

The evidence statements: Oral health improvement approaches for local authorities and their partners

## The evidence statements

This document lists the evidence statements that support the recommendations in NICE's guideline on [Oral health improvement approaches for local authorities and their partners](#). For details of which evidence statements are linked to each recommendation, see section 9 of the guideline. Only evidence statements linked to a recommendation are listed in this document.

The evidence statements are short summaries of evidence in the reviews and report (see below). Each statement has a short code indicating which document it has come from and the number of the evidence statement in the document. For Reviews 1 and 2, **evidence statement 1.2** in the guideline, indicates that the statement is numbered 2 in review 1 and **evidence statement 2.2** in the guideline, indicates that the statement is numbered 2 in review 2.

Evidence statements in Report 1 are reported differently. Report 1 contains 6 'summary key findings' which are the equivalent of evidence statements. In the guideline, report 1 is coded as an **Expert Report (ER)** noted with the associated key summary statement. For example ER 1.4 in the guideline links to Report 1, 'summary key finding 4'. Both codes are included for each summary finding in this document (see page 43).

The evidence reviews and report are:

- Review 1: 'Evidence review 1: review of evidence of the effectiveness of community-based oral health improvement programmes and interventions (see page 3 of this document for the evidence statements)
- Review 2: 'Qualitative evidence review of barriers and facilitators to implementing community-based oral health improvement programmes and interventions' (see page 7 of this document for evidence statements)
- Report 1: An overview of oral health needs assessments, to support NICE Public Health Guidance "Oral health: local authority strategies to improve oral health, particularly among vulnerable groups"

(see page 8 this document for evidence statements, which are called 'summary key findings')

The reviews and report are available [online](#).

## **Review 1: ' Evidence review 1: review of evidence of the effectiveness of community-based oral health improvement programmes and interventions'**

### **Evidence Statement 2: Association between nursery based supervised tooth brushing programmes and dental caries at age 5**

Weak evidence from one interrupted time series study (UK<sup>1</sup>) suggests that a national daily supervised tooth brushing programme in nurseries that includes provision of fluoride toothpaste for home use is associated with significant improvements in oral health of five year old children at a population level, with a difference in mean  $d_3mft$  of -0.99 (95% CI -1.08 to -0.90)<sup>1</sup> over the 12 years following programme implementation. This reduction follows a trend of increasing caries prevalence in the decade prior to programme implementation (data not reported).

Significant reductions in dental caries were seen amongst the most deprived communities (Deprivation Categories 6 and 7 difference in mean  $d_3mft$ : -1.71, 95% CI -1.93 to -1.49)<sup>1</sup> as well as in the least deprived communities (Deprivation categories 1 and 2 difference in mean  $d_3mft$ : -0.43, 95% CI -0.60 to -0.25)<sup>1</sup>, suggesting that the programme may be effective at reducing absolute oral health inequalities in this age group.

<sup>1</sup> Macpherson et al. 2013 [++]

### **Evidence Statement 3: Association between nursery or school based oral health promotion and education programmes and dental decay among children under the age of five**

Weak evidence from one cluster RCT (US<sup>1</sup>) and two before and after studies (France<sup>2</sup>, Sweden<sup>3</sup>) suggests that nursery based oral health education and promotion programmes are not associated with improvements in oral hygiene, oral

health knowledge or dental decay status, but may prevent the worsening of caries amongst young children in deprived communities.

One study<sup>1</sup> found that a single, brief preschool based oral health education programme alone has no impact on the self-reported oral hygiene behaviours of five year old children (comparative statistics not reported)<sup>1</sup>. This study also found no programme effect on oral health knowledge, or attitudes toward oral hygiene, dentists or nutrition (comparative statistics not reported)<sup>1</sup>.

Another study<sup>2</sup> found no significant difference in mean caries levels amongst children from deprived areas who participated in a school based oral health education and brushing programme (mean (SD) dmft - before 1.47 (2.75) vs. after 1.44 (2.78); reported as NS, 95% CI and p-value NR)<sup>2</sup>, while children from non-participating schools in similarly deprived or semi-deprived areas had significant increases in mean dmft during the same time period (mean (SD) dmft – before 0.97 (2.42) vs. after 1.52 (2.83); 95% CI NR, p=0.04)<sup>2</sup>, suggesting that the programme was associated with preventing a worsening of tooth decay.

The third study<sup>3</sup> found that the percentage of caries free three year olds increased from 35% in the early 1970's, prior to the kindergarten based oral health education programmes implementation, up to 97% twenty years after implementation; no statistical analysis or associations were reported<sup>3</sup>.

<sup>1</sup> Grant et al. 2010 [-]

<sup>2</sup> Tubert-Jeannin et al. 2012 [+]

<sup>3</sup> Axelsson et al. 2005 [-]

**Evidence Statement 4: Effect of multi-component, community based oral health promotion programmes on dental caries and dental service access in children under the age of five**

Moderate evidence from two interrupted time series (UK<sup>1,2</sup>) describing similar programmes suggests that oral health promotion campaigns delivered through multiple venues and targeting several aspects of oral health may be associated with

a reduced risk of dental decay in children under the age of five living in deprived communities.

In the most deprived communities, the programme was associated with a dmft prevented fraction of 46%<sup>1</sup> among three year old children, and 37%<sup>1</sup> among four year old children.

Evidence from one study<sup>2</sup> suggests that a multi-component community wide intervention implemented in at risk areas is associated with significantly lower odds of experiencing tooth decay at age 5 in the most deprived areas (DepCat 7 d<sub>3</sub>mft>0: OR 0.35, 95% CI 0.26 to 0.47; p<0.001)<sup>2</sup> and across the wider population (DepCats 1-7 d<sub>3</sub>mft>0: OR 0.66, 95% CI 0.57 to 0.77; p<0.0001)<sup>2</sup>.

Neither programme was associated with significant differences in dental service utilisation, assessed either using the Care Index amongst three year olds (before: 1.5%, after: 1.9%; 95% CI and p-value NR)<sup>1</sup> or four year olds (before: 3.2%, after: 3.8%; 95% CI and p-value NR)<sup>1</sup>. The second study assessed restorative care utilisation using survey data and found no difference in use amongst children from the most deprived communities before versus after the programme implementation (no values reported)<sup>2</sup>.

<sup>1</sup> Blair et al. 2004 [+]

<sup>2</sup> Blair et al. 2006 [+]

**Evidence Statement 5: Association between community based oral health promotion and education programmes and the oral health and hygiene of young, low-income children**

Moderate evidence from one cohort study (US<sup>1</sup>) and one before and after study (Sweden<sup>2</sup>) suggests that community based oral health promotion and education programmes delivered to low-income mothers or parents of young children (aged 2) may be associated with preventing tooth decay over approximately one year.

One study [1]<sup>1</sup> found that oral health education counselling of low income mothers of 2 year old children, plus assignment to a dental care organisation to improve service access, was associated with a 48% increased likelihood of three year old children being caries free (RR 1.48, 95% CI 1.13 to 1.93)<sup>1</sup>, and a significantly lower mean (SD) dt (0.75 (2.5) vs. 1.6 (2.5); 95% CI NR, p=0.04)<sup>1</sup>, significantly fewer children exhibiting bleeding gums (before: 49.3%; vs. after: 39.1%, 95% CI NR, p<0.01) but had no impact on visible plaque amongst three year olds (statistics NR)<sup>1</sup>.

The second study [2]<sup>2</sup> found that provision of five education sessions, a toothbrush and discounted fluoride toothpaste to low-income parents at a community based outreach facility was associated with significantly increased likelihood of being caries free at age three (RR 2.5, 95% CI 1.8 to 3.4, NNT 4.6)<sup>2</sup>, with a significantly lower mean (SD) dt at age 3 (programme: 3.0 (NR) vs. comparator: 4.4 (NR); 95% CI NR, p<0.01)<sup>2</sup>, significant reductions in the percentage of parents reporting they did not brush their child's teeth daily (13.2% at age 2 to 5.6% at age 3, 95% CI NR, p<0.001; intervention vs. comparator at age 3 p<0.01)<sup>2</sup> and significant reductions in the percentage of parents reporting no use of fluoride toothpaste (7.5% at age 2 to 2.1% at age 3, 95% CI NR, p<0.001; intervention vs. comparator at age 3 not significant).

<sup>1</sup> Milgrom et al. 2010 [1]

<sup>2</sup> Wennhall et al. 2005 [2]

**Evidence Statement 6: Effect of oral health promotion and education programmes provided by home health visitors on the oral health and access to dental services of very young children**

Moderate evidence from one RCT (UK<sup>1</sup>), one non-randomised controlled trial (UK<sup>2</sup>) and one cohort study (UK<sup>3</sup>) suggests that oral health promotion and education programmes delivered by health visitors during early life home visits are no more effective than standard health visits at improving the oral health of children under the age of five, but may be associated with improvements in dental registration rates in deprived areas.

One study<sup>1</sup> found that an oral health education programme provided to parents during home health visits is no more effective than a usual health visitor programme (which also addressed oral health) at reducing caries amongst three year or five year olds (mean dmfs age 3: 2.03, 95% CI 1.39 to 2.67 vs. 2.19, 95% CI 1.41 to 2.97; age 5: 3.99, 95% CI 2.94 to 5.04 vs. 4.84, 95% CI 3.39 to 6.29)<sup>1</sup>.

