Food Regulation Standing Committee

Issues paper: Commercial foods for infants and young children

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Contents

Executive Summary

This issues paper summarises the current environment relating to infant and early childhood nutrition in Australia and New Zealand including examining commercially available foods for children aged up to 4 years.

Early childhood is a critical time where poor dietary patterns can have life-long impacts on health and wellbeing. Australian and New Zealand Infant and Toddler Feeding Guidelines recommend children eat a wide variety of nutritious foods every day from the five (Australia)/four (New Zealand) food groups, with a focus on vegetables, fruit, wholegrains, lean meats, fish, legumes, and dairy. Infants and young children should have mostly whole and less processed foods. Energy dense, nutrient poor foods (commonly referred to as discretionary foods) should be avoided as they do not provide the nutrients required for optimal growth and development and can establish long term preferences for unhealthy foods.

Commercial foods aimed at infants and young children are frequently used by Australian and New Zealand parents, with many parents believing them to be a healthy choice. It is also widely believed that the content of commercial foods for infants and young children is tightly regulated by Government. However, there are limited regulations for the composition and nutritional quality of commercial food for infants and young children.

The evidence presented in this paper shows that many infants and young children are not eating diets that align with the relevant Dietary Guidelines, and commercial foods for infants and young children are poorly aligned with the recommendations in these Guidelines.

Key findings include:

- Around one-third of Australian toddlers are estimated to exceed the recommended upper limit for sodium;
- Australian children often eat less than the recommended intake of vegetables and meat and alternatives, and these food groups may be displaced with 'discretionary' foods high in sugars and/or sodium;
- Most products for infants don't declare iron content (despite iron being an important nutrient for development for this age group);
- Most foods promoted as 'first foods' have a sweet flavour profile which can establish sweet flavour preferences and limit acceptance of more bitter flavoured foods such as vegetables;
- The texture of infant foods is often not suitable for the developmental stage of older infants; and
- Many foods for young children are energy-dense and high in sugars and sodium.

In light of the evidence presented above, the following statement of the problem is proposed:

Commercial foods for infants and young children are poorly aligned with some aspects of the Australian and New Zealand Infant and Toddler Feeding Guidelines. These commercial foods are often high in sugar (infant and young children's foods), sodium (young children foods) and either do not contain iron-rich ingredients or are too low in iron to make a claim (infant and young children foods). Labelling does not support carers to make informed choices for infants and young children due to product naming not always accurately reflecting ingredients. There are also concerns the texture of commercial infant foods typically do not match developmental progression in feeding.

1. Introduction

The first 1000 days of a child's life (from conception) is a critical time for physical, cognitive, social, and emotional health that can have a lifelong impact. There is a growing body of evidence demonstrating that early nutrition and lifestyle have long-term effects on later health and disease outcomes (referred to as developmental or metabolic programming) [1]. Supporting parents and families to develop healthy lifestyle habits during the first 1000 days of their child's life can have positive flow-on impacts in every decade of their lifetime [2].

A newborn's brain grows from being a quarter of the size of an adult's brain to 80% of adult size by 3 years of age, with healthy growth relying highly on a nutritious diet [3]. There is now clear evidence that early life nutrition is linked to coronary heart disease, type-2 diabetes, osteoporosis, asthma, lung disease and some forms of cancer. As such, obesity, diabetes, cardiovascular morbidity, and neuropsychiatric diseases have been considered paediatric diseases with recognition that disease prevention needs to start with improved nutrition during development [4]. Modern diets typically contain more processed, low-fibre foods and fewer fruit, vegetables, unprocessed grains, nuts and seeds than recommended, which is also associated with changes in gut microbial biodiversity, another common risk factor strongly linked with allergy and obesity [5]. The first 2-3 years are also critical times for programming of long-term energy regulation, especially establishing patterns of healthy nutrition and physical activity and setting a child's taste patterns and food preferences [5].

The nutritional quality of foods eaten by infants and young children is particularly important due to their high requirements for vitamins and minerals relative to energy and the limited quantity of food able to be consumed (for example a 7- to 12-month-old baby needs more iron than an adult male but needs only a third of the energy and can only eat small portions). Dietary Guidelines recognise this and specifically recommend against discretionary foods (foods that are energy dense and nutrient poor) for this reason [6].

Despite the vulnerability of this population and the importance of nutrition in this critical period, there are limited regulations for the composition and nutritional quality of food for infants and foods aimed at young children. Recent years have seen a significant growth in commercial foods specifically aimed at infants and young children, particularly high energy, low nutrient snack foods. A recent survey of Australian parents found half of children (aged under 5 years) in Australia consume commercial foods for infants and young children regularly (every week), with 20% consuming them most days. The survey indicated that a significant proportion of parents believed infants and young children need different foods to regular family foods and half of parents incorrectly believed commercial foods are healthier than, or as healthy as, homemade foods (with tight regulation by government to ensure this is the case) [7].

In November 2020 Food Ministers considered a paper prepared by the Australian Government Department of Health on commercial foods for infants and young children. This paper examined the composition and availability of commercially available foods aimed at infants and young children in Australia and New Zealand. Ministers agreed to refer this matter to the Food Regulation Standing Committee (FRSC) for further consideration and to determine what actions could be explored in the Food Regulation System to improve commercial foods for infants and young children. Ministers also agreed to refer aspects of this work not suited to regulatory approaches to the Healthy Food Partnership for consideration (see Section 7).

The Food Regulation Policy Framework sets out the process for identifying and assessing a food regulatory issue and determining the appropriate policy response. Under the Food Regulation Policy Framework, the first step is to understand the issue and define the problem (if any). This paper

considers the dietary recommendations for infants and young children, whether infants and young children are meeting these recommendations, and assess how well commercial foods for infants and young children are aligned to the dietary recommendations for this age group. The paper also reviews the current regulatory environment for foods for infants and young children and considers what actions are underway in Australia, New Zealand and internationally to improve commercial foods for infants and young children.

Scope

The products considered to be within the scope of this paper include those defined in the Australia New Zealand Food Standards Code as 'food for infants' and 'formulated supplementary foods for young children' (excluding toddler milk drinks). Commercial food and drink products that fall outside of the definition of 'cereal-based food for infants' and 'food for infants' but are marketed towards, or labelled as suitable for, infants and young children from the age of 4 months to less than 4 years of age (for example finger foods and snacks)*, are also considered to be within the scope of this paper.

Provision of foods and meals in settings such as day care are not considered in scope for this work. Infant formula products and toddler milk products are not in scope for this work.

*Products are considered being marketed as suitable for this age group if they:

- are labelled with the words: 'baby', 'infant', 'toddler', or 'young child', including synonyms such as 'bub', 'tot', or 'little one', or are labelled with other terms implicitly or explicitly referring to their suitability for or consumption by children less than 4 years of age, such as 'little hands', 'early growth', or 'first foods'; and/or
- are recommended for introduction at an age of less than 4 years of age, as indicated by an age statement anywhere on product packaging; and/or
- have a label with an image of a child who appears to be younger than 4 years of age or feeding with a bottle; and/or
- are in any other way presented as being suitable for children under the age of 4 years.

2. Evidence-based recommendations for nutrition in infancy and early childhood.

A healthy diet provides children with the nutrition to support optimal growth and development. Australia and New Zealand have food-based dietary guidelines for infants and young children: the Australian Dietary Guidelines and 2012 Australian Eat for Health, Infant feeding guidelines - Information for health workers (AIFGs) and the recently updated 2021 New Zealand Healthy Eating Guidelines for Babies and Toddlers (NZIFGs). These guidelines take into account nutrient requirements set out in the Nutrient Reference Values for Australia and New Zealand [8]. While recognising these are separate documents, they share many similarities, and will be referred to in this document as Australian and New Zealand Infant and Toddler Feeding Guidelines when discussed together.

Australian and New Zealand Infant and Toddler Feeding Guidelines recommend children eat a wide variety of nutritious foods every day from the five (Australia)/four (New Zealand) core food groups, with a focus on vegetables, fruit, wholegrains, lean meats, fish, legumes, and dairy. Infants should have mostly whole and less processed foods as much as possible. Energy dense, nutrient poor foods are commonly referred to as discretionary foods and should be avoided as they do not provide the

nutrients required for optimal growth and development and can establish preferences for unhealthy foods.

Key recommendations in the Australian and New Zealand Infant and Toddler Feeding Guidelines are summarised below [9]:

Introduction of foods The guidelines recommend infants exclusively receive breastmilk until around 6 months, or when an infant is not receiving breastmilk, infant formula should be used as the alternative. Solid foods should be introduced from around six months of age, when developmentally ready.

First foods should be iron-rich foods in recognition of the importance of iron for babies' development and diminishing iron stores by 6 months of life.

Following the introduction of solid foods, the Australian and New Zealand guidelines recommend continuing to provide breastmilk until 12 months and 24 months of age respectively, or longer if desired. However, Australian infant feeding guidelines do not include any allocation for breastmilk when making recommendations for serves of core food for young children. When an infant is not receiving breastmilk, infant formula should be used as the alternative up to 12 months.

Texture and type of foods Infants should be offered a range of foods of an appropriate texture and consistency for their developmental stage. Range and quantity of foods should be increased so that by 12 months the infant is consuming a wide variety of family foods, particularly nutrient-dense foods from the five food groups (Australia) and four food groups (New Zealand)[1]. The NZIFG state that prolonged use of puréed foods and delaying the introduction of lumpy textures beyond the age of nine months is associated with feeding difficulties in older children and a lower intake of nutritious foods, such as vegetables and fruit.

Allergen introduction Since the AIFGs were published in 2012, the available evidence on the introduction of allergenic foods has strengthened and the Australasian Society of Clinical Immunology and Allergy (ASCIA) 2016 Guidelines on Infant Feeding and Allergy Prevention [10] has been published. The more recent NZIFG provide recommendations in relation to food allergies.

Both the NZFIG and the ASCIA guidelines recommend giving common allergenic foods to infants before they are one year old to help reduce the chance of developing a food allergy. Introducing complementary foods later than six months can increase the risk of developing a food allergy. Once introduced and if there is no allergic reaction, allergenic foods should be offered regularly (approximately twice a week) as not continuing it in the diet may result in susceptible babies developing an allergy to that food. For infants that are susceptible to food allergies, the process for introducing foods should follow the same advice for introducing common allergy-causing foods.

Flavour profile, salt and sugar Human taste preferences and aversions are an innate human characteristic. Evolution has shaped our response to certain flavours and our sensory systems evolved to detect and prefer the once rare calorie-rich foods that taste sweet [11]. Likewise, a sensitivity to and preference for salty foods appears to have an innate component that develops at around four months of age [12].

[1] In Australia, fruit and vegetables are counted as separate food groups, while in New Zealand fruits and vegetables are grouped into the one food group.

Early food experiences can also influence long term dietary preferences and habits with studies showing that early and repeated exposure to sweet, salty, and bitter flavours (such as in green leafy vegetables) influences acceptance and preference for certain foods [11-17].

Both the AIFGs and NZIFGs note that the foods that young children receive and are exposed to in their first two years of life form the basis of their eating patterns and food preferences and that infants given salty or very sweet foods may acquire a taste for them, which can result in eating patterns associated with negative health outcomes. The NZIFGs note a variety of foods with different tastes, including naturally sweet, savoury, and bitter flavours should be provided.

Australian and New Zealand Infant and Toddler Feeding Guidelines advise that foods with added sugars or salt are unsuitable for infants and young children and are recommended to be avoided. The Guidelines also recommend avoiding adding salt to foods for infants, and to provide low salt foods due to the limited maturity of infants' organs, particularly the kidneys, and their ability to conserve fluids and excrete sodium. Excess sodium in the diet can also increase the excretion of calcium. In addition to creating a preference for sweet foods, consumption of added sugars is associated with poor dietary quality, obesity, increased risk of non-communicable diseases and increased dental caries [17].

