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# WHO Global Consultation on Public Health Intervention against Early Childhood Caries

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## Abstract

Early Childhood Caries (ECC) is prevalent around the world, but in particular the disease is growing rapidly in low- and middle-income countries in parallel with changing diet and lifestyles. In many countries, ECC is often left untreated, a condition which leads to pain and adversely affects general health, growth and development, and quality of life of children, their families and their communities. Importantly, ECC is also a global public health burden, medically, socially and economically. In many countries, a substantial number of children require general anaesthesia for the treatment of caries in their primary teeth (usually extractions), and this has considerable cost and social implications. A WHO Global Consultation with oral health experts on "Public Health Intervention against Early Childhood Caries" was held on 26-28 January 2016 in Bangkok (Thailand) to identify public health solutions and to highlight their applicability to low- and middle-income countries. After a 3-day consultation, participants agreed on specific recommendations for further action. National health authorities should develop strategies and implement interventions aimed at preventing and controlling ECC. These should align with existing international initiatives such as the Sixtieth World Health Assembly Resolution WHA 60.17 *Oral health: action plan for promotion and integrated disease prevention*, WHO Guideline on Sugars and WHO breastfeeding recommendation. ECC prevention and control interventions should be integrated into existing primary healthcare systems. WHO public health principles must be considered when tackling the effect of social determinants in ECC. Initiatives aimed at modifying behaviour should focus on families and communities. The involvement of communities in health promotion, and population-directed and individual fluoride administration for the prevention and control of ECC is essential. Surveillance and research, including cost-effectiveness studies, should be conducted to evaluate interventions aimed at preventing ECC in different population groups.

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KEYWORDS
Early Childhood Caries, health promotion, prevention, public health

## 1 | INTRODUCTION

The findings of the 2015 Global Burden of Diseases study[1,2] revealed that dental caries of the primary dentition was the 12th most prevalent disease (560 million children) in all ages combined. The significance of the dental, medical, social and economic costs of Early Childhood Caries (ECC) has increased in all regions of the world. The aetiology of ECC is complex, and the disease progresses more rapidly than caries in the permanent dentition. ECC is due to the strong influence of health behaviours and practices of children and families, mostly mothers and/or caregivers. In addition, structural factors and poor socioeconomic conditions have an important impact on the development of ECC and lead to inequalities which are increasing in low- and middle-income countries.[3,4] Moreover, ECC is an economic burden to society. Treatment of ECC under general anaesthesia (GA) for extensive dental repair is especially costly.[3] In England, over 60 000 children had decayed teeth extracted under GA between 2012 and 2013; a conservative estimate of the cost of these admissions for the extraction of decayed teeth was £27.6 million, which is equivalent to the cost of running 3 secondary schools.[5]

Many countries have introduced effective school-based programmes to improve oral health,[6,7] but it is realized that, in many countries, the disease occurs before the child attends school and can benefit from these programmes.

A WHO Global Consultation on ECC was held in Bangkok (Thailand) on 26-28 January 2016 to explore possible public health solutions to the worldwide problem of ECC. The 3-day meeting was organized by the WHO Collaborating Centre for Oral Health Education and Research, Mahidol University, in collaboration with the WHO Oral Health Programme; nineteen experts from 13 countries, including academic experts from the WHO Collaborating Centres and the WHO Expert Panel on Oral Health, attended from all 6 WHO regions. Reviews were presented on the definition of ECC, global epidemiology of ECC, pattern and development of ECC, aetiology of ECC, infant feeding and diets of the young child, strategies for prevention considering modifiable risk factors, and sociobehavioural factors and effective public health initiatives. Group discussions on each of these topics were held to reach an agreement on conclusions and recommendations.

The purpose of this report is to provide a summary of the meeting "A WHO Global Consultation on ECC"[8] to provide an overview of ECC prevention strategies, and to emphasize the urgent need for action this important public health problem.