A second study<sup>2</sup> reported a significant increase in the proportion of children aged 0 to 2 years who were registered with a dentist after the home visitor programme. However, discrepancies in the reported effect size and significance (mean difference: 4% (-8% to 0%),  $p < 0.05$ )<sup>2</sup> undermines the certainty of interpretation. No significant differences were found at longer term follow-up (aged three to five).

One observational study<sup>3</sup> found that intensive home visits addressing general as well as oral health to be significantly associated with improved dental registration rates amongst young children in disadvantaged communities (adjusted OR 2.60, 95% CI NR;  $p < 0.001$ )<sup>3</sup>.

<sup>1</sup> Whittle et al. 2008 [+]

<sup>2</sup> Yuan et al. 2007 [+]

<sup>3</sup> Shute and Judge 2005 [-]

### **Evidence Statement 8: Effectiveness of school based fluoride varnish interventions at preventing dental caries among primary and secondary school students**

Moderate evidence from one RCT (Sweden<sup>1</sup>), two cluster RCTs (Germany<sup>2</sup>, UK<sup>3</sup>) and one interrupted time series (Germany<sup>4</sup>) suggests that school based fluoride varnish programmes can be effective at preventing or reducing enamel caries amongst children in deprived or at risk communities, but are less effective amongst children in non-deprived or low risk areas.

One study<sup>1</sup> found that more frequent application schedules (once a month for 8 months during the school year) confers the largest benefit, with a prevented fraction of incident approximal caries in the permanent dentition of 76% across the general student population and 82% to 83% amongst students from low-medium income communities with no access to fluoridated water, but not effective amongst children from high income communities with access to fluoridated water<sup>1</sup>.

Evidence regarding biannual school based fluoride application programmes was inconsistent, with one study<sup>1</sup> suggesting that such a programme is effective at reducing incident caries of the approximal surfaces in secondary school students (prevented fraction 57%, significant at  $p < 0.001$ )<sup>1</sup>. This study found differential effects of the biannual fluoride varnish schedule, with no significant impact seen amongst children from low risk communities, and a prevented fraction of 66% to 69% in low-medium income areas with no fluoridated water<sup>1</sup>.

Two studies<sup>2,3</sup> found that biannual fluoride varnish application was not effective at reducing mean caries levels in the first permanent molars in an area with low caries prevalence (0.81 (SD 1.74) vs. 0.78 (SD 1.81); 95% CI and p-value NR) at reducing mean caries increment for more advanced lesions in the primary dentition (mean  $d_3fs$  increment difference: 0.01 (SE 0.18), 95% CI -0.34 to 0.37; mean  $d_2fs$  increment difference: 0.28 (SE 0.20); 95% CI -0.12 to 0.67)<sup>3</sup>. The third study<sup>3</sup> was effective at reducing the mean increment of  $d_1fs$  lesions (mean difference: 0.28 (SE 0.20); 95% CI -0.12 to 0.67, significant at  $p = 0.03$ )<sup>3</sup>.

The final study<sup>4</sup> found that four years after the addition of a biannual fluoride varnish programme to existing health promotion efforts, there was a 42% reduction in mean DMFT amongst nine year olds in an underprivileged community, and a 40.7% reduction in mean DMFT amongst 12 year olds, however, no significance tests were reported.<sup>4</sup>

<sup>1</sup> Moberg et al. 2005 [++]

<sup>2</sup> Splieth et al. 2011 [-]

<sup>3</sup> Hardman et al. 2007 [ + ]

<sup>4</sup> Dohnke-Hohrmann and Zimmer 2004 [-]

### **Evidence Statement 11: The effect of school based daily supervised tooth brushing on the oral health and hygiene of primary school children**

There is moderate evidence from three cluster RCTs (2 UK<sup>1,2</sup> and 1 Australia<sup>3</sup>) to suggest that daily, school based, teacher supervised tooth brushing with 1,000 to 1,450ppm fluoride toothpaste may reduce dental decay among primary school children and weak evidence from one cluster RCT (The Netherlands<sup>4</sup>) to suggest that such programmes may improve oral hygiene in the short but not long term.

One study<sup>1</sup> using 1,450ppm fluoride toothpaste showed an overall reduction in incident dmfs/DMFS: mean difference -0.32, 10.9% reduction (95% CI NR,  $p < 0.001$ )<sup>1</sup>. When disaggregated by dentition type, the reduced incidence was significant only in deciduous teeth (mean difference 0.33, % reduction NR); 95% CI NR,  $p < 0.001$ )<sup>1</sup> while no significant difference was seen in the permanent dentition (reported as non-significant, values NR)<sup>1</sup>. A greater effect was seen amongst children with caries at baseline (mean difference -1.39 (-30.0%); 95% CI NR;  $p < 0.001$ )<sup>1</sup>.

Another study<sup>2</sup> using 1,000ppm fluoride toothpaste found a reduction in D<sub>3</sub>FS of the first permanent molars by 39% (95% CI NR;  $p = 0.002$ )<sup>2</sup> among children in a relatively deprived area.

Another study<sup>3</sup> found that daily supervised tooth brushing with a low fluoride toothpaste (specific content not reported) had no significant effect on 3 year caries incidence (D<sub>3</sub>MFS) in teeth that were caries free at age 5 (difference and 95% CI NR,  $p = 0.256$ )<sup>3</sup>.

One study<sup>4</sup> found significant improvements in mean brushing frequency during the course of the programme and immediately thereafter (effect size and 95% CI NR;  $p < 0.001$ )<sup>4</sup>, but this effect was not maintained one year after the end of the programme (effect size and 95% CI NR;  $p = 0.45$ )<sup>4</sup>. The intervention had no effect on attitudes towards toothbrushing (one year effect size and 95% CI NR;  $p = 0.59$ )<sup>4</sup>.

<sup>1</sup> Jackson et al. 2005 [+]

<sup>2</sup> Pine et al. 2007 [+]

<sup>3</sup> Burnett et al. 2005 [-]

<sup>4</sup> Wind et al. 2005 [-]

### **Evidence Statement 12: The association between multi-component school based interventions and the oral health of primary school children**

There is inconsistent evidence from one cohort study (US<sup>1</sup>) and two before and after studies (US<sup>2</sup>, Sweden<sup>3</sup>) regarding the association between multi-component school based oral health programmes, which include the provision of preventive services (e.g. pit and fissure sealants) and dental caries in primary school students.

One cohort study<sup>1</sup> found that caries incidence was significantly higher in the comparator group vs. the programme group in both the primary and permanent dentition (dfs OR 2.00, 95% CI 1.31 to 3.06; DFS OR: 2.20, 95% CI 1.38 to 3.48)<sup>1</sup>. The greatest benefit was seen for the occlusal surfaces of the primary (OR: 2.46, 95% CI 1.58 to 3.82)<sup>1</sup> and permanent dentition (OR: 2.78, 95% CI 1.70 to 4.56)<sup>1</sup>.

A second study<sup>2</sup> found that overall, the preventive programme was associated with a significantly higher mean percent of erupted first molars with decay (adjusted DMFT difference: 3.02% (1.24 to 4.80),  $p < 0.05$ )<sup>2</sup> which may be attributable to low uptake of sealant services, as only 18% of eligible students received sealants. When assessed according to sealant status, there was a significantly lower percentage of decayed first molars amongst eligible children who had received sealants vs. those who did not (difference: -4.6%, 95% CI -7.9% to -1.3%;  $p < 0.05$ )<sup>2</sup>, suggesting that efforts should be made to ensure adequate uptake of school based pit and fissure sealant services if such programmes are to have an effect.

The third study<sup>3</sup> reported reductions in mean DFS and mean DS amongst 7, 12 and 19 years olds from the early 1970's, prior to programme implementation, to 1993; neither statistical analysis nor information on secular trends was reported<sup>3</sup>.

<sup>1</sup> Niederman et al. 2008 [-]

<sup>2</sup> Bodner and Pulos. 2010 [++]

<sup>3</sup> Axelsson et al. 2005 [-]

**Evidence Statement 13: The effect of health promotion programmes addressing common risk factors on the oral health and related behaviours of school children**

Inconsistent evidence was identified from two cluster non-randomised trials (UK<sup>1</sup>, Sweden<sup>2</sup>) and one ecological study (Canada<sup>3</sup>) regarding the effectiveness of school based programmes that address common risk factors on oral health outcomes.

One study<sup>1</sup> that focused on altering the school environment in order to promote healthy school based eating, resulted in no effect on tooth decay ( $D_{3cv}MFT$ ) amongst school children (effect size not reported)<sup>1</sup>. When considering obvious dentine decay on its own ( $D_{3cv}T$ ), there was a significant effect favouring the control group, with attendance at non-programme schools associated with significantly lower levels of visibly cavitated teeth ( $\beta$  (SE): -0.31 (0.15); 95% CI NR,  $p < 0.05$ )<sup>1</sup>.

Another study<sup>3</sup>, assessing of "Healthy Schools", which altered the school environment to promote general health, reported that voluntarily participating schools had a significantly lower mean percentage of children with two or more decayed deciduous or permanent teeth (effect size not reported,  $p = 0.007$ )<sup>3</sup>; subgroup analysis revealed this relationship to be significant in low- but not high-income schools (data not reported)<sup>3</sup>.

Another study<sup>2</sup> reported that a school based tobacco education programme delivered by dental professionals had no impact on the tobacco using behaviours of secondary school students, however, no statistical analysis was reported<sup>2</sup>.

