



# Too soon for the tooth fairy

The implications of child  
poverty for oral health

**Author**

Prathibha Sural

Dr Rob Beaglehole

2018

CHiLD  
POVERTY  
ACTION  
GROUP



# About Child Poverty Action Group

Child Poverty Action Group (CPAG) is an independent charity working to eliminate child poverty in New Zealand through research, education and advocacy. CPAG believes that New Zealand's high rate of child poverty is not the result of economic necessity, but is due to policy neglect and a flawed ideological emphasis on economic incentives. Through research, CPAG highlights the position of tens of thousands of New Zealand children, and promotes public policies that address the underlying causes of the poverty they live in.

If you would like to support CPAG's work, please visit our website: [www.cpag.org.nz](http://www.cpag.org.nz)

## Acknowledgments

The writing of this report was led by Prathibha Sural in collaboration with Dr Rob Beaglehole. CPAG are sincerely grateful to the authors for their efforts and for their contribution toward a goal of improving the wellbeing of low-income children in Aotearoa-New Zealand. Our thanks also to Professor Toni Ashton for providing extensive peer review and editing, and to Professor Innes Asher, Dr Katie Bach, Janfrie Wakim and Dr M.Claire Dale for their feedback and editing.

## About the Authors

Prathibha Sural has received a degree of Bachelor of Dental Surgery (BDS) from India and a Master's degree in Public Health at the Auckland University of Technology (AUT). She has a special interest in child oral health and believes in family empowerment and advocacy as a way to improve oral health of children. She works as a Research Assistant at CPAG and as a Field Interviewer at the University of Auckland for the Growing Up in New Zealand longitudinal study.

Rob Beaglehole is a Specialist in Dental Public Health. He is the Principal Dental Officer for the Nelson Marlborough DHB. He is also the New Zealand Dental Association's Public Health Spokesperson. He has been instrumental in firmly placing the dangers of sugary drinks on the national agenda, including helping to initiate sugary drink free policies at DHBs, Councils and schools around New Zealand.

### **Too soon for the tooth fairy**

ISBN: 978-0-9951058-2-9

© 2018

Child Poverty Action Group Inc.

PO Box 5611

Wellesley St

Auckland 1141

New Zealand

[www.cpag.org.nz](http://www.cpag.org.nz)

Disclaimer: This publication is intended to provide accurate and adequate information on the matters contained herein and every effort has been made to ensure its accuracy. However, it has been written, edited and published and made available to all persons and entities strictly on the basis that its author, editors and publishers are fully excluded from any liability or responsibility by all or any of them in any way to any person or entity for anything done or omitted to be done by any person or entity in reliance, whether totally or partially, on the contents of this publication for any purpose whatsoever.

---

# Contents

Preface .....	2
Introduction.....	3
Burden of child dental diseases in New Zealand.....	4
New Zealand is at risk of poor oral health.....	6
Effects of poor oral health in childhood.....	8
Caries and erosion are preventable .....	9
Solutions.....	10
Reduce child poverty.....	10
Advocacy and political leadership.....	10
Control of sugary drinks.....	11
Implementation of a tax on sugary drinks.....	12
Community water fluoridation .....	13
Contemporary oral health promotion.....	13
Community engagement.....	13
Oral health research .....	14
Improved dental health services for children.....	14
Recommendations .....	15
Conclusion .....	16
Bibliography .....	17

# Preface

Poverty is a key factor contributing to preventable childhood health problems and diseases, and as such it is a key factor contributing to poor oral health amongst children. Indeed, poor oral health is a marker of poverty. Māori and Pasifika children are also at especially high risk.

Poor oral health in childhood tends to lead to poor oral health in adult life. This in turn is associated with poor general health, including a higher incidence of cardiovascular disease and respiratory conditions. Poor oral health in children can lead to long-term impact on one's social life including choice of employment and ability to earn an income.

This cycle of poor health is entirely preventable, and the prevalence of dental caries amongst children is declining in most developed countries. However, in New Zealand, the prevalence remains stubbornly high. This is in spite of improvements in oral health being a stated priority of governments for almost two decades.

This paper summarises current knowledge about the size of the problem, its causes and potential solutions. Our purpose is to stimulate action on this major, preventable public health issue. This action needs to come from a number of sources including parents and other caregivers, schools, local communities, the dental profession, and food and drinks producers as well as government. A co-ordinated, comprehensive and long-term strategy is needed along with sustainable funding. New Zealand has paid lip service to this problem for far too long: it is time for action.

# Introduction

Four-year-old Sophie has just had her baby teeth removed under general anaesthesia as a result of multiple cavities. However her mother was relieved to have saved around \$4000 because the dentist had told her that if not for our public health system, that is the amount she would have paid for this procedure. Did she really get it without cost? There might be several parents out there feeling the same way. But low levels of awareness and a lack of education centred on improving children's oral (dental) health mean that the financial burden of this treatment falls upon all of New Zealand. Every year, we spend tens of millions in public health on dental health treatments like these (Sundborn, Beaglehole, & Thornley, 2014, July 23). Many factors that contribute to extensive and severe disease lead to poor oral health in children. Most are preventable, and strongly associated with poverty. We will all gain if these problems can be prevented. As a nation, we will save the \$4,000 economic cost of each operation, and as communities and families, we will avoid the pain endured by these children.

Dental caries - commonly called 'tooth decay' - is the most common chronic disease seen in children and one of the leading causes of hospital admissions for New Zealand children (Bach & Manton, 2014; Health Promotion Agency, 2015; Ministry of Health, 2010). It develops as a result of loss of minerals from teeth due to the acid produced by bacteria living inside the oral cavity as they metabolise sugars over a period of time (Beighton & Bartlett, 2006). The saliva contains minerals and antibiotics needed to curb the damaging activities of these microorganisms and also to regulate the pH level in the oral environment. However, if a high-sugar and acidic diet is consumed too frequently, the function of the saliva to wash the bacteria from the mouth has reduced efficacy, and tooth problems often result (Rugg-Gunn & Nunn, 1999).

Early childhood caries (commonly known as ECC) is a condition occurring in infants and toddlers which presents with holes in multiple teeth. It can progress very quickly from a tiny black dot to a big, painful abscess, also spreading quickly to adjacent teeth (Bach & Manton, 2014). The common causes for ECC are a high-sugar diet with limited or no oral hygiene practices, bottle-feeding (particularly at night) or consuming sugary drinks in feeding cups and sucking on pacifiers dipped in honey or other sugar-sweetened food and drinks (Manton & Hayes-Cameron, 2013).

