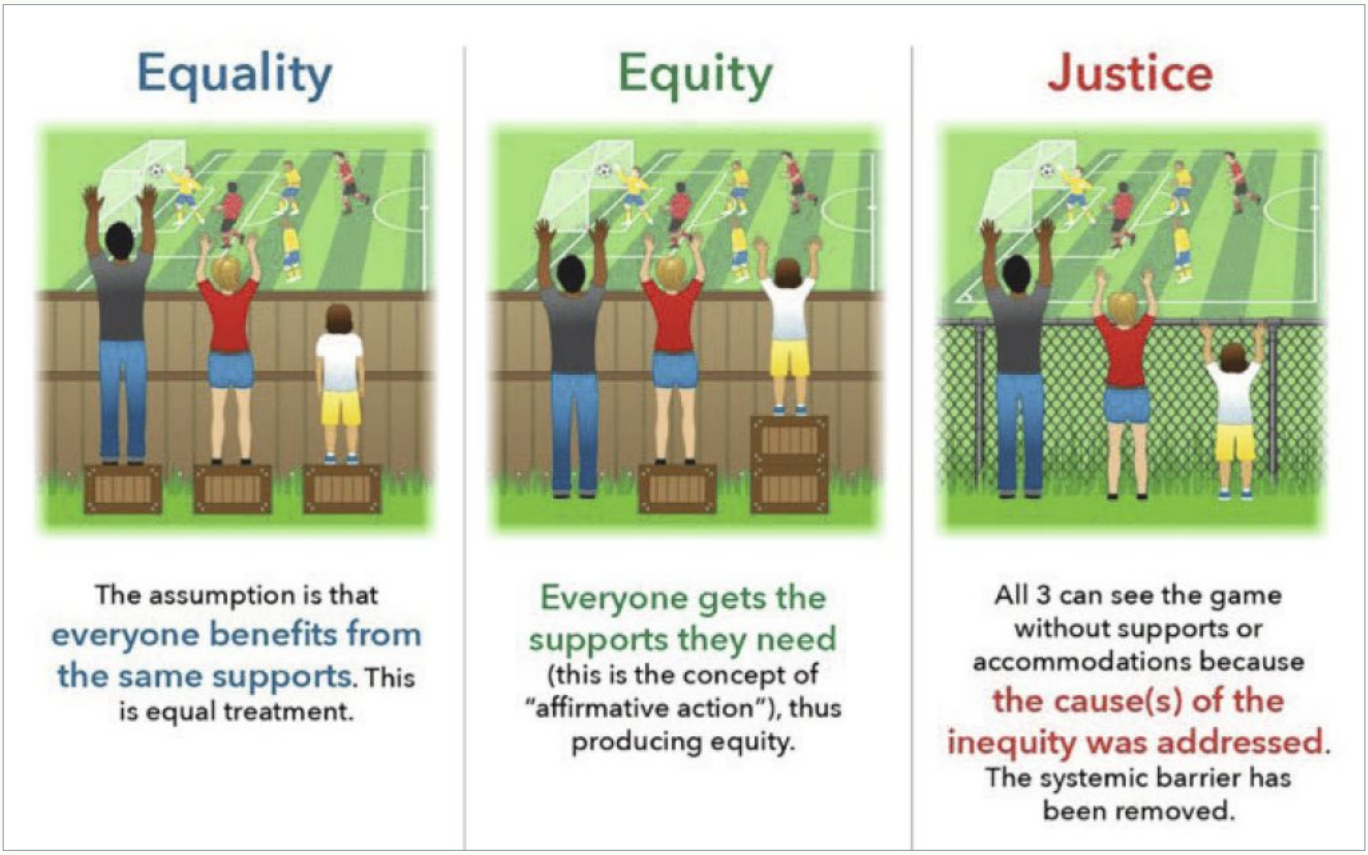