## 2 | DEFINITION OF ECC

It is considered to be a high priority to disseminate globally the definition and diagnostic criteria for ECC and to include ECC in the WHO International Classification of Diseases, 11th edition (ICD-11). The modified definition of ECC which was proposed in 1999, and adopted by the American Academy of Pediatric Dentistry (AAPD) in 2003[9-11]—"ECC experience is the presence of one or more decayed (noncavitated or cavitated lesions), missing (due to caries) or filled tooth surfaces in any primary tooth in a child under the age of six[10]"—was accepted during the meeting.

The suggested ICD-11 classification of ECC[12] reads as follows: "Early childhood caries (ECC) is characterized by the presence of one or more teeth affected by severe carious lesions or with white spot lesions in anterior and posterior primary teeth, extraordinary loss of teeth due to caries, or filled tooth surfaces in affected teeth. ECC is mostly found in young children under the age of 6. Those children with ECC have been shown to have a high number of teeth affected by progressive disease. Consequences of ECC include a higher risk of pain or discomfort, abscesses, carious lesions in both the primary and permanent dentitions, risk for delayed physical growth and development, increased days with restricted activity, and diminished oral health-related quality of life. The aetiology is frequently linked with a high-frequent consumption of sugared drinks or food, lack of breastfeeding, and/or poor oral hygiene. Additionally, the disease often manifests in children living in poor families and in poor environmental settings."

## 3 | THE GLOBAL STATUS OF ECC

To assess the impact of the classification of ECC proposed in 1999, Dye et al[13] conducted a systematic literature review of the prevalence and measurement of dental caries in young children from 1999 to 2014. The criterion for lesion detection, as reported in 71% of the 87 papers reviewed, used cavitation in enamel as a minimal threshold. Only 15% of papers reported noncavitated and/or cavitated as the caries detection level, which is aligned with AAPD's ECC definition. The current variation in detection level limits our ability to obtain valid estimates of disease prevalence rates around the globe.[13]

The WHO Oral Health Programme has maintained its "WHO Oral Health Country/Area Profile Programme (CAPP)" for oral diseases surveillance since 1995.[14] Essentially, the data presented in the CAPP follow the WHO manual—"Oral Health Survey Basic Methods."[15] Since the introduction of AAPD's ECC definition, data on the percentage of children under the age of 6 with one or more treated/untreated caries lesions (prevalence) have been reported for 44 of the 194 WHO Member States. It was noted that the prevalence ranged from 0.0% in Nigeria to 98% in Cambodia, and Bosnia and Herzegovina. It should be noted that while some of the surveys included in the database included noncavitated carious lesions, most surveys did not.

The World Bank classifies Member States into 4 income groups using gross national income (GNI) per capita each year: low, lower middle, upper middle and high.[16] Table 1 provides information about the percentage of children under the age of 6 with one or more treated/untreated caries lesions (prevalence) and the mean number of affected teeth among children under the age of 6 for 25 countries where the data were available from the CAPP and the World Bank's national income category did not change from 1999 through 2015.[16] These countries were chosen as it is easier to interpret the data from stable economies. Most caries lesions remain untreated regardless of national income categories. For example, it has been reported that the d component constitutes 100% of dft (dmft) index in Finland, Greece, Japan and Philippines. It was considered critical to gather more solid information on caries experience in the primary dentition, especially in low- and middle-income countries, as there were only 6 countries: Uganda, Syrian Arab Republic, Mexico, Sri Lanka, Malaysia and Philippines in these categories where the data were available. To assist, it was recommended that subnational surveys of young children should be carried out using the WHO Oral Health Survey Basic Methods which also include important guidances for risk factor analysis that should be applied to preschool children.

