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# Purchasing and use of non-fluoride and children's toothpaste in Aotearoa New Zealand

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## Abstract

**Background and objectives:** Regular tooth brushing with fluoride toothpaste is associated with a lower risk for dental caries while brushing with non-fluoride toothpaste is not. In recent years a number of non-fluoride toothpaste brands have entered the oral healthcare market in Aotearoa | New Zealand (NZ). Given the current caries epidemic, this study aims to document sales of non-fluoride toothpaste and the oral health marketing claims made on the packaging.

**Methods:** Data were gathered from two sources: (1) IRI MarketEdge data definitions prepared by Colgate provided dollar sales in NZD, unit sales, dollar market share and average unit cost of both non-fluoride toothpaste and children's toothpaste for toothpaste products sold in NZ supermarkets from 2012 to 2021; and (2) non-fluoride toothpaste products sold in NZ stores and online were purchased and the oral health claims on the packaging/websites were documented.

**Results:** In general, sales of non-fluoride toothpaste rose over the years from 2012 to 2021. Non-fluoride toothpaste is easily purchased from a variety of retailers and online. The packaging on many of these products contains health claims that may confuse consumers. Some non-fluoride toothpaste packaging does not state the non-fluoride status.

**Conclusions:** This study shows that overall, during the study period, sales volumes of non-fluoride toothpaste have increased in NZ. However, consumers have little or no protection or recourse from misleading marketing claims on the packaging.

## Introduction

Regular brushing with fluoride toothpaste is an important component of oral self-care (Clark et al., 2018; Twetman et al., 2003; Walsh et al., 2019; Whelton et al., 2019). However, only two in three Aotearoa | New Zealand (NZ) adults brush their teeth with fluoride toothpaste at least twice daily, with a similar rate reported for children 0-14 years (Ministry of Health, 2022). There is significant variation in toothbrushing rates by ethnicity and deprivation in New Zealand. Proportionally fewer Māori (56.4%, 95% confidence interval [CI] 51.0–61.6%) and Pacific adults (63.3%, 95% confidence interval [CI] 53.0–72.8%) brush twice daily with a fluoride toothpaste than NZ Europeans (69.2%, 95% confidence interval [CI] 66.6–71.7%) or Asian New Zealanders (76.5%, 95% confidence interval [CI] 70.9–81.5%). Furthermore, more adults in the least deprived quintile brushed their teeth

twice daily (76.1%, 95% confidence interval [CI] 69.1–82.2%) than those in the most deprived quintile (57.5%, 95% confidence interval [CI] 52.7–62.2%) (Ministry of Health, 2022).

Regular tooth brushing with fluoride toothpaste is associated with a lower risk for dental caries than brushing with non-fluoride toothpaste (Twetman et al., 2003; Walsh et al., 2019). Emerging evidence from a range of countries such as the United Kingdom (UK), Australia and NZ suggest that the use of non-fluoride toothpaste may be increasing (Hobbs et al., 2020; Malik & Baysan, 2019; Smith et al., 2021). Toothpaste manufacturers market a wide range of toothpastes specifically aimed for use by children, including products with no fluoride and those with varying concentrations of fluoride ranging from 450 to 1450 parts per million (ppm). Indeed, a recent Australian study showed a dramatic increase in consumer demand with a corresponding availability of non-fluoride children's toothpaste (Smith et al., 2021). While it is the adults in the household making oral healthcare product purchasing decisions, how they are used and the frequency of application (Hobbs et al., 2020; Li et al., 2016; Malik & Baysan, 2019; Smith et al., 2021), few studies report on the sale and purchase of non-fluoride toothpaste in NZ and how these products are promoted.

Against this background, this study aimed to (1) examine the dollar sales, unit sales, dollar market share and average unit cost for both non-fluoride toothpaste and children's toothpaste of all toothpaste products sold in NZ supermarkets from 2012 to 2021 and (2) explore the oral health claims made by non-fluoride toothpaste brand owners.