<sup>1</sup> Freeman and Oliver 2009 [-]

<sup>2</sup> Hedman et al. 2010 [-]

<sup>3</sup> Muirhead and Lawrence 2011 [+]

#### **Evidence Statement 14: The effect of school based oral health education programmes on dental decay amongst school aged children**

There is moderate evidence from one cluster RCT (Belgium<sup>1</sup>), one cross sectional study (Germany<sup>3</sup>), and one before and after study (The Netherlands<sup>4</sup>) to suggest that oral health education programmes may improve plaque and gingival health, and when combined with fluoride provision are associated with reduced tooth decay amongst primary school children.

One study<sup>1</sup> found that an oral health education programme resulted in no difference in the prevalence of decay (DMFT prevalence difference: 0.61%; 95% CI NR;  $p=0.76$ )<sup>1</sup> and had no effect on average decay levels (mean (SEM) DMFT: 0.92 (0.02) vs. 1.0 (0.06); 95% CI NR,  $p=0.49$ ; mean (SEM) DMFS: 1.46 (0.04) vs. 1.59 (0.10), 95% CI NR,  $p=0.31$ )<sup>1</sup>.

The study<sup>1</sup> also reported a significant reduction in the Plaque Index of the buccal surfaces (-0.05, 95% CI -0.007 to -0.09;  $p=0.02$ )<sup>1</sup>, but no significant difference in the Plaque Index of the occlusal surfaces (no comparative statistics reported)<sup>1</sup>.

Significant improvement in gingival health also reported (mean (SEM) SBI scores: 0.21 (0.003) vs. 0.29 (0.02), 95% CI NR,  $p<0.001$ )<sup>1</sup>. However, significant differences between the groups already existed at the beginning of the study; whether these baseline differences were controlled for during analysis was not reported. Another study<sup>2</sup> found that a six year, intensive school oral health promotion programme, which included weekly fluoride varnish applications, was associated with significant increases in the proportion of children who were caries free at age 12 versus children from non-participating schools (73% vs. 41%; reported as significant, 95% CI and  $p$ -value)<sup>2</sup>. Significant reduction in average decay levels (mean (SD) ICDAS D<sub>5,6</sub>MFT: 0.50 (NR) vs. 0.77 (NR); 95% CI NR,  $p=0.043$ )<sup>2</sup> and oral health inequalities (severity of caries index (SiC) score – programme: 0.96 (SD NR), comparator: 1.46 (SD NR); 95% CI NR,  $p<0.005$ )<sup>2</sup> were observed as well.

A third study<sup>3</sup> that included an educational packet focusing on oral health, school based teeth brushing lessons and weekly fluoride mouth rinsing was associated with

significantly lower decay levels at age 12 (mean (SD) DMFS (0.5 (NR) vs. 2.0 (NR); reported as significant, 95% CI and p-value NR)<sup>3</sup>.

<sup>1</sup> Vanobbergen et al. 2004 [-]

<sup>2</sup> Pieper et al. 2012 [+]

<sup>3</sup> Pieterse et al. 2006 [+]

### **Evidence Statement 15: The effect/association of school based oral health education programmes on oral hygiene amongst school aged children**

Moderate evidence from two cluster RCTs (Belgium<sup>1</sup>, Ireland and UK<sup>2</sup>) and two before and after studies (Israel<sup>4</sup>, The Netherlands<sup>7</sup>) suggests that oral health education alone is insufficient to alter the tooth brushing behaviours of school children, but that the provision of oral hygiene supplies (e.g. toothbrushes, toothpaste) may be associated with improved oral hygiene.

One oral health education only programme<sup>1</sup> resulted in no significant difference in the proportion of students reported to not brush every day in intervention vs. comparator groups (8.4% vs. 7.0%; 95% CI NR,  $p=0.27$ )<sup>1</sup>, or in regular use of dental floss (6% vs. 7%; 95% CI NR,  $p=0.71$ )<sup>1</sup>. This study did find small but statistically significant differences in use of fluoride toothpaste, with intervention groups having higher use (88% vs. 86%, 95% CI NR,  $p<0.05$ )<sup>1</sup>.

Another intervention study<sup>2</sup> found that children who received an oral health promotion and education programme without coinciding provision of toothbrush and fluoride toothpaste had significantly decreased salivary fluoride levels over the course of a year, with higher fluoride levels taken to be indicative of regular toothbrushing with fluoride toothpaste (values and 95% CI NR;  $p=0.0001$ )<sup>2</sup>. A separate arm in this trial that also provided free fluoridated toothpaste and toothbrush for a year was found to significantly improve tooth brushing behaviour, as measured by salivary fluoride levels (0.024 (SD NR) vs. 0.019 (SD NR); 95% CI NR;  $p<0.0001$ )<sup>2</sup>.

Another study<sup>3</sup> reported significant increases in the percentage of children brushing twice a day after implementation of an oral health education programme plus provision of oral hygiene supplies and tutoring on oral hygiene skills (32.8% vs. 97.4%; 95% CI NR,  $p < 0.0001$ )<sup>3</sup>, as well as corresponding reductions in the percentage of children brushing once per day after programme implementation (67.2% vs. 12.6%; 95% CI NR,  $p < 0.0001$ )<sup>3</sup>.

Another study<sup>4</sup> included oral health education, fluoride mouth rinsing and oral hygiene demonstrations, and was associated with no difference in proportion of children who reported brushing their teeth at least twice per day before and after the intervention implementation (62% vs. 79%; reported as NS, 95% CI and p-value NR)<sup>4</sup> or between participating and non-participating schools after the programme's implementation (79% vs. 84%; reported as NS, 95% CI and p-value NR)<sup>4</sup>.

<sup>1</sup> Vanobbergen et al. 2004 [-]

<sup>2</sup> Dental Health Foundation 2007 [+]

<sup>3</sup> Livny et al. 2008 [+]

<sup>4</sup> Pieterse et al. 2006 [+]

### **Evidence Statement 16: The effect/association of school based oral health education programmes on dental access, diet and oral health knowledge and attitudes among school aged children**

Weak evidence from two cluster RCTs (Belgium<sup>1</sup>, Ireland and UK<sup>2</sup>) and one before and after study (Israel<sup>3</sup>) suggests that school based oral health education programmes may be associated with improved access to restorative dental services, and improvements in oral health related diet and knowledge among school aged children.

One intervention study<sup>1</sup> found that an annual, one hour school based oral health education programme was effective at improving restorative dental service utilisation amongst school children, as assessed by the Restoration Index (mean (SEM) Restoration Index (F/DF): 0.80 (0.01) vs. 0.73 (0.02); 95% CI NR,  $p < 0.01$ )<sup>1</sup>, however, there was no difference in the proportion of students reporting that their last visit to

the dentist was more than six months ago (intervention: 67.0%, comparator: 66.6%, 95% CI NR,  $p=0.11$ )<sup>1</sup>. The programme was also associated with significant reductions in the proportion of children eating more than 2 between-meal snacks, as reported by parents (29.9% vs. 36.9%, difference: -7%, 95% CI NR;  $p<0.001$ )<sup>1</sup>.

Another study<sup>3</sup> reported no changes in the percentage of children bringing sandwiches with sweetened spreads to school (before: 37.7%, after: 33.2%; 95% CI NR,  $p=NS$ )<sup>3</sup>, but was associated with a significant reduction in the percentage of students bringing sweetened soft drinks to school (before: 22.4%, after: 13.3%; 95% CI NR,  $p=0.01$ )<sup>3</sup>.

Another study<sup>2</sup> found that an oral health education programme was effective at improving student knowledge of tooth brushing and toothpaste (group values and 95% CI NR;  $p=0.02$ )<sup>2</sup>, total snack knowledge (group values and 95% CI NR;  $p=0.009$ )<sup>2</sup> and safer snack knowledge (group values and 95% CI NR;  $p=0.004$ )<sup>2</sup>.

<sup>1</sup> Vanobbergen et al. 2004 [-]

<sup>2</sup> Dental Health Foundation 2007 [+]

<sup>3</sup> Livny et al. 2008 [+]

### **Evidence Statement 18: The effect of community based oral health education programmes on plaque and gingival health of school aged children**

Weak evidence from two before and after studies (US<sup>1,2</sup>) describing similar programmes suggests that community centre based oral health promotion and education programmes that include provision of oral hygiene supplies (e.g. toothbrush and fluoride toothpaste) may be associated with improvements in plaque scores, gingival health and oral health knowledge

The two studies<sup>1,2</sup> assessed the same programme delivered at community based children's clubs in two different cities and reported reductions in Plaque Index ranging from 0.09 units (-3%; 95% CI NR;  $p<0.044$ )<sup>2</sup> to 1.12 units (-29%; 95% CI NR;

p<0.001)<sup>1</sup> after four weeks, with the higher percent reduction exhibited in the community with higher plaque levels at baseline.

Both programmes were associated with a significant reduction in Gingival Index scores, ranging from 0.044 units (-24%; 95% CI NR; p<0.001)<sup>2</sup> to 0.19 units (-51%; 95% CI NR; p<0.001)<sup>1</sup>; as with the Plaque Index, there were higher baseline Gingival Index values in the study with the higher percent reduction<sup>1</sup>.

One of the studies<sup>2</sup> reported significant improvements in overall oral health and hygiene knowledge amongst school aged children, with significant increases in the proportion of children answering five oral health questions correctly after the programme (37% vs. 70%; 95% CI NR, p<0.001)<sup>2</sup>.