The impact of ECC on the child, the family and society is not fully portrayed by the epidemiological statistics given in Table 1. Self-reported information is required, because ECC causes pain and difficulty in speaking and eating, and may lead to underweight and stunting.[17,18] ECC has adverse effects on the quality of life of children, family and caregivers, regardless of social groups.[19] In addition, ECC has substantial resource implications. Treatment under general anaesthesia for extensive dental repair/restoration is usually carried out in hospital and is time-consuming and costly. The experience can also be traumatic for both the child and the family.[20,21] It is worth noting that caries severity in primary teeth is a predictor for caries experience in the permanent dentition.[22] ECC is not only a problem for children and their families but also a public burden and a threat globally, and therefore, public health approaches are required to tackle ECC.[3]

## 4 | PREVENTION AND CONTROL OF ECC

### 4.1 | Risk factors

The primary risk factor for ECC is undoubtedly exposure to sugars through the diet. There is, however, evidence of varying quantity and quality to suggest that the factors shown in Table 2 are related to ECC, although some risk factors appear to be much more important than others, and there may be interactions among them. Fisher-Owens et al[23] used a multilevel conceptual model to explain how risk factors can apply at 3 different levels: the child, the family and the community. At the child level, these could include genetic, biological, health behaviours and practice, and physical and demographic attributes; at the family level: socioeconomic status, family composition, and health status, and practice behaviours of families; and at the community level: culture, social environment and social capital, and community oral health environment such as accessibility to fluoridation and to the healthcare system.

For ECC prevention, the majority of the emphasis was placed on the amount of consumption of free sugars and the frequency with which they are consumed, infant feeding practices, poor removal of dental plaque and the low availability of fluoride. Reasons for these caries-inducing behaviours lie in the family—their own experiences, circumstances and lifestyles. However, the family (or caregivers) are subjected to strong cultural, economic and marketing influences which shape beliefs, attitudes and behaviours. The lack of the use of fluoride is an important environmental factor for ECC.[24] Some factors were conceived as being nonmodifiable risks (e.g genetic profile, salivary components) and were not considered further. More emphasis was given to "modifiable" risk factors as they could lead to recommendations or policies for changes in practice. Specific reviews were presented on infant feeding practices and social and behavioural determinants.

#### 4.1.1 | Infant feeding and diet of the young child

Breastfeeding is the natural way of providing young infants with the nutrients they need for healthy growth and development. Virtually, all mothers can breastfeed, provided they have accurate information and the support of their family, the healthcare system and society at large. WHO recommends exclusive breastfeeding for the first 6 months of life, followed by continued breastfeeding with appropriate complementary feeding for up to 2 years or beyond.[25] The great importance of breastfeeding for the health of the child and mother is acknowledged.[26] Breastfeeding in infancy may protect against dental caries.[27] Further research is needed to understand the reported higher risk of caries in children breastfed after 12 months. Tham et al[27] suggested a 2-3 times greater risk of dental caries if breastfeeding is frequent and/or nocturnal after 12 months. However, this observation was based on a meta-analysis in which some of the included studies had not controlled for confounding factors. The protective effect may be confounded by high and frequent consumption of free sugars in children after the age of 12 months. In particular, cohort studies with adequate control for confounding factors (including intake of free sugars in complementary foods and drinks) are required. Discontinuation of breastfeeding or replacement of breastfeeding by infant formula is not recommended.

Free sugars in drinks and foods play a major role in the development of dental caries and other chronic diseases. The WHO published a Guideline on Sugars Intake for Adults and Children in 2015, which includes a strong recommendation that the intake of free sugars is reduced in both children and adults.[28] The WHO guideline is based on systematic reviews of the evidence pertaining to the intake of sugars and risk of overweight and obesity and the risk of dental caries. The evidence for an association between intake of free sugars and dental caries was provided primarily from epidemiological studies of children which demonstrated a positive association between amount of free sugars consumption and dental caries. The Guideline recommends that children and adults reduce their daily intake of

**TABLE 1** Percentage of children[a] with one or more treated/untreated caries lesions and mean number of dft/dmft among children[a] in countries where the income category did not change from 1999 to 2015