## Methods

We requested data for the dollar sales in NZD (millions), unit sales (millions), dollar market share (per cent) and average unit cost (dollars) for both non-fluoride toothpaste and children's toothpaste products. Dollar market share per cent is the amount of revenue from sales of non-fluoride toothpaste divided by the total revenue for toothpaste sales. Dollar market share per cent can be interpreted as cents in the dollar. These data were sourced from IRI MarketEdge based on data definitions provided by Colgate. This definition was based on stock-keeping unit (SKU) data for toothpaste products sold in NZ Supermarkets. The range of non-fluoride toothpaste included the following: Beelab toothpaste, Beevantage toothpaste, Dabur herbal toothpaste, Dabur miswak toothpaste,

Dentiste toothpaste, Ecodenta toothpaste, Ecostore (but excluding Ecostore Whitening with Fluoride 100g), Grin (but excluding Grin Kids Berrylicious with Fluoride 70g, Grin Whitening with Fluoride 100g), Himalaya herbals toothpaste, Kingfisher toothpaste, Manuka Health toothpaste, Nature's Gate toothpaste, Red Seal, Riddells Creek toothpaste, Sarakan toothpaste, Thursday Plantation toothpaste, Vicco toothpaste, and Weleda toothpaste. Data were obtained from 2012 to 2021 and included dollar sales (millions), unit sales (millions), dollar market share (per cent) and average unit cost (dollars) for both non-fluoride toothpaste and children's toothpaste.

We also canvassed five Christchurch-based supermarkets, health food stores, and pharmacies for non-fluoride toothpaste products available for sale (n=10 distinct types) to conduct an exploratory analysis of the health claims made by non-fluoride toothpaste brand owners. The non-fluoride toothpaste products were chosen off the shelf based on their packaging. Products were selected on the basis that the packaging made either: a. no claims about the product containing fluoride, or b. that the packaging claimed the product did not contain fluoride. If a product had already been sourced from a previous outlet, it was not purchased again. During the assessment of packaging claims, it was out of the scope of this study research to assess the accuracy of the claims made or whether the claims can be substantiated in the scientific literature. These products were purchased by the research team and records were taken of claims made on the container and packaging material. An online search was also

conducted, and records were taken in a similar way. In cases where multiple flavours were available, only one example product was purchased.