Use of commercial foods for Infants and Young Children

Both the AIFG and NZIFG advise that if using commercially prepared foods, these should only be used from time to time and to avoid an over-reliance on them, which may reduce the variety of flavours and textures in a baby's diet. The guidelines also advise that special complementary foods or milks for young children are not required for healthy children and discretionary foods are not recommended due to infants' and young children' high nutrient needs relative to their low energy requirements. The NZIFG also specify that commercial teething biscuits (often called rusks) contain salt and sometimes sugars, so a teething ring or cold flannel/washcloth is a better option.

3. Adherence to Infant and Toddler Feeding Guidelines in Australia and New Zealand

The following section summarises/discusses the evidence on adherence to the Infant and Toddler Feeding Guidelines in Australia and New Zealand, focussing on the key recommendations outlined in Section 2 of this document.

Introduction of foods

In Australia, around a quarter of infants commence solids at 4-5 months, and about two-thirds start by 5-6 months. Most infants (96%) have started solids by 6 months [18]. The median age for receiving solids is 22 weeks of age [19]. The high rate of infants starting solids prior to 6 months of age appears to have remained consistent, with the 2010 Australian National Infant Feeding Survey also finding nearly all infants had received solid foods by 6 months [20].

The First Foods NZ study [21] follows 625 infants aged 7-9 months from the Auckland, Wellington and Dunedin area to investigate what infants are eating as they move to solid foods. The study found that approximately three quarters (75.4%) of caregivers introduced solids foods at the appropriate age of around 6 months[22]. The mean age of introduction of solid foods was 5.18 months, with the majority starting by 6 months. Similarly, the New Zealand Health Survey reported that 5.4% of infants were being introduced solid foods before 4 months in the 2020-2021 survey, and that there has been a reduction in the number of children introduced solid foods before 6 months between the 2011/12 and 2021/22 surveys (54.8% vs 43.8%) [23]. The FFNZ study had

notably better adherence to the guidelines for the introduction of solid foods than previous studies in New Zealand. However, it is noted that a higher proportion of Pacific mothers are less likely to meet the recommendations, along with those with lower education levels and those living in areas of high socioeconomic deprivation, for whom more targeted support may be required[22].

The FFNZ study also analysed the dietary intake data against the NZIFG around the texture of foods introduced to infants. Most infants met the recommendations for puréed foods textures (80.3%), spoon-feeding (74.1%) and the introduction of iron-rich foods (88.3%). During the time when solid foods were introduced, 61.4% and 65.6% of infants consumed infant rice cereal and red meat, respectively[22]. It was highlighted that at the age of participation in the study (7-10 months) 86% of the infants were no longer fully spoon-fed, which aligns with the recommendation that encourages self-feeding from an early age.

Breastmilk and formula consumption

Breastmilk and formula still make a substantial contribution to the nutrient intake of young children entering their second year of life, contributing approximately 30% of total energy between 12-16 months [24] [25]. The exact proportion of young children consuming breastmilk and formula is not collected nationally in Australia. Several sub-national studies show the percentage of young children continuing to consume breastmilk beyond 12 months in Australia to be between 30%-45%, however these studies tend to include dyads (parent/child groupings) of higher socioeconomic status which may influence results [24, 26].

The New Zealand Healthy survey from 2021/22 reported that 52% of infants and 9.5% of infants exclusively were exclusively breastfed until at least 4 months and 6 months of age, respectively [ref]. The FFNZ of infants found that nearly all caregivers initiated breastfeeding, 37.8% exclusively breastfed until around 6 months of age, and 66% were breastfeeding during the study (mean age 8.4 months)[22].

Allergen introduction

A recent Australian observational study of Australian children reported that by one year, around 95% of children in the study had been exposed to the common food allergens hen's egg and peanut, 76% of the children had consumed tree nuts, and 82% had consumed sesame [27]. However, the study group in this research were highly educated parents with significantly higher than normal breastfeeding rates which may not be representative of the broader Australian population.

Consumption of foods from five/four food groups

The available evidence indicates that dietary intakes of Australian young children are varied, with meat and alternatives and vegetables being particular food groups where intakes may be inadequate. These food groups play an important role in providing iron for growth and promoting a vegetable rich diet which is important for lifelong health.

The Australian National Health Survey 2020-21 found that for children aged 2-3 years there was high adherence to recommendations for fruit intake with 93.8% of Australian children consuming the recommended amount of fruit for their age, however, consumption of vegetables was considerably less with only 27.7% of Australian children aged 2-3 years consuming the recommended amount of vegetables.

The Australian Feeding Infants and Toddlers Study 2021 (OzFits 2021) was the first national study to assess dietary intakes in Australian children under 2 years of age. The OzFits 2021 was a cross-

sectional study of children aged 0 to 23.9 months of age and their caregivers through a national telephone survey of 1140 caregivers between April 2020 and April 2021 [28]. A limitation of the OzFits study is that the sample was not representative of the Australian population. Caregivers were more likely to be university-educated, married or in a de facto relationship and have a high household income.

As part of the OzFits study, Moumin et al. [29] assessed the intake of 475 young children aged 1-2 years old using a one-day food record and compared this against the recommended amounts of the five food groups outlined in the Australian Dietary Guidelines. Most young children consumed the recommended levels of fruit and dairy, however only 30% consumed enough vegetables, 1 out of every 10 consumed enough cereals and grains, and on average the young children consumed half the recommended servings of meat and alternatives.

Byrne et al. [30] also assessed quantity and diversity of core food intake for young children aged 12-16 months, looking at the 24-hour food intake for 551 mother-toddler dyads in South Australia. Findings from the study show the quality of dietary diversity is highly variable in this age group. Just over half of participants consumed at least some food from each of the five food groups on the day of recall. Dairy and cereal were the most consumed food groups, eaten by 96% and 97% of children, respectively. Intake of meat and meat alternatives was below recommended intake levels. Half the young children surveyed ate less than 30 g of meat or meat alternatives, with the most consumed items being egg, chicken, and ham, which contain lower levels of iron compared with red meats.

In the New Zealand FFNZ study vegetables and fruit were the most commonly consumed food groups. A high proportion of infants (88.3%) were offered iron-rich foods when solid foods were first introduced, but 31.8% recalled consuming meat and protein rich foods daily during the recall days. Parents self-reported that they felt that their infants consumed a variety of foods, despite this, few infants (aged 7-10 months) consumed a food from each food group on both days of dietary recall (6.5%)[22]. The authors state that this is the first study to suggest that most infants aged 7 to 10 months are not meeting the food group recommendation, and that further support is required considering the disconnect with parent's perception of the variety of their infant's diet. The results of the Young Foods Study New Zealand (YFNZ) which includes infants from 10 to 12 months of age and young children from 12 months to fewer than 48 months will provide valuable insights into how well the older children are meeting the recommended food groups.

Consumption of discretionary foods

Studies show the majority of young children are consuming discretionary foods, which are food and drink not necessary to provide the nutrients the body needs [6]. These foods are often high in energy, saturated fat, sugars, and salt. These discretionary foods may be displacing more nutritious foods in the diet which are important for a child's growth.

Moumin et al. [29] and Byrne et al. [30] found nearly all young children (89% and 91% respectively) consumed discretionary items on the day of the 24-hour food recall. Coxon et al. [31] examined the main foods contributing to discretionary food intake in young children aged 12-24 months, finding sweet biscuits/cakes/muffins to be most commonly consumed (10.8%), closely followed by manufactured infant sweet or savoury snack foods (9.3%).

The SMILE Study (Study of Mothers' and Infants' Life Events Affecting Oral Health) followed 2181 mother/infant dyads from birth to 5 years [32]. The Authors found 21% of infants had consumed foods and/or drinks containing added or free sugar by 6–9 months. At 1 year, 96% of children had consumed discretionary foods, which contributed on average 11.2% of total energy. Between 1 and

2 years, intake of free sugars increased sharply, from 3.6% of total energy to 22.5%. The greatest contributors to free sugars intake at 1 year were commercial infant foods (26.6%) and cereal based products (19.7%). At 2 years, the main sources were discretionary foods, such as fruit juice, biscuits, cakes, desserts, and confectionery; with yoghurt and non-dairy milk alternatives two notable core-food exceptions.

The 2011-12 Australian National Nutrition and Physical Activity Survey estimated that 30% of total energy intake for young children aged 2-3 years old comes from to discretionary items with the largest discretionary food contributor to the 2-3 year olds energy intake being biscuits (4.8%)[29]. The 2020-21 National Health Survey included some short questions on foods consumed and reported that consumption of sugar sweetened drinks in children aged 2-3 years was minimal, with 94.6% of children not consuming sugar sweetened or diet drinks (e.g. cordials, soft drinks, flavoured mineral waters, sports drinks, fruit and vegetable drinks with added sugars, or flavoured and sparkling waters). Another comprehensive national nutrition survey is expected to collect data in the coming year which will provide more recent estimates of young children's eating patterns.

Coxon et al. [31] explored the demographics of families with a higher likelihood of increased discretionary food intake. The research showed children born to younger mothers (<25 years), children with two or more siblings, and children born to mothers born in Australia and United Kingdom (compared to children of women born in India, China, and other Asian countries) had a higher total energy intake from discretionary foods.

The New Zealand FFNZ study also looked at adherence to the Guidelines on the addition of salt and sugar to food preparation. Most participants met the recommendation not to include salt (75.7%) or sugar (90.9%) to foods to food preparation[22]. Of those that added salt, this was mainly to roasted meats and vegetables, family meals and potato fries, whereas sugar was most often added to baking, breakfast cereals, fruit purées and family meals.

Use of commercial foods for Infants and Young Children

Recent results from the Victorian Royal Children's Hospital survey of caregivers of infants and young children (aged 4 month -<5 years) indicate that one in five (19%) of the babies and young children surveyed eat commercially prepared ready-made foods most days of the week. For two in five (39%) of the babies and young children surveyed, ready-made foods made up at least half of their meals and snacks, and for 22% of those surveyed these products made up most or all of their diet.

Results from the New Zealand FFNZ study of 625 ethnically diverse infants aged 7-10 months found that most infants (79%) had used a pouch at some time in their life, but only 28% were considered current frequent users[2] (mean age 8.4 months), and of those frequent users only regularly consuming pouches through the nozzle was rare (5%). Most infants were reported as being spoon-fed by the caregivers, with very few directly sucking the food through the nozzle on a regular basis. Predictors of frequent pouch use in infants were the infant being of Māori of Pacific ethnicity, larger households and higher socioeconomic deprivation level[33].

The Young Foods New Zealand Study (YFNZ) was an extension of the FFNZ study and was a cross-sectional study of 287 children aged 1 to 3.9 years. In this age group, 11.1% of children were considered current 'frequent' users and of these children 65% always consumed the pouch from the

[2] A frequent user was defined as an infant that was given food from a pouch at least 5 times per week in the last month.

nozzle[34]. These two New Zealand studies highlight that over-consuming pouches was common amongst infants and young children, yet few infants and even fewer children were consuming these frequently.

Determinants of parental food choice for infants and young children

The Victorian Royal Children's Hospital survey of caregivers of infants and young children (aged 4 months -<5 years) asked why they choose ready-made foods for their children. Most parents (92%) reported choosing these foods for convenience, and 36% stated that they might choose these foods because of a lack of knowledge of how to prepare healthy meals at home. Parents also believe commercial foods are an economical choice, with 68% of parents reporting they would be at least somewhat likely to feed their child ready-made foods because it was cheap[7].

The majority of parents surveyed (73%) reported giving ready-made baby and toddler foods because they believed them to be a healthy choice. Half of parents (49%) believed ready-made foods are healthier than, or as healthy as, food made at home. Two in five parents (41%) of babies and/or young children believed that young children have different nutritional needs to the rest of the family meaning they cannot eat regular family food. The majority of parents (53%) believed that the content of commercial ready-made food products for infants and young children is tightly regulated by government to ensure that it provides good nutrition for children [7].