| Income category | WHO region | Country | Age | Year | Children with one or more treated/untreated caries lesions (%) | Mean dft (dmft) | d (%) | f (%) |
|---|---|---|---|---|---|---|---|---|
| Low income | AFRO | Uganda | 3 | 2002 | 45 | 1.7 | 82 | 4 |
| Low income | AFRO | Uganda | 4 | 2002 | 59 | 2.4 | 79 | 3 |
| Low income | AFRO | Uganda | 5 | 2002 | 65 | 3.1 | 68 | 4 |
| Lower middle income | EMRO | Syrian Arab Republic | 5 | 2009 | 61 | 3.3 | 85 | 12 |
| Lower middle income | SEARO | Sri Lanka | 5 | 2002-2003 | 65 | 3.5 | 94 | 3 |
| Lower middle income | WPRO | Philippines | 2 | 1999 | 59 | 4.2 | 100 | 0 |
| Lower middle income | WPRO | Philippines | 3 | 1999 | 85 | 7.4 | 100 | 1 |
| Lower middle income | WPRO | Philippines | 4 | 1999 | 90 | 8.8 | 99 | 0 |
| Lower middle income | WPRO | Philippines | 5 | 2011 | 88 | 5.6 | 100 | 0 |
| Upper middle income | PAHO | Mexico | 1-4 | 2008 | – | 4.2 | 95 | 5 |
| Upper middle income | WPRO | Malaysia | 5 | 2005 | 76 | 5.6 | 95 | 4 |
| High income | EMRO | Kuwait | 4 | 2004 | 68 | 3.7 | 92 | 8 |
| High income | EMRO | Kuwait | 5 | 2004 | 76 | 4.8 | 88 | 13 |
| High income | EMRO | United Arab Emirates | 5 | 2001-2002 | 83 | 5.1 | – | 6 |
| High income | EURO | Denmark | 5 | 2014 | – | 0.4 | 75 | 25 |
| High income | EURO | Finland | 5 | 2009 | 61 | 0.3 | 100 | – |
| High income | EURO | Greece | 2-3 | 2005 | – | 1.9 | 100 | – |
| High income | EURO | Greece | 4-5 | 2005 | – | 3.4 | 97 | – |
| High income | EURO | Ireland (fluoridated area) | 5 | 2001-2002 | 37 | 1.3 | 85 | 8 |
| High income | EURO | Ireland (non-fluoridated area) | 5 | 2001-2002 | 55 | 2.2 | 82 | 5 |
| High income | EURO | Israel | 5 | 2007 | 65 | 3.3 | 82 | 15 |
| High income | EURO | Italy | 4 | 2004 | 22 | 0.8 | 80 | 18 |
| High income | EURO | Italy | 5 | 2012 | 63 | 1.4 | – | – |
| High income | EURO | Norway | 5 | 2003 | 36 | 1.4 | – | – |
| High income | EURO | Sweden | 3 | 2011 | 4 | – | – | – |
| High income | EURO | Switzerland | 2 | 2003 | 13 | 4.3 | – | – |
| High income | EURO | United Kingdom (England, Wales and NI) | 5 | 2013 | 31 | 0.9 | 89 | 11 |
| High income | PAHO | Bahamas | 5 | 1999-2000 | 58 | 2.4 | 92 | 4 |
| High income | PAHO | Canada (Ontario) | 5 | 2006 | – | 1.5 | – | – |
| High income | WPRO | Australia | 4 | 2003-2004 | 38 | 1.7 | 76 | 12 |
| High income | WPRO | Australia | 5 | 2009 | 42 | 1.8 | 61 | 28 |
| High income | WPRO | Brunei Darussalam | 3 | 2012 | 39 | 2 | – | – |
| High income | WPRO | Brunei Darussalam | 5 | 2012 | 59 | 3.9 | – | – |
| High income | WPRO | Japan | 3 | 2011 | 25 | 0.6 | 100 | – |
| High income | WPRO | New Zealand | 2-4 | 2009 | 20 | 0.8 | 50 | 38 |
| High income | WPRO | New Zealand | 5 | 2013 | 43 | 1.9 | – | – |
| High income | WPRO | Singapore | 3-4 | 2005 | 26 | 0.7 | 86 | 14 |
| High income | WPRO | Singapore | 4-5 | 2005 | 37 | 1.4 | 93 | 7 |

[a]Children under the age of six. WHO region AFRO; African region, EMRO; Easter Mediterranean region, EURO; Euro region, PAHO; American region, SEARO; South East region, WPRO; Western Pacific region, Data from https://www.mah.se/CAPP/Country-Oral-Health-Profiles/According-to-WHO-Regions/. Accessed March 5, 2017.