Another common condition affecting teeth is 'dental erosion'. It results from tooth enamel being chemically etched away from the tooth as a consequence of exposure to acids either from the stomach or from food and drinks consumed, exposing the nerves of the teeth to the oral environment. The exposed nerves respond to the external stimuli and produce excruciating pain and sensitivity (Rugg-Gunn & Nunn, 1999). The erosion was once considered to be a consequence of aging, but there is now evidence to show that this condition is becoming more common in children. This has been attributed to increased consumption of fast foods, carbonated drinks and fruit-based drinks among children (Ayers, Drummond, Thomson, & Kieser, 2002; Fung & Brearley Messer, 2013).

# Burden of child dental diseases in New Zealand

While ECC prevalence in most developed countries is 1-12%, dental data in New Zealand indicate an ECC prevalence of 50% amongst five-year olds with marked disparities across various demographic groups (Health Promotion Agency, 2015; Ministry of Health, 2010). Although national data on dental erosion are not available, a Dunedin study showed a prevalence of 82% overall tooth wear (at least one tooth involved) in children aged between five and eight years (Ayers et al., 2002). Moreover, despite various public health measures and modern oral health interventions, there has been little improvement in the oral health of young children of New Zealand (Bach & Manton, 2014).

## Effects of poverty on children's oral health

National-level studies show that there is an alarming level of inequality in New Zealand in both health and socioeconomic status of individuals. Māori and Pasifika peoples are disproportionately affected by poverty and are overrepresented in social risk factors such as low education levels, unemployment, poor housing, geographic deprivation and many more. A recent investigation provides evidence of a wide gap in indicators of inequality between European and Māori and Pasifika communities (Marriott & Sim, 2014). Māori and Pasifika children are therefore at especially high risk of poor oral health.

According to the Child Poverty Monitor (2017), 290,000 children in New Zealand – that is 27% of kiwi kids - are currently living in income poverty, while 135,000 (12%) live in households experiencing material hardship<sup>1</sup>. Socioeconomic status plays a vital role in people's health, particularly children's health and oral ill-health is strongly associated with poverty. While any child is at risk of tooth decay, disadvantaged populations, such as children living in unfavourable social conditions, from an ethnic minority and indigenous community, immigrants and refugees living in developed nations or whose parents have low literacy levels, are more susceptible to ECC (Çolak, Dülgergil, Dalli, & Hamidi, 2013; Reza et al., 2016).

In Australia, a significantly higher proportion of children from low socioeconomic households demonstrated worse clinical oral health indicators when compared to those from high socioeconomic households (Bach & Manton, 2014). These findings are consistent with the findings of the national data of New Zealand (Ministry of Health, 2006, 2010), where the prevalence of caries is higher among children from lower-income households when compared those from higher socioeconomic households.

---

1 Child Poverty Monitor. (2017). <http://childpoverty.co.nz/>

**Table 1: Mean number of sound primary teeth and prevalence of untreated coronal decay on at least one primary tooth, among children aged 2–11 years, by population group**

Population group		Mean number of sound primary teeth (95% CI)	Prevalence of untreated coronal decay on at least one primary tooth (95% CI)
All	Total	11.6 (11.0–12.2)	16.6 (12.7–20.5)
Sex	Girls	11.2 (10.4–12.0)	15.3 (9.1–21.4)
	Boys	12.0 (11.2–12.9)	18.0 (12.0–23.9)
Age group (years)	2–4	18.8 (18.3–19.4)	14.9 (10.2–20.7)
	5–11	8.8 (8.0–9.6)*	17.3 (12.2–22.4)
Ethnic group	Māori	10.7 (10.1–11.4)	26.6 (19.9–33.4)
	Pacific	11.2 (10.0–12.4)	25.6 (18.0–34.5)
	Asian	13.2 (11.4–15.1)	18.1 (11.6–26.2)
	European/Other	11.8 (11.0–12.6)	12.5 (7.4–17.5)
Neighbourhood deprivation (NZDep2006 quintile)	1 (least deprived)	12.2 (10.5–13.9)	12.2 (5.6–22.4)
	2	12.7 (10.5–14.9)	8.4 (3.6–16.3)
	3	10.3 (8.0–12.5)	20.2 (13.0–29.1)
	4	12.7 (10.9–14.4)	12.4 (7.6–18.7)
	5 (most deprived)	10.6 (9.3–11.9)	27.2 (19.0–35.5)

NOTE: \* Children between 5-11 years naturally have fewer primary teeth than 2-4 year olds because it is mixed-dentition period. CI = Confidence Interval.

Source: 2009 New Zealand Oral Health Survey

As shown in Table 1, the findings of the 2009 New Zealand Oral Health Survey show that children from Māori and Pasifika ethnic groups are twice as likely as European/other children to have at least one untreated decayed primary tooth. Similarly, children from the most deprived areas are also twice as likely as those from least deprived areas to have one or more untreated decayed primary teeth. European children and those from the least deprived areas also had a higher number of sound primary teeth than their counterparts from Māori and Pasifika communities and from most deprived suburbs (Ministry of Health, 2010). Possible reasons include dietary factors, unavailability of fluoridated community water supply and poor access to professional dental care and oral health-related information. The 2009 Survey also found that children from the most deprived areas and from Pasifika households had the lowest rate of utilisation of free dental service in the previous 12 months, followed by Māori children (Ministry of Health, 2010).

# New Zealand is at risk of poor oral health

A recent systematic review of sugary drink consumption data from 187 countries suggests that consumption of fruit juice is highest in New Zealand, particularly in women aged between 20 and 29 years with 2.3 servings/day (Singh et al., 2015). On average, New Zealanders consume around 37 teaspoons of sugar per person per day, while the World Health Organization (WHO) recommendation for daily sugar intake for an average adult is no more than 12 teaspoons (Beaglehole, 2014). A recent study has also found that sugary drinks sold in New Zealand supermarkets contain more added sugar than those sold in Australia, Canada and the UK. According to this study 52% of sugar-sweetened beverages (SSBs) purchased in New Zealand contained added sugar, which was the highest when compared with those purchased in Australia (42.2%), Canada (42.8%) and in the UK (9%) (Nyika, 2018).

During childhood, parents and caregivers choose food and drink for children, which serves as a model of eating and drinking behaviour for them in the future (Savage, Fisher, & Birch, 2007). The 2007 New Zealand Food and Drinks Survey shows high levels of availability and consumption of sugary drinks in the majority of the families surveyed. Most of the parents and caregivers reported that their children consumed these drinks on a daily basis (National Research Bureau, 2008). Consumption of sugary drinks is much higher in Māori and Pasifika children and adolescents than those from other ethnic groups (Ministry of Health, 2012). In the 2007 Food and Drinks Survey, availability of (less expensive) cordials and powdered drinks was more common in Māori and Pasifika households, while more European and Asian parents and caregivers reporting availability and child consumption of (more expensive) fruit juice in their homes (National Research Bureau, 2008).