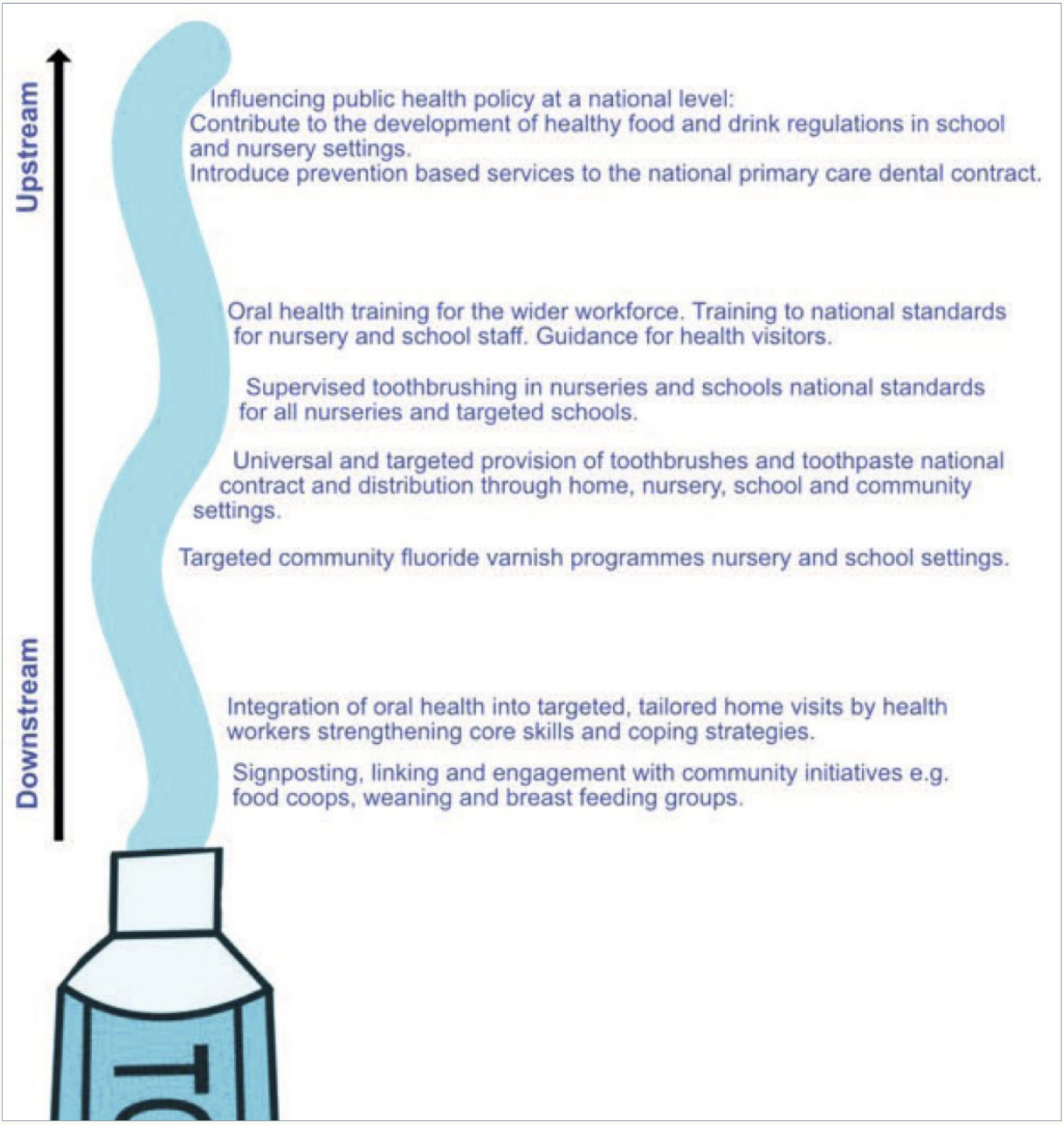