free sugars to <10% of their total energy intake. A further reduction to below 5% is suggested to protect oral health throughout life and provide additional health benefits. Moreover, for countries with a low intake of free sugars, levels should not be increased. Higher intakes of free sugars threaten the nutrient quality of diets by providing substantial energy without specific nutrients.[28] It was recognized that controlling free sugars intake has positive influences on both oral health and general health, through the prevention of

**TABLE 2** Overview of risk factors and underlying determinants of ECC

| |
|---|
| Free sugars added to baby bottles |
| Free sugars in foods and drinks |
| Nonuse and nonavailability of fluoridated toothpaste |
| Social determinants: family, culture and environment |
| Genetic susceptibility |
| Hypoplasia of enamel |
| Nutritional status of mother and infant |
| Oral flora |
| Poor oral hygiene and control of dental plaque |
| Breastfeeding—beyond 12 months, especially if frequent and/or nocturnal |
| Saliva—quantity (reduced flow) and constituents (particularly variations in proteins present) |

nondesirable weight gain, obesity and associated noncommunicable diseases (NCDs). Worldwide obesity has more than doubled since 1980, and 41 million children under the age of 5 years were reported as being overweight or obese in 2014.[29] Oral health promotion should therefore be integrated with general health promotion through a common risk factor approach.[30] Specific issues with the consumption of free sugars by infants and young children were recognized. The first was the addition of free sugars to feeding bottles. This habit was widespread but unnecessary in many cultures and regions. The second issue related to the high level of consumption of free-sugars-containing drinks and foods (including complementary foods), which is encouraged by aggressive product marketing. Consequently, comprehensive programmes in health and oral health promotion that promote the intake of healthier foods and diets and avoid early introduction of free sugars and consumption of sugar-sweetened beverages and high sugars foods, are essential. Advocacy initiatives are important to stimulate relevant political action. Comprehensive programmes may include the adjustment of agricultural policies that lead to less sugars production and more sustainable crops;[31] appropriate and context-specific nutrition information and guidelines for children, which are developed and disseminated in a simple, understandable and accessible manner to all target groups in society; the implementation of an effective tax on sugar-sweetened beverages and high sugars foods; the implementation of recommendations for the marketing of foods and nonalcoholic beverages to children to reduce their exposure to the power of, the marketing of less healthy foods; the development of nutrient profiles to identify less healthy and beverages; the establishment of global cooperation to reduce the impact of cross-border marketing of unhealthy foods and beverages; and the implementation of a standardized global nutrient labelling system.[32]

### 4.1.2 | Optimum exposure to fluoride

The appropriate use of fluoride for the prevention of dental caries has been a major dental public health strategy.[33,34] Methods of delivering fluoride are well known, and those appropriate for the prevention of ECC were considered in more detail. These included fluoride delivered through either water, salt or milk, fluoridated toothpaste and intra-oral topical fluoride application.[24] Exposure to optimum fluoride concentration in drinking water from birth not only benefits the primary dentition, helping to control ECC, but also provides some pre-eruptive effect for the permanent teeth.[35-38] Where salt is used as a vehicle for fluoride, the WHO Guideline on Sodium Intake must be considered.[39] Salt intake at a country level should be monitored so that adjustments can be made if required, the levels of fluoride in the salt, to ensure that the population is receiving optimum levels of exposure to fluoride.

Evidence is available that, for children younger than 6 years, the use of fluoridated toothpaste is effective in caries control.[40] However, ingesting excessive amounts can lead to mild fluorosis. To minimize the risk of enamel fluorosis in children while maximizing the caries-prevention benefit for all age groups, the appropriate amount should be used by all children. Guidance on the use of fluoridated toothpaste for young children differs from country to country. The greatest variations are found in the age at which its use should begin, recommendations on the concentration of fluoride that should be used, and in the amount of toothpaste placed on the brush. For example, it is recommended that parents should brush their children's teeth twice daily using a "smear" or "rice-size" amount of fluoridated toothpaste (0.1 mg F) for children aged 3 years and under and a "pea-size" amount of fluoridated toothpaste (0.25 mg F) for children aged 3-6 years.[41,42] Variation in guidance can be expected where background exposure to other forms of fluoride differs among the target population groups.[24] However, the universal use of affordable toothpastes, containing the optimum concentration of fluoride for the community and having regard for the age of the child, is an essential public health goal.