The findings of a literature review conducted recently by the Health Promotion Agency (2015) support the view that the oral health of children relates mainly to the awareness levels of parents and caregivers, their own dental behaviour, their understanding of how to care for primary teeth and when to seek professional advice for their children's teeth. The review found that a majority of parents and caregivers thought that primary teeth were less important than adult teeth. It also shed light on a low oral health literacy of parents and primary caregivers in New Zealand. Again, poverty appears to be a factor, with women from lower socioeconomic backgrounds having a lower level of knowledge of oral health.

The literature review also showed that children from the most deprived areas are less likely to brush their teeth twice daily when compared to children from other communities and from the least deprived areas. Parents from low socioeconomic households are more likely to begin brushing their children's teeth at a later age, to brush their children's teeth less frequently and to utilise dental service only for relief of symptoms (Bach & Manton, 2014).

In a South Auckland study (Schluter, Durward, Cartwright, & Paterson, 2007) involving Pasifika mothers and their four-year-old children, there was a notable lack of understanding of good oral health practices that are consistent with dental recommendations. Almost half of the participants reported brushing their children's teeth less than once a day. Snacking and drinking immediately before going to bed was a regular practice among 57% of the children studied. In an effort to reduce the risk of disparities occurring, the Ministry of Health encourages enrolling children from Māori and Pasifika backgrounds and those living in low-decile areas for free dental services by their first birthday while for children from all other groups, the Ministry recommends enrolment by their third



birthday. Importantly, in the South Auckland study, more than half of the mothers studied did not know that the Community Oral Health Service (COHS) is available for free, and at four years of age, a quarter of the children had not received their first dental check-up (Schluter et al., 2007).

In another study (Rothnie, Walsh, Wang, Morgaine, & Drummond, 2012) involving expectant mothers of Dunedin investigating their knowledge of child oral health care, only two thirds of the participants (ethnicity unspecified) knew correct preventive practices in children. A quarter did not know how to enrol their child in the COHS. In this study, women from low socioeconomic backgrounds had poor levels of oral health knowledge. The findings are very similar to those of another study involving pregnant Māori women (Broughton et al., 2014).

New Zealand children are entitled to free dental care either from a dentist or dental therapist until their 18<sup>th</sup> birthday (Health Promotion Agency, 2015). Therefore, fee-for-service should not be a barrier for visiting a dentist to children from poor families. However, lack of knowledge of this entitlement to free dental care for children, lack of adequate transport and lack of availability of dental care providers in rural areas could still be problematic. A shortage of the dental workforce, particularly from Māori and Pasifika backgrounds, is one of the major issues in New Zealand. According to the latest Dental Council of New Zealand data (2017), several territorial authorities have no dentists or oral health therapists (dental therapists and hygienists). Of those that have, there are less than thirteen oral health professionals per 100,000 population. Only 3.1% of the dentists are Māori. These data show an overall increase in practising oral health professionals over the years. The percentage of Māori dental therapists has seen a slight improvement from 10.9% in 2012 to 11.3% in 2015 while for Pasifika ethnicity the rates have risen from 2.5% to 3.8%. The Dental Council data also shows a slight increase in younger oral health therapists joining the workforce. This slight growth, however, is not sufficient because over a third of the currently practicing therapists are aged between 55 and 75 years (Dental Council of New Zealand, 2017). Their retirement may worsen the current workforce shortage.

A final risk factor relates to the water supply. Half of New Zealand's population does not have access to a fluoridated community water supply, particularly those living in rural areas (Centre for Public Health Research, 2017). Children who had no access to a fluoridated water supply have shown higher caries prevalence than those who had access to fluoridated water (Ministry of Health, 2006).

# Effects of poor oral health in childhood

Oral health during childhood has a significant influence on the oral health outcomes throughout the life course. Primary teeth or milk teeth are crucial to jaw development and to reserve space for the future permanent teeth just as much as they are needed for chewing and aesthetics. Hence, premature loss of these teeth may lead to crowding of teeth, malnutrition, poor dietary choices, sleep and behavioural issues and low self-esteem due to poor aesthetics. It may also affect speech articulation and school performance. Poor oral health in childhood has also been associated with small stature (Finucane, 2012).

The period between 6-14 years of age is called 'mixed dentition period' because both primary and permanent teeth are present in the mouth. Hence, if untreated decayed primary teeth are present next to the permanent teeth, decay can spread to them too, permanently damaging the permanent teeth and carrying forward the dental problems into adulthood. Poor oral health outcomes may also affect an individual's general health, correlating with many common health issues including diabetes, cardiovascular diseases, and respiratory diseases (Petersen, 2003). Although no cases of child death due to dental sepsis have been documented in New Zealand, there have been a few incidences reported in the United States (Finucane, 2012).

Poor dental experience can be a vicious cycle because the delay in seeking dental care may result in a need for more complex dental treatments later (Finucane, 2012). Exposure to major dental treatments, particularly in childhood, increases the fear of dental treatment and so may result in delaying treatments, not only for themselves but also for their children in the future (Smith & Freeman, 2010).

# Caries and erosion are preventable

The good news is that both dental caries and erosion are preventable. Dental caries can be prevented by using good oral hygiene practices, avoiding high-sugar and low pH diet and with regular visits to a dental office. Use of fluorides, either added to toothpastes and mouthwashes or to community water supply, is also effective in increasing the resistance to demineralisation of dental hard tissues. Avoiding low-pH foods such as pickled foods, and sugary drinks such as carbonated drinks, fruit-based drinks and flavoured milk can help in reducing the incidence of dental erosion. Diluting the juice, restricting sugary drinks to meal times and giving at least two hours' gap between two feeds can also help in allowing the saliva to clear the carbohydrates and adjust the pH level in the mouth.

The American Academy of Paediatric Dentistry (AAPD) also puts emphasis on restricting saliva-sharing behaviours among family members and improving oral health of parents and siblings in order to minimise transmission of cariogenic bacteria. It also highlights the importance of application of fluoride varnishes by dental professionals on teeth that are at high risk for dental caries. To achieve this, it stresses the need to provide children with better access to screening and therapeutic measures and to improve ongoing relationships of dental care providers with their patients with a family-centred approach (Health Promotion Agency, 2015).