In New Zealand two studies have looked at parental perceptions of baby food pouches. A qualitative study was conducted in six parenting forums[35]. Perceptions of baby food pouches fell into two broad categories – benefits and concerns. The most commonly reported themes related to benefits were convenience, health, baby enjoys, variety, and cost; whereas the most common concerns reported were: health, cost, lack of dietary exposure, dependence, and waste. Many parents reported both benefits and concerns.

These results are similar to that of the FFNZ study. Of those that used pouches, 90% of users reported the main reasons for choosing pouches were 'convenience' (90%), 'easy to use' (63%) and 'practical' (53%). In contrast, 62% of participants reported that they did not like using these products, due to 'health concerns' (26%) or 'environmental concerns' (17%)[33].

Dietary intake of infants and young children compared with recommended nutrient intakes

The Nutrient Reference Values for Australia and New Zealand set out recommended intakes and limits for various vitamins and minerals, as well as energy, carbohydrate, and protein.

Australia

OzFits 2021 compared the dietary intakes of 976 children aged 6 to 24 months against the Nutrient Reference Values for Australia and New Zealand [29]. The study did not assess the dietary intake of Vitamin D due to a lack of food composition data.

The study concluded that children's diets were above the Adequate Intake or Estimated Average Requirements for most nutrients except iron, zinc, and sodium:

- 90% of infants aged 6-11.9 months and 25% of young children were inadequate in their intake of iron
- 20% of infants 6-11.9 months had insufficient intake of zinc
- One third of young children exceeded the upper limit for sodium.

The high prevalence of inadequate iron intake suggest that infants 6 to 11.9 months and young children 12 to 24 months may be at risk of iron deficiency. However, study authors note that,

compared to other life stages, the EARs for iron and zinc are very high, and inadequate intakes are frequently reported for this age group in other high-income countries. Whether the high prevalence of dietary inadequacy is reflected in biomarkers of iron status or anaemia is unknown, as this study did not examine this. There are no contemporary data on the prevalence of iron or zinc deficiency in Australian children aged 6 months to 2 years old. Assessment of iron status in infants and young children from Sydney and Adelaide in the late 1990's found that 76% and 69-72% respectively were found to have sufficient blood iron levels [36, 37].

Inadequate iron status is of concern amongst Aboriginal and Torres Strait Islander populations with several studies reporting high prevalence of anaemia among infants and young children. A study of Aboriginal and Torres Strait Islander children born in Far North Queensland between 2006 – 2010 found 61.3% of infants included in the study became anaemic between six and 23 months[38]. Another study of Aboriginal infants born between 2004 – 2006 identified that 68% of participants were anaemic between 6 – 12 months[39]. The study also reported that the incidence of growth faltering by 12 months of age was 42%. While the cause of anaemia in Indigenous populations is thought to be multi-factorial, inadequate intake of iron rich foods has been identified as a contributing factor[39]. This is consistent with reportedly low dietary iron intake among young Aboriginal and Torres Strait Islander children[40, 41].

The high prevalence of excessive sodium intake is of concern, as this increases the risk of hypertension later in life and may create a taste preference for salty foods. While the OzFits study did not specify the main sources of sodium, previous studies have found family foods such as breads, cereals and cheese are the largest contributors to sodium intake [42, 43]. In one study, discretionary foods accounted for approximately 35% of sodium intake[43]. It is not reported whether the cereals, dairy or discretionary foods were commercial foods aimed at young children, or foods for the broader consumer base.

These findings are consistent with other studies including:

- A 2010 study of 95 Indigenous infants and young children in the Gomeroi gaaynggal cohort in New South Wales, Australia. This diet analysis study found a high prevalence of inadequate iron intake (58%) and the majority of children exceeded the recommendation for sodium. Most young children met daily dairy and fruit recommendations although intake of discretionary foods was high [44].
- The 2008–2010 Melbourne Infant Feeding Activity and Nutrition Trial (InFANT) Program included one study within this program that tracked the food and nutrient intakes of 177 children at both age 9 and 18 months and found that children were being introduced to discretionary food as early as 9 months of age and more than half of children were exceeding the upper limit for sodium [45].
- Another study modelled the iron intake of 485 infants and 423 young children, and showed that 32.6 % of infants and 18.6 % of young children had inadequate iron intake [46].
- An Australian cross section survey of children aged 1 to 5 conducted in Adelaide between September 2005 and July 2007 observed adequate intakes for a majority of micronutrients, except for low prevalence of iron deficiency and iron deficiency anaemia [47].
- A 1999–2001 survey assessing the food and nutrient intakes of 341 9-month old infants in Adelaide showed the prevalence of iron and zinc inadequacy was 9% and 1%, respectively [48].

New Zealand

The New Zealand FFNZ and YFNZ studies are currently analysing the dietary intake data of infants and young children and will provide important information on the total diet and contribution of commercial infant foods to the diets of this population group. The first papers from this study are expected to be published soon.

A study conducted between May 2019 and May 2020 with New Zealand infants found that at 9 months of age 92% of the study group had sufficient blood iron levels [49].

International

Public Health England conducted a rapid scoping review of commercial infant and young child foods in 2019. The review found that usage of commercial foods for infant and young children peaked in infants aged 6-12 months, with evidence from large surveys suggesting that the percentage of these infants consuming commercial foods for infants was between 40 and 60 per cent. Cereal-based commercial infant and young children foods were the most commonly consumed type of commercial food (excluding milk products). The exception to this was consumption of commercial infant and young children snacks (sweet and savoury) which continued to be consumed into the second year of life[50].

4. Impacts of poor nutrition in infancy and early childhood

This section reviews the prevalence of health outcomes associated with poor dietary patterns such as overweight and obesity and dental caries in Australia and New Zealand. These conditions can be inter-related with a recent meta-analysis finding children under 6 years with overweight and obesity had a significantly higher level of dental caries compared with children of normal weight [51].

A 2011 systematic review of studies that applied whole-of-diet analysis of children aged 1-5 years to examine associations between diet and nutrition, health, and development found results from two birth cohorts that healthier dietary patterns were associated with better lean mass, cognition, and behaviour, but not with bone mass or body mass index at later ages. Few studies have characterised the diets of children under 5 years of age and linked diet with health outcomes [52].

Overweight and obesity

Over four in five children who are well above a healthy weight (obese) will become adults who are well above a healthy weight [53]. Obesity is difficult to reverse so early intervention is critical to get the best start in life. Early childhood is a risk period for rapid weight gain above the standard weight gain associated with normal growth and development [1]. There are many factors that contribute to the development of overweight and obesity including genetics, early life experiences, psychology, and the environment. Consumption of foods that are energy dense and nutrient poor is one factor. Social determinates of overweight and obesity include socioeconomic position, early life circumstances, social exclusion, social connections, relationships and values, employment and work, housing, and the residential environment [54]. The AIHW report Inequalities in overweight and obesity and the social determinants of health 2007–08 to 2017–18 found children of a parent with an education level of a bachelor degree or higher qualification were less likely to have overweight or obesity than those without it, and those living in in the highest income households had lower rates of obesity than those living in the lowest income households [55].

The Australian Health Survey 2011-13 found one in five Australian children (21%) aged 2-4 years were above a healthy weight [56]. The more recent National Health Survey 2017-2018 found one in four 2-4 year olds (24.6%) were above a healthy weight [57]. The proportion of Aboriginal and Torres

Strait Islander children aged 2-4 years above a healthy weight (overweight and obesity) was 21.6% in 2018-19 [58].

The New Zealand Health Survey 2020/21 found 23.1% of 2-4 year old children were considered above a healthy weight (overweight and obesity). Children living in the most deprived areas were 2.5 times as likely to be obese as children living in the least deprived areas, after adjusting for differences in age, gender and ethnicity [59].

Dental caries

Poor nutrition, particularly consumption of sugary drinks and snacks is a risk factor for dental caries. Early childhood caries are defined as the presence of one or more decayed, missing (due to caries), or filled tooth surfaces in any primary tooth in a child under the age of 6 years. In those under 3 years, any sign of smooth-surface caries is indicative of severe early childhood caries. If left untreated this can result in pain, infection, delayed growth and cognitive development, and restriction of normal daily activities in the short term. Early childhood caries is also the best predictor of future dental caries [60].

Dental decay is common in children in both Australia and New Zealand, with between 35%-40% of five year olds experiencing early childhood dental decay or cavities [61, 62].

Australia

In 2006 about half of children in Australia entered primary school with some form of untreated dental caries [63]. Research studies in the past are more likely to assess the dental health of school-aged children, and less work has been undertaken in young children under 5 years. A 2006 study of 4606 children aged 2-3 years found parental/carer reported early childhood caries rates across Australian jurisdictions ranged from 2.5 – 5.6 percent [64].

Several researchers [60, 65, 66] have found early childhood caries rates increase steeply in children between 18–36 months of age. They associate this increase with dietary changes, the introduction of high sugar foods and beverages, poor oral hygiene such as irregular tooth brushing, parental oral health, knowledge and behaviour, and lack of water fluoridation. Researchers concluded oral health promotion and intervention strategies for young children and carers was ideal during this age stage and could stop or slow the progression of dental caries. Early childhood caries rates among 6 to 7-year-old children was tenfold that of 2 to 3-year-old children [65].

Indigenous young children are more at risk of dental caries than non-indigenous children. The 2000-2003 national estimates for dental caries showed that Aboriginal 6-year-olds had an average decayed, missing and filled primary teeth (dmft) score that was 2.38 times higher than non-Aboriginal children (3.68 vs 1.54). Rural Aboriginal children were generally at a disadvantage compared with those living in urban areas [67].

Aboriginal and Torres Strait Islander children aged under 5 years had almost one and a half times the rate of hospitalisation for dental care as non-Indigenous children [68].

In a cross-sectional study of Australian children (5-10yrs) and (8-14yrs), the association of modifiable risk factors with area-based inequalities in untreated dental caries among Indigenous and non-Indigenous Australian children differed substantially. Consumption of sugar-sweetened beverages was associated with dental caries for both groups, and irregular tooth brushing was also significantly associated with dental caries for Indigenous children [69].

New Zealand

Similar to Australia, early childhood caries is also a problem in New Zealand. School dental data from 2011 shows a caries prevalence of around 50% in children at age five. A higher prevalence in indigenous children with 58% of Maori and 64% of Pacific children experiencing caries by age five [70]. Between 2000 and 2009, dental-based admissions made up 7.3% of all New Zealand hospital admissions for children aged 29 days to 14 years. Dental conditions were the leading cause of potentially avoidable hospital admissions [71].

Some of the major contributing factors to dental caries in children are poor dietary and oral hygiene practices as well as socio-economic disadvantage, remote geographical locations with limited access to health and other services, and Indigenous or non-English speaking backgrounds.

Other research on rates of dental caries in young children in Australia and New Zealand is summarised in Appendix 1.

5. Regulatory environment - foods for infants and young children

A summary of the relevant regulations for foods for infants and young children is provided below.

Australia New Zealand Food Standards Code

The Australia New Zealand Food Standards Code (the Code) defines an infant as a person under the age of 12 months and young children as aged 1 to 3 years.

Regulatory requirements for infant foods are outlined in *Standard 2.9.2 – Food for Infants*. This Standard covers "a food that is intended or represented for use as a source of nourishment for infants". It does not cover infant formula products; formulated meal replacements; formulated supplementary foods; or unprocessed fruit and vegetables.

Standard 2.9.3 – Formulated meal replacements and formulated supplementary foods includes 'formulated supplementary foods for young children' under Division 4 of the Standard. This Standard covers food that is intended to supplement a normal diet on occasions where energy and nutrient intake may be inadequate.