The other study<sup>1</sup> reported mixed results, with no improvements in knowledge of plaque (82% vs. 85%, reported as NS)<sup>1</sup>, recommended brushing frequency (82% vs. 85%, reported as NS)<sup>1</sup> or healthy foods (75% vs. 81%, reported as NS)<sup>1</sup>, but significant improvements in knowledge of recommended brushing duration (51% vs. 69%; 95% CI NR, p<0.05)<sup>1</sup> and recommended dental visit frequency (64% vs. 81%; 95% CI NR; p<0.05)<sup>1</sup>.

<sup>1</sup> Biesbrock et al. 2003 [+]

<sup>2</sup> Biesbrock et al. 2004 [+]

**Evidence Statement 19: The effect of home visits to low income families by community based care coordinators or facilitators on dental service access amongst low income school children**

There is weak evidence from one RCT (US<sup>1</sup>) and one before and after study (Canada<sup>2</sup>) to suggest that intensive home visits by care facilitators or coordinators may improve access to<sup>2</sup> and use of<sup>1</sup> dental services among low income children eligible for government funded dental care. No effect sizes were reported in either study.

<sup>1</sup> Binkley et al. 2010 [+]

<sup>2</sup> Harrison et al. 2003 [-]

**Evidence Statement 20: The association between participation in work based oral health promotion programmes and oral health among adults**

There is weak evidence based on a within group analysis of an RCT (Japan<sup>1</sup>) and a cross sectional study (Japan<sup>2</sup>) to suggest that work based oral health education and promotion programmes may be associated with improved oral health amongst employed adults.

The first study<sup>1</sup> reported significant improvements in periodontal and gingival inflammation in a group of employees participating in a web-based periodontal education programme, measures on which the control group saw no improvement (no values reported)<sup>1</sup>.

The second study<sup>2</sup> reported significant associations between attending three annual work based oral health education sessions and lower DMFT and improved periodontal health amongst both men and women (comparative statistics not reported)<sup>2</sup>.

<sup>1</sup> Ojima et al. 2003 [-]

<sup>2</sup> Morishita et al. 2003 [+]

**Evidence Statement 21: The effect of oral health interventions and promotion programmes on the oral health, oral hygiene and knowledge of elderly populations**

Weak evidence from one RCT (UK<sup>1</sup>) and two cluster non-randomised controlled trials (Australia<sup>2,3</sup>) suggests that oral health interventions and education programmes

may be effective at improving flossing behaviour, gingival health, dental attendance and knowledge amongst elderly individuals, but has no impact on tooth decay, brushing habits, or plaque levels in this population.

One study<sup>1</sup> found that a six month xylitol chewing gum intervention had no significant effect on tooth decay levels amongst individuals over the age of 60, but did lead to significant improvements in plaque levels and gingival health (effect sizes not reported,  $p < 0.001$  for both comparisons)<sup>1</sup>.

One study<sup>2</sup> found that a community based health education and promotion programme delivered at social clubs amongst elderly migrant populations led to significant improvements in flossing, although effects varied with ethnicity (Greek clubs: OR 13.33, 95% CI 5.64 to 31.58; Italian clubs: OR 5.16, 95% CI 2.32 to 11.51)<sup>2</sup>. The programme had no effect on toothbrushing behaviours in either group.

In terms of dental access, the programme<sup>2</sup> had no significant effect on dental attendance amongst participants from Greek social clubs (OR 0.77, 95% CI and  $p$ -value NR)<sup>2</sup>, while significant increases in attendance were reported amongst older community dwelling Italian migrants (OR 1.82, 95% CI 1.01 to 3.35)<sup>2</sup>. Finally, the study reported significant improvements in caries knowledge ( $\beta$  1.32 (SE 0.46);  $p < 0.01$ ), periodontal health knowledge ( $\beta$  2.07 (SE 0.36);  $p < 0.001$ ) and oral cancer knowledge ( $\beta$  5.47 (SE 0.69);  $p < 0.001$ ) amongst older Greek migrant populations, while significant associations were seen in periodontal ( $\beta$  0.49 (SE 0.25);  $p < 0.05$ ) and oral cancer knowledge ( $\beta$  0.96 (SE 0.45);  $p < 0.05$ ) amongst older Italian migrant populations<sup>2</sup>.

Another study<sup>3</sup> found that an oral health promotion and education programme at community based social clubs had no significant effect on plaque levels, but did lead to significant improvements in gingival health amongst elderly migrants in Australia (effect size not reported,  $p < 0.01$ )<sup>3</sup>. The programme also had no significant effect on regular toothbrushing (values not reported)<sup>3</sup>, but did find significant differences in daily flossing behaviour (values not reported)<sup>3</sup>.

<sup>1</sup> Al-Haboubi et al. 2012 [+]

<sup>2</sup> Marino et al. 2004 [-]

<sup>3</sup> Marino et al. 2013 [-]

**Evidence Statement 22: The effect of oral health interventions and promotion programmes on the oral health and dental service access of homeless or formerly homeless individuals**

There is weak evidence from one RCT (US<sup>1</sup>) and one before and after study (US<sup>2</sup>) suggesting that oral health programmes amongst the homeless or formerly homeless may reduce perceived barriers to access of dental services, but may not improve utilisation of such services.

One shelter based study<sup>2</sup> found that a simple oral health programme that includes providing mothers with the contact information for local dentists as well as with access to a telephone in order to make an appointment for their children is associated with significantly reduced perceived barriers to dental care (mean (SD) ABC scores: 45.00 (15.98) vs. 37.95 (12.60); 95% CI NR; p<0.001)<sup>2</sup>.

A second study<sup>1</sup> found that a broad health promotion and provision programme amongst the formerly homeless had no significant effect on dental service utilisation after six months (adjusted OR 0.541, 95% CI 0.265 to 1.105; p=0.092)<sup>1</sup> or 18 months (adjusted OR 0.882, 95% CI 0.435 to 1.788, p=0.727)<sup>1</sup>. Nor was any effect seen in terms of dental decay after six months (values NR, p=0.36)<sup>1</sup> or 18 months (values NR, p=0.75)<sup>1</sup>.

<sup>1</sup> Ciaranello et al. 2006 [+]

<sup>2</sup> DiMarco et al. 2010 [-]

**Evidence Statement 24: The effect of community based oral health promotion and prevention programmes on dental decay and gingival health of Indigenous populations**

Inconsistent evidence from one cluster RCT with results reported in three separate publications (Australia<sup>1,2,3</sup>), one non-randomised controlled trial (US<sup>4</sup>) and one before and after study (Canada<sup>5</sup>) was identified regarding the effect of community based oral health promotion programmes on the oral health of children in Indigenous communities.

One study<sup>1</sup> suggested that a multi-component oral health promotion programme that includes fluoride varnish applications may be effective at reducing tooth decay (adjusted d<sub>3</sub>mfs increment: -3.5 (-5.1 to -1.9); prevented fraction 36%)<sup>1</sup>.

Another publication<sup>2</sup> for the same study found a significant reduction in two year d<sub>3</sub>mfs cumulative incidence (RR 0.75, 95% CI 0.71 to 0.80)<sup>2</sup>; the reduction was significant among surfaces that were sound at the start of the study (RR: 0.73, 95% CI 0.69 to 0.79)<sup>2</sup> and those that were considered opaque at baseline (RR: 0.77, 95% CI 0.65 to 0.92)<sup>2</sup>, but not among hypoplastic surfaces (RR: 0.90, 95% CI 0.75 to 1.08)<sup>2</sup> or precavitated surfaces (RR: 0.92, 95% CI 0.74 to 1.15)<sup>2</sup>.

A third publication<sup>3</sup> found that the same programme had no effect on Gingival Index scores (0.48 (SD 1.15) vs. 0.54 (SD 1.22); 95% CI NR, p=0.56)<sup>3</sup>.

Another study<sup>4</sup> of a 12 month community- and family-level nutrition programme focussing on breastfeeding and the consumption of sweetened beverages reported significant reductions in cavitated enamel (d<sub>2</sub>) and incipient enamel (d<sub>1</sub>) lesion prevalence in three communities after accounting for secular trends in similar communities; the association ranged from a reduction in d<sub>2</sub> lesions of 0.342 to 0.440 (significant at p≤0.032)<sup>4</sup>, and 0.300 to 0.631 in d<sub>1</sub> lesions (significant at p≤0.059 and p=0.013, respectively)<sup>4</sup>.

Another study<sup>5</sup> found no significant difference in the proportion of children who were caries free before and after the implementation of a three year, school based oral health education and promotion programme, which included the provision of fluoride (8%, after: 30%; reported as NS; 95% CI and p-value NR)<sup>5</sup>. The programme was associated with significant reductions in average decay levels in the permanent but not primary dentition (DMFT: 5.5 (SD 6.2) vs. 6.1 (8.5); 95% CI NR, p<0.05. dmft: 20.1 (SD 18.2) vs. 20.4 (SD 19.2); reported as NS, 95% CI and p-value NR)<sup>5</sup>.

<sup>1</sup> Slade et al. 2011 [++]

<sup>2</sup> Divaris et al. 2013 [+]

<sup>3</sup> Roberts et al. 2010 [+]

<sup>4</sup> Maupome et al. 2012 [-]

<sup>5</sup> Macnab et al. 2007 [-]

**Evidence Statement 25: The effect of community based oral health promotion and prevention programmes on oral hygiene and dietary behaviours, and dental service utilisation amongst children in Indigenous communities**

Inconsistent evidence from one cluster RCT (Australia<sup>1</sup>) and one before and after study (Canada<sup>2</sup>) was identified regarding the effect of community based oral health promotion programmes on the oral health of children in Indigenous communities.