# Solutions

To achieve better oral health for disadvantaged children, there is an urgent need for a contemporary and collective approach to address the barriers at personal, community and national levels. Since ECC and erosion are multifactorial in nature, the preventive measures should be comprehensive in order to limit the bacterial activity, acidic environment and presence of fermentable carbohydrate in the oral cavity.

## Reduce child poverty

This report highlights the fact that there is a clear association between poverty and many measures of poor oral health, with Māori and Pasifika children being at especially high risk. Mitigating child poverty is therefore fundamental to improving oral health in New Zealand and reducing disparities. A comprehensive strategy for reducing child poverty is required, including policies aimed at improving education, housing and health as well as policies which directly improve the incomes of low-income families. A range of recommended policies is given in CPAG's 2017 Briefing to the Incoming Government (Child Poverty Action Group, 2017).

## Advocacy and political leadership

In the New Zealand Health Strategy 2000, oral health was one of the thirteen population health objectives for the following decade. It was also considered as one of the twelve priorities for Māori Health. In its vision statement 'Good Oral Health for All, for Life' published in 2006, the Ministry of Health (2006) identified the seven key action areas to improve oral health, including reduction in oral health inequalities. The New Zealand Health Strategy 2016 also embraces the principles of the previous strategy and aims to achieve 'people-powered health' by 2026. It emphasises improving health literacy of people and helping them to make healthier choices (Ministry of Health, 2016). As yet, little progress appears to have been made, at least for children.

The importance of oral health is often downplayed in the political arena. For example, a long-term politician and former Associate Health Minister, Peter Dunne, argued in a TV show, broadcast in March 2015, that prevention of tooth problems starts with brushing teeth twice daily, not by reducing consumption of sugary drinks (Fluoride Action Network NZ Inc, n.d.-a). However, the reality is, while brushing teeth will help to reduce the bacterial activity in the mouth, it does little to control chemical tooth wear. In fact, brushing teeth that have already been softened by exposure to acidic food and drinks will only hasten the process of enamel loss (Noble, 2006).

As former Prime Minister Helen Clark recently indicated, it is time for the political leaders to take a serious look into the determinants of oral health of New Zealanders and undertake pragmatic initiatives, possibly including universal free dental care (Walters, 2017). If the oral health of children is improved, then the cost of treating their teeth under general anaesthesia is saved. This money can then be directed towards extending oral health services. While providing free dental care to all New Zealanders may be too expensive, extending free dental care to young adults up until their 21<sup>st</sup> birthday could be a great start in making significant influence on the oral health of New Zealand population.

The New Zealand Dental Association (NZDA, 2016) and its thirteen partner organisations have teamed up to develop a Consensus Statement on Sugary Drinks with seven strategies to reduce

sugary drinks consumption at population level. These strategies reflect the need for regulation of marketing, labelling and advertising of sugary drinks, encouraging effective social marketing campaigns to create awareness among people to avoid sugary drinks, particularly for their children and developing a 'water-only' culture in the school environment. They also propose a joint advocacy campaign for the adoption of a health levy on all sugary drinks.

## Control of sugary drinks

There is a need for advocacy to ban advertisements on sugary drinks, restrict their sales, particularly to vulnerable groups like children, adolescents and people with low oral health literacy levels. The definitions of fruit juice and fruit drink vary across countries. While a fruit juice is typically made up of pure juice extracted from a fruit, there is no standard definition for a fruit drink. For example, according to the Food and Agriculture Organization of the United Nations (FAO), a fruit drink has a fruit content ranging between 10-20% (Bates, Morris, & Crandall, 2001), whereas according to the New Zealand Juice and Beverage Association (NZJBA) guidelines, a minimum requirement of fruit content in a fruit drink is only 5% (NZJBA, 2013). In an Auckland study (Sural, 2016), only half the parents and primary caregivers knew the difference between a fruit juice and a fruit drink. In the same study, the nutrition labels of all the popular brands and sub-brands chosen by the participants for their children showed that the fruit content in fruit drinks ranged between 5-35% while in fruit juice it was 90-100%. However, sugar levels on nutrition panels for the fruit drinks were the same or higher than that of fruit juice, inferring that the sweetness in fruit drinks is adjusted by adding a significant amount of sugar. Therefore, displaying the amount of added sugar on the nutrition panel can be a useful signal for consumers.

The new Government elected in 2017 has taken the first step to reduce population level sugar consumption by urging the manufacturers to reformulate their products to make them healthier (Jones, 2017, October 30). Further actions needed are better standards of nutrition labelling and more straightforward guidelines. Hiding the sugar levels on the nutrition panels using scientific names (such as sucrose, maltose, and fructose) or using alternative names should be banned. Better front-of-pack labelling with warning signs like how much sugar is present, or pictorial warnings such as the 'Happy Tooth®' logo, or teaspoon images on food and drinks sold in the supermarkets can be more powerful. The Happy Tooth logo has been very successful in Switzerland and many other countries because it tells people whether a food or drink is tooth friendly based on both its caries and erosive potential (Toothfriendly International, 2015).

Definition of sugar-sweetened beverages (SSBs) varies across countries. While some developed countries consider even 100% fruit juices as SSBs, in New Zealand natural juices are not classified as SSBs because they contain only natural sugars (Australian National Preventive Health Agency, 2014; Beaglehole, 2014). However, evidence shows that excess consumption of natural sugars in the form of juices after squeezing out all the fibres can be as detrimental to health as added sugars. Moreover, even the natural sugars in the juices and their low pH can be just as bad for teeth as other sugary drinks. The pH value of the vast majority of SSBs and fruit juices is slightly higher than that of car battery acid (Beaglehole, 2014). Therefore, the World Health Organization (WHO) uses the term 'sugary drinks' to identify "all types of beverages containing free sugars and these include carbonated or non-carbonated soft drinks, fruit/vegetable juices and drinks, liquid and powder concentrates, flavoured water, energy and sports drinks, ready-to-drink tea, ready-to-drink coffee, and flavoured milk drinks" (World Health Organization, 2017, p. 1).

# Implementation of a tax on sugary drinks

In many countries, a tax on sugary drinks sold in the market is becoming increasingly effective in controlling their sales. In Mexico and in some states of the United States a sugar tax has resulted in marked health benefits due to reduction in sugar consumption (McDonald, 2015). The WHO also recommends a tax that increases the price of sugary drinks by a minimum of 20% in order to bring about notable population-wide health gains (World Health Organization, 2017).

