Public Health England

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Foods and drinks aimed at infants and young children: evidence and opportunities for action

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Contents

Executive summary

Infancy and early childhood is perhaps the most critical time for establishing food preferences and dietary patterns. Diets in infancy in the UK are not, on average, in line with national recommendations – solid foods are introduced ahead of the recommended ‘around 6 months’ of age and excess calorie and sugar intake is common.

The consequences of this are likely to have an effect across the life course - affecting diets, body weights, and disease risk throughout childhood and into adult life. In England, with nearly a quarter of children aged 4 to 5 years overweight or obese, and a similar proportion with tooth decay by the age of 5 years, there are serious health, welfare and economic consequences for families and society. Our children are starting off on the wrong trajectory for their future wellbeing.

Society, including the food and drink industry, should support parents to make the best possible choices for their infants’ health now and into the future. Commercial baby foods and drinks aimed at children up to 36 months may provide infants’ first non-milk taste experiences and form a substantial proportion of their diet.

The food and drink choices made by parents for their children are shaped by a range of factors including the types of products available, messaging on products and how they are marketed, as well as their nutrient composition. Messaging and marketing associated with some products conflicts with national recommendations on infant and young child feeding and causes confusion.

Assessment of the evidence reviewed for this report (including dietary survey and product data, a rapid scoping review, dietary advice, and consumer and stakeholder views), demonstrates clear inconsistencies between national recommendations on infant and young child feeding and some commercial baby foods and drinks in terms of the types of products available, their ingredient and nutrition composition and product labelling and marketing. Where these inconsistencies exist they encourage the introduction of foods before the recommended age, or the consumption of foods or ingredients in amount or frequency not recommended as part of a healthy diet for this age group.

Types and composition of products

Feeding advice for infants and young children is clear that sugar and salt should not be added to foods, the amount and frequency of consumption of sugary foods and drinks should be reduced, and sugary foods (including dried fruit), should not be provided between meals.

Some commercial baby foods have added sugar or salt, or contain ingredients that are high in sugar or salt. This is more common in commercial baby finger foods, which 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 is found in processed dried fruit products which are often marketed as healthy snacks due to their high fruit content, but the sugar in these products is often free sugars as they contain ingredients such as fruit juices, purees and concentrates. These should not be marketed as suitable for children to eat between meals. On average, savoury finger foods (including puffs, crisps, biscuits, crackers, wafers) contain the highest levels of salt per 100g across all product types.

There is concern that the growth of the commercial baby finger food market (volume sales increased by nearly 11% in 2017-2018), and the way products are labelled and marketed is encouraging snacking, by 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 nutritionally to confectionery.

Fruit and vegetables are recommended first foods for infants and young children. Advice is to start feeding infants with single vegetables and fruits, and vegetables that are less sweet. However, the balance of products on the market is mainly fruit, particularly mixed fruit; a less sweet product mix would better prepare babies to accept a wide range of different, less sweet tastes and protect dental health.

Labelling and marketing of products

More than one-third of baby meals are marketed at children under 6 months, despite government advice that solid foods should be introduced (alongside breast milk or infant formula) at around 6 months of age.

Nearly three-quarters of fruit juice-based baby drinks are marketed at infants under 12 months which is inconsistent with advice to offer only breast milk, infant formula or water as drinks between 6 and 12 months of age. If fruit juice is offered for children up to 5 years of age it should be heavily diluted (10% juice), but the proportion of fruit juice in commercial baby drinks is higher (15-50% juice).

Around one-third of commercial baby foods and drinks are 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 provide back of pack or website advice on how to feed these products (from a spoon), this is not consistent across the market.

The use of nutrition and implied health claims, and health halo statements, can suggest to parents that products are healthier than their nutrient composition indicates. In addition, 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.

Summary

The evidence shows that commercial practices are not consistently supporting achievement of a healthy diet. Government actions are needed to better align the marketing of, messaging on, and nutrient composition of products aimed at infants and young children with national advice, to capitalise on the opportunity to set infants' first tastes, food experiences and diets overall in a direction that better supports their future health.

Opportunities for action

Improving product ranges aimed at infants and young children requires a range of actions across marketing, labelling, and the nutrient composition of products. The following should be considered:

Marketing and labelling:

- ensure product marketing is consistent with scientific advice to introduce solid foods at around 6 months of age
- ensure honest labelling so that product names are not misleading and are aligned with the primary ingredients
- restrict use of nutrition and implied health claims and health halo statements
- ensure that clear feeding instructions (use a spoon/do not suck) are present on the front of pack of products packaged in pouches with a nozzle
- ensure that products high in sugars are labelled as not being suitable for eating between meals

Nutrient composition:

- improve the nutrient composition of commercial baby foods and drinks, reducing sugar in these products, particularly snacks and drinks

These actions on commercial baby foods and drinks address only a part of infant and young child feeding and should be part of a wider package of measures.

These should include, but not be limited to:

- strengthening and scaling up consumer awareness campaigns that promote government advice on introducing solid foods (for example, Start4Life campaigns)
- putting in place a recurring survey to provide information on the use of foods and drinks in infancy as well as information on breastfeeding and use of nutritional supplements, so that up-to-date information on infant feeding practices is available to inform policy and practice

Given the importance of action in children's early years, government will need to consider the most appropriate mechanisms of action to ensure that change is achieved consistently and at pace across the commercial baby food and drink sector.

Introduction

Improving the nutritional content of foods and drinks consumed by children, and strengthening the nutrition/dietary information available for parents are key commitments in the government's 'Childhood obesity: A plan for action' chapters 1 and 2 (1, 2).

This document sets out the evidence for action on foods and drinks aimed at infants and young children. It considers how the commercial baby food and drink market in the UK aligns with dietary advice for children aged up to 36 months and identifies actions that could be taken to improve products to better support parents and carers to make the best choices for feeding their young children.

Evidence considered in this review includes:

- UK and international recommendations and advice for feeding infants and young children aged 6 to 36 months
- dietary requirements, recommendations and intakes for sugar, salt and energy
- use, role in the diet, and impact of consumption on diet and health outcomes, of commercial baby foods and drinks
- consumer views on commercial baby foods and drinks
- characteristics of the UK baby food and drink market, including types of products, recommended age of use, packaging and labelling, and nutrient composition
- stakeholder views on the scope for action to improve commercial baby foods and drinks

Scope

The scope of this programme of work includes meals, finger foods, and drinks marketed at infants and young children aged up to 36 months. It does not include formula milks.

Products aimed at infants and young children must comply with EU Commission Directive 2006/125/EC (4).The Directive sets out compositional criteria and specific rules on the presence of pesticide residues for 'processed cereal-based foods' and 'baby foods' other than processed cereal-based foods. In addition to these requirements, products must also comply with other specific provisions in relation to hygiene, the use of food additives, the presence of contaminants and the use of materials intended to come into contact with the foods. Consideration of this directive is outside the scope of this report.

Evidence for action

The need for action

Children's early years provide an important foundation for their future health and strongly influence many aspects of overall well-being (5). Research supports the concept that the early life environment has widespread consequences for later health (6).

Children's food preferences and eating habits are formed early in life having consequences for a range of health and development outcomes in later life, and many children are growing up in an obesogenic environment that encourages weight gain and obesity (7). Obesity in children and adults can lead to a range of health and social problems. Children who are overweight or obese are more likely to be obese adults (8). Excess weight increases the risk of conditions such as heart disease, some cancers and type 2 diabetes in adulthood (9).

In 2017/18, 18% of boys and 21% of girls aged 2 to 4 years (10) and almost a quarter of 4 to 5 year olds in England were overweight or obese (11). As excess weight is due to energy intakes exceeding requirements, it is apparent that children are consuming too many calories in their early years. Obesity prevalence for children living in the most deprived areas of England is more than double that of those living in the least deprived areas for both 4 to 5 year olds and 10 to 11 year olds (11). Younger generations are becoming obese at earlier ages and staying obese for longer (12). Evidence suggests that rapid weight gain in infancy is associated with an increased risk of obesity in later childhood and adulthood (13).