One study<sup>1</sup> reported that after two years of a multi-component oral health promotion programme, there was no difference in the percentage of children reported to have brushed their teeth on the previous day between programme and control communities (40.5% vs. 40.2%; 95% CI NR,  $p=1.00$ )<sup>1</sup>, and was associated with a worsening of sugary drink consumption amongst children, compared to control group communities at the end of the two year programme (61.5% vs. 52.5%; 95% CI NR,  $p=0.03$ )<sup>1</sup>.

Another study<sup>2</sup> reported that participation in a school based oral health education and promotion programme, which included a supervised toothbrushing component, was associated with a significant reduction in the percentage of children reported to brush their teeth at home each day (95% vs. 75%; 95% CI NR,  $p=0.01$ )<sup>2</sup> and associated with significantly higher percentage of children brushing their teeth each day at school (0% vs. 100%; 95% CI NR,  $p<0.0001$ )<sup>2</sup>.

The programme was also associated with an increase in the proportion of children reported to eat confectionary fewer than three times per week (9% vs. 63%, 95% CI NR,  $p<0.0001$ )<sup>2</sup> and an increase in the percentage of children reported to consume

sugary drinks fewer than three times per week after the programme implementation than before (19%, after: 58%; 95% CI NR,  $p=0.0002$ )<sup>2</sup>.

The second study<sup>2</sup> also suggests that participation in a school based oral health promotion programme is associated with an increased percentage of children reporting to have visited the dentist each year (76%, after: 100%; 95% CI NR,  $p=0.002$ )<sup>2</sup>.

<sup>1</sup> Roberts et al. 2010 [+]

<sup>2</sup> Macnab et al. 2007 [-]

## **Review 2: ‘Qualitative evidence review of barriers and facilitators to implementing community-based oral health improvement programmes and interventions’**

### **Evidence statement 1: funding.**

Evidence from 8 studies showed that funding can act as either a barrier or a facilitator to the implementation of oral health interventions or programmes.

Four studies (1 [+] UK<sup>1</sup>, 2 [-] US<sup>2,3</sup> and 1 [-] Australian<sup>4</sup>) reported consistent views that adequate and sustainable funding facilitated the implementation and development of their respective programmes, whereas 3 studies (1 [++] UK<sup>5</sup>, 1 [+] Republic of Ireland<sup>6</sup> and 1 [-] US<sup>7</sup>) reported that a lack of funding and/or unsustainable funding had acted as a barrier, or potential barrier, to implementation.

The authors’ of 1 (+) US<sup>8</sup> study noted that participants’ did not identify funding as one of the barriers they encountered.

<sup>1</sup> Blenkinsopp et al. 2002 (+)

<sup>2</sup> Diamond et al. 2003 (-)

<sup>3</sup> Douglass et al. 2005 (-)

<sup>4</sup> Burchell et al. 2006 (-)

<sup>5</sup> Yusuf et al. 2012 (++)

<sup>6</sup> Owens 2011a (+)

<sup>7</sup> Wolfe and Huebner 2004 (-)

<sup>8</sup> Prokhorov et al. 2002 (+)

**Evidence statement 2: policies.**

Evidence from 4 studies showed that institutional, local and national policies can act as either barriers or facilitators to the implementation of oral health interventions or programmes.

Two studies (1 [-] US<sup>1</sup> and 1 [++] UK<sup>2</sup>) identified university funding and reward structures, and dental payment contracts, as specific policies that had acted as barriers to implementation. Both examples were linked to policies creating a lack of financial incentive to participate in community based oral health programmes. See Evidence Statement 1 for funding related barriers and facilitators. A third (-) Australian study<sup>3</sup> reported that institutionalising new oral health procedures had improved the professional practice of nurses involved in an early childhood oral health programme. A fourth (++) UK study<sup>4</sup> reported differences of opinion on whether having local and national policies prioritising oral health had facilitated the incorporation of oral health into existing Healthy School programmes.

<sup>1</sup> Diamond et al. 2003 (-)

<sup>2</sup> Yusuf et al. 2012 (++)

<sup>3</sup> Maher et al. 2012 (-)

<sup>4</sup> Stokes et al. 2009 (++)

**Evidence statement 3: perceived need for the intervention or programme.**

Evidence from 8 studies showed that issues of perceived need can act as barriers to the implementation of oral health interventions and programmes. This theme had close links with perceived benefit, see Evidence Statement 4.

Five studies (3 [+] UK<sup>1,2,3</sup>, 1 [-] UK<sup>4</sup> and 1 [++] UK<sup>5</sup>) reported barriers relating to how oral health was perceived as a low priority for many service users with complex and competing life pressures; for example, people who are homeless, or parents or carers of children with disabilities. The studies described how, against a backdrop of other, often more immediate and competing life problems, oral health was a low and non-urgent priority for many. This made it difficult for intervention staff to engage service users in issues of oral health. They suggested the aims and timing of oral health interventions should fully acknowledge the life circumstances of the service users in order to be realistic and appropriate.

Reluctance of some intervention staff to provide oral health advice to service users was also reported in 3 studies (1 [+] UK<sup>6</sup>, 1 [-] Australia<sup>7</sup> and 1 [-] US<sup>8</sup>). Reasons were not explored in depth but included apprehension that the advice would not be well received, the feeling they were interfering with people's lives, or that they might alienate the service users.

Health professionals in 1 (++) UK study<sup>5</sup> reported a parental perception that their child was too young to go to the dentist was a barrier to registering some young children with a dentist; one of the aims of the oral health programme in question.

<sup>1</sup> Coles et al. 2012 (+)

<sup>2</sup> Owens 2011a (+)

<sup>3</sup> Owens 2011b (+)

<sup>4</sup> Macpherson et al. 2010 (-)

<sup>5</sup> Holme et al. 2009 (++)

<sup>6</sup> Blenkinsopp et al. 2002 (+)

<sup>7</sup> Maher et al. 2012 (-)

<sup>8</sup> Wolfe and Huebner 2004 (-)

**Evidence statement 4: perceived benefit of the intervention or programme.**

Evidence from 4 studies showed how a lack of perceived benefit among service users can act as a barrier to implementation, whereas a perceived benefit can facilitate implementation.

One (++) UK study<sup>1</sup> reported how a parental perception that oral health was important had acted as a facilitator for registering their children with a dentist, a specific aim of the oral health programme in question. This was consistent with evidence from 3 studies (1[++] UK<sup>1</sup> and 2 [+] UK<sup>2,3</sup>) reporting how a lack of perceived benefit meant oral health was a low priority for many service users relative to other competing life pressures. This had caused engagement barriers between staff and service users during implementation. The low prioritisation of oral health was consistent and closely linked to Evidence Statement 3 on perceived need.

Two studies (1[++] UK<sup>1</sup> and 1 [-] US<sup>4</sup>) reported additional barriers. One (++) UK study<sup>1</sup> reported some parents expected more than talking when attending preventative oral health sessions for their children. They reported they could not see the point of attending multiple sessions without anyone looking inside their child's mouth. The second, a (-) US study<sup>4</sup>, reported that oral health care was not perceived to be beneficial by a group of pregnant Alaskan native women and that they did not perceive dental care during pregnancy to be safe. While not directly relevant to the UK it highlights the possibility that oral health may not necessarily be perceived as beneficial or understood to be safe in all communities.

<sup>1</sup> Holme et al. 2009 (++)

<sup>2</sup> Owens 2011a (+)

<sup>3</sup> Coles et al. 2012 (+)

<sup>4</sup> Riedy 2010 (-)

**Evidence statement 5: self-efficacy.**

Six studies provided evidence on barriers or facilitators relating to self-efficacy, described as the extent to which service providers feel they will be able to do what is expected within the oral health intervention or programme.

The views in 2 studies reported how a level of self-efficacy had acted as a facilitator to implementing their respective interventions (1 [+] UK<sup>1</sup> and 1 [+] US<sup>2</sup>). This included staff feeling more confident and empowered to introduce and tailor oral health advice to their service users as a result of the intervention training, and that increased self-efficacy was associated with engaging in more oral health related activities towards both parents and children.

The views expressed in 4 studies reported how a lack of self-efficacy amongst oral health intervention or programme staff could act as a barrier to implementation across a range of interventions (1 [-] Australia<sup>3</sup>, 1 [+] Republic of Ireland<sup>4</sup>, 1 [+] US<sup>5</sup> and 1 [+] UK<sup>6</sup>). Where described lack of self-efficacy was attributed to: role ambiguity; lacking knowledge about oral health; not feeling confident to deliver oral health promotion messages; and feeling it may cross professional boundaries to do so. One (+) UK study<sup>6</sup> reported that even personnel appropriately knowledgeable and skilled to deliver oral health advice may not feel willing or able to dispatch their skills if they don't feel their role enables them to, which may inhibit implementation.

Views expressed in this theme often had close links with self-proficiency, see Evidence Statement 6.

<sup>1</sup> Coles et al. 2012 (+)

<sup>2</sup> Kranz et al. 2011 (+)

<sup>3</sup> Maher et al. 2012 (-)

<sup>4</sup> Owens 2011a (+)

<sup>5</sup> Prokhorov et al. 2002 (+)

<sup>6</sup> Trubey and Chestnutt 2013 (+)

**Evidence statement 6: self-proficiency.**

Five studies provided evidence on barriers or facilitators relating to self-proficiency; described as the possession of the skills necessary for implementation. Issues of self-proficiency appeared closely aligned with self-efficacy, see Evidence Statement 5.