In New Zealand, there is a strong debate on this issue. Researchers who find significant impacts of high-sugar diet on health, doctors who treat non-communicable diseases and public health dental professionals who extract teeth from children still wearing nappies, are strongly supportive of a sugar tax (Mann, 2017; Plumb, 2016, April 2). But some political leaders and policy analysts argue that it may impose an unfair burden on the poor, as they will pay a higher share of their income than the rich (Christian, 2017; Mann, 2017). Countering this argument is the fact that people on low incomes spend a higher share of their income on sugary drinks to the detriment of their health. They are also more likely to reduce consumption in response to a price increase of high-sugar products and therefore stand to benefit most from the health gains (McDonald, 2015). As Thornley argues, a sugary drinks tax as low as 50 cents per litre may markedly reduce sugar consumption while helping the Government to generate revenue to invest on initiatives to curb the health burden of population-levels of sugar consumption (Christian, 2017). Results of the two separate New Zealand Herald polls demonstrate people's support to tax sugary drinks; the support is even higher for low-income people (Plumb, 2016, April 2; "Sugar tax on fizzy drinks: Majority want it," 2017, August 1).

There are different ways of implementing a tax on sugary drinks. As listed by McDonald (2015), they can be nutrition-based, volume-based, value-based or flat taxes. But first, it is important to communicate a clear health goal to the public about the primary purpose of such a tax. Also, a portion of the revenue generated from the tax should be utilised for prevention and treatment of oral health problems.

It is important to consider the impact of a tax on the prices of sugary drinks. Otherwise, people may continue to buy the same amount of sugary drinks but a cheaper brand. In a study on parents' awareness of effects of commercial fruit beverages on their children's teeth, price and affordability of sugary drinks was one of the main factors for choosing a brand and sub-brand of fruit drinks for their children, among low-income groups in particular (Sural, 2016).

People living in rural suburbs are more likely to have fewer healthy food and drinks choices or the healthier food and drinks, when available, can be very expensive (Rush, 2009). While there is debate about the influence of availability of healthier food and drinks on the eating patterns and health behaviours of children, a review confirms this association (Blanchette & Brug, 2005). In New Zealand, bottled water and milk are more expensive than many SSBs (Woodford, 2014, March 30). Therefore, a tax on sugary drinks must be accompanied by strategies for improving the availability and affordability of healthy alternative food and drinks, including provision of water fountains at schools and near public places.

## Community water fluoridation

At the community level, the first pragmatic approach is improving community water fluoridation (CWF). At present, the power to make the decision on fluoridating local community water supply lies with the respective local authorities. However, the new Health (Fluoridation of Drinking Water) Amendment Bill proposes transferring this decision-making power to the local District Health Boards (DHBs) with respect to their expertise in public health. Once this Bill is passed, DHBs will decide which water supply should be fluoridated, while local authorities continue to receive funding for the infrastructure and hold the responsibility to oversee its implementation (Kirk, 2017; Ministry of Health, 2017).

However, there are some challenges for its implementation of CWF in some areas. First of all, different areas of New Zealand have different sources of water supply. CWF is more cost-effective in areas with reticular water supply such as in big cities. Hence, a majority of population with access to fluoridated drinking water supply live in Auckland, Wellington, Hamilton and Dunedin (Centre for Public Health Research, 2017). Therefore, for the people from other towns and rural suburbs, alternative arrangements (such as free supply of fluoridated toothpastes and toothbrushes) should be considered. A supervised tooth brushing programme with free supply of tooth paste and tooth brush in a school in Northland, which has no access to CWF, has been successful in improving the oral health of the students participated in the programme (Clark, 2017).

A second barrier to the use of CWF is the existence of vocal anti-fluoridationist groups who continue to deny the efficacy of fluoridation. They also express concerns about the loss of personal choice and informed consent. Some ethnic groups have also shown a lack of knowledge with strong misconceptions about use of fluorides (Fluoride Action Network New Zealand Inc, n.d.-b; Grant, Dawson, & Thomson, 2013). Oral health professionals need to maintain their efforts to collaborate with these communities in order to clear their misunderstandings and provide information on alternative methods of oral care.

## Contemporary oral health promotion

Another community level intervention is to improve oral health literacy levels and self-efficacy skills of New Zealanders through advanced oral health promotion activities. In particular, in deprived communities and for new immigrants, there is a lack of knowledge around free provision of dental care for children. While there has been an increase in health promotion activities to reduce sugary food consumption in the recent years, these emphasise the effects of sugary food and drinks on obesity and other non-communicable diseases with little focus on oral health (Heart Foundation, 2012; Waitemata District Health Board, n.d.). Oral health messages should also emphasise the erosive potential of sugary drinks. Otherwise, people may simply switch to other drinks with alternative sweeteners, which can still be detrimental to oral health. For example, if pure fruit juices and sugary drinks with alternative sweeteners are not included in a sugary drinks category and hence are exempt from a sugar tax, people are likely to switch to these drinks, possibly assuming that they are healthier. Problems such as these can be reduced - if not overcome - by clear, consistent and targeted oral health messages.



## Community engagement

Getting community buy-in is imperative for the success of health educational campaigns. Involving schools, supermarkets, hospitals and other community settings can be an effective means of oral health promotion. For example, the 'water-only school' initiative pioneered by Yendarra School in 2006 became so popular that it has forced the beverage industry to stop selling sugary drinks at all primary and intermediate schools (Collins, 2017, June 24). A Nelson supermarket has joined with the Nelson District Health Board and agreed to stop selling SSBs to children in school uniform during school hours (Ruddock, 2017).

## Oral health research

Despite being one of the key action areas of the oral health strategy of the Ministry of Health, there has been little focus on oral health research. Most of the major oral health promotion initiatives in New Zealand are based on evidence from other developed countries. There are very few studies available in New Zealand that reveal oral health knowledge and behaviour of primary caregivers. These are specific to some demographic groups, and limit comparison of the evidence from the general population (Health Promotion Agency, 2015). National surveys study only the clinical indicators for dental caries with no record of prevalence of dental erosion. Hence, there is an urgent need to undertake national level research on the prevalence of tooth wear in children. In addition, studying the difference between different types of fruit-based drinks in terms of their nutritional benefits can help the Government to tighten the guidelines for production and sales of these drinks and also motivate people to reduce consumption.

## Improved dental health services for children

The Government should take responsibility to strengthen the oral health workforce, particularly in deprived areas. For example, the introduction of mobile dental clinics is one means of reaching more remote populations. Since unattractive remuneration and high occupational stress have been common reasons reported for job dissatisfaction among oral health therapists (Ayers, 2009; Ayers, Meldrum, Thomson, & Newton, 2006), improved remuneration and other incentives to encourage the current workforce to continue their service may be helpful. Simultaneously, providing financial support to the youth population to take up oral health as a career should be considered. Plunket nurses regularly see most of the infants and young children in New Zealand (Riches, 2015). Empowering them with updated oral health education to provide oral health advice to parents and caregivers and referring the high-risk children to oral health professionals can be another cost-effective way to reach out to the communities in need.