The most common cause of dental decay is frequent consumption of sugar in foods and drinks (14). Although oral health is improving in England, just under a quarter of 5 year olds have tooth decay (15), and in 2014, 12% of 3 year olds had visible tooth decay with on average 3 teeth affected (16). Almost 9 out of 10 hospital tooth extractions among children aged 0 to 5 years are due to preventable tooth decay (17).

Whilst home-prepared foods are generally recommended to help introduce infants and young children to a range of appropriate flavours and textures, commercially manufactured foods and drinks aimed at infants and young children are widely available in the UK. It is therefore important that these product ranges support the development of healthy eating habits in young children.

Recommendations and advice for feeding infants and young children aged 6 to 36 months

UK guidance

The Scientific Advisory Committee on Nutrition (SACN) reviewed the scientific evidence underpinning recommendations on feeding infants in its 'Feeding in the first year of life' report (13). In relation to the introduction of solid foods, also known as complementary feeding[1], SACN's recommendations included:

- most infants should not start solid foods until around 6 months of age
- breast milk, infant formula and water should be the only drinks offered to children between 6 and 12 months of age
- a wide range of solid foods should be introduced in an age-appropriate form from around 6 months of age
- dietary, flavour and texture diversification should proceed incrementally
- in view of the high intakes of salt (sodium chloride) and free sugars in this age group, there is a need to re-emphasise the risks associated with added salt and free sugars in foods given to infants

Advice relating to diet and feeding practices for prevention of caries in children aged up to 3 years is included in 'Delivering Better Oral Health', an evidence-based toolkit for adverse dental health outcome prevention (20). It includes:

- from 6 months of age infants should be introduced to drinking from a free-flow cup, and from age 1 year feeding from a bottle should be discouraged
- sugar should not be added to baby foods or drinks
- the frequency and amount of sugary food and drinks should be reduced
- sugar-free medicines should be recommended
- only milk or water should be drunk between meals

Dried fruit is potentially cariogenic (causes tooth decay) because it can stick to the teeth, so it is better to consume it as part of a meal and not as a between-meal snack (20).

[1] The introduction of foods other than breast milk (or infant formula) to complement the nutrients provided by breast milk (and/or infant formula) when breast milk (and/or infant formula) alone is not sufficient to meet the nutritional requirements of the growing infant. The introduction of solid foods diversifies the infant diet whilst breastfeeding (and/or infant formula feeding) continues during the early years of life.

The National Institute for Health and Care Excellence (NICE) Public Health Guideline for oral health in under 5 year olds (21) includes the following recommendations relating to diet and feeding practices:

Encourage parents and carers to:

- use a bottle for expressed breast milk, infant formula or cooled boiled water only
- offer drinks in a non-valved, free-flowing cup from age 6 months to 1 year
- discourage feeding from a bottle from 1 year onwards
- limit sugary foods to mealtimes only
- avoid giving biscuits or sweets as treats
- encourage snacks free of salt and added sugar (such as vegetables and fruit) between meals
- provide milk and water to drink between meals (diluted fruit juice can be provided with meals – 1 part juice to 10 parts water)

Discourage parents and carers from:

- adding sugar or any solid food to bottle feeds
- adding sugar or honey to foods
- offering baby juices or sugary drinks at bedtime

Consumer-facing advice on infant and young child feeding reflects these recommendations. Table 1 provides a summary, by age group, of current government advice for feeding infants and young children aged from around 6 months of age, available online from the Start4Life programme (22) and NHS.UK webpages (23).

Table 1. Summary of Start4Life and NHS advice on introducing solid foods

Age of child	Feeding advice
Around 6 months	Small amount of solid food, once-a-day (breast milk (or infant formula) will still be providing most of the baby's energy and nutrients). The introduction of solid foods can start with single vegetables and fruits or baby rice mixed with a baby's usual milk. Gradually increase the amount and variety of food eaten offering a range of foods from the different food groups. Include vegetables that aren't so sweet (this will help your baby get used to a range of flavours). Babies don't need salt or sugar added to their food (or cooking water) – salty food isn't good for their kidneys and sugar can cause tooth decay.

Age of child	Feeding advice
	Once you have started introducing solid foods from around 6 months of age, try to move your baby on to mashed, lumpy or finger foods (from puréed or blended foods) as soon as they can manage them.
7-9 months	Eat together as much as possible. Gradually move towards eating 3 meals a day (breast milk (or infant formula) are still an important source of energy and nutrients at this age). Offering a wide variety of different foods is important to ensure they get enough energy and nutrients (such as iron). Keep offering a variety of foods, even the ones they don't seem to like, and let them get used to it in their own time. Babies don't need salt or sugar added to their food (or cooking water) – salty food isn't good for their kidneys and sugar can cause tooth decay. Babies under 12 months don’t need snacks, offer extra milk feeds instead if a baby appears hungry between meals.
10-12 months	Should now be used to having 3 meals a day in addition to their milk feeds. Lunch and tea can include a main course and a pudding (such as fruit or unsweetened yogurt). Eat together as much as possible. Remember, your baby does not need salt or sugar added to their food or cooking water. Babies shouldn't eat salt as it isn't good for their kidneys and sugar can cause tooth decay.
12+ months	Infants should be having 3 meals a day. They may also need 2 healthy snacks in between (for example fruit, vegetable sticks, toast, bread or plain yogurt). Still no need for salt or sugar added to their food or cooking water. Can now drink whole cows’ milk and have full fat dairy products (full fat for children under 2 years, and semi-skimmed milk from 2 years onwards if they’re eating and growing well). Avoid sweet drinks.

Example menus for food provision in early years settings

This series of example menus and associated guidance was developed to support early years settings (such as nurseries and childminders) to offer food and drink in line with current government dietary recommendations for infants and children aged 6 months to 4 years (24).

Key elements include:

- basing food provision on foods from 4 groups (potatoes, bread, rice, pasta and other starchy carbohydrates; fruit and vegetables; beans, pulses, fish, eggs, meat and other proteins; dairy and alternatives) which provide a range of essential nutrients that children need to grow and develop
- food provision planned across the day to provide approximately 90% of the average daily energy and nutrient requirements for a child aged 1 to 4 years (meals 70%; snacks 20%)
- offering a wide variety of different foods to ensure that sufficient energy and nutrients are added to the diet, and infants get used to a variety of tastes
- ensuring that savoury foods and less sweet vegetables, rather than just fruits and sweet flavoured dishes are offered to help encourage infants to accept a wide range of different tastes
- preference for preparing food for infants and young children from scratch, rather than using commercially produced infant and baby foods, to give greater control over the tastes and textures of food provided
- provide only fresh tap water and plain milk for children to drink
- avoid sweet foods such as cakes, biscuits and confectionery between meals
- dried fruit should not be provided as part of snacks

International guidance

In 2016 the World Health Organization (WHO) published ‘Guidance on ending the inappropriate promotion of foods for infants and young children’ (25). The goals of the guidance are to protect breastfeeding, prevent obesity and chronic diseases, and to promote a healthy diet, and in addition, to ensure that caregivers receive clear and accurate information on feeding.

Key relevant recommendations include:

Emphasis should be placed on the use of suitable, nutrient-rich, home-prepared, and locally available foods that are prepared and fed safely.

Foods for infants and young children that are not products that function as breast-milk substitutes should be promoted only if they meet all the relevant national, regional and

global standards for composition, safety, quality and nutrient levels and are in line with national dietary guidelines. Nutrient profile models should be developed and utilized to guide decisions on which foods are inappropriate for promotion. Relevant Codex[2] standards and guidelines should be updated and additional guidelines developed in line with WHO's guidance to ensure that products are appropriate for infants and young children, with a particular focus on avoiding the addition of free sugars and salt.

The messages used to promote foods for infants and young children should support optimal feeding and inappropriate messages should not be included. Messages should not include any image, text or other representation that might suggest use for infants under the age of 6 months (including references to milestones and stages).

Dietary requirements, recommendations and intakes for children aged 6 to 36 months

UK data on the dietary intakes of infants and young children, and the contribution commercial baby foods and drinks make to their diets comes from 3 sources: the Infant Feeding Survey (IFS) (33), the UK Diet and Nutrition Survey of Infants and Young Children (DNSIYC) (29) and the National Diet and Nutrition Survey Rolling Programme (NDNS RP) (28). More information on these surveys can be found in Appendix 1.