It should also be noted that infants and young children are often consuming other family foods which are not regulated to meet specific requirements for this age group [72].

Compositional regulations

Standard 2.9.2 – Food for infants of the Code [72] requires foods for infants to meet specific compositional requirements as outlined below:

- iron content for cereal-based food for infants
- sodium content for rusks, biscuits, flour, pasta and fruit and vegetable drinks, juices and ready-to-eat fruit-based foods
- monosaccharide and disaccharide content of drinks, vegetable juice or non-alcoholic beverages
- content of inulin-type fructans or galacto-oligosaccharides for foods for infants.

The standard also includes food safety requirements for the use of honey to reduce *clostridium botulinum* risk.

Outside of a limit of 4g/100g of monosaccharide and disaccharide content for fruit drink, vegetable juice and non-alcoholic beverages, there are no other regulatory requirements for the sugar content of infant foods, including those promoted as meal and snack options for infants and young children.

Division 4, Standard 2.9.3 requires minimum composition limits for energy, protein and vitamins and minerals to be met. It also provides maximum concentrations for some vitamins and minerals; inulin-type fructans; galacto-oligosaccharides and lutein.

Labelling regulations

Standard 2.9.2 – Food for infants specifies labelling requirements for infant foods. Labelling provisions include [72]:

- That food packaging must not say, or imply, that a food is suitable for infants under 4 months of age.
- A statement indicating the consistency of the food.
- A statement indicating the minimum age of the infants for whom the food is recommended.
- Warning statements if the food is recommended for infants under 6 months of age of "Not recommended for infants under the age of 4 months".
- A food must not be represented as being a sole source of nutrition for infants.
- The label cannot indicate that the food can be added to bottle feeds of an infant formula product.
- The word 'sweetened' if the monosaccharide and disaccharide content of added sugars and honey is more than 4 g/100 g.
- In association with the word 'honey', the word 'sterilised' in line with requirements for any honey that is being used as an ingredient is treated to inactivate Clostridium botulinum spores.
- If a reference is made in the label (including in the name of the food) to milk, eggs, cheese, fish, meat, poultry, nuts or legumes, the percentage of that ingredient is to be included.
- If the food contains more than 3 g of protein/100 kJ the label must include the warning statement 'Not suitable for infants under the age of 6 months'.

The Code also provides standards that apply to labelling of all foods. These include allergy labelling requirements, nutrition health and related claims such as 'no added sugar', the requirement for a Nutrition Information Panel and a statement of ingredients which lists ingredients the food in descending order by ingoing weight. Despite the recommendations for infants and young children to eat iron rich foods, iron content does not need to be declared on the Nutrition Information Panel unless a claim is made about the foods' iron content. This may make it challenging for parents and caregivers to identity commercial foods which are iron-rich.

Division 4, Standard 2.9.3 includes labelling restrictions for, including requirements for the food to be described as a food for supplementing a normal diet and specifications for claims relating to vitamin and mineral content.

Health and Nutrition Claims

Infant and young children foods are not an exception to Standard 1.2.7 regarding nutrition content claims or health claims. While infant formula products, kava and foods that contain more than 1.15% alcohol, are not able to carry nutrition content or health claims, this exclusion does not apply to infant foods.

Within Standard 2.9.2 – Food for infants there are some requirements for claims about vitamins, minerals and protein in infant foods [72]. These include:

- A claim must not be made that a food for infants is a source of protein unless at least 12% of the average energy content of the food is derived from protein.

- A claim that a food is a good source of a vitamin or mineral may only be made if a reference quantity of the food contains at least 25% Recommended Dietary Intake (RDI) or Estimated Safe and Adequate Daily Dietary Intake (ESADDI), as appropriate. The RDIs and ESADDIs for vitamins and minerals are set out in Schedule 1.
- A claim as to the presence of a vitamin or mineral in a food for infants may only be made if the food contains, in a normal serving, at least 10% RDI or ESADDI, as appropriate. The RDIs and ESADDIs for vitamins and minerals are set out in Schedule 1.
- Limitations in the use of a claim that compares the vitamin or mineral content of a food for infants with that of another food.

Health Star Rating

The Health Star Rating (HSR) system is a voluntary front-of-pack labelling system that rates the overall nutritional profile of packaged food and assigns it a rating from ½ a star to 5 stars. The HSR is in operation in both Australia and New Zealand but is not regulated through the Australia New Zealand Food Standards Code [73].

Currently some foods are excluded from the HSR system. This includes all foods covered by Standard 2.9.2 – Food for infants – in the Food Standards Code. Similarly, infant formula and formulated supplementary foods for young children, including toddler milks, are also excluded from the HSR system.

This exclusion of the HSR system for infant foods, precludes their use for foods intended for infants under 12 months of age. Foods targeted at young children over 12 months of age would still be eligible to display the HSR [73]. The Australian Government Department of Health and Aged Care has purchased an extraction from the George Institute FoodSwitch database[74] to determine the categories of infant foods on the market in 2022. Of the 149 foods targeted towards young children, 34 (23%) displayed the HSR.

Regulation of serving sizes

The Australian and New Zealand food standards code doesn't provide advice on recommended serving sizes for infant and toddlers products unlike in Canada which has reference serving sizes for foods for children under 4 years [75].

Regulation of product claims

Misleading, misinforming, or deceptive representations and nutrition or health claims on labels are covered by both consumer law and the Food Standards Code in the Australian context.

Misleading health claims on infant and young children foods have previously been subject to investigations by the Australian Competition and Consumer Commission (ACCC). In 2016 the ACCC filed reports against Heinz Company Australia Ltd (Heinz) for making misleading health claims that their product Little Kids Shredz, which was over 60% sugar, was beneficial to the health of children aged 1-3 years. The Federal Court found Heinz had breached consumer law and they were charged penalties of $2.5M [76].

International regulations- CODEX Alimentarius

Codex Alimentarius is a collection of international food standards, guidelines and codes of practice designed to contribute to the safety, quality, and fairness of international food trade. The aim of these standards is to protect public health and ensure fair practices in food trade. However, Codex standards are not automatically adopted and require amendment to local legislation or regulations

to align with the provisions outlined in Codex Alimentarius as appropriate within the specific country context. The relevant Codex standards in relation to foods for infants and young children are:

- Guidelines for Use of Nutrition and Health Claims- states that nutrition and health claims shall not be permitted for foods for infants and young children except where specifically provided for in relevant Codex standards or national legislation (CAC/GL 23-1997)
- Standard for Canned Baby Foods [77]- intended for foods to use during an infant's weaning period and during the progressive adaptation of infants and children to ordinary food. It applies to foods in either ready to eat form or dry form requiring reconstitution with water. This standard provides compositional requirements, including in relation to vitamins and minerals. Specifically in relation to sodium, the standard limits total sodium content - not to exceed 200mg/100g calculated on the ready-to-eat basis. Addition of salt to fruit products and dessert products based on fruit is not permitted. The standard also states that the name of the product shall be that of the major characterising ingredient(s) accompanied by words suitable to indicate the consistency and intended use of the product. The standard also includes requirements for hygiene, packaging, ingredient and nutrition declaration, date marking and storage instructions, directions for the preparation and use of the product.
- Standard for processed cereal-based foods for infants and young children [78]- intended for cereal-based products for feeding infants as a complementary food from the age of 6 months and for feeding young children as part of a progressively diversified diet. The standard includes requirements that the product be prepared primarily from milled cereal(s) which should constitute at least 25% of the final mixture on a dry weight basis. The standard defines four types of cereal based foods for infants: products which need to be prepared for consumption with milk or another appropriately nutritious liquid; cereals with added protein which are to be prepared for consumption with water or another protein-free liquid; pasta; and rusks and biscuits which are to be used directly or after pulverisation with the addition of water, milk, and other suitable liquids.
- Under this Standard, there are compositional requirements including energy density (not less than 3.3 kJ/g), protein (dependent on the product type), carbohydrates (including limits on the use of sucrose, fructose, glucose syrup or honey), lipids, minerals (including limits for sodium and calcium), vitamins and flavourings. This Standard states that nutrition claims may be permitted under national legislation for the foods that are subject to the Standard provided that they have been demonstrated in rigorous studies with adequate scientific standards.
- The Standard also includes requirements for hygiene, packaging, contaminants, naming of the food, ingredient declaration, declaration of nutritive value, date marking and, storage instructions.
- Guidelines on formulated complementary foods for older infants and young children [79] – intended for foods that are suitable for use during the complementary feeding period. These foods are specifically formulated to provide additional energy and nutrients to complement family foods by providing nutrients which are either lacking or present in insufficient quantities. The Guidelines focus on compositional requirements to maximise the nutritional value of formulated complementary foods and reduce anti-nutrients which can impair nutrient bioavailability and absorption. For example, the Standard specifies cereals should be processed in a way to reduce fibre content and decrease anti-nutrients which can lower the protein quality and digestibility, amino acid bioavailability and mineral absorption. It also states that it may be necessary to fortify products with particular amino acids which may be deficient in certain ingredients (for example, products based on legumes and pulses may

require the addition of L-methionine as legumes and pulses can be deficient in this amino acid). There is a focus on providing nutrients which may be lacking in local foods and is therefore very much dependent on the country context in which it applies.

- This Guideline also includes labelling requirements with a requirement that the label shall indicate that the food is a formulated complementary food for older infants and young children and indicate the major sources of protein in the food. Labels should also state the age from which the product is recommended (no less than six months of age) with an accompanying statement indicating the decision to introduce formulated complementary feeding should be made in consultation with a health worker based on the individual infants' specific needs.

6. Current areas of concern in relation to the commercial infant and young children food market.

The size of the market for infant and young children foods has grown substantially over recent years, particularly in the young children snack category [80]. Compared to regular foods (i.e. those not targeted specifically at infants and young children), foods aimed at young children have been found to be more expensive and generally of poorer nutritional quality [80].

Several studies have looked at both the nutritional profile and levels of processing of commercial foods for young children. Highly processed foods are increasingly being found to be associated with poorer health outcomes and non-communicable diseases including obesity and cardiometabolic risk factors in children and adults [81-85]. With research growing internationally there is support for dietary recommendations to limit processed foods.

This section summarises the existing evidence which assesses how well the commercial infant and young children food market is aligned with the recommendations in the Australian and New Zealand Infant and Toddler Feeding Guidelines, with a focus on composition and information on product labels.

Composition

Australia

Moumin et. al. [86] analysed the Australian commercial infant and young children food market and compared this against infant feeding guidelines. This analysis was undertaken in 2019 by searching for 'baby food' on retailer websites and by reviewing foods in the 'baby food' section of major Australian supermarket chains (noting that the term 'baby food' is used in Australia to refer to foods for both infants and young children). A total of 446 products were identified, 414 of which provided nutrition information and ingredient lists. Meals were the most common product type identified comprising two-thirds (68%) of the foods included in the analysis. Types of meal products were mixed main dishes (20 % of all products analysed), ready-made desserts and breakfasts (20% of products) and puree fruit and vegetable first foods (18% of products). Finger foods comprised around one-third of the products analysed, which were predominantly sweet finger foods (18% of products) with savoury finger foods comprising 11% of the products. From all the products included in the analysis, 40% contained free sugars.