Two studies (1 [++] UK<sup>1</sup> and 1 [+] US<sup>2</sup>) reported compatible views on how intervention staff<sup>1</sup> or prospective intervention staff<sup>2</sup> felt a lack of skills, lack of expertise, or the feeling that they were not adequately prepared, had inhibited their ability to implement oral health programmes or interventions.

Three studies also provided evidence that increases in self-proficiency (1 [+] UK<sup>3</sup> and 1 [++] UK<sup>4</sup>), or reports of a wish to increase self-proficiency (1 [+] UK<sup>5</sup>), had facilitated participation in, or implementation of, oral health interventions or programmes.

All three examples were reported by staff who had an engagement function within the intervention such as: workers engaging homeless clients in oral health topics (1 [+] UK<sup>3</sup>); community programme champions engaging local communities to advocate and support a school programme (1 [++] UK<sup>4</sup>); or pharmacists opportunistically engaging members of the public in health advice (including oral health) in the pharmacy (1 [+] UK<sup>5</sup>).

<sup>1</sup> Stokes et al. 2009 (++)

<sup>2</sup> Prokhorov et al. 2002 (+)

<sup>3</sup> Coles et al. 2012 (+)

<sup>4</sup> Yusuf et al. 2012 (++)

<sup>5</sup> Blenkinsopp et al. 2002 (+)

**Evidence statement 7: compatibility.**

Eight studies provided evidence on barriers or facilitators related to the theme compatibility. This covered issues on how compatible the oral health intervention or programme was with existing services, or with the lives of the target service users.

One (++) UK study<sup>1</sup> identified 3 factors as facilitators to the programme implementation: home visits; the conceptual fit of the programme with existing dental services; and programme staff minimising disruption to school and nursery staff.

Seven studies identified barriers relating to a lack of compatibility and a number of similarities were apparent. Incompatibility between the intervention or programme aims and the target population were broadly identified by 4 studies (1 [+] UK<sup>2</sup>, 1 [+] Republic of Ireland<sup>3</sup>, 1 [+] US<sup>4</sup> and 1 [-] US<sup>5</sup>), distrust of outsiders by 2 (-) US studies<sup>6,7</sup> and excessive burden on the programme workforce by 1 (++) UK study<sup>8</sup>. A related issue, service user resistance or lack of interest, was also reported as a barrier to implementation in 2 studies (1 [+] US<sup>4</sup> and 1 [-] US<sup>5</sup>).

The views highlighting incompatibility between the lives of service users and intervention aims had clear links with those expressed in Evidence Statements 3 and 4 on perceived need and perceived benefits respectively..

<sup>1</sup> Holme et al. 2009 (++)

<sup>2</sup> Coles et al. 2012 (+)

<sup>3</sup> Owens 2011a (+)

<sup>4</sup> Prokhorov et al. 2002 (+)

<sup>5</sup> Wolfe and Huebner 2004 (-)

<sup>6</sup> Diamond et al. 2003 (-)

<sup>7</sup> Riedy 2010 (-)

<sup>8</sup> Yusuf et al. 2012 (++)

**Evidence statement 8: adaptability and flexibility.**

Seven studies provided evidence identifying implementation barriers and facilitators related to the theme adaptability and flexibility. This covered the extent to which programmes or interventions could or could not be modified to fit provider needs and preferences; existing organisational practices, and community needs, values and norms.

Five studies (1 [++] UK<sup>1</sup>, 1 [+] UK<sup>2</sup>, 1 [-] UK<sup>3</sup>, 1 [-] US<sup>4</sup> and 1 [-] Australia<sup>5</sup>) provided evidence that intervention or programme flexibility or adaptability had acted as a facilitator to implementation. Examples included: seeking and gaining positive parental consent for school based activities involving children; tailoring oral health messages to service user's individual life circumstances; responding to over demand on the service; and having flexibility to adapt to different local community structures. One (+) UK study<sup>6</sup> reported a desire for more flexibility to potentially aid intervention implementation and 1 (+) UK study<sup>7</sup> presented mixed views on the need for flexibility between different staff groups within the intervention.

Overall, the evidence was broadly consistent in expressing how flexibility and adaptability had facilitated the implementation of the oral health interventions and programmes under study. The views expressed in this theme were closely related to those expressed under compatibility (Evidence Statement 7) and service user acceptability (Evidence Statement 16).

<sup>1</sup> Yusuf et al. 2012 (++)

<sup>2</sup> Coles et al. 2012 (+)

<sup>3</sup> Macpherson et al. 2010 (-)

<sup>4</sup> Diamond et al. 2003 (-)

<sup>5</sup> Burchell et al 2006 (-)

<sup>6</sup> Blenkinsopp et al. 2002 (+)

<sup>7</sup> Trubey and Chestnutt 2013 (+)

**Evidence statement 9a: intervention resources; space, equipment and structural organisation of the programme.**

Five studies provided evidence on barriers or facilitators related to the physical space, equipment and structural resources available for the intervention or programme during implementation.

One (-) UK study<sup>1</sup> reported staff experienced problems storing stocks of tooth brushing packs (toothpaste, a toothbrush and a health educational leaflet) and 1 (-) US study<sup>2</sup> reported a lack of garage space was a consistent problem implementing mobile dental van interventions.

Facilitators were reported in 3 studies (1 [++] UK<sup>3</sup>, 1 [-] Northern Ireland<sup>4</sup>, 1 [-] US<sup>5</sup>) and included: people with tetraplegia valuing teleconference equipment and an electrical toothbrush; school based staff indicating small class sizes, sufficient staff, and availability of sinks had made it easier to run supervised tooth brushing, and how a resource pack and assistance with the provision of fruits and vegetables would be useful in facilitating schools' continuation in healthy snack schemes.

<sup>1</sup> Blinkhorn 2008 (-)

<sup>2</sup> Douglass et al. 2005 (-)

<sup>3</sup> Holme et al. 2009 (++)

<sup>4</sup> O'Neill and O'Donnell 2003 (-)

<sup>5</sup> Yuen and Pope 2009 (-)

**Evidence statement 9b: intervention resources; programme administration and time requirements.**

Five studies provided evidence identifying barriers related to administrative burden or time.

Consistent evidence identifying barriers related to administrative burden was reported in 5 studies (2 [++] UK<sup>1,2</sup>, 2 [+] UK<sup>3,4</sup> and 1 [-] US<sup>5</sup>). Issues included: cumbersome activity monitoring forms, the need to revise, streamline or simplify paperwork once the programme was underway; inefficiencies in data entry and non-electronic data recording in school based programmes, and problems associated with asking parents to fill in and return consent forms for their children at regular intervals.

The (+) UK<sup>4</sup> study reported differences in views. A group consisting mainly of managerial staff perceived paper work was more of a problem than groups largely consisting of support workers and health educators who typically dealt with the forms day to day. The reasons for the difference were not explored further.

Oral health promoters involved in 1 (++) UK study<sup>2</sup> described feeling they needed more time (in itself a resource) to organise and implement a pilot programme which was delivered within just over a month with a lead time of just over 2 months. They also described how having protected time to devote to the pilot programme had helped their working practices.

<sup>1</sup> Yusuf et al. 2012 (++)

<sup>2</sup> Holme et al. 2009 (++)

<sup>3</sup> Coles et al. 2012 (+)

<sup>4</sup> Trubey and Chestnutt 2013 (+)

<sup>5</sup> Diamond et al. 2003 (-)

**Evidence statement 9c: intervention resources; service user facing information.**

Five studies provided evidence on the impact of service user facing intervention resources, such as information leaflets or educational materials, on the implementation of oral health interventions or programmes.

Two studies identified barriers relating to intervention resources not being tailored to the target audience (1 [+] Australian<sup>1</sup> and 1 [++] UK<sup>2</sup>). These included concerns that: information in leaflets may be overwhelming for people with low literacy; they were not in the service user's native language; they were too wordy and would benefit from more pictures; they didn't have enough teeth-related information; the information was inappropriately targeted towards "middle class" families; there was a need to tailor information toward disadvantaged families, in particular, culturally and linguistically diverse groups; the language and content was too long, detailed and overwhelming; and that the information contained medical or dental jargon like "sealant or fluoride treatment" that wouldn't be understood. One (-) Australian study<sup>3</sup> reported staff didn't access some of the resources in other languages because they weren't aware they existed or the process of accessing and printing resources was difficult.

One (+) study in the Republic of Ireland and Northern Ireland<sup>4</sup> identified a progress chart as a consistently used and usefully perceived resource within a school based oral health programme.

Inconsistent views were reported in 1 (+) study based in the Republic of Ireland<sup>5</sup>. Parents, social workers and community nurses reported using information packs designed as part of the intervention, but their use was patchy. They identified pictures and diagrams as being particularly useful elements within the packs.

<sup>1</sup> Arora et al. 2012 (+)

<sup>2</sup> Yusuf et al. 2012 (++)

<sup>3</sup> Maher et al. 2012 (-)

<sup>4</sup> Dental Health Foundation 2007 (+)

<sup>5</sup> Owens 2011a (+)

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**Evidence statement 10: contact time.**

Three studies reported barriers or facilitators related to the amount of contact time between the service provider and service user. The views expressed were generally brief and not explored in depth.