It is important to note that data from IFS and DNSIYC is from 2010 and 2011 respectively. Dietary patterns and the types and range of products aimed at infants and young children may have changed significantly in the period since the data was collected.

The main dietary intake issues identified for infants and young children relate to sugar and salt intakes which are exceeding recommendations. Survey data also suggests that young children's energy intakes are exceeding their requirements.

The following sections set out dietary recommendations and information on intakes for children aged 6 to 36 months, for sugar, salt and energy.

Sugar recommendations and intakes

In 2015 SACN published its review of the latest evidence on carbohydrates and health (26). SACN recommended to government that free sugars, as defined in its report, should be adopted in the UK, replacing non-milk extrinsic sugars (NMES) on which previous government recommendations were based. SACN recommended that the

[2] The Codex Alimentarius Commission develops and adopts food standards that serve as a reference for international food trade.

average population maximum intake of free sugars should be reduced and should not exceed 5% of total dietary energy. This recommendation was set for individuals from 2 years old onwards; due to the absence of information, no quantitative recommendations for carbohydrate and sugar requirements were set for children aged under 2 years (26).

According to a definition of free sugars for the UK, 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 (27).

The most recent NDNS data shows that just 13% of 1.5 to 3 year olds are meeting the government recommendation for free sugars intake of no more than 5% of total energy (and only 2% of children aged 4 to 10 years) (28). Table 2 shows that average daily sugar intake for children aged 1.5 to 3 years is 11.3% of total energy. Trend data for children aged 1.5 to 3 years shows that although free sugars consumption is on a downward trend (2008/2009 – 2016/2017), intake is still far above recommendations for 2 year olds that free sugars intake should not exceed 5% of total energy (28).

Table 2. Sugar recommendations and intakes for infants aged 4 months to 3 years

Nutrient	Age of child	Dietary recommendation	Daily sugar intake	Largest contributing product type	Source of dietary intake data and year of survey
Sugar % of total energy intake	4-6 months	n/a	4.3% Non-milk extrinsic sugars (NMES)	Commercial infant foods, particularly 'fruit-based foods and dishes' and 'cereal based foods and dishes'	DNSIYC, 2011 (29)
	7-9 months		6.2% Non-milk extrinsic sugars (NMES)		
	10-11 months			Milk and milk products	
	1.5-3 years	No more than 5% of total energy (children aged >2yrs) (26)	11.3% (32.6g/day) Free sugars	1.Cereal and cereal products 2. Non-alcoholic beverages 3. Sugar, preserves and confectionery	NDNS, 2014/2015 - 2015/2016 (28)

Salt recommendations and intakes

SACN's 'Salt and Health' report concluded that for children, health benefits would be gained from a reduction in average salt consumption (30). Based on this, government recommends an average salt intake for infants and children aged 7 to 12 months of less than 1 gram per day, and less than 2 grams per day for 1 to 3 year olds. The population targets for average salt consumption do not represent an optimal or ideal level of salt consumption but, in common with the population target of salt intake set for adults, they represent achievable population goals.

DNSIYC reported that salt intakes exceeded government recommendations by 50 to 100% after 10 months of age (29, 30). NDNS data suggests that average salt intakes for children aged 1.5 to 3 years exceed the recommendation (Table 3).

Table 3. Salt intakes for infants aged 4 months to 3 years

Nutrient	Age of child	Dietary recommendation[30]	Daily salt intake (g/day) [a]	Largest contributing product type	Source of dietary intake data and year of survey
Salt	4-6 months	Children aged 0-6 months: <1g/d	0.6	Infant formula	DNSIYC, 2011 (29)
	7-9 months	Children aged 7-12 months: 1g/d	1.1	Infant formula	
	10-11 months		1.5	Cereals and cereal products	
	12-18 months	Children aged 1-3 years: 2g/d	2.3		
	1.5-3 years		2.8	Cereal and cereal products	NDNS, 2014/2015 - 2015/2016 (28)

[a] Salt values have been calculated by multiplying sodium values by 2.5 (1g sodium is equivalent to 2.5g salt)

Energy requirements and intakes

SACN's report on 'Dietary Reference Values for Energy' provides Estimated Average Requirement (EAR) values for energy for infants aged 0 to 12 months based on different feeding practices: breast feeding, breast milk substitute feeding or mixed feeding (31). It also provides EARs for children aged 1 to 18 years based on their basic metabolic rate (BMR) and physical activity levels (PAL). Table 4 shows the EAR values for mixed fed infants aged 4 to 11 months and for children aged 1 to 3 years, and average daily energy intake for children aged from 4 months to 3 years based on data from DNSIYC and the NDNS RP.

DNSIYC reported that 75% of the children surveyed (aged 4 to 18 months) had parent-reported intakes that exceeded the UK EAR for energy, and that the percentage exceeding the EAR increased with age following the introduction of solid foods (29). Table 4 shows that average energy intakes were above the EAR for boys and girls aged 4 to 12 months and girls aged 2 years.

Table 4. Energy requirements (EAR) and intakes for children aged 4 months to 3 years.

Nutrient	Age of child	Estimated average requirement (EAR) (kcal/day) [a]		Daily energy intake (kcal/day)	Largest contributing product type	Source of dietary intake data and year of survey
		Boys	Girls			
Energy Mean intake of total energy	4-6 months	579-642	541-597	696	Infant formula	DNSIYC, 2011[29]
	7-9 months	655-704	598-645	788		
	10-11 months	736-757	672-692	859		
	12-18 months	1 year old: 765 2 years old: 1004	1 year old: 717 2 years old: 932	967	1. Milk and milk products (27%) 2. Cereals and cereal products (24%)	
	1.5-3 years	1 year old: 765 2 years old: 1004 3 years old: 1171	1 year old: 717 2 years old: 932 3 years old: 1076	1076	Cereals and cereal products	NDNS, 2014/2015 - 2015/2016[28]

[a] EAR conversion calculation: kcal/day = kJ/day divided by 4.184 (32). Estimated Average Requirement (EAR) values for infants 6 to 11 months of age (feeding mixed or /unknown) adapted from Table 5, SACN Dietary Reference Values for energy (31). Estimated Average Requirement (EAR) values for infants aged 1 to 3 years adapted from Table 8, SACN Dietary Reference Values for energy (31).

Use of commercial baby foods and drinks and their contribution to the diet

The IFS reported that when babies were aged 4 to 6 months, mothers were most likely to have given them fruit or vegetables on the previous day (46%), ready-made baby foods (38%), baby rice (31%) and home-made foods (28%). At 8 to 10 months, fruit and vegetables were still a large proportion of babies' daily diets (77% of mothers gave these on the previous day), but mothers were much more likely to be giving their babies home-made foods (70%) than ready-made baby foods (44%) (33).

Baby rice was the most common type of food mothers used when first introducing their baby to solids (57%). Other types of food were mentioned by relatively low proportions

of mothers: for example, 12% first gave ready-made baby food, 11% gave home-made foods and 10% gave rusks (33).

The use of ready-made foods was most common between 5 and 10 months (42% of babies aged 5 to 7 months, 45% of those aged 8 to 10 months, dropping to 31% of those aged 10 months or older) (33).

DNSIYC reported that commercial infant foods (meat, fish, fruit, dairy or cereal based) were consumed by a greater proportion of children aged 4 to 11 months compared to children aged 12 to 18 months (29). Over 50% of children aged 4 to 11 months consumed commercial infant meat and fish based products and dishes during the four-day food diary period, decreasing to 29% of those aged 12 to 18 months. Other commercial savoury based foods and dishes, fruit based foods and dishes, dairy based foods and dishes, and cereal based foods and dishes showed a similar pattern of consumption. The only type of commercial baby foods for which there was an increase in consumption with age was snacks (sweet and savoury); 34% of children aged 4 to 6 months consumed these, compared to 60% or over for those aged 7 to 11 months and 42% of those aged 12 to 18 months. Mean consumption of baby specific snacks (sweet and savoury) ranged from 6-7g per day among consumers (29).

Table 5 shows DNSIYC data on the contribution of commercial baby foods and drinks to dietary intakes of energy, non-milk extrinsic sugars (NMES) and sodium. Commercial baby drinks contributed 1% of energy and 6-7% of NMES for children aged 4 to 9 months, compared with 0% of energy and 2-4% of NMES for children aged over 10 months (29).