Although other self-applied fluorides (such as mouth rinses) are effective for dental caries prevention, they are usually not recommended for use by children younger than 6 years of age. Fluoride varnishes, gels and foams can be professionally applied according to the child's individual risk.

### 4.1.3 | The parents/caregivers and their environment

Although sugars intake, poor oral hygiene and inadequate use of fluoride are rightly given prominence as primary risk factors, reasons for these unfavourable behaviours need to be understood if preventive strategies are to be successful. A review of these aspects of ECC risk has been published by Seow et al[43]; they reported that the rates of ECC are highest among the socially disadvantaged groups and indigenous and ethnic minorities. For example, there is an association between low levels of education and low family incomes with a high prevalence of ECC.[43]

The adoption of durable health habits in childhood begins at home with the parents/caregivers, especially the mother, as she plays an important role in forming the child's oral health behaviours. Therefore, parents/caregivers should be informed that their own

dental health habits will greatly influence their children's oral health and consequently their quality of life. There is a need for sound health education and awareness raising programmes that involve all family members and provide parents/caregivers with adequate guidance on how to maintain the oral health of their children.

An oral check-up, after the first tooth has erupted in the mouth, should be integrated into existing health programmes alongside vaccinations and general medical check-ups. This could lead to a continuing programme of interventions that provide reassurance and reinforce in mothers and parents/caregivers the need to attend health appointments. Policy-makers at local and national levels should be encouraged to integrate an oral health element into existing health promotion programmes and policies.

The social context and cultural pressures within societies also influence families' behaviour. Creating supporting environments in which families live is an important element of oral health promotion. Accordingly, all sectors of the community should utilize community health workers and make use of social media to promote healthy behaviours at local and national levels. Thus, an ECC approach to prevention should be multidisciplinary targeting "child level," "family level" and "community level."[23]

## 4.2 | Arresting of caries lesions

Recognition of ECC is crucial for its prevention and control. A further focus should be on the early detection of carious lesions, in part because these progress faster in the primary dentition than in permanent teeth.[44,45] The identification of early lesions allows a preventive approach aimed at avoiding the progression of the disease to cavitation and tooth destruction. Health behaviours alone (i.e without professional intervention) may suffice in securing caries arrest. In addition to the health behaviours, professional topical fluoride application may be effective for arresting caries lesions. For instance, systematic reviews show that sealants and 38% silver diamine fluoride solution (SDF) can be effective in arresting the progression of non-cavitated caries lesions in enamel and dentine in primary teeth[46,47] and that 5% sodium fluoride varnish can remineralize early carious lesions in primary teeth.[47]

ECC lesions which have progressed to cavitation require temporization to preserve the tooth structure, avoid unnecessary extraction and negative consequences, including pain, infection and hospitalization, and prevent social consequences such as interfering with preschooling activities. SDF is shown to be a cost-effective procedure.[48,49] Topical application of fluoride varnish and SDF can arrest the progression of ECC lesions,[50] and effectiveness is greater with biannual application.[50,51] Inhibition of lesion progression can also be achieved by the application of flowable fluoride-releasing glass ionomer cement.[50] Application of SDF is a painless, simple and low-cost therapy which can be widely promoted as an alternative to conventional invasive caries management procedures.[52] Arrested cavitated lesions can remain appropriately unrestored, providing they do not present risks for posterior space loss or culturally unacceptable anterior aesthetics. However, if required, atraumatic restorative treatment (ART), which has been included in the recent Basic Package of Oral Care by the WHO Regional Office for Africa,[53] can be used. It is a cost-effective technique which is less invasive to dental tissue and can be undertaken with less discomfort to patients. It was considered a "patient-friendly" procedure.[54,55] In addition to ART, an interim version of ART called the interim therapeutic restoration (ITR), which is almost identical to ART with the exception of proposed subsequent clinical intervention, can be provided prior to the definitive restoration.[56] Finally, where resources allow, cavities in molars may be treated using the Hall technique. This involves seating a stainless steel crown, filled with glass ionomer cement, over the affected tooth. This is relatively painless procedure that can be undertaken without local anaesthesia.[57]