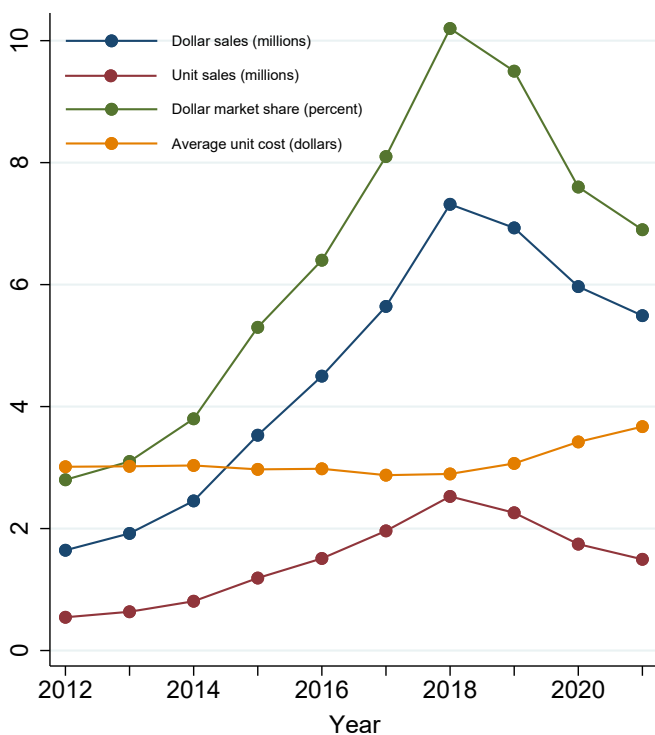
## Results

### *Toothpaste sales, Total New Zealand Supermarkets*

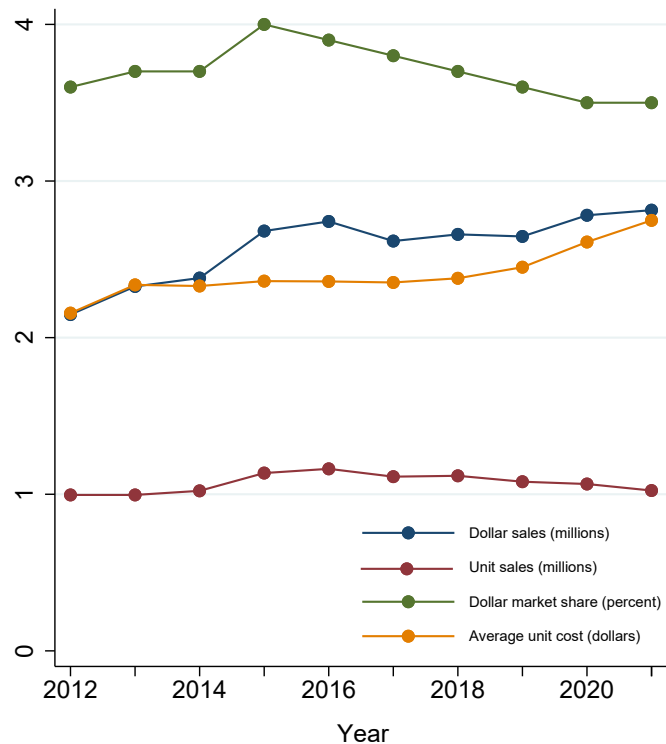
Data on dollar sales (millions), unit sales (millions), dollar market share (per cent) and average unit cost (dollars) for both non-fluoride toothpaste and children's toothpaste from the period 2012 to 2021 are summarised in Figure 1. Sales of non-fluoride toothpaste (units and market share) rose from 2012 to 2018, spiking in 2018, before declining in the three years to 2021. From 2018 to 2021 the average unit cost (dollars) increased slightly after several stable years. For children's toothpaste, dollar sales (millions) and average unit cost (dollars) increased from 2012 to 2021 while unit sales (millions) remained stable. Finally, dollar market share (per cent), or the amount of revenue from sales of non-fluoride toothpaste divided by the total revenue for toothpaste sales, increased from 2012 to 2015 but then fell back to approximately 2012 levels by 2021 (Figure 2). Dollar market share per cent can be interpreted as cents in the dollar, or that for every dollar spent on toothpaste, how many cents of that dollar was spent on non-fluoride toothpaste.

### *Toothpaste efficacy and safety claims*

Table 1 presents the claims made by several non-fluoride toothpaste brands. In total we identified nine different non-fluoride toothpaste brands. For each brand (and type of formulation), we noted whether it







**Figure 1.** Non-fluoride toothpaste sales (millions), market share (per cent) and average unit cost (dollars) from 2012 to 2021. (Note: Data sourced from IRI MarketEdge based on data definitions provided by COLGATE)



**Figure 2.** Children's toothpaste sales (millions), market share (per cent) and average unit cost (dollars) from 2012 to 2021. (Note: Data sourced from IRI MarketEdge based on data definitions provided by COLGATE).

Table 1. A summary of oral health claims made by non-fluoride toothpaste brands (current as at January 2023).

Oral health claims			
Product	Tube/tub claims <i>(copied verbatim)</i>	Packaging claims <i>(copied verbatim)</i>	Website claims <i>(copied verbatim)</i>
Jack n' Jill Natural Toothpaste  	None	None (product not boxed)	Natural ingredients including 40% Xylitol and Calendula help to soothe gums and fight tooth decay... Xylitol is the magic ingredient that helps balance the pH in the mouth. The organic calendula soothes little gums and is calming [for milkshake flavour] This natural raspberry-flavored toothpaste for little boys and girls is free from preservatives fluoride SLS sugars and colours. And yet it is as effective as conventional alternatives as it contains xylitol to fight tooth decay and organic calé [for raspberry flavour] <a href="https://www.cosmeticsnow.nz/iteminfo/jack-n-jill-natural-toothpaste-with-calendula-fluoride-free-milkshake-50g">https://www.cosmeticsnow.nz/iteminfo/jack-n-jill-natural-toothpaste-with-calendula-fluoride-free-milkshake-50g</a> <a href="https://www.baillieandlewis.co.nz/products/jack-n-jill-natural-toothpaste-org-raspberry-50g">https://www.baillieandlewis.co.nz/products/jack-n-jill-natural-toothpaste-org-raspberry-50g</a> Accessed 3 April 2023
Weleda Ratanhia Toothpaste  	None	Tightens gum texture... Toning ratanhia helps keep the gums and oral cavity in good condition.	Developed with dentists, using natural strengthening extracts from the wild ratanhia root to prevent bleeding gums... The sturdy red root is rich in tanning (sic) agents which protect and strengthen sore gums, and it contains natural anti-bacterial qualities... Regular use strengthens and tones gums to prevent bleeding, cleans teeth and prevents plaque build-up. Long-lasting fresh minty taste. Certified natural dental care <a href="https://www.weleda.co.nz/product/r/ratanhia-toothpaste">https://www.weleda.co.nz/product/r/ratanhia-toothpaste</a> Accessed 24 March 2023
Red Seal Natural Toothpaste  	Zinc Oxide helps in healing the mouth Calcium Carbonate for cleaner whiter teeth Red Seal toothpastes are Paraben free with natural antimicrobial protection.	None	None This product is now listed as discontinued. The website <a href="https://www.redseal.global/nz/our-products/oral-care/?subcategory=all&amp;page=3">https://www.redseal.global/nz/our-products/oral-care/?subcategory=all&amp;page=3</a> suggests suggest Red Seal complete care. Our Complete Care Toothpaste, naturally certified to NATRUE standards, freshens breath and helps remove plaque for the whole family. Helps prevent plaque build up No Synthetic Colours No Artificial Flavours Paraben-Free SLS-Free Vegan Friendly Cruelty-Free NATRUE Certified Natural
Ecostore Complete Care Toothpaste  	Helps protect gums Magnolia Bark Extract – A natural extract shown to support oral health Kanuka Oil ... Shown to have antibacterial properties.	Helps protect gums Magnolia Bark Extract – A natural extract shown to support oral health Kanuka Oil ... Shown to have antibacterial properties.	This plant and mineral-based formulation contains antibacterial native Kanuka oil, with magnolia bark extract to support overall oral health. <a href="https://ecostore.com/nz/toothpaste-complete-care-100gm-unit/">https://ecostore.com/nz/toothpaste-complete-care-100gm-unit/</a> Accessed 17 March 2023