Table 5. Contribution of commercial infant foods and beverages to children's diets

Nutrient	Contribution of commercial infant foods and beverages (% of dietary intake) [a]			
	4-6 months	7-9 months	10-11 months	12-18 months
Energy	16	17	14	6
Non Milk Extrinsic Sugars (NMES)	51	40	29	13
Sodium	16	15	10	3

[a] Source: DNSIYC tables 6.8, 6.15 and 6.25 [29]

The most recent NDNS data (2015/15 – 2015/16) showed that the contribution of commercial baby foods and drinks to intakes of children aged 1.5 to 3 years was 1% of total energy, 1% of free sugars, and 0% of sodium (28).

Rapid scoping review: usage and impact of commercial baby foods and drinks

PHE commissioned academics at Teesside University to conduct a rapid scoping review of the published and unpublished evidence base to explore the usage, marketing and impact of commercial baby foods and drinks on the diets and health of infants and young children aged 4 to 36 months. The objectives of the review were to determine how commercial baby foods and drinks are used; how they are marketed and the impact this has on purchase, preference and usage; and if there is an impact of their use on the consumption of energy or total sugars, weight status or dental health.

The review identified 34 studies from 7 Organisation for Economic Co-operation and Development (OECD) countries (25 studies were cross-sectional surveys, 5 were longitudinal, 1 was a market review, 2 were qualitative interviews and 1 was a randomised controlled trial).

Evidence showed that usage of commercial infant and baby foods and drinks peaked in infants aged 6 to 12 months, with the evidence from large surveys suggesting that 40-60% of these infants consume commercial foods. Cereal-based commercial baby foods were the most commonly consumed type of product (excluding milk products). The exception to this was consumption of commercial infant and baby snacks (sweet and savoury) which continued to be consumed into the second year of life. There was inconsistency between studies regarding changes over time in the consumption of various types of commercial baby foods and drinks, and across different age groups.

There was variation in the consumption of commercial infant and baby foods and drinks according to how infants were fed, with breastfed infants less likely to be consumers, and consuming smaller amounts of commercial baby foods and drinks than formula-fed infants.

There was insufficient evidence to reach conclusions on consumer views, attitudes or opinions to commercial baby foods and drinks, and about the impact of marketing on purchase, preference or consumption patterns.

In terms of diet, commercial baby foods contribute a significant proportion of total energy and sugar intake between the ages of 6-12 months. Evidence from the US and Germany suggested that commercial baby food consumers have lower energy intakes from complementary foods than non-consumers, with weaker evidence that this may translate to lower total energy intakes among commercial baby food consumers. The main contributor to intake of non-milk extrinsic sugars (NMES) for infants aged 4-9 months in the UK was commercial infant foods, and there was some evidence to suggest that higher added sugar intake in infancy may predispose children to higher added sugar intake during later childhood.

Evidence on the impact of consumption of commercial baby foods and drinks on weight status and dental health was limited and inconsistent.

The evidence was inconsistent regarding any association between consumption of commercial baby fruit and vegetables at 6 months of age and consumption of fresh fruit and vegetables up to 7 years of age, and in relation to dietary diversity.

The review highlighted the overall lack of research in this area and that the limited quality and quantity of evidence, particularly the lack of studies based on recent data, makes it difficult to draw conclusions relvant to current UK policy and practice.

The full review is published separately as Appendix 2.

Consumer research

PHE commissioned consumer research in 2018 from Define Research and Insight Ltd. to inform the development of the Start4Life social marketing campaign. Participants were mothers from C1, C2, and D socioeconomic groups (34) who took part in focus groups exploring the introduction of solid foods into their babies' diets (see Appendix 3 for a methodology summary). Key findings regarding use of, and attitudes towards, commercial baby foods and drinks are outlined below.

Food manufacturers were trusted amongst participants to know what is best for babies:

- labels with 'from 4 months' suggested this is a safe time to start introducing solid foods
- ready-made jars and pouches were assumed to be healthy and appropriate for babies' needs and therefore would not contain too much sugar/salt
- the use of 'organic', 'preservative free', 'no added sugar etc', and headline vegetable ingredients/borrowing real food names (eg carrot sticks), especially on premium brands, suggested these were healthy products. Many also assumed that any foods labelled 'no added sugar/salt' meant these were low in sugar/salt and therefore appropriate
- participants explained that they didn't feel the need to examine labels if labelling suggested that products were healthy
- most participants used ready-made snacks to some extent, making the same assumptions as for ready-made baby food (i.e. appropriate for baby, not unhealthy, not too sugary or salty). Product labelling linking to fruit and vegetables suggested benefits and good nutritional content

Use of commercial baby foods and drinks:

- whilst most of the participants incorporated some home cooking into babies' meals, there were strong drivers for use of ready-made jars and pouches
- some participants said commercial baby foods were useful as a guide to portion size as a reference for homemade foods
- ready-made food was acknowledged to be convenient
- the higher cost of jars and pouches could be offset by offers, particularly on own-brand items
- the high prices (compared to homemade foods) suggested to some that the product itself was 'premium' so must be good for babies
- there was generally low awareness that commercial baby foods can be high in sugar and salt and when this becomes more apparent participants could reappraise choices
- when using pouches, there was a mix of participants who feed from a spoon or let a baby suck on the pouch. Participants said their baby was more likely to suck on the pouch when out and about compared to when they were at home
- there was a strong assumption that some snacking was acceptable (or desirable) with little concrete knowledge of any official guidance on snacks for babies

These findings are consistent with other studies that have investigated the effect of confusing health claims and messages on food aimed at children (35).

The UK commercial baby food and drink market

Following a competitive tender process, PHE commissioned Kantar Nutrition (formerly known as Kantar Worldpanel) to provide data on sales and nutrition information for products aimed at infants and young children. This generally means products in the 'baby' aisle of retailers, plus some chilled/frozen products. The Kantar Nutrition data represents purchases of products by a panel of 30,000 UK households over a 52-week period to September 2018. Details of the data received and the methodology for data preparation and analysis can be found in Appendix 4.

Products in the Kantar Nutrition dataset were categorised by PHE into the food and drink categories and sub-categories shown in Table 6.

Table 6. Baby food and drink product categorisation

Product type	Product category	Product sub-category	Detail
Baby meals	Main meals		Composite main meals Combinations of protein/starchy/fruit and vegetable foods Excludes fruit and vegetable only products

Product type	Product category	Product sub-category	Detail	
	Fruit and vegetable first foods	Single vegetables	100% (or nearly) fruit and/or vegetables, usually purees Includes products with functional ingredients (i.e. ascorbic acid, water) Excludes products with legumes, beans, starchy ingredients or oils (e.g. cooking sauces and soups)	
		Single fruit		
		Mixed fruit (>1)		
		Mixed vegetables (>1)		
		Mixed fruit and vegetables		
	Dry cereals/foods	Savoury	Product name suggests savoury (eg vegetable flavour)	Excludes plain starchy foods (eg baby rice/plain pasta/couscous/oats Excludes ready to eat products
		Sweet	Product name suggests sweet (eg fruit flavour)	
	Desserts and breakfasts		Combinations of fruit/dairy/starchy foods Includes ambient yoghurts, desserts, breakfasts (not dry, eg porridge/muesli made up) including plain flavours Includes fruit purees with added cereals/grains/rice and or water/milk Includes products made with dairy alternatives Excludes chilled yoghurts (these are included in the sugar reduction programme)	
	Soups & cooking sauces		Excludes oils and seasonings	
	Other		Includes plain pasta/rice/couscous and stocks	
Baby finger foods	Savoury finger foods		Includes products based on starchy foods and/or pulses Product name suggests savoury/plain, not sweet (eg vegetable flavour) Includes puffs, breadsticks, savoury rice cakes, biscuits, wafers and grain-based crisps	
	Fruit and vegetable based finger foods	Vegetable based crisps/waffles	Includes products with more than 25% fruit or vegetable ingredients Includes fruit/vegetable based products with added cereal/oats (eg fruit bakes/bites, fruit shapes) Includes plain/coated/flavoured dried fruit/vegetables	
		Fruit crisps		
		Fruit based bars with cereal/oats		
		Other fruit-based snacks		
	Sweet finger foods	Biscuits/biscotti/wafers (includes minis)	Product name suggests sweet, not savoury (eg fruit flavour) Includes fruit flavoured products	
		Rice cakes		

Product type	Product category	Product sub-category	Detail
		Puffs	Includes products with up to 25% fruit or vegetable ingredients
		Cereal/oat bars	
Baby drinks	Drinks		Excludes formula milks and plain water

Market analysis

Data for 1120 commercial baby food and drink products were included in this analysis. Table 7 shows the number and proportion of products at category and sub-category level. Baby meals make up three-quarters (76%) of all commercial baby food and drink products, with finger foods at 22% and drinks at 2%. Nearly half of baby meals (and one-third of all products) are main meals, and a quarter are fruit or vegetable based first foods. Desserts and breakfasts make up 14% of baby meals and 11% of products overall. Sweet finger foods make up nearly half of all baby finger food products and 10% of products overall.