Not having enough contact time was reported as an implementation barrier in 2 UK studies (1 [+]<sup>1</sup> and 1 [++]<sup>2</sup>). This related to staff not having enough time with service users who were homeless to implement the intervention fully<sup>1</sup>, and community programme champions not having enough time to explain details of an oral health programme to parents of children to be enrolled<sup>2</sup>.

One (-) Australian study<sup>3</sup> that provided outreach services to people with mental health illness reported that adequate contact time had facilitated implementation by enabling dentists in the intervention sufficient time to overcome known barriers related to the complex needs of the service users - such as dental phobia, regular breaks during treatment sessions and unpredictable behaviour. The study authors' reported this protected time had been achieved through securing block funding. See Evidence Statement 1 for other funding related barriers and facilitators.

<sup>1</sup> Coles et al. 2012 (+)

<sup>2</sup> Yusuf et al. 2012 (++)

<sup>3</sup> Burchell et al 2006 (-)

**Evidence statement 11a: general organisational factors; integration.**

Four studies provided evidence on barriers or facilitators relating to the integration of a new oral health programme or intervention with existing practice or services.

One (-) Australian study<sup>1</sup> reported that integrating a dental outreach service targeting people with mental illness with existing health and support services was perceived to be important to the programme sustainability.

Conversely, multiple stakeholders from 1 (++) UK study<sup>2</sup> reported that implementing a pilot programme in schools had taken a large and unsustainable amount of their time and resource, which would need to be addressed if the programme was rolled out to more schools. One (-) US study<sup>3</sup> experienced problems recruiting Alaskan native women into a dental intervention. Problems were partly attributed to failing to integrate the recruitment process into the women's lives and normal decision making processes, which relied on family and community input.

Integration was not reported to be acting as a barrier to the incorporation of oral health into existing Early Head Start and Head Start programmes in 1 US (-) study<sup>4</sup>.

<sup>1</sup> Burchell et al 2006 (-)

<sup>2</sup> Yusuf et al. 2012 (++)

<sup>3</sup> Riedy 2010 (-)

<sup>4</sup> Wolfe and Huebner 2004 (-)

**Evidence statement 11b: general organisational factors; shared vision.**

Five studies provided evidence on the impact of shared vision on implementing oral health interventions or programmes.

Two studies (1 [-] US<sup>1</sup> and 1 [++] UK<sup>2</sup>) reported that collaborating with organisations with a shared vision<sup>1</sup> or working with institutions (e.g. nurseries) with a positive attitude to oral care had helped the formation<sup>1</sup> and effective running<sup>2</sup> of the respective oral health programmes.

On the other hand, a lack of shared vision was reported as a potential barrier in 4 studies (1 [+] Republic of Ireland and Northern Ireland<sup>3</sup>, 1 [++] UK<sup>4</sup>, 1 [-] Australian study<sup>5</sup> and the same [++] UK<sup>2</sup> that reported facilitatory factors). Issues included: tensions between school staff and oral health promoters about integrating the programme into school life with minimal disruption<sup>3</sup>; problems rolling out a programme to child health professionals due to lack of time, confidence and perceived lack of willingness of others to receive information<sup>5</sup>; and having dual programme aims (universal care and targeted support), which was reported to be confusing to staff and parents and had the potential to cause stigma among those targeted<sup>2</sup>.

Finally, a (++) UK study<sup>4</sup> reported differences in opinion from different stakeholders about whose responsibility it was to incorporate oral health promotion in Healthy Schools, suggesting a lack of shared vision. The degree to which oral health was incorporated into Healthy Schools was reported to be largely due to historical patterns of working, partnerships, resources and priorities.

<sup>1</sup> Diamond et al. 2003 (-)

<sup>2</sup> Holme et al. 2009 (++)

<sup>3</sup> Dental Health Foundation 2007 (+)

<sup>4</sup> Stokes et al. 2009 (++)

<sup>5</sup> Maher et al. 2012 (-)

**Evidence statement 12a: specific practices and processes; coordination and collaboration.**

Five studies provided evidence that internal and external coordination and collaboration, had facilitated oral health programme implementation (2 [++] UK<sup>1,2</sup>, 1 [+] UK<sup>5</sup>, 1 [-] UK<sup>4</sup> and 1 [-] US<sup>5</sup>) while 3 studies provided evidence of barriers related to lack of collaboration and coordination (2 [++] UK<sup>1,6</sup> and 1 [+] US<sup>7</sup>). One (+) UK study<sup>8</sup> reported views seemingly opposing the formation of links between schools and dental practices but there was inconsistency in the underlying study that called into question whether this was what respondents' actually meant.

Specific practices that facilitated implementation or were reported as necessary for implementation, included: effective collaboration between programme staff and stakeholders (e.g. teachers, dental providers, programme champions and parents)<sup>1</sup>; getting external expertise and input<sup>2</sup>; the provision of a list of local NHS dentists that accepted homeless service users<sup>3</sup>; collaborating with community dental service promoters<sup>4</sup>; and using parent teacher associations and community leaders to mobilise community support for an oral health care programme<sup>5</sup>.

Specific practices that acted as barriers to implementation included: lack of clear professional roles and awareness of others' roles<sup>6</sup>, lack of existing formal links between dental practices and schools<sup>1</sup>, and problems finding a dentist that sees young children or accepts Medicaid in the US<sup>7</sup>.

<sup>1</sup> Yusuf et al. 2012 (++)

<sup>2</sup> Stokes et al. 2009 (++)

<sup>3</sup> Coles et al. 2012 (+)

<sup>4</sup> Blinkhorn 2008 (-)

<sup>5</sup> Diamond et al. 2003 (-)

<sup>6</sup> Holme et al. 2009 (++)

<sup>7</sup> Kranz et al. 2011 (+)

<sup>8</sup> Trubey and Chestnutt 2013 (+)

**Evidence statement 12b: specific practices and processes; communication, consent, and engagement.**

Six studies (3 [++] UK<sup>1,2,5</sup>, 1 [-] UK<sup>3</sup>, 1 [-] US<sup>4</sup> and 1 [-] Australian<sup>6</sup>) provided evidence on barriers and facilitators on specific practices and processes.

These were grouped into 3 categories of communication, parental consent, and engagement.

Lack of communication was reported as a barrier to implementation in 2 studies (both [++] UK<sup>1,2</sup>). Barriers included: lack of communication between different programme staff groups, managers and other professionals including teachers<sup>1,2</sup>; staff not being kept up-to-date with changes to advice or programme resources<sup>1</sup>; and short time scales for communication<sup>2</sup>. Facilitators included effective communication between different staff groups within the oral health programme<sup>2</sup>.

Four studies (2 [++] UK<sup>1,2</sup>, 1 [-] UK<sup>3</sup> and 1 [-] US<sup>4</sup>) provided consistent evidence that effective parental engagement and cooperation was needed to gain parental consent for their child to participate in school or nursery based programmes and this was essential for their successful implementation.

Three studies reported facilitating factors relating to engagement of people within, or external to, the oral health intervention or programme (2 [++] UK<sup>1,5</sup>, and 1 [-] Australia<sup>6</sup>) and 1 (++) UK study<sup>2</sup> also reported barriers. Together they provided a consistent view that engaging key individuals (such as parents and teachers for school based programmes) was an important and often essential element of implementation.

<sup>1</sup> Holme et al. 2009 (++)

<sup>2</sup> Yusuf et al. 2012 (++)

<sup>3</sup> Macpherson et al. 2010 (-)

<sup>4</sup> Diamond et al. 2003 (-)

<sup>5</sup> Stokes et al. 2009 (++)

<sup>6</sup> Burchell et al 2006 (-)

**Evidence statement 13: specific staffing considerations.**

Eight studies provided evidence on barriers or facilitators relating to specific staffing considerations.

Three (1 [-] Australia<sup>1</sup>, 1 [+] Republic of Ireland<sup>2</sup> and 1 [-] US<sup>3</sup>) reported problems recruiting and retaining key staff that impacted implementation including: uncompetitive pay<sup>1</sup>; embargos on recruitment<sup>2</sup>; and recruiting and retaining dentists. A fourth (1 [++] UK<sup>4</sup>) reported concerns about a lack of capacity in the extended duties dental nurse workforce to recruit from.

One (++) UK study<sup>1</sup> reported that a lack of clear roles and responsibilities amongst school staff had acted as a barrier to processing and obtaining consent from parents and engaging parents effectively. Barriers and facilitators related to gaining parental consent are also discussed in Evidence Statements 8, 9b, 11b 12b. Dentists' in 1 (++) UK study<sup>1</sup> reported barriers relating to time consuming non-computerised administrative duties when recording programme activity. Issues of administration are also reported in Evidence Statement 9b.

Specific staff members and staff roles within the intervention or programme team were identified as being important in facilitating implementation in 6 diverse studies (2 [++] UK<sup>4,5</sup>, 1 [+] US<sup>6</sup> and 3 [-], 2 US<sup>3,8</sup> and 1 Australian<sup>7</sup>). Often more than one key staff role was highlighted within the same programme, particularly in the more complex programmes.

Multiple stakeholders in 1 (++) UK<sup>4</sup> study reported an overreliance on certain staff members or teams during the implementation of a pilot oral health programme that was not sustainable. They reported alternative staffing roles and responsibilities for day to day logistic delivery of the programme needed to be considered in the future.