Oral health claims			
Product	Tube/tub claims <i>(copied verbatim)</i>	Packaging claims <i>(copied verbatim)</i>	Website claims <i>(copied verbatim)</i>
Comvita Propolis Toothgel	Xylitol, a natural substance found in birch trees, helps to prevent plaque build-up with regular brushing. Propolis, which is created by bees from the natural resin produced by trees, has well known oral health benefits...	Xylitol, a natural substance found in birch trees, helps to prevent plaque build-up with regular brushing. Propolis, which is created by bees from the natural resin produced by trees, has well known oral health benefits...	From our research we also found that xylitol, which is found in birch trees and many fruits and vegetables, also has tooth friendly benefits to help you maintain complete oral hygiene.” “This is a great tasting natural alternative toothgel that contains bee Propolis to help maintain your oral health and hygiene. Propolis is created by the bees from natural sap and resins found on trees and is used by the bees to protect their hive. Propolis contains high levels of active bioflavonoids, with well-known antioxidant properties. <a href="https://www.comvita.co.nz/oral-health/propolis-toothgel?size=90g">https://www.comvita.co.nz/oral-health/propolis-toothgel?size=90g</a> Accessed 17 March 2023



Grin Natural Strengthening Toothpaste	Magnolia bark extract combats bacteria Hydroxyapatite remineralises [sic] teeth naturally Organic sea salt supports healthy teeth and gums	Remineralises teeth Magnolia bark extract combats bacteria Hydroxyapatite remineralises teeth naturally Organic sea salt supports healthy teeth and gums	Grin’s natural Strengthening toothpaste delivers not only a thorough, fresh, clean, but most importantly, works to combat bacteria, strengthen and remineralise your teeth with key ingredients; Hydroxyapatite, Organic sea salt and Magnolia bark extract...” Natural Hydroxyapatite is the best alternative to fluoride, proven to provide the necessary minerals to remineralise and restore enamel. The antiseptic properties of Magnolia Bark Extract and Organic Sea Salt help to combat common oral bacteria and keep the gums and mouth healthy. Natural xylitol helps to prevent plaque build-up with regular brushing Magnolia Bark Extract–Magnolia bark extract works to control oral bacteria growth and prevent the build-up of tartar. This active ingredient comes from the magnolia tree which is recognised for containing several natural, compounds that function as anti-inflammatory, anti-bacterial, and anti-allergic agents. Natural Hydroxyapatite–Don’t let that scientific name fool you–hydroxyapatite is a naturally occurring (sic) mineral form of calcium apatite and is actually the main mineral that our dental enamel is made of. Hydroxyapatite is the best alternative to fluoride and has been proven to provide the necessary minerals to remineralise subsurface areas of the tooth, restoring the enamel to its near natural state, without changing the composition of the enamel. Organic Sea Salt–ever wondered why dentists suggest rinsing with saltwater after a dental procedure? The alkaline nature of sea salt increases the pH balance of your mouth, creating an environment that bacteria really, really hate. The sea salt we’ve put in Grin is certified organic, so it retains more of the good stuff such as calcium, magnesium, silicon, phosphorus and iron. <a href="https://www.grinnatural.co.nz/products/grin-strengthening-100-natural-toothpaste">https://www.grinnatural.co.nz/products/grin-strengthening-100-natural-toothpaste</a> Accessed 17 March 2023
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Product			Oral health claims		
Brand/type	Tube/tub claims (copied verbatim)	Packaging claims (copied verbatim)	Website claims (copied verbatim)		
BLAQ Whitening Toothpaste	None	Bentonite Clay – Packed with calcium, magnesium and silica and with it's negatively charged molecules it works to detoxify your mouth and whiten teeth enamel Charcoal powder – With its porous texture, it cleanses and gently polishes teeth... Peppermint Oil – Packed with vitamins, antioxidants, and vital nutrients for good oral care and to combat bad breath.	Packed with calcium, magnesium and silica to strengthen enamel and whiten teeth while removing grime, bacteria and toxins. Whitens teeth naturally while fighting off bacteria that causes tooth decay, plaque build-up and gum disease... Activated Charcoal: removes grime, bacteria and toxins Packed with calcium, magnesium and silica to strengthen enamel and whiten teeth while removing grime, bacteria and toxins. Whitens teeth naturally while fighting off bacteria that causes tooth decay, plaque build-up and gum disease. Packed with antiseptic properties to heal ulcers and cuts while combating bad breath. <a href="https://blaq.co/products/blaq-charcoal-whitening-toothpaste?variant=42081763950787">https://blaq.co/products/blaq-charcoal-whitening-toothpaste?variant=42081763950787</a> Accessed 17 March 2023		
					