Table 7. Number and proportion of products by category and sub-category

Product category/sub-category	Number of products	Proportion of products within category (%)	Proportion of all products (%)
Baby meals	**852**	**100**	**76.1**
Main meals	406	47.7	36.3
Fruit and vegetable first foods	220	25.8	19.6
Dry cereals/foods	85	10.0	7.6
Desserts and breakfasts	121	14.2	10.8
Soups & cooking sauces	6	0.7	0.5
Other	14	1.6	1.3
Baby finger foods	**247**	**100**	**22.1**
Savoury finger foods	85	34.4	7.6
Fruit and vegetable based finger foods	47	19.0	4.2
Sweet finger foods	115	46.6	10.3
Baby drinks	**21**	**100**	**1.9**
Baby drinks	21	100	1.9

Total number of products =1120

Key differences between the 3 product categories in terms of volume/portion size (drinks have a greater volume than finger foods), pack size (finger foods are often sold in multipacks whilst most baby meals are sold in single units), and price (finger foods have the highest per 100g cost), make it difficult to compare market share. Table 8 therefore shows the composition of the commercial baby food and drink market by

product category based on 4 measures - number of products, volume sales, sales spend, and estimated portions purchased.[3]

Baby meals make up the greatest proportion of the market in terms of number of products (76%), volume sales (81%) and sales spend (64%). Baby finger foods account for around one-fifth of products and one-third of sales spend, but three-fifths of portions purchased. Baby drinks make a small contribution to the market across all measures.

Kantar Nutrition analysis shows that baby finger foods have been the growth driver in the baby food and drink market in recent years (spend increased from £61M in 2014 to £101M in 2018[4], and volume sales grew by 10.8% in 2017-2018[5]) (40).

Table 8. Number and proportion of products, volume sales, sales spend and estimated portions purchased, by product category

Product category	Products		Volume sales (kg, 000's)		Sales spend (£, 000's)		Estimated portions purchased[3]	
	Number	Proportion (%)	Number	Proportion (%)	Number	Proportion (%)	Number	Proportion (%)
Baby meals	852	76.1	33545	81.3	188727	63.8	255756	38.6
Baby finger foods	247	22.1	5624	13.6	102071	34.5	393287	59.3
Baby drinks	21	1.9	2083	5.0	4888	1.6	13887	2.1
All	**1120**	**100**	**41252**	**100**	**295686**	**100**	**662929**	**100**

Based on volume sales (September 2017 to September 2018), manufacturer branded products hold a much greater share of the commercial baby food and drink market than retailer own brand products (88% compared with 12%).[6]

Table 9 shows the profile of products by the age range they are marketed at (according to product packaging). More than one-third of baby meals and nearly a quarter of baby drinks are marketed at babies aged under 6 months. Just over half (19 out of 35) of the baby food ranges that appear in the Kantar Nutrition dataset have products marketed at children aged 4 months. Around 15% of baby meals, 60% of baby finger foods, and a quarter of baby drinks are marketed at children aged 12 months and over.

[3] Calculated as: volume sales(kg)/mean portion size(kg). Mean portion sizes, calculated from Kantar Nutrition data and manufacturers' recommendations, were 131.6g for baby food, 14.3g for baby finger food and 150g for baby drinks.
[4] 52 w/e 27 April 2014 to 52 w/e 22 April 2018
[5] 52 w/e 22 April 2018
[6] PHE is aware that one of the main retailers introduced their product range towards the end of the data collection period, and another introduced a product range shortly after September 2018 which may result in an increased market share for retailer own brand products.

Table 9. Number and proportion of products marketed at different age groups, by product category

Age range product is marketed at	All products		Baby meals		Baby finger foods		Baby drinks	
	Number	Proportion (%)	Number	Proportion (%)	Number	Proportion (%)	Number	Proportion (%)
4 Months	315	28.1	305	35.8	5	2.0	5	23.8
5 Months	2	0.2	1	0.1	-	-	1	4.8
6 Months	130	11.6	107	12.6	14	5.7	9	42.9
7 Months	288	25.7	228	26.8	60	24.3	-	-
8 Months	3	0.3	1	0.1	2	0.8	-	-
9 Months	8	0.7	2	0.2	6	2.4	-	-
10 Months	90	8.0	83	9.7	7	2.8	-	-
12 Months	232	20.7	79	9.3	147	59.5	6	28.6
Over 1 Year	50	4.5	46	5.4	4	1.6	-	-
Unspecified	2	0.2	-	-	2	0.8	-	-
Total	**1120**	**100**	**852**	**100**	**247**	**100**	**21**	**100**

The most common type of packaging for baby food products is a pouch (35% of products). Jars are used for 17% of products, and boxes, bags and trays are each used for more than 10% of products (Table 10).

Table 10. Types of baby food product packaging

Type of packaging	Number of products	Proportion of products (%)
Pouch	390	34.8
Jar	186	16.6
Bag	133	11.9
Box	122	10.9
Tray	114	10.2
Pot	76	6.8
Packet	51	4.6
Bottles	19	1.7
Tub	12	1.1
Can	9	0.8
Carton	3	0.3
Sachet	3	0.3
Tin	2	0.2
Total	**1120**	**100**

Baby food and drink purchasing by socioeconomic status (SES) group

Table 11 shows variations in purchasing of baby food products by socioecomonic status (SES) group. Across the 5 SES groups, based on volume sales, groups C1 and AB buy the largest proportion of baby meals (26% and 25% respectively), group AB buys the

largest proportion of baby finger foods (34%) and group C2 buys the largest proportion of baby drinks (29%). Group E buys the smallest proportion of all baby food and drink products.

Within each SES group, baby meals account for the most volume sales, followed by finger foods and then drinks. Generally, the proportion of sales of baby meals increases from group AB (79%) to group E (88%), whilst sales of finger foods decrease (18% for group AB vs. 8% for group E). Further detail on purchases at product sub-category level can be found in Appendix 5 Table 1.

Table 11. Baby food and drink volume sales, by product category and SES group

	SES group	Group AB		Group C1		Group C2		Group D		Group E		All SES groups	
Product category		Volume sales	Proportion of category volume sales (%) by SES group	Volume sales	Proportion of category volume sales (%) by SES group	Volume Sales	Proportion of category volume sales (%) by SES group	Volume sales	Proportion of category volume sales (%) by SES group	Volume sales	Proportion of category volume sales (%) by SES group	Total volume sales	Proportion of volume sales (%)
Baby meals	Sales	8572	*25.4*	8822	*26.2*	7006	*20.8*	6708	*19.9*	2615	*7.8*	**33723**	**100**
	Proportion of volume sales (%) within SES group	*78.9*		*80.8*		*80.0*		*84.4*		*87.8*		***81.3***	
Baby finger foods	Sales	1912	*33.8*	1553	*27.4*	1147	*20.3*	811	*14.3*	237	*4.2*	**5661**	**100**
	Proportion of volume sales (%) within SES group	*17.6*		*14.2*		*13.1*		*10.2*		*8.0*		***13.7***	
Baby drinks	Sales	378	*18.1*	546	*26.2*	606	*29.1*	427	*20.5*	125	*6.0*	**2083**	**100**
	Proportion of volume sales (%) within SES group	*3.5*		*5.0*		*6.9*		*5.4*		*4.2*		***5.0***	
All products	**Total sales**	**10862**	**26.2**	**10921**	**26.3**	**8759**	**21.1**	**7946**	**19.2**	**2977**	**7.2**	**41467**	**100**
		100		**100**		**100**		**100**		**100**		**100**	

Nutrient analysis

This analysis included 968 products (86% of products in the dataset). Both simple averages and sales-weighted averages[7] (SWAs) were calculated; all averages presented are simple averages unless otherwise stated.