In addition to promoting the common preventive strategies of plaque control and diet control, Innes and Robertson (2018) also recommend some cost effective, 'minimally invasive' clinical procedures in children (p. 2). These procedures aim at preventing caries occurrence or arresting incipient lesions by reducing the bacterial growth in the oral environment or repairing carious teeth by promoting remineralisation of dental hard tissues. Some examples of such procedures are covering the deep fissures on the biting surfaces of the back teeth by placing a fissure sealant (a resin-based material), fluoride varnish applications and placing ready-made stainless steel crowns on primary teeth (Hall technique). Since these techniques do not need anaesthesia or drilling these are less likely to induce post-operative anxiety in children.



# Recommendations

- **Implement a comprehensive set of policies for reducing child poverty in New Zealand.**
- **Advocate for stronger government leadership in developing initiatives for improving children’s oral health and in monitoring actions.**
- **Increase awareness of free provision of professional dental care, particularly in more deprived communities.**
- **Improve standards of nutrition labelling and develop front-of-package indicators of the number of teaspoons of sugar in food and drinks.**
- **Guidelines regarding the consumption of sugar and sugar-sweetened beverages should be simple, so as to be understood by children.**
- **Use the term ‘sugary drinks’ to include all drinks containing free sugars.**
- **Explore the options for a tax on sugary drinks alongside a comprehensive health promotion campaign which supports a switch to healthier alternatives.**
- **Introduce a national strategy for effective childhood nutrition that includes equity issues for poverty, and reducing obesity. Policy drivers need to be identified with an underpinning evidence-base.**
- **Tighten regulations regarding the sales and promotion of sugary drinks.**
- **Advocate for introducing fluoride into local water supplies which are currently not fluoridated.**
- **Improve oral health literacy and self-efficacy skills of New Zealanders through oral health promotion activities especially tailored to meet the needs of those in poverty, Māori and Pasifika.**
- **Undertake national-level research on the prevalence of dental erosion in children.**
- **Develop a national plan for strengthening the oral health workforce including increasing the number of Māori and Pasifika dental health professionals.**
- **Extend the use of minimal intervention clinical procedures in children to prevent and control progression of caries.**
- **Adequately fund oral health public education campaigns through schools and media.**

# Conclusion

Poor oral health among children is a marker of poverty, particularly dental caries and dental erosion. New Zealand is facing more challenges for oral health owing to its growing ethnic diversity, steep socioeconomic gradient, high levels of sugar consumption and low levels of naturally-occurring fluoride concentrations in drinking water. Although the Government has taken some steps to reduce dental diseases along with some community-based projects on oral health promotion, there is significant inequality in this area. Hence, more equity-focused child oral health initiatives, better labelling standards and regulation of promotions and sales of sugary drinks and improved access to fluoridated drinking water are urgently required. In addition, public oral health social marketing campaigns to raise awareness among parents and caregivers and national level research to understand the burden of dental erosion and nutritional values of different types of fruit-based drinks and to examine the oral health literacy level of New Zealanders is also recommended. At the same time, increasing public awareness of free access for children to dental care is urgently required. Addressing dental workforce shortages and use of minimal intervention clinical procedures in children to prevent and control progression of caries are also needed to ensure a better oral health for all children of New Zealand.

# Bibliography

- Australian National Preventive Health Agency. (2014). *Obesity: Sugar-sweetened beverages, obesity and health*. Retrieved from [https://sydney.edu.au/medicine/public-health/menzies-health-policy/publications/Evidence\\_Brief\\_Sugar\\_sweetened\\_Beverages\\_Obesity\\_Health.PDF](https://sydney.edu.au/medicine/public-health/menzies-health-policy/publications/Evidence_Brief_Sugar_sweetened_Beverages_Obesity_Health.PDF)
- Ayers, K. (2009). *The dental workforce in New Zealand* (Doctoral thesis, University of Otago, Dunedin, New Zealand). Retrieved from <http://hdl.handle.net/10523/4569>
- Ayers, K., Drummond, B. K., Thomson, W. M., & Kieser, J. A. (2002). Risk indicators for tooth wear in New Zealand school children. *International Dental Journal*, 52(1), 41-46. doi:10.1111/j.1875-595X.2002.tb00596.x
- Ayers, K., Meldrum, A. M., Thomson, W. M., & Newton, J. T. (2006). The working practices and job satisfaction of dental hygienists in New Zealand. *Journal of Public Health Dentistry*, 66(3), 186-191. doi:10.1111/j.1752-7325.2006.tb02578.x
- Bach, K., & Manton, D. J. (2014). Early childhood caries: A New Zealand perspective. *Journal of Primary Health Care*, 6(2), 169-174. doi:10.1071/HC14169
- Bates, R. P., Morris, J. R., & Crandall, P. G. (2001). Defining juices. In *Principles and practices of small-and medium-scale fruit juice processing*. Rome, Italy: Food & Agriculture Organization.
- Beaglehole, R. (2014). Sugar-sweetened beverages, obesity, diabetes and oral health: A preventable crisis. *Pacific Health Dialog*, 20(1), 39-42. Retrieved from <http://pacifichealthdialog.org.fj>
- Beighton, D., & Bartlett, D. (2006). Dental caries and pulpitis. In R. Ireland (Ed.), *Clinical textbook of dental hygiene and therapy*. Oxford, England: Blackwell Munksgaard.
- Blanchette, L., & Brug, J. (2005). Determinants of fruit and vegetable consumption among 6–12□ years□old children and effective interventions to increase consumption. *Journal of Human Nutrition and Dietetics*, 18(6), 431-443. doi:10.1111/j.1365-277X.2005.00648.x
- Broughton, J., Person, M., Maipi JTeH, C.-T. K. R., Smith-Wilkinson, A., Tiakiwai, S., Kilgour, J., ... Lawrence, H. (2014). Ukaipo niho: the place of nurturing for oral health. *The New Zealand Dental Journal*, 110(1), 18–23. Retrieved from [https://www.nzda.org.nz/pub/index.php?id=93&no\\_cache=1](https://www.nzda.org.nz/pub/index.php?id=93&no_cache=1)
- Centre for Public Health Research. (2017). *Environmental Health Indicators New Zealand: Access to fluoridated drinking-water*. Retrieved December 26, 2017, from <http://www.ehinz.ac.nz/indicators/drinking-water-quality/access-to-fluoridated-drinking-water/>
- Child Poverty Action Group (2017). A New Zealand Where All Children Can Flourish: Briefing Paper to the Incoming Government. Retrieved 30 March 2018 from [http://www.cpag.org.nz/assets/171026%20CPAG%202017%20election%20briefing%20paper%20V8\\_WEB.pdf](http://www.cpag.org.nz/assets/171026%20CPAG%202017%20election%20briefing%20paper%20V8_WEB.pdf)
- Child Poverty Monitor: 2017 Technical Report (2017). Retrieved 30 March 2018 from <http://www.childpoverty.co.nz/>
- Christian, H. (2017). *Government skips debate on sugary drink tax*. Retrieved October 2, 2017, from <https://www.stuff.co.nz/national/94097625/government-skips-debate-on-sugary-drink-tax>