BLAQ Teeth Whitening Charcoal Powder	None	None	If you're longing for a megawatt smile without using harsh chemical peroxides, say hello to your new bathroom BFF: our Charcoal Teeth Whitening Powder." "Formulated with detoxifying activated charcoal and bentonite clay to strip away the bacteria, toxins and grime that cause stains, cavities and gum disease, our gentle, minty fresh formula is an oral health game-changer! <a href="https://blaq.co/products/blaq-charcoal-teeth-whitening-powder?variant=39651381379267">https://blaq.co/products/blaq-charcoal-teeth-whitening-powder?variant=39651381379267</a> Accessed 17 March 2023		
					
Grants of Australia	Australia's original natural toothpaste	None (product not boxed)	The Grants Mild Mint with Aloe Vera Toothpaste has a mild mint taste and effectively but gently cleans teeth, promotes healthy gums and leaves your mouth feeling fresh and purified. This natural toothpaste contains the benefits of Organic Aloe and natural herbal extracts, making it ideal for those with sensitive teeth and gums or mouth ulcers, providing a deep clean without irritating those sensitive areas. Suitable for the whole family, including kids, the mild mint flavour comes from pure Mint Oil, Rosemary, Sage and Thyme, with a cool and refreshing taste that is not too overpowering. Lightly foaming, this classic toothpaste makes a great transition for those looking to switch from regular mainstream toothpaste to a natural alternative which tastes and feels almost exactly the same. <a href="http://www.grantsofaustralia.com.au">www.grantsofaustralia.com.au</a> accessed 3 April 2023		
					
White Glo Charcoal Deep Stain Remover (activated charcoal powder)	None	None	This highly absorbent Activated Charcoal penetrates and draws out stubborn stains, traps colour particles, fights bad breath and whitens teeth enamel. Uses the natural elements of Activated Charcoal to clean and whiten teeth. <a href="https://whiteglo.com/collections/activated-charcoal/products/activated-charcoal-teeth-whitening-powder">https://whiteglo.com/collections/activated-charcoal/products/activated-charcoal-teeth-whitening-powder</a> Accessed 17 March 20		
					



was available in a tube or tub and the health marketing claims made either on the website or the packaging. Across the different brands, claims varied substantially but there were some similarities. Across all toothpaste varieties, claims referred to the beneficial effect of non-fluoride toothpaste for improved oral health. Specific claims related to and included: reducing plaque build-up, cleaning teeth, soothing sore gums, combating bad breath and fighting off bacteria that cause tooth decay, plaque build-up and gum disease. In addition, some make claims of safety for both consumers and the environment or that the product was created in collaboration with oral health experts and dentists. Others also mentioned that the products are cruelty-free or suitable for vegans. Further detail on the variety of health claims made by non-fluoride toothpaste brands is summarised in Table 1.