The researchers compared the products identified in the analysis against recommendations for feeding infants and young children and identified several areas where the commercial food market was inconsistent with evidence-based advice:

- **Iron**- Only 12% of product declared iron content, most of which were fortified cereals and snack foods. Infant feeding guidelines highlight the importance of regular iron consumption for developing infants, and particularly infants' brains. However, the researchers concluded that iron content of commercial mixed main dishes was inadequate compared to recommendations from the National Health and Medical Research Council (NHMRC), providing only 2% of the recommended daily intake for iron. Despite the low iron content, product names predominantly featured meat, poultry, or fish, suggesting to parents and carers that it was a good source of protein and iron.
- **Sweet flavour**- A high proportion of fruit-based products were promoted as first foods (80%), and the few available vegetable-only first foods were sweet varieties such as carrot or sweet potato. Mixed fruit and vegetable first foods contained 50-70% apple puree. The researchers noted that the predominant fruit-based composition of the first foods market may limit acceptance of vegetables and foods with plain or bitter tastes for infants mostly consuming commercial baby foods. The researchers also noted that approaches to improve vegetable acceptance in infants and young children indicates that repeated taste exposure to a variety of vegetables supports increased vegetable intake, and that pairing vegetables with familiar sweet flavours does not appear to improve vegetable acceptance.
- **Texture**- the audit found that almost half of all products aimed at infants 8 months and older were packaged in squeeze pouches and were predominantly smooth pureed foods. The researchers noted this was inconsistent with guidelines that infants should be exposed to a variety of foods of increasingly challenging textures, progressing from smooth purees to mashed and soft, lumpy foods and then solid foods. The researchers cited evidence that sucking directly from squeeze-packs may lead to poor oro-motor development which can delay self-feeding skills. Feeding directly from a pouch can also discourage active food exploration and handling which are important for the development of feeding skills such as picking up foods, and finger and spoon feeding.
- **Discretionary foods**- the researchers identified a high number of what they considered to be discretionary snack foods aimed at young children. These products were the most energy dense, low in dietary fibre and contained the highest amounts of total sugars and sodium compared to other products. These foods were also considered to be highly processed. Savoury finger foods contained more sodium than other product categories, and the most energy dense foods were savoury and sweet finger foods.

Two recent studies have assessed Australian commercial foods for infants and young children against Nutrient Profile Models.

The first study compared commercial foods for infants and young children to the *WHO Europe Nutrient Profile Model for Commercially Available Complementary Foods* (more information on this model is provided at Section 7). The study included a total of 177 infant and 73 toddler foods from three major supermarkets in the analysis, concluding that 67% did not meet all the recommended nutrient composition standards for their category. Infant foods were more likely than toddler foods to be within the WHO proposed limits for dried and pureed fruit, sodium, energy density and total fat [87].

- **Sugars**, 75% of all products assessed contained added sugar (using the Public Health England definition of 'free' sugars[3], which includes fruit puree). Toddler foods were more likely than infant foods to include any type of added sugar (85% compared to 71%). While fruit puree was the most common source of added sugar found in infant products, more than a quarter (29%) of products marketed as suitable for children under 12 months included other sources of added sugar.
- **Sodium** - Sodium content was within WHO proposed limits for 77% of all products. The 'meals with chunky pieces' and non-fruit finger foods and snacks categories were less compliant. Infant foods were more compliant with the WHO proposed sodium limits compared to toddler/young children foods (93% compliant vs 38% compliant respectively). The authors considered this was due to the sodium limits for infant foods set out in Standard 2.9.2 in the Code which does not apply to foods for young children.

The second study analysed 276 products from 15 manufacturers targeting infants from 4+ to 12+ months, specifically 'squeeze pouch' products [88]. The products were compared with a Nutrient Profiling Model developed by the UK Government's Food Standards Agency. Only two products were found to be nutritionally adequate according to the model.

- **Ingredients** - 43% of pouches were fruit-based, 32% dairy-based, 21% vegetable-based, 3% grain-based, and one product's primary ingredient was water. Of the pouches targeted at 12 + months, none had a vegetable as a primary ingredient. Only 9.1% of all products included any bitter or green vegetables (spinach, broccoli) and, where included, these were mixed with free sugars[4].
- **Sugar** - 67% of pouches targeted at children 12+ months and 55.5% of pouches targeted at infants 6+ months contained added sugar, mostly in the form of fruit puree. 86.5% of pouches for 4+ month-old infants contained free sugars, mostly in the form of fruit puree. Total sugar was found to be highest in pouches for younger infants (4+ months) (8.7 ± 3.6 = g/100 g) and young children (12+ months) (8.4 ± 3.8 g/100 g).
- **Micronutrients** - No products were fortified with iron or reported on the iron content. Only 24% of products reported calcium content.

Other Australian studies have found 85% of toddler foods available in Australia are ultra-processed [5], with 80% being snack foods that do not align with dietary guidelines [89].

The Australian Government Department of Health and Aged Care has purchased an extraction from the George Institute FoodSwitch database [74] to determine the categories of infant and young children foods on the market in 2022. Analysis of the foods in the database (n=365) found that 40% of finger foods and snacks designed for infants and 68% of those designed for young children

[3] Free sugars includes: all added sugars in any form; all sugars naturally present in fruit and vegetable juices, purées and pastes and similar products in which the structure has been broken down; all sugars in drinks (except for dairy-based drinks); and lactose and galactose added as ingredients. The sugars naturally present in milk and dairy products, fresh and most types of processed fruit and vegetables and in cereal grains, nuts and seeds are excluded from the definition.

[4] Free sugars includes: all added sugars in any form; all sugars naturally present in fruit and vegetable juices, purées and pastes and similar products in which the structure has been broken down; all sugars in drinks (except for dairy-based drinks); and lactose and galactose added as ingredients. The sugars naturally present in milk and dairy products, fresh and most types of processed fruit and vegetables and in cereal grains, nuts and seeds are excluded from the definition.

[5] According to the NOVA definition of ultra-professed foods and drinks.

contained free sugars[3]. As expected, foods designed for infants were low in sodium, reflecting the existing compositional regulations for infant foods. However, sodium content was significantly higher in foods designed for young children.

New Zealand

Two cross-sectional studies have been published in New Zealand looking at commercial foods for infant and young children in New Zealand supermarkets.

The most recently published cross-sectional survey took place in 2019-2020. Of 266 commercial infant and toddler foods sold in New Zealand supermarkets, 58 of these foods were classified as 'snack foods' [90]. More than half of these foods contained at least one source of free sugar or at least one source of added sugars. Of the 208 non-snack foods, one quarter were classified as 'fruit' and one quarter were classified as 'meat and fish'.

Most non-snack foods (63.9%) were sold in pouches. Overall, the majority of pouches were "fruit" (36.1%), followed by "vegetable" (21.1%) and "dairy" (18.0%)[8]. Infant food pouches contained considerably more total sugars compared to other forms of infant food packaging, but contained similar energy, iron, and vitamin B12 content.

The iron content of all forms of infant foods was low, except for prepared "dry cereals" which were fortified with iron. None of the infant food pouches were fortified with iron.

The second cross-sectional survey of commercial commercial infant and toddler foods sold in New Zealand reviewed products available in 2019 only[91]. This study analysed the texture, flavour profile of the products, and use of ingredients that are allergenic. Of the 197 foods analyzed, 43 (21.8%) were recommended for consumption by children from four months of age or older,

- **Added salt/sugar**: 10 (5.1%) had added salt and 67 (34%) contained free sugars.
- Texture: Of the 153 wet 'spoonable' products the majority were of the lowest textural complexity (smooth, puréed, super smooth). Textural complexity increased along the age gradient for savoury (vegetable, meat, or poultry-based meals) but not for fruit-based meals and breakfasts.
- **Flavour profile**: The majority (69%) contained ingredients with a sweet flavour, and sweet vegetables were used more often than bitter tasting vegetables.
- **Allergens**: Of the common food allergens, cow's milk was used in 34% of the commercial infant foods, and wheat was present in almost a quarter. Other common allergenic ingredients were infrequently added to these products, only 2% of products contained egg, 2% contained soy, fish was only resent in one product and nuts were absent as ingredients in all products.

International research

A recent study by da Rocha et al. found that more than 60% of infant and toddler products were ultra-processed (based on the NOVA classification[6]), more energy dense and higher in protein, total fat, saturated fatty acids, and carbohydrates compared to processed and minimally processed foods. Overall, only 35.1% of commercial foods were identified as appropriate for children up to 36 months, in that they met the compositional criteria of the WHO Europe Nutrient Profile Model

[6] Ultra-processed foods are defined in the NOVA system as typically containing 5 or more ingredients, including substances extracted from foods and substances derived from further processing of food components. Diet quality and processed foods (foodstandards.gov.au)

for Commercially Available Complementary Foods (more information on this model is provided at Section 7) [83].

Serving size

A desktop survey conducted by the Australian Government Department of Health and Aged Care found that the majority of foods designed for 4 – 6-month-old infants had a serving size of 110 – 120g[92]. Where such products are predominantly fruit and vegetable based, an infant would readily exceed recommendations for infants to consume approximately 20g each of fruits and vegetables daily[93]. Current practice in relation to serving size of infant foods thus may contribute to high intakes of free sugars, particularly in fruit-dominant products.

Allergens

A recent study examining the presence of allergens in commercial foods for infants and young children, found that despite recommendations that infants and young children be exposed to allergenic foods regularly from the age of 6 months, few products contained allergens. From an audit of 251 baby food products from 14 companies, 27 products were found to contain wheat, 73 products contained cow's milk proteins, and 3 contained egg, but none contained peanuts, tree nuts, sesame, or shellfish. Furthermore, current labelling practices such as "free from wheat/nuts etc" may be leading parents to believe they should be avoiding giving allergenic foods to their babies [94]. It is important to note that (appropriately labelled) allergenic foods are widely available beyond the baby food aisle for purchase in both Australia and New Zealand.

Labelling and Marketing

Claims

A 2020 study of toddler foods on the Australian market (154 foods) found that 99% of all foods had some messages or claims (as per Standard 1.2.7 of the Code), with up to 26 claims per food. Claims not specifically regulated in Standard 1.2.7 and other types of messaging (e.g. lack of additives, preservatives, colours and flavours) were more common than regulated claims such as low sugar or gluten-free. Core foods had more claims than discretionary foods, while discretionary foods included more child-specific messages, organic or natural messages. Core food claims were more likely to be about taste, general level health claims or environmental claims and messages [89].

These findings were replicated in a 2022 audit of infant and toddler foods which found 100% of products (n=330) displayed on-pack claims, with 97% of products displaying statements relating to the absence of ingredients (i.e., 'free from' claims). Of the 164 products that featured a 'no added sugar' claim on their packaging, 93% (n=153) contained added sugars when applying Public Health England's (PHE) definition of 'free' sugars[7][95].

The Victorian Royal Children's Hospital survey of caregivers of infants and young children (aged 4 months -<5 years) reported that when choosing a particular ready-made baby or toddler food product, claims on the packaging about the contents of the product (such as organic, natural sweetness and no added sugar) were very or extremely likely to influence the majority of parents'

[7] Free sugars includes: all added sugars in any form; all sugars naturally present in fruit and vegetable juices, purées and pastes and similar products in which the structure has been broken down; all sugars in drinks (except for dairy-based drinks); and lactose and galactose added as ingredients. The sugars naturally present in milk and dairy products, fresh and most types of processed fruit and vegetables and in cereal grains, nuts and seeds are excluded from the definition.

choices. The claims ‘natural ingredients’ and ‘made with fruit and vegetables’ were the most likely to increase uptake, with 93% of parents agreeing it was ‘at least somewhat likely’ to make them choose to buy that particular product [7].

Naming and description of the food

Under the Code, food labels must display the name of the food, with Standard 1.2.2 outlining that the name of the food must, where a prescribed name exists, be the prescribed name, otherwise must be a name or description sufficient to indicate the true nature of the food. While there is no requirement to list all ingredients in the product name, the omission of certain ingredients in the names of infant foods may be cause for concern in relation to truth in labelling. For example, a product named ‘barley, banana and spinach’ would indicate the major, if not the only ingredients, in the food are the named ingredients. However, the ingredients list states apple as the ingredient with the largest ingoing weight, with the addition of pear and sweet potato also being more prominent than two of the characterizing ingredients on the label (barley 5% and spinach 5%). A desk top review by the Department of Health in 2020 found this practice was widespread, with apple (including puree, juice or paste) present in the vast majority of pouch products. On the other end of the scale, declarations about the inclusion of ingredients within a product may contain minute amounts of the named product. For example, a product named ‘cheese chickpea pops’ had just 0.1% ingoing weight of cheese.[92] A study conducted in 2022 similarly found that product names of infant and toddler foods available in Australian supermarkets frequently did not accurately reflect composition [96]. The study reported that one third of products assessed in the survey had a product name that did not accurately reflect the range and proportion of ingoing ingredients.