Simple averages and SWAs, and range of values are shown in Table 12 for each category and sub-category of baby foods and drinks for sugar and energy. For most sub-categories, simple averages and SWAs for sugar are similar, but for sweet finger foods and baby drinks the SWA is 20-30% higher than the simple average, showing that volume sales are greater for higher sugar products. For example, most baby drinks are diluted fruit juices, with juice contents ranging from 15% to 50%. The 2 top selling baby drink products contain 50% fruit juice, resulting in the sugar SWA being noticeably higher than the simple average.

The highest sugar levels are seen in fruit and vegetable based, and sweet finger foods, at 47.5g and 17.0g sugar/100g (SWA 44.1g and 22.4g sugar/100g) respectively. This reflects the use of ingredients such as fruit juices, purees and concentrates, as well as added sugar in some products. The highest energy (kcal/100g) levels were seen in savoury finger foods. All sub-categories included products with a wide range of sugar and energy values. It is important to note that this analysis presents data for products per 100g, not per serving. Values for sugar and energy per 100g are higher for finger foods compared with baby meals but serving sizes of finger foods are smaller than baby meals.

[7] Sales weighted averages are calculated by weighting the energy or nutrient level of different products by their volume sales

Table 12. Average total sugar (g/100g) and energy (kcal/100g) content of baby food and drink products, by product sub-category

		Sugar (g/100g)			Energy (kcal/100g)		
Product category/sub-category	Number of products	Average	SWA	Range of sugar content	Average	SWA	Range of energy content
Baby Meals							
Main meals	367	2.5	2.2	0.6-8.2	71	71	32-254
Fruit and vegetable first foods	170	9.4	10.3	0.6-19.5	55	58	23-96
Dry cereals/foods[a]	66	7.5	8.4	0.7–11.0	108	110	45-156
Desserts and breakfasts	110	8.9	8.8	2.0-18.1	76	76	37-147
Soups & cooking sauces	5	3.0	3.8	0.2-4.7	46	50	20-67
Other [b]	9	1.5	1.0	0.2-3.2	375	381	352-395
Baby finger foods							
Savoury finger foods	77	3.8	3.9	0-13.1	441	451	362-532
Fruit and vegetable based finger foods	43	47.5	44.1	13.0-67.7	344	335	248-497
Sweet finger foods	104	17.0	22.4	0.8-29.0	415	410	280-553
Baby drinks							
Baby drinks	17	3.9	4.7	1.4-5.2	19	22	8-26

Total number of products = 968
[a] Values shown are for foods as consumed
[b] Values shown are for foods as sold

Within the baby meals category, fruit and vegetable first foods have the highest average sugar content. Table 13 shows the variation between different types of these products. The most common type, mixed fruit, has one of the highest average sugar levels. The average sugar content of vegetable only products is more than 50% lower than for fruit only products.

Table 13. Sugar content of single and mixed fruit and vegetable first food products

First foods: product type	Number of products	Proportion of products (%)	Average sugar content (g/100g)	Range of sugar content (g/100g)
Single fruit	17	10.0	11.7	8.4–19.5
Mixed fruit	104	61.2	11.1	6.3–17.1
Single vegetable	8	4.7	4.0	0.6-8.2
Mixed vegetable	25	14.7	3.4	1.2–9.8
Mixed fruit and vegetable	16	9.4	7.7	3.7–13.0
All fruit and vegetable first foods	**170**	**100**	**9.4**	**0.6-19.5**

The salt content of baby food products is generally low, with average levels below 0.1g/100g[8] (0.04g sodium/100g) in all sub-categories except sweet and savoury finger foods. Sweet finger foods have an average salt content of 0.18g/100g, ranging from 0g to 0.75g/100g. For savoury finger foods the average is 0.35g salt/100g, ranging from 0g to 2.6g/100g. This data, together with analysis for other nutrients, and ranges for top-selling products can be found in Appendix 5 Table 2 and Table 3.

Analysis of 233 products marketed at children aged 1 year and over suggests that main meals provide an average of 22.6% of a 1 year old boy's daily EAR for energy, and desserts and breakfasts an average of 6.9% (Table 14). Assuming that a 2-course meal occasion such as lunch should provide approximately 30% of a 1-year old's daily EAR (the basis of the nutrient framework for the example early years menus (24)), these figures suggest that portion sizes and energy density are, on average, not inappropriate for this age group, with an average main meal and dessert combined providing 29.5% of the daily EAR. This reflects feedback from businesses that they generally use age appropriate EARs for energy to set the energy content and portion size of single serve products, splitting energy requirements proportionally across eating occasions.

On average, finger foods (often marketed as snacks) provide between 6.9% (fruit and vegetable-based finger foods) and 12.8% (sweet finger foods) of the energy EAR for a 1 year old. Sweet finger foods provide a greater proportion than the 10% of energy EAR suggested for snack occasions (in the nutrient framework for the example early years menus (24)), and a similar amount of energy as a tip for parents given by PHE's Change4Life campaign on the maximum energy content of 100kcal for packaged snacks bought for older, school-age children (36).

[8] Salt values have been calculated by multiplying sodium values by 2.5

Table 14. Energy (kcal) per serve for products marketed at children aged 1 year and over, and comparison with energy requirements (EAR)

Product sub-category	Number of products	Energy (kcal) per serve		% contribution to energy requirements (EAR) of a 1-year old boy (765 kcal/day)[31]
		Average	Range	
Main meals	99	173	65-282	22.6
Desserts and breakfasts	5	53	53-101	6.9
Savoury finger foods	39	66	13-92	8.7
Fruit and vegetable-based finger foods	43	53	19-98	6.9
Sweet finger foods	47	98	19-134	12.8

Stakeholder views

PHE held a series of 1:1 meetings in Autumn 2018 with a range of commercial baby food and drink businesses (retailers and manufacturers), representative trade bodies and health non-government organisations (NGOs). Businesses were identified pragmatically using market share analysis of the Kantar Nutrition dataset as well as broader market research and intelligence to ensure a range of businesses and baby food product types were represented. A list of organisations invited to and attending meetings is shown in Appendix 6.

The aim of this initial engagement was to set in context PHE's scoping work on products aimed at infants and young children, and to obtain views from stakeholders on the scope for action to improve these products. Discussions were held around businesses' past and current reformulation work and views from NGOs on how to improve the commercial baby food offering.

There was general recognition from all stakeholders of the need to reduce added sugar in products and reduce the offerings of sweet finger foods.

The main areas of concern that businesses raised related to:

- existing EU regulations and how a reduction and reformulation programme would relate to these (in relation to both product categorisation and nutrient content)
- the limited scope for reformulation in products containing only or mainly fruit and vegetables, in products with no added sugar, and in products such as biscuits and rusks where sugar has a function other than sweetness (eg to facilitate melting and hence reduce the likelihood of choking)

- the belief that baby food products were generally safer and healthier than generic alternatives
- the absence of recommendations on which to base reformulation guidelines (eg the absence of free sugars intake recommendations for children under 2 years of age, and no portion size guidance for this age group)

NGO's concerns included:

- high levels of free sugars in products
- dried fruit products marketed as snacks

Conclusions

The available evidence highlights the need for action, showing that infants and young children are eating too much sugar and salt, and energy intakes are exceeding requirements.

Commercial baby foods and drinks are widely available and used in the UK, particularly for infants aged between 6 to 12 months, so there is an opportunity for these products to support the development of good eating habits at this early age.

To support parents and carers to make the right choices, products aimed at infants and young children should be consistent with UK government advice on infant and young child feeding. However, the evidence presented in this report, and product knowledge gathered during the evidence review process, highlights some clear inconsistencies between government advice and some commercial baby foods and drinks in terms of the types of products available, their ingredient and nutrient composition, and the labelling and marketing of products. These inconsistencies, most of which have previously been highlighted (37-39) are presented below, and opportunities for action to address these issues are summarised in the next section.