## Discussion

This study reports a rising trend in sales of non-fluoride toothpaste in New Zealand from 2012 to 2018, which then decreased from 2018 to 2021. The study also reports health-related claims made by these non-fluoride toothpaste brands, many of which may not be founded in scientific evidence.

Before considering the implications of these findings, it is important to consider several limitations of this research. First, we relied on sales data sourced from a market research company, using definitions provided by a toothpaste company. As a data source, IRI stated they could not guarantee data accuracy in all respects, and gave the following caveats: i) the sales market data were based on a definition that was provided to IRI by Colgate, which may not be the same definition recognized by others; ii) all data shown were based on IRI's coverage of the market, which may not be the same definition recognized by others; iii) IRI retail sales data are sourced from third parties.

In addition, Table 1 reports the marketing claims of a convenience sample of non-fluoride toothpaste products found at local stores. While our search was indicative of some products currently available on the market in NZ, it was not systematic and may have missed products currently available on the market that we did not source. Future research should consider using a more systematic approach to gathering non-fluoride toothpaste products. This approach could follow more comprehensive audit procedures used in previous research by Smith et al. (2021). Nevertheless, despite these limitations, we believe this is one of the first studies internationally to report on supermarket sales of toothpaste alongside examining the health claims made by non-fluoride toothpaste brands. Finally, it was out of the scope of the current study to assess whether the advertising claims made by non-fluoride toothpaste brand owners were accurate or evidence based.

This study found a wide variety of oral health claims made by non-fluoride toothpaste brand owners. Claims were made on packaging and websites for products available in NZ shops and online. However, many of these claims may not be evidence-

based. For example, some claims related to reducing plaque build-up, cleaning teeth, combating bad breath, soothing sore gums, and fighting off bacteria that cause tooth decay, plaque build-up and gum disease. Further, the claims on the packaging of non-fluoride toothpaste were often unclear with the unsubstantiated claims made and reinforced on the accompanying websites. While it was out of the scope of the research to assess the accuracy of the claims made or whether the claims can be substantiated in the scientific literature; it is generally accepted that toothbrushing with toothpaste containing at least 1,000ppm fluoride is best practice for oral health care at home (Clark et al., 2018; Do & Health, 2020; New Zealand Guidelines Group, 2009; Twetman et al., 2003; Walsh et al., 2019). Another issue identified in this study is that it may be difficult for consumers to know whether a toothpaste contains fluoride or not, as non-fluoride status is often not documented or is in very small print on the packaging.

A final limitation is that brand offerings in the market are dynamic, and it is unclear the extent to which other market and economic factors were at play that may have influenced our findings. Therefore, the underlying reasons behind the changes in sales volume, shown in this study, also need to be considered. For example, Ecostore and Grin released a range of non-fluoride toothpaste products around this period, and considerable advertising campaigns occurred during the study period. Furthermore, there is anecdotal evidence of independent traders purchasing New Zealand-made products (including units of non-fluoride toothpaste) from NZ supermarkets in 2017 and 2018, to ship offshore for resale in more profitable international markets. Together these factors are likely to account for the spike in sales in 2018. Finally, the reduction in non-fluoride toothpaste sales may be because the intensity of advertising products was reduced in 2019. It needs to be noted here that changes in sales volume over time were not analysed statistically and given these potential and unconfirmed artificial influences on sales, further analyses were not considered due to the risk of obtaining spurious results. Despite the limitations of this study, our data may begin to provide important insights into market trends in toothpaste sales.

From a public health perspective, it is important to consider the implications of the rising use of non-fluoride toothpaste on the oral health of the individual and society (Vos et al., 2017; Whelton et al., 2019). Potentially, it is likely that some individuals are unaware of the importance of fluoride for the prevention of dental caries or hold beliefs that fluoride exposure is harmful (Donn, 2018; Hobbs et al., 2020). Some individuals may not believe that brushing with a fluoride toothpaste is effective (Broadbent et al., 2006), or are concerned about the potential toxicity of fluoridated toothpaste (Gupta et al., 2021).