Partnerships with children’s characters

There are a range of products available in Australia and New Zealand that make use of children’s characters as a marketing tool. For example, *Disney* is partnered with a custard and yoghurt pouch manufacturer and *Bluey* is partnered with manufacturers of yoghurt and custard pouches, flavoured milks, and sweet and savoury biscuits.

7. Current approaches to improve commercial foods for infants and young children.

Australia and New Zealand

Healthy Food Partnership

There is work underway in Australia through the Healthy Food Partnership to look at approaches for improving commercial foods aimed at infants and young children. The Foods for Early Childhood Reference Group commenced in 2021 with the role of developing voluntary guidance to support the food industry to improve commercial foods for infants and young children. The guide, expected to be finalised in the second half of 2023, will focus on non-regulatory, voluntary changes that can be implemented by industry to improve the following aspects of commercial foods: sweet flavour profile (and overuse of sweet ingredients); packaging (including use of pouches with spouts); labelling (including use of marketing claims, ‘free-from’ allergy statements and product names reflecting ingredients); and large manufacturer determined serving sizes. These topics are the focus of the non-regulatory Partnership activities as they are not necessarily suitable for regulatory approaches for improving commercial foods for infants and young children.

Membership of the Reference Group includes public health professionals, industry representatives and academics with an interest in this topic. The Reference Group is chaired by the Australian

Government Department of Health and Aged Care and reports to the Partnership Executive Committee.

Information for parents on feeding infants and young children

While information and education about healthy eating is provided, other factors such as marketing, convenience, and price also play a significant role in determining what foods parents choose to feed their children.

Current education and information activities targeting infant and toddler feeding practices in the jurisdictions centre around providing consumer resources for parents. All jurisdictions produce materials (such as brochures) on infant feeding. Information on introducing solids is communicated to new parents by Maternal and Child Health nurses at child health checks. Several jurisdictions also produce targeted information for Māori, Aboriginal and Torres Strait Islander peoples.

Face to face programs which focus on providing a range of information, education and support on health eating have been found to be effective and are run in some jurisdictions. For example:

- In Western Australia, *Food Sensations for Children,* run by Foodbank Western Australia, is a face-to-face evidence-based program run by qualified nutritionists and dietitians providing food literacy education for parents of 0 – 5 years. The program includes cooking and nutrition education.
- INFANT (INfant Feeding, Active play and NuTrition) is an evidence based Victorian program developed by Deakin University. INFANT trains Maternal & Child Health nurses and health professionals to deliver evidence based key messages that support parents to establish healthy eating at key developmental times in their child's first year of life.
- In Queensland, the Good Start Team works with Māori and Pacific Islander families to talk about healthy pregnancies, healthy babies, and healthy children. It also works with children in schools to teach healthy eating and being active.

Further information on activities in Australia and New Zealand targeting feeding infants and young children is summarised in Appendix 2.

International actions

United Kingdom

In June 2019, Public Health England released '*Foods and drinks aimed at infants and young children: evidence and opportunities for action'.* This report outlined advice to government on the opportunities for action to improve foods and drinks aimed at infants and young children aged up to 3 years (36 months). Analysis considered dietary survey and product data, a rapid scoping review, dietary advice, and general public and stakeholder views. The report concluded there were inconsistencies between national feeding recommendations and the types of products available, ingredient and nutrient composition of products and product labelling and marketing. Key findings from this report included:

- Some commercial baby foods have added sugar or salt or contain ingredients that are high in sugar or salt, particularly commercial baby finger foods that are often marketed as snacks.
- Sweet finger foods (including biscuits, wafers, puffs, bars, bites, fruit shapes) make up two-thirds of the baby finger food market. The highest sugar content was found in processed dried fruit products which are often marketed as healthy snacks due to their high fruit content. However, the sugar in these products is often added sugars as they contain ingredients such as fruit juices, purees, and concentrates.

- On average, savoury finger foods (including puffs, crisps, biscuits, crackers, wafers) contained the highest levels of salt per 100g across all product types.
- Concern that the growth of the commercial baby finger food market (volume sales increased by nearly 11% in 2017-2018), and the way products were labelled and marketed encouraged snacking (e.g. suggesting to parents that these products form an expected and appropriate part of an infant's diet when many are biscuits or savoury snacks and others are similar in nutritional quality to confectionery).
- The balance of products on the market was mainly fruit, particularly mixed fruit. This was inconsistent with advice to start feeding infants with single vegetables and fruits, and vegetables that are less sweet.
- More than one-third of baby meals were marketed at children under 6 months, despite government advice that solid foods should be introduced (alongside breastmilk or infant formula) at around 6 months of age.
- Nearly three-quarters of fruit juice-based baby drinks were marketed at infants under 12 months which was inconsistent with advice to offer only breastmilk, infant formula, or water as drinks between 6 and 12 months of age.
- Around one-third of commercial baby foods and drinks were packaged in pouches, many of which have nozzles. There is concern that sucking from these pouches is harmful for developing teeth and although some businesses provided back of pack or website advice on how to feed these products (from a spoon), this was not consistent across the market.
- Use of nutrition and implied health claims, and health halo statements, can suggest to parents that products are healthier than their nutrient composition indicates.
- Product names do not always reflect the range and balance of ingredients used, for example where the product name suggests that it is savoury or vegetable based, whereas the first, or main ingredient is fruit.

The report made a number of recommendations including: improving the composition of commercial baby foods and drinks, ensuring product marketing is consistent with advice about when to introduce solid foods, ensure product names are not misleading and aligned with primary ingredients, restrict use of nutrition and implied heath claims and health halo statements, ensure feeding instructions are clear regarding use of nozzles, and ensure products high in sugars are not labelled as being suitable for eating between meals.

Europe

The WHO European Regional Office has finalised a nutrient and promotion profile model (NPPM) for commercial infant foods marketed as suitable for infants and young children aged 6-36 months, which was made available as an online tool in March 2023 [97]. The NPPM aims to support European countries to make policy changes for commercial infant foods to ensure both high nutritional quality and appropriate marketing, in line with internationally recognized diet and health goals for infants and young children aged 6–36 months[98].

The model provides compositional thresholds and guidance on product-labelling and promotions. The NPPM focuses on marketing of commercial infant foods high in saturated fats, trans fatty acids, free sugars, and salt. The NPPM and accompanying NPPM toolkit provide a framework for governments and policymakers to develop effective legal and policy measures to ensure the sale of appropriate foods for infants and young children in their own settings. The NPPM does not apply to breastmilk substitutes and non-breastmilk substitute products for special dietary or medical purposes.

Compositional thresholds in the NPPM aim to reduce the sugar content and sweet taste profile of products. Thresholds are also in place to ensure appropriate energy density, sodium, protein, and fat contents. Examples include:

- Added sugars and other sweetening agents (including all syrups, honey, fruit juice, fruit juice concentrates or non-sugar sweeteners such as saccharin, acesulfame, sucralose, aspartame, and stevia) should not be used in commercial foods for infants and young children up to 36 months. Fruit juice and fruit juice concentrate are considered added sugars and should not be used except for a small amount of lemon or lime juice as a preservative.
- Maximum 15% energy from total sugar in meals and snacks. This is intended to assert downward pressure on the use of processed or concentrated 100% fruit to impart sweet taste to the product.
- Blended, pulped, puréed or powdered 100% fruits (i.e. not juice) (including puréed/powdered dried fruit) are only permitted in specified quantities by weight (≤5% in savoury meals and dairy foods, ≤10% in dry cereals/starches).
- Minimum energy density thresholds for dry cereals (80 kcal/100 g) and savoury meals (60 kcal/100 g) to ensure that complementary foods provide adequate nutrition for infants and young children between 6 and 12 months and are not made largely of water or very low-energy foods.
- Maximum energy for snacks is 50 kcal per serving.
- Sodium content should be reduced to 50 mg/100 kcal for all foods except cheese purées and meals (where cheese is listed in the product name and the protein content from dairy is 2.2 g/100 kcal), where the limit suggested is 100 mg/100 kcal of product.
- Minimum content by weight of named traditional protein sources in meals.
- Minimum protein content for meals, and cereals/snacks made with milk.
- Industrially produced trans-fatty acids are not permitted.
- Total fat maximum 4.5 g/100 kcal for most products, except in some meals.

The NPPM also includes promotional requirements, with the aim to improve messaging to caregivers around product age suitability and improve product naming, to warn of high sugar content, and limit use of health, nutrient and marketing claims. Examples of promotional requirements include:

- Minimum age recommendation of 6 months and products must not encourage (either implicitly or explicitly) early food introduction (including references to milestones and stages).
- Maximum age recommendation of 12 months for puréed foods.
- Front-of-pack indicator labels for high total sugar content (> 30% energy in fruit or vegetable purées, desserts, and dry fruit snacks and > 40% energy in dairy foods).
- Front-of-pack product names must clearly represent or name the main ingredients, reflect the ingredients in descending order of content and not hide sweet tastes or high fruit content.
- The ingredient list must clearly state the proportion (%) of the largest single ingredient, added water/stock, fruit content and traditional protein source.
- Food packaging with a spout must include a clear statement to discourage caregivers from allowing infants and young children to suck the food directly via the spout, such as: “Infants and young children should not be allowed to suck directly from the pouch/container”.

- No compositional, nutritional, health or marketing claims are permitted on packs or related marketing materials, except statements relating to common allergens and religious or cultural requirements.
- No product should convey an endorsement or anything that may be construed as an endorsement by a professional or other body, unless this has been specifically approved by the relevant national, regional, or international regulatory authorities.

Following the publication of the WHO Europe recommendations and focus on the importance of early childhood nutrition for later health, several international studies have looked at the nutritional intakes and raised concerns about commercial foods for young children [99]. These studies note that products containing ingredients such as sugar, salt, fat, and ultra-processed foods comprise an increasing percentage of children's diets [100].

United States of America

Infant and toddler foods are not subject to any special US Food and Drug Administration (FDA) regulations. Manufacturers simply need to follow the regulations that govern all foods designed for consumption by humans of any age. There are no specific requirements for iron composition or labelling of infant and toddler foods. However there are requirements for making iron nutrient claims[101]. Iron content is also required to be labelled in the nutrition facts panel of all foods. In March 2021, a new Bill was introduced to US Congress – Baby Food Safety Act – not only does it require FDA to monitor for heavy metals in these foods but to regulate foods for consumers up to 36 months old. This Bill has yet to be passed[102].

Health Canada

Infant foods sold in Canada are subject to some restrictions on labelling, claims and sodium content. This includes a requirement for iron to be included in their Nutrition Facts table on pack for pre-packaged "Foods intended solely for infants 6 months of age or older but less than 1 year of age"[103].

8. Statement of the problem

Australian and New Zealand Infant and Toddler Feeding Guidelines recommend children eat a wide variety of nutritious foods every day, with a focus on vegetables, fruit, wholegrains, lean meats, fish, eggs, legumes and dairy and avoiding energy dense, nutrient poor foods.

The evidence presented in this paper indicates that many infants and young children are not consuming enough of the recommended food groups and are consuming excessive amounts of sugar and salt. Early childhood is a risk period for rapid weight gain. Around one in five Australia and New Zealand children are above a healthy weight, which can increase their risk of developing health issues such as heart disease, some cancers, and type 2 diabetes later in life.