Figure 2: **How a proportionate universalism approach can help improve health outcomes for everyone across a population, but those with the poorest health benefit the most from service delivery.[40]**

Figure 3: **Main Childsmile interventions with the upstream/ downstream continuum.[43,44]**



Childsmile has integrated this concept into its programme, highlighting both downstream, targeted innovations and larger national level interventions for greater inequality impact.

Despite the efforts of Childsmile, and similar programmes to reduce inequalities in healthcare, it is obvious that it remains a pressing issue. The 2021/2022 NDIP report highlighted that 58.4% of P1 children in SIMD 1 presented with no obvious decay, while in SIMD 5 85.5% of P1 were not free of decay.[45] In the latest NDIP publication, it is evident that inequalities in healthcare still exist: 71.9% of P7 children living in SIMD 1 have no obvious decay experience whereas 88% of those living in SIMD 5 do.[46]

Economic evaluation

The cost effectiveness of the Childsmile programme is a large factor in its overall effectiveness. Although investment in the programme with training, toothbrush pack production, staff distribution and implementation can be costly, the overall goal is to cover expenses by long term savings from treatment avoidance and reducing decay in children through early interventions. In 2015, an article titled, 'Improving Child Oral Health: Cost analysis of a National Nursery Toothbrushing Programme' was published to discuss the NHS savings by avoiding extractions, fillings, and treatments through evidence-based interventions. The estimated cost of the nursery toothbrushing programme

in Scotland, requested from all Scottish Health Boards, was £1,762,621 per year. In 2001/2, the estimated dental treatment costs were shown to be £8,766,297. Following the implementation of toothbrushing programmes from Childsmile, dental costs dramatically decreased and in 2009/10, average dental costs were recorded to be £4,035,200, a 56% reduction.[44] Dental treatment costs have been shown to decrease over time and savings of over two and a half times the cost of the implementation of the programme were expected by the eight year.[47] The recent supporting healthy smiles publication from Childsmile and Care Inspectorate, a body ensuring care in Scotland is of high quality and standard, states that the Childsmile Toothbrushing Programme has been shown to save approximately £3 in dental treatment costs for every £1 spent on the programme.[48]

Sustainability

The Scottish Government released a plan for 'NHS Scotland climate emergency and sustainability strategy: 2022-2026' detailing how greenhouse gases can be reduced to create a greener planet while still delivering high standards of healthcare.[49] It highlights the impending climate crisis. The carbon cost of dental treatment is 40 times the cost of preventative measures.[50] With climate crisis looming, Childsmile adopted the Centre for Sustainable Healthcare (CSH) approach and their four 'Principles of sustainable clinical picture'. These are: prevention; patient self-care; lean service delivery; and low carbon alternatives.[51] Through this, Childsmile can adopt an approach that has sustainable value with a balance of the best outcome for the patient and environmental, social, and financial impacts.[52]

To further ensure Childsmile contributes to a greener Scotland, they have set sustainability aims: reduced staff travels and carbon footprint by using online platforms for meetings; monitoring and reviewing of equipment and supplies; and switching to lower carbon alternatives - 100% of Childsmile vehicles aim to be electric by 2025; and integrate Childsmile Recycle and Smile programme.[53]

'Recycle and Smile' was developed in collaboration by Childsmile, NHS National Services Scotland and a recycling contractor.[54] With the high distribution of toothbrushing packs, it is estimated that the National Supervised Toothbrushing Programme uses over 1 million toothbrushes and 178,000 toothpaste tubes annually.[55] These types of plastics can take up to 1000 years to decompose which, in theory isn't sustainable. However, Childsmile partner with participating schools and nurseries to salvage these plastics from the general waste bins to work towards a cleaner, greener, more sustainable Scotland. Toothbrushes and toothpaste tubes from the programme are collected by a Childsmile member and dropped at a local collection site where they are sterilised and recycled into playground equipment, garden planters and vehicle parts.

Hygiene poverty and food insecurity

With the UK cost-of-living crisis and the strain on NHS dentistry leading to more private healthcare, the inequality gap will only widen. Many families are suffering from 'hygiene poverty', and are unable to afford basic hygiene products.[56] Approximately 6.5% of the UK adult population are living in hygiene poverty and admit that dental hygiene products are not high on their priority list, when compared to other essentials.[57]

Additionally, low-income families also experience food insecurity. Fresh, unprocessed, nutritional food is typically perceived to be expensive. The consumption of cheaper highly processed food and drinks with high sugar content increases an individual's risk of dental decay and is more common in households who face food insecurity.[58] Foodbanks are experiencing increasing numbers of visitors as food insecurity rates increase: a 37% increase from 2022/2023.[59] Numbers will rise without help from Childsmile.[60] Food insecurity and hygiene poverty both play a role in poor health and disease in children and families in the UK and may be linked to the increase in dental caries, reinforcing the need for preventative programmes like Childsmile.

In summary

Childsmile is a complex set of evidence-based interventions based on preventative care aiming to improve the oral health of children and reduce inequalities in Scotland. The increased participation in programmes each year highlights the ongoing need and has created opportunities for families facing inequalities. Since implementation of Childsmile, there have been trends of decay reduction and with yearly inspections from NDIP, numbers will be continuously monitored. However, it is evident that inequalities still exist.

Although Childsmile cannot be the solution to reducing dental caries and inequality in Scotland, it is essential in the current UK climate where the inequality gap is ever increasing with widespread hygiene poverty and food insecurity. Preventative programmes such as Childsmile are vital for early detection of dental diseases, promoting healthy habits from a young impressionable age and is the most cost-effective and sustainable mode of action. However, it requires continuous evaluation to progress.

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