This study found that some products were marketed as "fluoride-free" possibly to capitalise on other concurrent public health messaging. That is, social marketing campaigns such as smoke-free (Health

Promotion Agency, 2018), alcohol-free (Dry July NZ Trust, 2022) or Chlorofluorocarbons (CFC)-free (Lickley et al., 2020), may have created associations for consumers that a product or behaviour that is “free” is the optimal solution for human health and the environment. Such beliefs may be reinforced by the marketing of non-fluoride toothpaste brands which can contain claims that they are ‘natural’ products and are therefore safer for the consumer and/or the environment. The results of the current study document many instances of non-fluoride toothpaste brand owners stating that their products are “safer” and “natural”. Indeed, eco-friendly consumerism has rapidly gained traction across many developed nations particularly in Europe and the United States of America (USA) (de Oliveira et al., 2022; Larranaga & Valor, 2022; Ministry for Environment, 2001).

This notion is supported by a recent marketing survey conducted by Price Waterhouse Coopers in which it was estimated that half of the survey respondents had become more eco-friendly; expecting that companies should be more environmentally conscious in their advertising and communications (Price Waterhouse Coopers, 2022). In addition, recent market research has shown that toothpaste manufacturers are anticipating demand for ‘natural toothpaste’ to grow as consumers reject products containing ingredients such as colouring agent titanium dioxide in favour of plant extracts, natural minerals and essential oils (Euromonitor International, 2022). Sodium lauryl sulphate (SLS) is associated with a range of oral sensitivity issues (e.g., Alli et al., 2019; Herlofson & Barkvoll, 1996), therefore some consumers are reluctant to use products containing it. This study found that many non-fluoride toothpaste products report that they do not contain SLS.

A further issue for consumers is that the subsequent growth in toothpaste product offerings is now creating the need for competitive product positioning for brands in a crowded product-category marketplace (Nguyen, 2017). To grow market share, marketers increasingly aim to also focus on the creation of “more advanced, premium toothpaste” involving market segmentation and product differentiation (Nguyen, 2017, p.2). Therefore, it is conjectured that the proliferation of non-fluoride toothpaste – including non-fluoride toothpaste for children – is a response by non-fluoride toothpaste brand owners to increase sales into new segments (children) and to increase sales to those consumers wanting a differentiated, premium, and supposedly healthier option in existing segments. A recent Australian study supports this idea. In an audit of all varieties of toothpaste marketed for preschool children, twenty-two toothpaste products (20.6% of the total sample), were described as “made in Australia” – possibly aiming to capitalise on local consumer goodwill – and were also all non-fluoridated (Smith et al., 2021). Importantly, 18 of the 20 most expensive toothpastes examined in the Smith et al. (2021) study were non-fluoridated.

There are a number of tactics brand owners may use to increase their sales of non-fluoride toothpaste

(Euromonitor International, 2022; Nguyen, 2017; Smith et al., 2021). Unfortunately, parallel to this, protection for consumers has been undermined. In 2010, amendments to the Medicines Regulations 1984 and the Medicines (Standing Order) Regulations 2002 meant that only toothpaste products containing at least 1,500ppm fluoride or other substances used to treat tooth sensitivity continued to be regulated under the medicines legislation (New Zealand Government, 2010). Consequently, most toothpaste products are now regulated under the Cosmetic Products Group Standard issued by the Environmental Protection Authority. By definition, a “*cosmetic product means any product or preparation intended to be placed in contact with the various external parts of the human body (epidermis, hair system, nails, lips and external genital organs) or with the teeth and the mucous membranes of the oral cavity with a view exclusively or mainly to cleaning them, perfuming them, changing their appearance and/or correcting body odours and/or protecting them or keeping them in good condition*” (Environmental Protection Authority, 2020). Therefore, toothpaste brand owners must now adhere to correct labelling and advertising of ingredients; they cannot claim a therapeutic purpose and may only claim their product protects teeth and/or improves oral hygiene.

Despite this, marketing claims can suggest health benefits on products but cannot claim an actual health benefit. Consequently, sellers of non-fluoride toothpaste do not have to ensure that claims made are substantiated by scientific testing. Here, it is important to note that in NZ, toothpaste is not governed by the much stricter Food Act (2014) because the definition of ‘food’ does not include cosmetics (Implementation Subcommittee for Food Regulation, 2018).

The marketing of non-fluoride toothpaste is covered by the Fair Trading Act 1986. This Act outlines illegal business behaviours including making misleading statements about a product’s use or benefits, in any form including in advertising. In the current scenario, it is up to consumers to alert authorities that products are not adhering to the Act because there are no Consumer Information Standards for toothpaste. There are other Consumer Information Standards for other products and services that are regulated under the Fair Trading Act 1986. Those currently covered by Consumer Information Standards include Water Efficiency, Care Labelling, Country of Origin (for clothing and footwear), Used Motor Vehicles, Origin of Food, and Fibre Content Labelling standards (Ministry of Business Innovation and Employment, 2023).