Types of products available

Snacks/finger foods

Commercial baby finger foods (loosely defined as bite-size, easy-to-eat pieces of food that babies can pick up and eat by themselves), many packaged and marketed as snacks, have been the growth driver in the baby food market in recent years (40). This mirrors the growth in the wider snack food market. Analysis of Kantar Nutrition data suggests that 6 out of 10 portions of commercial baby foods purchased are finger foods (Table 8), and Start4Life research (2018) highlighted that all focus group participants were buying dedicated baby snacks. The contribution of snacks to excess energy intake is a concern in all age groups, with half the sugar children aged 4-10 years are consuming coming from snacks and sugary drinks (36).

Snacks for young children are intended to be ‘mini meals’, providing essential energy and nutrients from around 12 months. Infant and young child feeding advice states that sugar and salt should not be added to foods, the frequency and amount of sugary foods should be reduced, and sugary foods (including dried fruit) should not be provided between meals. Commercial baby finger foods such as sweet and savoury biscuits, crisps and puffs, and processed dried fruit products (Table 6) are not consistent with the types of foods given as examples of healthy snacks - fruit, vegetable sticks, toast, bread or plain yoghurt (Table 1).

Two-thirds of commercial baby finger foods are sweet (Table 7); these products have the highest average sugar content (per 100g) across all baby food products (Table 12), and can be as high in sugar as standard biscuits and confectionery. Some of these products contain added sugar, and many, marketed as snacks, contain dried fruit as an ingredient - this is inconsistent with dental health recommendations that dried fruit should be consumed as part of a meal.

The highest sugar content is found in processed dried fruit products – these are often marketed as healthy snacks due to their high fruit content, but the use of juices, purees and concentrates as ingredients means that the sugar in these products is considered to be mainly free sugars which should be limited in children's diets.

Savoury finger foods contain higher levels of salt than products in all other sub-categories (up to 2.6g salt/100g).

Drinks

Drinks marketed at infants and young children are generally mixtures of fruit juice and water. One in 4 baby drink products are aimed at babies aged under 6 months, and nearly three-quarters at children aged under 12 months (Table 9). This is not consistent with government recommendations that breast milk, infant formula and water should be the only drinks offered between 6 and 12 months of age.

Dental health recommendations state that drinks other than milk, water or diluted fruit juice (1 part juice to 10 parts water) are not recommended for children aged under 5 years and this is also reflected in consumer advice (21, 22). Baby drinks are not diluted to this extent – the juice content ranges from 15% to 50%, with the 2 top selling products at 50% (1 part juice to 1 part water).

Desserts

Infant and young child feeding advice suggests that for children aged 10 to 12 months, lunch and tea can include a main course and dessert such as fruit or unsweetened yoghurt. Analysis of Kantar Nutrition data shows that most desserts are marketed at babies under 10 months of age (data not shown), and many contain ingredients other than fruit or unsweetened yoghurt.

Fruit and vegetable first foods

Around one-fifth of all baby food and drink products are 100% fruit and/or vegetables, mostly purees. These are commonly marketed as first foods for the youngest babies (from 4 to 7 months). The balance of products on the market does not reflect the

recommendation to start the introduction of solid foods with single vegetables and fruits, and feeding vegetables that are less sweet. The most common product type, mixed fruit (61% of products), has one of the highest average sugar levels, and only 15% of products are single vegetables or fruits (Table 13). Single fruit and vegetable products are more likely to support babies to recognise the tastes of individual foods, and a less sweet product mix would better prepare them to accept a range of different tastes and protect dental health.

Given that consumer research suggested that parents trusted food manufacturers to know what was best for their babies, the presence of products such as drinks, desserts and snacks in the baby food aisle may suggest to parents and carers that they are an expected and appropriate part of the diet (i.e. good choices) for infants and young children.

Ingredient and nutrient composition of products

Sugar

Infant and young child feeding advice states that sugar should not be added to babies' food. Some baby food products have added sugar, and many use processed fruit ingredients such as purees, powders and pastes which are included in the definition of free sugars (27) (Table 15).

Table 15. Examples of added and free sugars in products

Product name [a]	Ingredients [a b]
Chocolate pudding	Whole Milk (79%), Water, **Sugar**, Cornflour, Fat Reduced Cocoa Powder (1%)
Strawberry baby biscuit	Wheat Flour (59%), **Grape Juice Concentrate** (26%), Palm Oil (6%), Sunflower Oil (5%), **Strawberry Powder** (3%), Raising Agent (Sodium Bicarbonate) (<1%), Thiamin (<1%)
Egg custard	Whole Milk (46%), Rice (24%), Skimmed Milk (17%), Water, **Sugar**, Egg (3%)
Rusk	Wheat Flour, **Sugar**, Palm Oil, Raising Agents (Ammonium Carbonates), Calcium Carbonate, Emulsifier (Monoglycerides), Niacin, Iron, Thiamin, Riboflavin, Vitamin A, Vitamin D
Fruit bars	**Date Paste** (86%), **Apple Powder** (13%), Rice Flour (<1%), Sunflower Oil (<1%)
Whole wheat bars with fruit filling	Fruit Filling (35%) (**Apple Juice Concentrate**, **Strawberry Puree** (6%), **Blackcurrant Puree**, Gelling Agent (Pectin), Raspberry Extract), Whole Wheat Flour, **Apple Juice**

Product name [a]	Ingredients [a b]
	Concentrate, Wheat Flour, Sunflower Oil, Rice Flour, Raising Agent (Baking Powder), Thiamin
Ginger biscuits	Fortified Wheat Flour (Calcium Carbonate, Iron, Niacin, Thiamin), Vegetable Oils (Palm Oil, Rapeseed Oil), Salt, Natural Butter Flavouring, **Sugar & Cane Molasses**, Wholemeal Flour (Wheat), Oatmeal, **Partially Inverted Sugar Syrup**, Ground Ginger (1%)

[a] Product names and ingredients have been standardised
[b] Bold text indicates ingredients considered to be added or free sugars

Consideration of the scope for action to reduce sugar in commercial baby foods and drinks will need to take into account the use of processed fruits and vegetables. The sugars in purees, commonly used as ingredients in first foods, are classed as free sugars. Infant and young child feeding advice for babies aged around 6 months recommends that they should move on to mashed, lumpy or finger foods as soon as they can manage them – this is important both developmentally and in terms of sugar intakes. However, purees, fruit juices, and other processed fruit ingredients are commonly used across product sub-categories and in products marketed at babies older than 6 months, adding sweetness and contributing to free sugar intakes which are above recommendations for children at all ages where recommendations have been set. This use of processed fruit ingredients, particularly in fruit and vegetable based and sweet finger foods, means that some products have a higher sugar content than biscuits or sweet confectionery products.

Salt

Infant and young child feeding advice states that salt should not be added to babies' food. Levels of salt are generally low in commercial baby food products with averages in all sub-categories below 0.1g salt/100g, except for sweet and savoury finger foods (0.18g and 0.35g salt/100g respectively). Some baby foods contain added salt, whilst others contain ingredients such as cheese which are high in sodium (Table 16).

Table 16. Examples of products containing added salt, and use of ingredients high in sodium

Product name [a]	Ingredients [a b]	Salt content (g/100g)
Chickpea crisps	Chickpea Crisps (Chickpea Flour (45%), Rice, Potato Starch, Corn Flour, **Salt**), Rapeseed Oil, Spicy Tomato Seasoning (3%) (Tomato Powder, Rice Flour, Dried Bell Pepper, Onion Powder, Herbs (Basil, Oregano), Natural Flavourings, Garlic Powder, Spice (Cayenne))	2.6
Cheesy cracker shapes	Gouda Cheese (40%), Potato Starch, Tapioca Starch, Corn Starch, Paprika, Yeast Extract, Natural Cheese Flavour	1.4
Veggie waffles	Carrot Puree (34%), Wheat Flour, High Oleic Sunflower Oil, Concentrated Carrot Juice (6%), Rapeseed Lecithin, Vinegar, Powdered Cumin (0.5%), Curry Powder, **Salt**	0.8
Oat breakfast cereal	Organic Oat Flour, Organic Whole Grain Flour (Organic Wheat, Organic Rye, Organic Barley), Organic Oat Flakes, Organic Barley Malt, **Salt**, Thiamin	0.8
Cheese crackers	Wheat Flour (49%), Rice Flour (19%), Cheese (14%), Sunflower Oil (9%), Malt Extract (barley) (6%), Malted Wheat Flour (<1%), Raising Agents (Sodium Bicarbonate, Ammonium Bicarbonate) and Thiamin (<1%)	0.5

[a] Product names and ingredients have been standardised
[b] Bold text indicates added salt

Consideration of the scope for action to reduce salt in commercial baby foods will need to take into account the use of added salt and high salt ingredients.