<sup>1</sup> Burchell et al 2006 (-)

<sup>2</sup> Owens 2011a (+)

<sup>3</sup> Douglass et al. 2005 (-)

<sup>4</sup> Yusuf et al. 2012 (++)

<sup>5</sup> Holme et al. 2009 (++)

<sup>6</sup> Rajabiun et al. 2012 (+)

<sup>7</sup> Maher et al. 2012 (-)

<sup>8</sup> Diamond et al. 2003 (-)

#### **Evidence statement 14: training.**

Eight studies provided evidence on barriers or facilitators relating to training.

Six studies (all targeting under 5s) provided consistent evidence that training or elements of training had facilitated, or potentially facilitated, the implementation of the programme or intervention in some way (2 [++] UK<sup>1,2</sup>, 1 [+] US<sup>3</sup> and 3 [-]; 1 UK<sup>4</sup>, 1 US<sup>5</sup>, and 1 Australia<sup>6</sup>). Consistent with this, 1 (+) US study<sup>7</sup> reported lack of training may have acted as a barrier to implementation. Two studies (1 [++] UK<sup>2</sup> and 1 [+] UK<sup>8</sup>) provided less clear views. One ([++] UK<sup>2</sup>) suggested that training could be extended to more people to improve the programme<sup>2</sup>, while the second ([+] UK<sup>8</sup>) reported positive and negative feedback on the value of training received to implement the intervention<sup>8</sup>.

Facilitatory elements included: providing training sessions for nursery staff to increase awareness of the importance of oral health<sup>1</sup>, increased self-efficacy to deliver oral health interventions or programmes as a result of training<sup>2,5,6</sup>, and increased oral health activity as a result of training<sup>3</sup>.

Respondents in 1 (+) US study<sup>7</sup> reported a lack of training was a key barrier to delivering spit tobacco prevention programmes. Perhaps surprisingly, this included some staff specifically trained in the prevention of spit tobacco use. This counterintuitive view was not explored further in the study but highlights the possibility that people adequately trained may experience other barriers that stop them using their training and skills fully.

<sup>1</sup> Holme et al. 2009 (++)

- <sup>2</sup> Yusuf et al. 2012 (++)
- <sup>3</sup> Kranz et al. 2011 (+)
- <sup>4</sup> Macpherson et al. 2010 (-)
- <sup>5</sup> Wolfe and Huebner 2004 (-)
- <sup>6</sup> Maher et al. 2012 (-)
- <sup>7</sup> Prokhorov et al. 2002 (+)
- <sup>8</sup> Blenkinsopp et al. 2002 (+)

**Evidence statement 15: technical assistance.**

Three studies provided evidence on barriers and facilitators related to technical assistance. This theme covered the combination of resources offered to providers once implementation begins; early monitoring and evaluation prompting retraining; and staff turnover and appropriate contingencies.

Evidence from 2 UK studies evaluating the same oral health programme (1 [++]<sup>1</sup> and 1 [+]<sup>2</sup>) reported how a lack of initial and on-going training and support had acted as a barrier to implementation. This caused confusion among staff about existing and planned programme changes as they were not kept up to date with developments. Some also reported struggling to maintain professional competence on an on-going basis through lack of training and support.

Evidence from 2 UK studies (1[+]<sup>2</sup> and 1 [++]<sup>3</sup>) reported how feedback on the initial implementation of the programme; feedback on training provision; and local problem solving efforts once the programme was underway, had led to suggestions for improvements to facilitate subsequent implementation. However, the studies did not report whether the suggestions were successful at facilitating subsequent implementation in practice, so should be interpreted cautiously.

<sup>1</sup> Holme et al. 2009 (++)

<sup>2</sup> Macpherson et al. 2010 (-)

<sup>3</sup> Yusuf et al. 2012 (++)

**Evidence statement 16: service user views on acceptability.**

Evidence from 4 studies (2 [++] UK<sup>1,4</sup> and 2 [+] US<sup>2,3</sup>) reported views on barriers or facilitators related to service user acceptability of the intervention or programme.

**Facilitators**

Three studies reported elements of service user acceptability that facilitated their interventions or programmes (1 [++] UK<sup>1</sup> and 2 [+] US<sup>2,3</sup>). All three reported how the friendliness of intervention staff had facilitated implementation in different ways. Each study also provided unique facilitating elements including: home visits by a dental support worker<sup>1</sup>; ease of service user participation<sup>1</sup>; and the provision of a friendly, accessible, available, comforting, knowledgeable and empathetic dental case manager<sup>2,3</sup>.

**Barriers**

One (++) UK study<sup>1</sup> talked about a dental health support worker home visit element of a programme. It reported there was potential for stigma to be attached to letting professionals into one's home if there was a perception it was to monitor parental behaviour. This was a result of some associating the term support with social support and bad parenting. It was important that visits were seen by service users (parents or carers) as advice rather than parental monitoring.

One (++) UK<sup>2</sup> study asked parents whose children did not have fluoride varnish in a school programme to comment on the reasons. They included fears children with severe allergies would be at risk of an adverse reaction in an outreach setting (the school) and absence from school.

<sup>1</sup> Holme et al. 2009 (++)

<sup>2</sup> Lemay et al. 2012 (+)

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<sup>3</sup> Rajabiun et al. 2012 (+)

<sup>4</sup> Yusuf et al. 2012 (++)

## **Report 1: An overview of oral health needs assessments, to support NICE Public Health Guidance “Oral health: local authority strategies to improve oral health, particularly among vulnerable groups”**

### **Expert Report 1.1: Summary Key Findings 1 OHNAs – Their importance and purpose**

It was agreed by the CDPHs interviewed that OHNAs are important in the commissioning and organisation of dental services (KF 12). However, from analysis of existing OHNAs, it often wasn't clear where and how the OHNAs fitted into the sponsoring organisation's commissioning plan (KF 5). CDPHs were of the view that Dental Service Commissioning was closely related to oral health improvement and needs to be borne in mind in the OHNA process (KF 22). Getting and keeping oral health on the agenda of Local Authority health improvement programmes was a concern (KF 20).

### **Expert report 1.2: Summary Key Findings 2 The evidence base**

The literature reviews undertaken suggest that evidence on a definitive approach to OHNA is lacking (KF 24). No publications were identified that described an Oral Health Needs Assessment which was taken forward via a strategy, implemented and evaluated (KF 23).

### **Expert report 1.3: Summary Key Findings 3 The conduct of OHNAs**

From the analysis of OHNAs, It is clear that approaches to undertaking OHNAs vary considerably (KF1). The aims of the examined OHNAs were not always made explicit (KF 2). It was suggested that in conducting an OHNA it is important to begin with the end in mind, i.e. to have in mind what the document will be used for and how it fits into the commissioning process (KF 14). It was also suggested that the conduct of an OHNA is a process, on-going and circular in nature (KF13). This was supported by evidence from the wider healthcare literature which suggests that HNA is a circular process – but much of this evidence is in the form of policy documents and has not been tested in before/after or intervention studies to determine the clinical and cost-effectives of the OHNA approach (KF 28). From the documents

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submitted it was not clear how existing OHNAs fit into an on-going overview or monitoring of need (KF 11).

#### **Expert report 1.4: Summary Key Findings 4 OHNAs - format and content**

The OHNAs examined took a very wide variety of formats. Virtually no two documents submitted followed a similar layout or format – save perhaps where one CDPH had produced OHNAs for two PCTs within their area of responsibility (KF 3). The CDPHs were clear that the concept of a ‘one-size fits all’ OHNA is flawed and that there is a need to recognise that in everyday practice, OHNAs may vary in complexity in relation to local circumstances (KF15). A wide variety of approaches to oral health improvement were adopted in OHNAs (KF 8).

The OHNAs analysed covered a wide variety of topics – some overarching, some focusing on a specific area of dental practice, some focusing on specific groups within the population (KF 4). There were a good number of the OHNAs which focussed on vulnerable and priority groups (KF 9). Corporate economic / option analyses seldom featured in the OHNAs analysed (KF 10).

#### **Expert report 1.5: Summary Key Findings 5 Stakeholder involvement in the OHNA process**

*Professional stakeholders* In conducting an OHNA it is important to involve key people from the outset, i.e. to ensure “sponsorship” of the process by those with the power to make the necessary decisions on change if required (KF 16). The CDPHs said that personal relationships are important in links between Local Authorities, Public Health England and NHS England (KF 17). However, in many cases, corporate partners / health alliances were not mentioned (KF 7).

*Patient and public involvement* There is a large literature on involving people and vulnerable groups, but studies of this in the context of oral health needs assessment are very limited (KF 29). Our analysis of the submitted OHNAs showed that involvement of patients and the public has in the past been variable (KF6). This was exemplified by the fact that patient and public involvement wasn’t raised as a significant issue by the CDPHs interviewed to any great extent (KF 21).

#### **Expert report 1.6: Summary Key Finding 6 Epidemiological aspects and evidence to inform OHNAs for vulnerable groups**

The literature review demonstrated that there are many studies on oral health needs assessment in vulnerable groups but these are largely simple epidemiological surveys of dental caries prevalence (KF 26). It was generally agreed that data to support OHNAs for vulnerable groups are lacking (KF 18). Views were mixed on whether proxy data could be used, some seeing this as acceptable while others were concerned that this may mask disparities within apparently homogeneous groups (KF 19). The literature review suggested that alternative measures may act as a proxy

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for dental need e.g. school league Tables (KF 27). While socio-dental indicators have been extensively described, this has largely been in one-off studies and not as part of an on-going, evaluated OHNA process (KF 25).

**END**