**TABLE 3** Specific recommendations for public health intervention against ECC

| |
|---|
| Include the definition of ECC in the ICD-11 classification |
| Recommend inclusion of preschool children in subnational surveys as part of oral health population surveys conducted in the country. Such surveys should be based on the WHO Basic Oral Health Surveys and include risk factor assessment |
| Detect early caries lesions for early intervention |
| Advocate the importance of primary teeth to parents/caregivers and the community by raising awareness of ECC's impact on quality of life of young children |
| Emphasize ECC within oral health education and interprofessional education with other health professions |
| Integrate ECC prevention within the primary health care (PHC) approach measures and implement at appropriate times, such as vaccination period, as a public health focus |
| Align ECC prevention intervention with other health promotion initiatives such as actions against childhood obesity, avoidance of free sugars in complementary foods and drinks, and promotion of breastfeeding |
| Implement comprehensive programmes that promote the intake of healthy foods and reduce the intake of sugar-sweetened beverages and foods, including introduction of taxation policy, awareness raising campaigns to reach all groups in society, implementation of recommendations on marketing of foods and unhealthy drinks to children |
| Develop a training package for dental and nondental personnel for providing appropriate prevention and management for ECC |
| Confirm the use of community fluoride administration, such as water, salt or milk as primary prevention of ECC |
| Perform toothbrushing for children by a parent twice daily, using a soft toothbrush of age-appropriate size |
| Use standard fluoride-containing toothpaste (1000-1500 ppm) in all children under the age of 6 |
| Use fluoride varnish and sealants with glass ionomer cement as agents to help prevent deterioration of the ECC-affected dentition |
| Support the use of silver diamine fluoride and ART, and other minimally invasive methods, using glass ionomer cement to stabilize the caries lesion |
| Promote evaluation, surveillance and research, including cost-effectiveness, for the prevention of ECC in different communities |

## 5 | CONCLUSION

The aetiology of ECC is complex due to the multilevel web of factors that modify risk.[3] Intervention approaches range from changing personal behaviour, working with families and caregivers, to public health solutions including building health policies, creating supportive environments, health promotion and orientation of health services towards disease prevention (Table 3). Preventive approaches should consider the social characteristics of the family, diet and feeding practices, and how the sociobehavioural risk factors of ECC can be modified. Population-based prevention of ECC and health promotion initiatives should be implemented, targeting pregnant women, new mothers and primary caregivers with the aim of raising awareness about the common risk factors, particularly the addition of free sugars to drinks and complementary foods. In addition, policies promoting the intake of healthier foods and diets and reducing the intake of sugar-sweetened beverages and foods should be formulated; these may include taxation and recommendations on the marketing of less healthy foods and drinks. In view of the many benefits of breastfeeding,[26] ECC prevention should align with WHO breastfeeding recommendations, although further research is required to obtain better quality data on any independent effect of breastfeeding of longer duration on caries risk. Emphasis on dental care should be given to the early detection of caries lesions. To facilitate this, ECC should be clearly defined. Dental personnel and other health professionals, as well as mothers and caregivers, should be trained to detect the early signs of ECC and instructed on seeking advice. Oral health should be integrated into the child's health profile at well-child clinics during primary health care, such as visits for vaccination. For the clinical management of ECC, noncavitated lesions should be arrested and remineralized, and the restoration of cavitated lesions should follow conservative principles which aim to preserve tooth structure and avoid unnecessary extraction. Finally, to monitor and evaluate ECC intervention programmes, subnational oral health surveys of preschool children may be required; such surveys should also include assessment of the factors that modify risk.

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