Similarly, the Therapeutic and Health Advertising Code aims to ensure that all advertising adheres to the laws of NZ and the Principles and Rules set out in the Code (Advertising Standards Authority, 2023). However, the Code is clear that the “*purpose of this Code is to ensure that advertisers maintain rigorous standards in therapeutic and health advertising*”. It does not apply to labels or packaging unless the label/packaging is pictured in the advertisement (Advertising Standards Authority, 2023). Examples exist in which some manufacturers have been investigated



for their advertising of non-fluoride toothpaste that contains a picture of the packaging. In 2018, following a complaint to the NZ Advertising Standards Authority (ASA) for unsubstantiated claims and fluoride “scaremongering”, anti-fluoride marketing was removed from a ‘fluoride-free’ or ‘natural’ toothpaste (Advertising Standards Authority, 2018). In this case, products were promoted using advertising describing fluoride as “nasty”, describing their non-fluoride products as “scientifically proven” (see Advertising Standards Authority complaint 18/222, 16/003; available at <https://cdn.asa.co.nz/>). However, it should be noted that in 2017, another complaint about a non-fluoride toothpaste advertisement claiming oral health benefits of using their product was not upheld (Advertising Standards Authority, 2017). Taken together, it can be seen that there is little protection or recourse for consumers who may unknowingly or mistakenly purchase and use a non-fluoride toothpaste.

Previous research has shown that the promotion of oral health behaviours including supervised toothbrushing and the provision of resources tailored for the target population improves oral health behaviours and oral health-related quality of life (Al Naasan, et al., 2022; Al Naasan, et al., 2022; Clark et al., 2018). Expansion of these programmes with additional emphasis on the use of toothpaste containing fluoride is important to include alongside actions against misleading marketing promoting the use of non-fluoride toothpaste. Other activities could include intervening at the community, policy and legislative levels. For instance, at a more regional- or local level, campaigns from national, regional or local advocacy groups such as the NZ Dental Association could advocate for the importance of having standardised fluoride labelling on toothpaste packaging and how to locate this information. Other interventions could relate to a health warning on non-fluoride toothpaste packages and tubes that state specifically they may not protect from dental caries. This has been successfully previously employed on cigarette packets with photos of smoker’s diseases to discourage the use of cigarettes (Blank & Hoek, 2020; Blank et al., 2021; Nee-Nee et al., 2019) and alcohol health warning labels to discourage alcohol consumption (Brennan et al., 2022). Legislation could also be introduced at a national level to require a separate section for non-fluoride toothpaste in supermarkets. Moreover, fluoride toothpaste products can be displayed more prominently with greater distinction to highlight that they contain fluoride. Clearer labelling of non-fluoride toothpaste products would help differentiate the different types of toothpaste for consumers. Here, it may be appropriate

for non-fluoride products to be prohibited from using the word ‘toothpaste’. To ensure more clarity for the consumer, it may be prudent to require the use of a different term that is not associated with oral health in consumers’ minds. For example, ‘mouth freshener’, could be used which would help differentiate it from toothpaste (and also fit with the classification of toothpaste being a cosmetic). Finally, and most importantly, now is the time to consider developing Consumer Information Standards, regulated under the Fair Trading Act 1986 which would provide clear guidelines for the marketing and sale of non-fluoride toothpaste. Overall, given the ongoing caries epidemic, action to address the potential for consumer confusion over toothpaste products’ effectiveness is essential.

In conclusion, this study reports a general rise and then a slight fall in sales of non-fluoride toothpaste over the past 10 years in NZ, and we have identified marketing material that has the potential to confuse consumers about the oral health benefits of non-fluoride toothpaste. We recommend that regulatory action be considered to protect New Zealanders’ oral health.

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**G.M.:** conceptualisation, methodology, data curation, investigation, resources, writing – review and editing, supervision, project administration.

**J.M.B.:** conceptualisation, methodology, writing – review and editing, visualisation/data presentation, supervision.

**B.K.:** investigation, data curation, visualisation/data presentation, writing – original draft.

**A.I.:** data analysis and interpretation, critical revision of the article, and final approval of the version to be published.

**M.L.:** writing – original draft, writing – review and editing.

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