- Clark, E. G. (2017). *Supervised tooth brushing in Northland* (Master's thesis, University of Otago, Dunedin, New Zealand). Retrieved from <https://ourarchive.otago.ac.nz/bitstream/handle/10523/7563/ClarkEllen2017MComDent.pdf?sequence=1>
- Çolak, H., Dülgergil, Ç. T., Dalli, M., & Hamidi, M. M. (2013). Early childhood caries update: A review of causes, diagnoses, and treatments. *Journal of Natural Science, Biology and Medicine*, 4(1), 29. doi:10.4103/0976-9668.107257
- Collins, S. (2017, June 24). Industry adopts water-only policy for primary schools. *The New Zealand Herald*. Retrieved from <http://www.nzherald.co.nz/>
- Dental Council of New Zealand. (2017). *Dental Council workforce analysis 2013-2015*. Retrieved from <http://www.dcnz.org.nz/assets/Uploads/Publications/workforce-analysis/Workforce-Analysis-2013-2015incl-2012-updated-demographics.pdf.pdf>
- Finucane, D. (2012). Rationale for restoration of carious primary teeth: A review. *European Archives of Paediatric Dentistry*, 13(6), 281-292. doi:10.1007/BF03320828
- Fluoride Action Network NZ Inc. (n.d.-a). *Associate Health Minister Peter Dunne on dental health*. Retrieved August 27, 2016, from <http://fluoridefree.org.nz/associate-health-minister-peter-dunne/>
- Fluoride Action Network NZ Inc. (n.d.-b). *Fluoride Free NZ*. Retrieved September 24, 2014, from <http://fluoridefree.org.nz/>
- Fung, A., & Brearley Messer, L. (2013). Tooth wear and associated risk factors in a sample of Australian primary school children. *Australian Dental Journal*, 58(2), 235-245. doi:10.1111/adj.12055
- Grant, S. M., Dawson, S. K., & Thomson, W. M. (2013). New Zealand dentists' views on community water fluoridation. *New Zealand Dental Journal*, 109(2), 69-73. Retrieved from [https://www.nzda.org.nz/pub/index.php?id=93&no\\_cache=1](https://www.nzda.org.nz/pub/index.php?id=93&no_cache=1)
- Health Promotion Agency. (2015). *A literature review on oral health in preschoolers*. Retrieved from <http://www.hpa.org.nz/sites/default/files/Literature%20review%20oral%20health.pdf>
- Heart Foundation. (2012). *Fuelled4life: Buyer's guide*. Retrieved May 4, 2016, from <http://www.fuelled4life.org.nz>
- Innes, N. P., & Robertson, M. D. (2018). Recent advances in the management of childhood dental caries. *Archives of Disease in Childhood*. doi:10.1136/archdischild-2017-313196
- Jones, N. (2017, October 30). Ardern warns over sugar and salt levels, but wants to work with food industry. *The New Zealand Herald*. Retrieved from <http://www.nzherald.co.nz>
- Kirk, S. (2017). *Government commits \$12m to help councils cover costs of fluoridation in water supplies*. Retrieved February 24, 2018, from <https://www.stuff.co.nz/national/politics/93350347/government-commits-12m-to-help-councils-cover-costs-of-fluoridation-in-water-supplies>
- Mann, B. (2017). *The case for and against a sugar tax in New Zealand*. Retrieved October 2, 2017, from <https://www.stuff.co.nz/life-style/well-good/teach-me/89926905/The-case-for-and-against-a-sugar-tax-in-New-Zealand>

- Manton, D. J., & Hayes-Cameron, L. (2013). Dental caries. In A. C. Cameron & R. P. Widmer (Eds.), *Handbook of pediatric dentistry* (4th ed., pp. 47-62). Edinburgh, Scotland: Mosby/Elsevier.
- Marriott, L., & Sim, D. (2014). *Indicators of inequality in Māori and Pacific people*. Retrieved from [https://www.victoria.ac.nz/sacl/centres-and-institutes/cpf/publications/pdfs/2015/WP09\\_2014\\_Indicators-of-Inequality.pdf](https://www.victoria.ac.nz/sacl/centres-and-institutes/cpf/publications/pdfs/2015/WP09_2014_Indicators-of-Inequality.pdf)
- McDonald, A. (2015). *Sugar-sweetened beverage tax in Pacific Island countries and territories: A discussion paper*. Retrieved from <http://www.otago.ac.nz/wellington/otago665562.pdf>
- Ministry of Health. (2006). *Good oral health for all, for life: The strategic vision for oral health in New Zealand*. Retrieved from <http://www.health.govt.nz/system/files/documents/publications/good-oral-health-strategic-vision-2006.pdf>
- Ministry of Health. (2010). *Our oral health: Key findings of the 2009 New Zealand Oral Health Survey*. Retrieved from <http://www.health.govt.nz/system/files/documents/publications/our-oral-health-2010.pdf>
- Ministry of Health. (2012). *Food and nutrition guidelines for healthy children and young people (aged 2–18 years): A background paper*. Retrieved from <https://www.health.govt.nz/system/files/documents/publications/food-nutrition-guidelines-healthy-children-young-people-background-paper-feb15-v2.pdf>
- Ministry of Health. (2016). *New Zealand health strategy: Future direction*. Wellington, New Zealand: Author.
- Ministry of Health. (2017). *Proposed legislative changes: Decision-making on the fluoridation of drinking-water supplies*. Retrieved February 24, 2018, from <https://www.health.govt.nz/our-work/preventative-health-wellness/fluoride-and-oral-health/water-fluoridation/proposed-legislative-changes-decision-making-fluoridation-drinking-water-supplies>
- National Research Bureau. (2008). *2007 New Zealand Children's Food and Drinks Survey*. Retrieved from <http://www.hpa.org.nz/sites/default/files/CFDS-full%20report-fnl.pdf>
- Noble, S. (2006). Diet and nutrition. In R. Ireland (Ed.), *Clinical textbook of dental hygiene and therapy*. Oxford, England: Blackwell Munksgaard.
- Nyika, R. (2018). *Sugary drinks - NZ worse than Canada, UK and Australia, study finds*. Retrieved January 19, 2018, from <https://www.stuff.co.nz/national/health/100581810/sugary-drinks--nz-worse-than-usa-uk-and-australia-study-finds>
- NZDA. (2016). *Consensus Statement- Sugary drinks*. Retrieved from <http://www.healthysmiles.org.nz/assets/pdf/Consensus%20Statement%20on%20Sugary%20Drinks.pdf>
- NZJBA. (2013). *Beverage descriptors*. Retrieved from [http://www.nzjba.org.nz/myfiles/Juice\\_Descriptors\\_May\\_2013.pdf](http://www.nzjba.org.nz/myfiles/Juice_Descriptors_May_2013.pdf)
- Petersen, P. E. (2003). *The World Oral Health Report 2003*. Retrieved from [http://www.who.int/oral\\_health/media/en/orh\\_report03\\_en.pdf](http://www.who.int/oral_health/media/en/orh_report03_en.pdf)
- Plumb, S. (2016, April 2). Medical experts push for sugar tax. *The New Zealand Herald*. Retrieved from [www.nzherald.co.nz](http://www.nzherald.co.nz)