While educational materials to communicate this message to parents and carers are readily available, the food environment does not support parents to provide nutritionally adequate foods to their infants and young children. Commercial foods aimed at infants and young children are frequently used by Australian and New Zealand parents, with many believing them to be a healthy choice. It is also widely and incorrectly believed that the content of commercial foods infants and young children is tightly regulated by Government. However, there are limited regulations for the composition and nutritional quality of food for infants and foods aimed at young children.

The evidence presented in this paper shows many commercial infant and toddler foods are poorly aligned with the recommendations in the Australian and New Zealand Infant and Toddler Feeding

Guidelines with regards to their ingredient and nutrient composition and labelling. Commercial foods for infants and young children are often high in sugar (infant and young children foods) and sodium (young children foods). Infant pouches are predominately sweet and finger foods for young children contain added sugar (including fruit juice/juice concentrates) with some products containing added salt. Iron is a nutrient of concern for this age group yet commercial products for infant and toddlers are not required to label the iron content of the product to aid carers choices. Commercial infant foods often don't have age-appropriate texture progression or advice on how to progress to different textures.

Considering this evidence, the following statement of the problem is proposed:

Commercial foods for infants and young children are poorly aligned with some aspects of the Australian and New Zealand Infant and Toddler Feeding Guidelines. These commercial foods are often high in sugar (infant and young children foods), sodium (young children foods) and either do not contain iron-rich ingredients or are too low in iron to make a claim (infant and young children foods). Labelling does not support carers to make informed choices for infants and young children due to product naming not always accurately reflecting ingredients. There are also concerns the texture of commercial infant foods typically do not match developmental progression in feeding.

9. Recommendations and next steps

It is recommended that this work progress through Gateway 1 of the Food Regulation Policy Framework, with the next step being the development of a policy options consultation paper by the FRSC Priority 2 Working Group. The policy options consultation paper will consider and assess regulatory and non-regulatory actions to address the problem and seek feedback from stakeholders on the proposed options.

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Appendix 1- Prevalence of dental caries in Australia and New Zealand

Australia

A 2012/14 national survey found young children aged 6 years have an average decayed, missing and filled primary teeth (dmft) score of 1.4. This score varied across Australia, from 2.0 in Queensland to 0.7 in the South Australia[104].

Jurisdictions	**Average number of decayed missing filled teeth per child aged 6 years**
National average	1.4
QLD	2.0
NT	1.5
VIC	1.5
WA	1.2
NSW	1.1
TAS	1.1
ACT	0.9
SA	0.7

NSW

Young children may be more likely to be admitted to hospital because dental procedures may be difficult to perform in outpatient or community settings at this age. Dental caries continues to be a reason for treatment in hospital under general anaesthetic. In NSW in 2019/20 removal or restoration of teeth for dental caries in children was higher for children aged 0-4 years and particularly aboriginal children of this age group (See table 1 below). In 2019/20 better dental health practices may have prevented 369 per 100,000 hospitalisations for dental conditions for children aged 0-4 years. Compared to 208 per 100,000 for the general population.

Table 1:

Dental condition	**0-4 years (rate per 100,000 all children)**	**0-4 years (rate per 100,000 Aboriginal children)**	**All ages (rate per 100,000)**
Removal and restoration of teeth for dental caries (2019/20) [105]	289	376	104
Potentially preventable hospitalisations for dental conditions (2019/20) [106]	369	n/a	208

A 2007 dental health survey [107] found that for 2095 NSW children aged 5 and 6 years:

- Over 60% had never experienced decay in their deciduous (baby) teeth.
- On average there was one untreated decayed deciduous tooth per child

- Those children with the poorest dental health had on average five teeth that were affected by decay, more than three times the average for the age group.
- Those children from the lowest socioeconomic group had almost 1.5 times more decayed, missing and filled deciduous teeth than those from the highest socioeconomic group.
- Those children from remote and very remote areas of New South Wales had more than twice the number of decayed, missing and filled teeth than those living in major cities.

In 2015 there was a high prevalence of untreated dental caries among young Aboriginal children, particularly for those in remote locations. 173 NSW children aged two to five years were examined and 40% were found to have dental caries. Those living in remote areas had significant more dental caries than those in rural and metro areas [108].

VIC

In 2008 a Victorian research group, commenced a birth cohort study called VicGeneration (VicGen) to determine (a) the pattern of dental caries as teeth enter the mouth and (b) the prevalence of dental caries in children at four age points between zero and 3 years. The study aimed to report on the natural history of dental caries in young children aged between zero and 3 years and to assess lesion behaviour against a number of known risk factors including sweetened beverage consumption [60].

There were 467 mother/child dyads followed at 1, 6, 12, 18, and 36 months of age. Parent-completed surveys captured demographic, social, and behavioural data, and oral examinations provided clinical and data.

Very little carious activity was detected in the first 18 months of life. In the following 18 months however, there was a steep increase in non-cavitated lesions, particularly in the molar teeth, and the appearance of the first cavitated lesions. Eight per cent of children (95% confidence interval (CI): 5–12%) at 18 months and 23% (95% CI: 18–28%) at 36 months experienced decay. Interesting lesion behaviour was found between 18 and 36 months, with rapid development of new lesions on sound teeth (70% of teeth, 95% CI: 63–76%). Significant associations were found between soft drink consumption and lesion progression however not for fruit juice consumption [60].

WA

Data from the 2006 Longitudinal Study of Australian Children (LSAC) revealed early childhood caries among WA children aged 2–3 years in the LSAC cohort was 2.9%, slightly lower than the national average of 3.3%. Only ACT and SA had lower reported rates of early childhood caries at 2.5% and 2.7% respectively. Despite this, WA had the highest proportion (89.4%) of children that had not accessed dental services in the last 12 months[109].

However, a study of children living in rural and remote communities in Western Australia found much higher rates of early childhood caries. A study of the dental health of 253 children aged between 2 and 4 years found over 40% of these young children living in rural and remote communities already had one or more decayed teeth with 19% having severe early childhood caries and 15% having already suffered toothache. The disease burden was far higher among Indigenous children, who comprised one-third of the study group, in comparison with the non-Indigenous children in the study. Among the Indigenous children, decay was far more widespread (69% had decay compared with 25% of non-Indigenous children), and was more severely experienced (34% had severe early childhood caries) and 28% having suffered toothache (vs respective rates of 10% and 7% for the non-Indigenous children)[110].

QLD

A study of 378 Queensland children followed from birth to seven years found that the prevalence of dental caries increased from 2% and 6% at ages 2 and 3 years to 15%, and 52% at ages 4 and 7 years. The mean caries experience (decayed, missing, and teeth extracted due to caries) of the total cohort increased from 0.1 at 2 years to 2.0 at 7 years[111].

NT

Indigenous children in the Northern Territory have high rates of early childhood caries and this has been monitored with some improvements:

Survey year	2-3 years	4 years
2011 [112]	66% dfmt 3.6 teeth on average affected	80% dfmt 5 teeth on average affected
2012/13 [113]	56% dfmt 2.8 teeth on average affected	78% dfmt 4.8 teeth on average affected

SA

A study of 1398 children aged 5 years assessed for caries experience found 67% of indigenous children had caries compared to 40% of non-indigenous children. Children overall with caries were more likely to have consumed sweet drinks regularly when less than 6 months of age compared to those who didn't [114].

New Zealand

Recent New Zealand Ministry of Health data (2020) shows dmft scores for children aged 5 years from various regions in New Zealand[70].

Region	Average decayed missing filled teeth score (includes those w/out caries)	Average decayed missing filled teeth score in those with dental caries
New Zealand overall	1.98	4.62
Northern	2.88	5.09
Midland	2.01	4.38
Central	1.62	4.4
Southern	1.5	4.28

This suggests Indigenous and minority groups with socio-economic status inequalities shoulder the highest burden of dental caries.

Appendix 2 – Initiatives targeting feeding and foods for infants and young children

Resources for Parents and Guardians

All jurisdictions produce educational materials for new parents on feeding infants and young children. These are available to download from websites and used by Maternal and Child Health nurses at child health checks.

New Zealand –

- Healthy kids: infant feeding provides advice/ideas to get the family eating, moving and sleep well. Includes recipes. https://www.healthykids.org.nz/eat/infant-feeding
- Infant feeding guide card, available in multiple languages https://order.hpa.org.nz/search?q=infant+feeding+guide
- Infant feeding guide card, available in multiple languages https://order.hpa.org.nz/search?q=infant+feeding+guide
- Health Navigator: resources on starting solids https://www.healthnavigator.org.nz/healthy-living/b/baby-starting-solids/
- Health Navigator: resources on starting solids https://www.healthnavigator.org.nz/healthy-living/b/baby-starting-solids/
- Health Ed: Eating for Healthy Babies and Toddlers https://healthed.govt.nz/products/copy-of-eating-for-healthy-babies-and-toddlers-nga-kai-totika-mo-te-hunga-kohungahunga-he1521
- Health Ed: Eating for Healthy Babies and Toddlers https://healthed.govt.nz/products/copy-of-eating-for-healthy-babies-and-toddlers-nga-kai-totika-mo-te-hunga-kohungahunga-he1521
- Plunket, a Well Child Tamariki Ora Programme provider produces this resource and provides parents with a Watties first foods pamphlet in visits around the 6-9 months check https://www.plunket.org.nz/caring-for-your-child/feeding/solids/

Western Australia –

- Let's Feed the Family, a stand-alone or companion resource to Food Sensations for Children program. Let's Feed the Family - Superhero Foods HQ by Foodbank WA
- Superhero Foods are nutrition education resources for parents and children of all ages Products | Superhero Foods HQ by Foodbank WA
- Baby's first foods Baby's first foods – Healthy eating from around 6 months (healthywa.wa.gov.au)
- Toddler Tucker Toddler tucker – Healthy eating for 1 to 3 year olds (healthywa.wa.gov.au)

Victoria –

- These feeding related resources support MCH Key ages and stages visits Maternal and child health services - Better Health Channel:
    - Breastfeeding (PDF), Royal Children's Hospital, Victoria.
    - Baby teeth are important: tooth tips 0-12 months (pdf), (available in multiple languages) from Dental Health Services Victoria

    - Food and active play in the first year of life (pdf), Royal Children's Hospital, Melbourne, Victoria.
    - Why no sweet drinks for children (pdf), Royal Children's Hospital, Melbourne, Victoria.
        - Healthy eating and play for toddlers 1-2 years (pdf) - Royal Children's Hospital, Melbourne, Victoria
- The Victorian Aboriginal Community Controlled Health Organisation (VACCHO) have a range of healthy eating resources for Victorian ACCOs and community members, including
    - Tucker Talk Tips – Feeding Your Baby
    - Healthy eating guidelines for children aged 2–13 years

Queensland –

- Good Start Resources are co-designed culturally tailored for Māori and Pacific Islander families and communities.
- Growing Good Habits suite of tools supporting fussy eating, teaching kids to cook, meal planning, reading food labels. Also, referral pathways for health professionals to access when supporting families and children.
- Multicultural nutrition resources promoting healthy eating to a diverse range of communities often in partnership with community groups and other government services. Also supporting health service providers and community organisations to provide culturally appropriate dietary advice.
- Growing Strong series of 18 brochures for families who identify as Aboriginal and Torres Strait Islander peoples.
- Nutrition Education Materials Online Education materials designed for members of the public, providing nutritional information about a range of topics. The information contained within the NEMO resources is general in nature and designed for use in conjunction with individualised dietary advice from a Dietitian or other qualified health professional.
- Baby's first foods - The Baby's first foods consumer resource series offers parents and carers advice on infant nutrition, the importance of exclusive breastfeeding to around six-months-of-age and when to introduce complementary foods.