- Reza, M., Amin, M., Sgro, A., Abdelaziz, A., Ito, D., Main, P., & Azarpazhooh, A. (2016). Oral health status of immigrant and refugee children in North America: a scoping review. *Journal of the Canadian Dental Association. Journal de L'Association Dentaire Canadienne*, 82(g3), 1488-2159.
- Riches, J. (2015). *Colgate, Plunket and the NZDA work together*. Retrieved April 12, 2015, from <https://www.plunket.org.nz/news-and-research/media-releases/colgate-plunket-and-the-nzda-work-together/>
- Rothnie, J. J., Walsh, C. A., Wang, M. J., Morgaine, K. C., & Drummond, B. K. (2012). An exploratory study of pregnant women's knowledge of child oral health care in New Zealand. *New Zealand Dental Journal*, 108(4), 129-133. Retrieved from [https://www.nzda.org.nz/pub/index.php?id=93&no\\_cache=1](https://www.nzda.org.nz/pub/index.php?id=93&no_cache=1)
- Ruddock, K. (2017). *Nelson supermarket takes stand on selling sugary drinks to kids before and during school*. Retrieved December 26, 2017, from <https://www.tvnz.co.nz/one-news/new-zealand/nelson-supermarket-takes-stand-selling-sugary-drinks-kids-before-and-during-school>
- Rugg-Gunn, A. J., & Nunn, J. H. (1999). *Nutrition, diet, and oral health*. New York, NY: Oxford University Press Inc.
- Rush, E. (2009). *Food security for Pacific peoples in New Zealand: A report for the Obesity Action Coalition*. Retrieved from [http://www.ana.org.nz/sites/default/files/PacificfoodsecurityreportfinalMarch09\\_3.pdf](http://www.ana.org.nz/sites/default/files/PacificfoodsecurityreportfinalMarch09_3.pdf)
- Savage, J. S., Fisher, J. O., & Birch, L. L. (2007). Parental influence on eating behavior: Conception to adolescence. *The Journal of Law, Medicine & Ethics*, 35(1), 22-34. doi:10.1111/j.1748-720X.2007.00111.x
- Schluter, P. J., Durward, C., Cartwright, S., & Paterson, J. (2007). Maternal self-report of oral health in 4-year-old Pacific children from South Auckland, New Zealand: Findings from the Pacific islands families study. *Journal of Public Health Dentistry*, 67(2), 69-77. doi:10.1111/j.1752-7325.2007.00014.x
- Singh, G. M., Micha, R., Khatibzadeh, S., Shi, P., Lim, S., Andrews, K. G., . . . Global Burden of Diseases Nutrition and Chronic Diseases Expert Group. (2015). Global, regional, and national consumption of sugar-sweetened beverages, fruit juices, and milk: A systematic assessment of beverage intake in 187 countries. *PloS One*, 10(8), e0124845.
- Smith, P. A., & Freeman, R. (2010). Remembering and repeating childhood dental treatment experiences: Parents, their children, and barriers to dental care. *International Journal of Paediatric Dentistry*, 20(1), 50-58. doi:10.1111/j.1365-263X.2009.01004.x
- Sugar tax on fizzy drinks: Majority want it. (2017, August 1). *The New Zealand Herald*. Retrieved from <http://www.nzherald.co.nz>
- Sundborn, G., Beaglehole, R., & Thornley, S. (2014, July 23). Sugar's bitter after-effects. *Dominion Post*. Retrieved from <http://www.stuff.co.nz/dominion-post/>
- Sural, P. (2016). *An investigation into parents' awareness of effects of commercial fruit beverages on their children's teeth* (Master's thesis, Auckland University of Technology, Auckland, New

Zealand). Retrieved from <https://aut.researchgateway.ac.nz/bitstream/handle/10292/10370/SuralP.pdf?sequence=3&isAllowed=y>

Toothfriendly International. (2015). *Toothfriendly guidelines: pH-telemetry testing*. Retrieved from <http://www.toothfriendly.org/images/pHTelemetryGuidelines.pdf>

Waitemata District Health Board. (n.d.). *Beverage guidelines*. Retrieved from <http://www.arphs.govt.nz/Portals/0/Health%20Information/Nutrition%20and%20Healthy%20Eating/82420%20Beverage%20guidelines%20Brochure.pdf>

Walters, L. (2017). *Helen Clark urges government to fully fund dental care for all Kiwis*. Retrieved December 26, 2017, from <https://www.stuff.co.nz/national/politics/99025899/helen-clark-urges-government-to-fully-fund-dental-care-for-all-kiwis>

Woodford, K. (2014, March 30). Why is New Zealand's retail milk so expensive? *Sunday Star Times*. Retrieved from <http://www.stuff.co.nz/sunday-star-times>

World Health Organization. (2017). *Taxes on sugary drinks: Why do it?* Retrieved from <http://apps.who.int/iris/bitstream/10665/260253/1/WHO-NMH-PND-16.5Rev.1-eng.pdf?ua=1>

**Too soon for the tooth fairy**

ISBN: 978-0-9951058-2-9

© 2018

Child Poverty Action Group Inc.

PO Box 5611

Wellesley St

Auckland 1141

New Zealand

[www.cpag.org.nz](http://www.cpag.org.nz)