New South Wales –

- *NSW Health Starting Family Foods – Introducing your baby to solid foods* is a brochure for parents of babies (aged from birth to 12 months) with information on how to introduce solid foods. https://www.health.nsw.gov.au/heal/Pages/starting-family-foods-full.aspx
- *NSW Health Having a Baby* is resource for parents and carers with information for people who are pregnant or planning a pregnancy. Topics include feeding your baby. https://www.health.nsw.gov.au/kidsfamilies/MCFhealth/Publications/having-a-baby.pdf
- *8 healthy habits for children 0 to 12 months* - A resource that health professionals can discuss with parents and carers of children aged 0 to 12 months with eight simple steps to lead a healthy lifestyle. http://pro.healthykids.nsw.gov.au/resources/
- A Healthy mouth is a great start for your baby fact sheet **h**ttps://www.health.nsw.gov.au/oralhealth/prevention/Publications/healthy-mouth-great-start-flyer.PDF
- Starting Family Foods https://www.healthyliving.nsw.gov.au/food/starting-family-foods

Tasmania –

- Healthy Kids https://doh.health.tas.gov.au/healthykids
- Tuckertalk resources https://www.health.tas.gov.au/health-topics/nutrition-and-physical-activity/health-and-community-workers/nutrition-resources-pregnancy-and-early-childhood-workers-0-5/tucker-talk-handouts
- Start Them Right Booklet, website and social media - An easy read, guide on how and what to feed your child from birth to five years https://www.facebook.com/StartThemRight/
- Oral Health
    - https://www.health.tas.gov.au/health-topics/dental-health/learn-about-dental-health/dental-health-children
    - https://www.health.tas.gov.au/health-topics/dental-health/dental-health-programs-and-initiatives
    - Give your child's teeth a healthy Start https://www.health.tas.gov.au/publications/give-your-childs-teeth-healthy-start-brochure

Australian Capital Territory –

- From Milk to More - Resource on the introduction of solids From Milk to More.pdf (act.gov.au)
- Tuckertalk resources
    - Tuckatalk | Food for your Toddler (1–3 years old) (act.gov.au)
    - Tuckatalk | Children and Iron (act.gov.au)
    - Tuckatalk | Snacks (act.gov.au)
    - Tuckatalk | Baby's first foods (act.gov.au)

South Australia –

- Child and Family Health Services website - information on a range of topics Child and Family Health Service • Feeding (cafhs.sa.gov.au)
- Parenting SA – Feeding toddlers – Parent Easy Guide https://parenting.sa.gov.au/easy-guides/first-foods-for-babies-parent-easy-guide
- Parenting SA – First foods for babies – Parent Easy Guide https://parenting.sa.gov.au/easy-guides/first-foods-for-babies-parent-easy-guide
- WCHN – General Nutrition Resources for Children https://www.wch.sa.gov.au/patients-visitors/children/care-and-support/nutrition-for-children/general-nutrition-for-children
- SA Dental resource (https://www.dental.sa.gov.au/advice/avoid-sugary-foods-and-drinks)

Northern Territory –

- Feeding Babies (2019). Resource for remote communities. This information is about feeding babies from birth to early childhood https://digitallibrary.health.nt.gov.au/prodjspui/handle/10137/582
- Growing Healthy Kids (2019). Designed for use with families with young children (aged 0-5 years) who are growth faltering or are at risk of growth faltering. https://digitallibrary.health.nt.gov.au/prodjspui/handle/10137/8087
- Good Food for Strong Blood. Designed for use with families with young children (aged 6 months to 5 years) who have iron deficiency anaemia (weak blood). https://digitallibrary.health.nt.gov.au/prodjspui/handle/10137/8086

- Food and Health Communication across Cultures. Not directly about infant feeding, but a critical resource for health professionals communicating nutrition information to First Nations or multicultural families. Developed by Menzies School of Health Research Food and health communication across cultures - Menzies

Programs for Parents and Guardians

Face to face programs which focus on providing a range of information, education and support on health eating are run in some jurisdictions.

Queensland –

- The Good Start Team works with Māori and Pacific Islander families to talk about healthy pregnancies, healthy babies, and healthy children. It also works with children in schools to teach healthy eating and being active.

Western Australia –

- *Food Sensations for Children,* run by Food Bank Western Australia, is a face-to-face evidence-based program run by qualified nutritionists and dietitians providing food literacy education for parents of 0 – 5 years. The program includes cooking and nutrition education. Food Sensations for Children | Cooking Program | Foodbank
- *Healthy Eating and Cooking Programs* are fee for service nutrition education programs incorporating hands on interactive activities and cooking. https://www.foodbank.org.au/WA/healthy-eating-cooking-programs/?state=wa

Victoria –

- INFANT (INfant Feeding, Active play, and NuTrition) is an evidence based Victorian program developed by Deakin University. INFANT trains Maternal & Child Health nurses and health professionals to deliver evidence based key messages that support parents to establish healthy eating at key developmental times in their child's first year of life.
- Healthy Eating Advisory Service - Early Childhood Services Support and resources for early childhood services providers (including long day care, family day care and OSHC) in Victoria. See https://heas.health.vic.gov.au/early-childhood-services
- Smiles for Miles is an initiative of Dental Health Services Victoria (DHSV) which aims to improve the oral health of children and their families in high-risk areas across Victoria. https://www.dhsv.org.au/oral-health-programs/smiles4miles

New South Wales –

- *Munch & Move* is a NSW Health initiative that aims to build capacity within the NSW early childhood sector to promote healthy eating and physical activity and reduce small screen time in young children aged birth to 5 years. *Munch & Move* offers free professional development and resources to educators and service leaders working in early childhood services in NSW. https://healthykids.nsw.gov.au/
- *Supported Playgroup Resources* - Resources to support playgroup facilitators and auspice organisations across NSW deliver consistent, appropriate messages and activities about healthy eating and active play to families attending their supported playgroups. Supported playgroups reach children (0-5years) and their families across NSW with specific needs and/or those living in areas of social disadvantage. This includes Aboriginal families as well

as socially and geographically isolated families, single and young parents, and culturally and linguistically diverse families.

- https://healthykids.nsw.gov.au/resources-for-playgroups-and-parents-carers/
- *Brighter Beginnings: the first 2000 days of life* is a NSW Government initiative to give all children in NSW the best start in life. Brighter Beginnings offers step by step guides for parents and carers in NSW to help their child get the best start in life in their first 2000 days. It includes information on having a baby, parenting young children, and starting primary school. Topics include how to encourage healthy eating habits. https://www.nsw.gov.au/family-and-relationships/brighter-beginnings-step-by-step-guides

Tasmania –

- *Family Food Patch* program aims to improve the health and wellbeing of Tasmanian children and families through promotion of eating well and being active. Using peer education, Family Food Patch empowers families and local communities by building and mobilising skills in children's nutrition, physical activity, and community action. https://familiestasmania.org.au/services/family-food-patch/
- Move Well Eat Well for Early Childhood - Long Day Care Services and Family Learning Services can access this voluntary program to obtain an Early Childhood Award around six healthy eating messages and active play. This includes menu assessment, curriculum ideas, policies, and support. https://doh.health.tas.gov.au/mwew/early_childhood_services
- Workforce resourcing and nutrition support for Child Health and Parenting Service - Provision of professional development, education resources for families (Start Them Right Booklet and Tucker Talk handouts), client queries advice line and nutrition communications via website and social media.
- Little Tasmanian Project is a cross sector initiative under the Tasmanian Child Youth and Wellbeing Strategy to provide a baby pack for each newborn baby in Tasmania highlighting success stories of Tasmanians. Included as part of this initiative is a concierge connecting information about services and support for the first 1000 days. https://littletasmanian.com.au/

Northern Territory

- *Healthy Under 5 Kids – Partnering with Families (HU5K-PF*). The HU5K-PF program is a universal standardised well child and family health program offered to all NT families with children 0-5 years of age. The HU5K-PF program utilises a population health approach which focuses on child health outcomes and incorporates strategies within a series of key contact visits. Each key contact has evidence-based activities for physical assessment, nutrition, developmental surveillance, universal and age-sensitive anticipatory guidance for caregivers. The program provides a platform that builds on partnerships between the family and the health professional, and provides the care and support needed to empower families to become confident parents and caregivers. Contact Child.Health@nt.gov.au for more information.
- *Maternal Early Childhood Sustained Home Visiting Program (MECSH*). MECSH is a structured program of sustained nurse home visiting for families at risk of poorer maternal and child health and developmental outcomes. The MECSH program is delivered as part of a comprehensive, integrated approach to services for young children and their families. The MECSH program uses a tiered service model, which encompasses the primary health care

and more specialised services that families may need (About MECSH (earlychildhoodconnect.edu.au)

- *Families as First Teachers* (FaFT) delivers quality early learning and parent support programs to young children and their families. It develops place-based programs to engage families and communities and build parents' capacity to give their children the best start in life. The aim of FaFT is to improve the lifelong education, health and wellbeing outcomes for young Northern Territory children and their families (Families as First Teachers | Department of Education)
- *Talking About Feeding Babies & Little Kids (TAFBALK*). Developed by the Fred Hollows Foundation, Menzies School of Health Research and NT Health. The program was adapted from the WHO Infant and Young Child Feeding course for First Nations communities and is designed to build the capacity of Community Based Workers involved in the care of children and babies. The program aims to build skills and to counsel and support mothers and caregivers about breastfeeding and complementary feeding. Summary attached.
- *Strong Baby Tucker program*. Community based program involving local preparation of iron-rich meat and vegetable infant meals. Strong Baby Tucker is sold through the local Takeaway Store at a subsidised cost and is texture modified foods and iron rich to meet the nutritional needs of infants commencing solid foods. Contact Child.Health@nt.gov.au for more information.

Policies

Victoria –

- ***Healthy kids, healthy futures*** is the Victorian Government's five-year action plan to support children and young people to be healthy, active, and well.

New South Wales –

- NSW Health's First 2000 Days Framework is a strategic policy directive which outlines the importance of the first 2000 days of a child's life (from conception to age 5) and what action people within the NSW health system need to take to ensure that all children have the best possible start in life.
- The Early Childhood Oral Health Guidelines aim to improve the health and well-being of children in NSW by integrating oral health into general health interventions provided by Child Health Professionals. https://www1.health.nsw.gov.au/pds/ActivePDSDocuments/GL2014_020.pdf

Tasmania –

- Health Tasmania Five Year Strategic Plan 2022-2026 is a strategic plan to guide preventive health activity across the whole of government with communities. There are eight focus areas with one being eating well. A range of grants will be available to address actions within the strategy. This strategy supports many of the programs that current exist in Tasmania around foods for young children. **https://www.health.tas.gov.au/about/what-we-do/strategic-programs-and-initiatives/healthy-tasmania-strategic-plan**
- It takes a Tasmanian Village – Child and Youth Wellbeing Strategy (CYWB) - The Tasmanian Government developed Tasmania's first CYWB strategy for 0-25 year olds with a specific focus on the first 1000 days. **https://wellbeing.tas.gov.au**

- Communities of Practice – Maternity and Child Health staff. Only available internally for Department of Health staff which includes information on – why the first 1000 days matters, Healthy weight gain for pregnancy, infant feeding, food insecurity, practice tools, professional development, discussion forums etc.

Forums/Networks

Victoria

- Parents' Voice is an online movement of parents who are interested in improving the food and physical activity environments of Australian children. Their work includes implementing campaigns to support parents by aiming to shape the places that children live and play to enable healthy eating and physical activity. The website also includes useful information for parents on healthy eating. **https://parentsvoice.org.au/**

Queensland –

- **Queensland Child and Youth Clinical Network Forum** (note, nutrition components only, not exclusively nutrition) building on the system level focus through the Qld Clinical Senate and Unleashing Potential report.

Tasmania –

- Breastfeeding Coalition Tasmania brings together many groups interested in creating a more supportive environment for breastfeeding. http://www.breastfeedingtas.org/