Labelling and marketing of products

Products labelled as suitable for children from the age of 4 months

Analysis of Kantar Nutrition data shows that 36% of baby meals and 24% of baby drinks are marketed at children under 6 months (Table 9). This marketing does not reflect longstanding advice that introducing solid foods should happen at around 6 months of age (alongside breast milk or infant formula), and that breast milk, infant formula and water should be the only drinks offered to children between 6 and 12 months of age (13).

In 2010, more than one-quarter of mothers (30%) reported introducing solid foods into the diet by the time their baby was 4 months old despite UK health department guidelines recommending around 6 months (33). Start4Life research (2018) with mothers found a perception that foods labelled as suitable from 4 months suggested that this was a safe time to begin introducing solid foods.

Misleading labelling

Product names do not always reflect the range and balance of ingredients used in products. This can mean that the product name sounds savoury whereas the first, or main ingredient is sweet (Table 17).

Table 17. Examples of misleading labelling: product name

Product name [a]	Ingredients [a]
Broccoli, pear and peas	Pears (79%), Peas (14%), Broccoli (7%), Lemon Juice Concentrate
Carrot oat bars	Wholegrain Oats (42%), Apple Puree (30%), Carrot Powder (11%), Sunflower Oil, Inulin, Thiamin, Rosemary Extract
Kale, kiwi, peas and pear	Pear (53%), Kale (22%), Pea (13%), Kiwi (12%), Basilic Powder (0.01%), Lemon Juice Concentrate

[a] Product names and ingredients have been standardised

This type of labelling does not support parents and carers to make an informed choice at the point of purchase. Advice on feeding infants and young children includes achieving dietary variety, and based on product names, parents and carers may consider that they are providing this variety when the ingredients used in products are actually very similar. In addition, the use of fruit as an ingredient in products with a name that suggests the food is savoury or vegetable based may result in babies being fed sweeter meals than intended. Research for Start4Life (2018) showed that parents trust products marketed at infants and young children, and may not deem it necessary to read labels if a product appears to be healthy.

Use of nutrition and implied health claims

Recent research suggests that a large proportion of products marketed at children (aged over 1 year) through product packaging are less healthy, and claims used on product packaging are confusing (41). The health halo effect[9] has been well documented, especially with regards to food marketed at children (42-44).

Research with consumers for Start4Life (2018) suggested that the use of language such as ‘organic’, and ‘preservative free’ suggested that products were healthy, and meant that there was no need to check the label.

[9] Where using a single claim, such as being high in fibre or containing no added sugar, may encourage consumers to overestimate the healthiness of an item as they assume it means that the product will be healthy overall

Some of the commercial baby food products with the highest levels of sugar and salt (typically finger foods) make these kinds of claims (Table 18).

Table 18. Examples of misleading labelling: health

Language on packaging	Nutrient content (g/100g)
Packed with 7 key vitamins and minerals including iron and calcium	Sugar 29.0g
1 of 5 a day; packed with real fruit; no preservatives	Sugar 67.7g
1 of your 5 a day; no added nonsense; never from concentrate; no added sugar; no preservatives	Sugar 37.8g
Always organic; nothing unnecessary; no junk promise	Salt 0.43g
We are organic; no added preservatives	Salt 0.80g
No artificial colours, flavours or preservatives	Salt 0.96g
Rich in B vitamins; no nasties; GM free; no artificial colour, flavours or preservatives	Salt 1.1g

Many commercial baby foods market themselves as premium products giving the impression they are healthier than a homemade alternative, but this isn't necessarily the case (45).

Lack of clear feeding instructions

Analysis of Kantar Nutrition data shows that 35% of products are packaged in pouches (Table 10). Many of these have nozzles and there is some concern that feeding practices such as sucking a product directly from a pouch (i.e. not using a spoon to feed the product to a baby) is likely to be harmful for developing teeth and that the practice might encourage continual feeding (46). Some businesses provide back of pack or website statements recommending how to feed the product from a pouch (such as via a spoon) but this is inconsistent across the market.

Infant and young child feeding advice recommends that dried fruit should be eaten with, rather than between meals to protect dental health. A number of commercial baby finger food products contain dried fruit as an ingredient but are marketed as snacks. In addition, fruit and vegetable-based finger foods are often marketed as healthy snacks but can be high in free sugars due to the use of ingredients such as fruit juices, powders and concentrates. Few, if any, commercial baby finger foods include any advice on their labels that products should not be eaten between meals.

Surveillance and research

Limited up-to-date information on the use and contribution to dietary intakes of the commercial baby food and drink products currently on the market and , and on dietary intakes overall, for infants and young children aged 6 to 36 months highlights the need

for more regular monitoring in this area. In addition, research is needed to address the generally inconsistent and limited data available on the impact of the use of commercial baby foods and drinks on diet, nutrition and health.

Opportunities for action to improve product ranges aimed at infants and young children

The evidence presented in this report highlights clear inconsistencies between government advice on infant and young child feeding and some commercial baby food and drink products. Where these inconsistencies exist, they encourage the introduction of foods before the recommended age, or the consumption of foods or ingredients in amount or frequency not recommended as part of a healthy diet for this age group. Improving product ranges to address these inconsistencies will help to ensure that our youngest children are given the best start in life, and parents and carers are supported to help shape tastes and food preferences that will be carried into older childhood and adulthood.

PHE's advice to government on the opportunities for action is based on the following principles:

- creating a more supportive environment for parents and carers to enable healthier infant and young child feeding practices
- ensuring greater consistency between commercial baby food and drinks and government advice on introducing solid foods, to improve dietary intakes and protect dental health
- promoting development of good eating habits including texture progression, development of taste preferences, dietary variety and food recognition
- enabling parents and carers to make informed choices at the point of purchase

Advice relating to the labelling and marketing of commercial baby foods and drinks:

- ensure product marketing is consistent with scientific advice to introduce solid foods at around 6 months of age
- ensure honest labelling so that product names are not misleading and are aligned with the primary ingredients
- restrict use of nutrition and implied health claims and health halo statements
- ensure that clear feeding instructions (use a spoon/do not suck) are present on the front of pack of products packaged in pouches with a nozzle
- ensure that products high in sugars are labelled as not being suitable for eating between meals

Advice relating to the nutrient composition of commercial baby food and drinks:

Improve the nutrient composition of commercial baby foods and drinks, reducing sugar in these products, particularly snacks and drinks

Infant and young child feeding is determined by a wide range of factors. Improving commercial baby foods and drinks is just one area for action. Other possible policy actions relating to breastfeeding, safe feeding practices, consumer knowledge, marketing and promotion restrictions are also needed to improve the diets of infants and young children.

These actions should include, but not be limited to:

- strengthening and scaling up consumer awareness campaigns that promote government advice on introducing solid foods (eg Start4Life campaigns).
- putting in place a recurring survey to provide information on the use of foods and drinks in infancy as well as information on breastfeeding and use of nutritional supplements, so that up-to-date information on infant feeding practices is available to inform policy and practice

Given the importance of action in children's early years, government will need to consider the most appropriate mechanisms of action to ensure that change is achieved consistently and at pace across the commercial baby food and drink sector.

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Appendix 1: Dietary surveys reporting on infants and young children aged up to 36 months

The Infant Feeding Survey (IFS), a national survey of infant feeding practices, was conducted every 5 years from 1975 to 2010. Based on consumption of foods in the previous 7 days, the survey provided national estimates of the incidence, prevalence and duration of breastfeeding (including exclusive breastfeeding) and other feeding practices adopted by mothers in the first 8 to 10 months after their infant was born.

The 2011 UK Diet and Nutrition Survey of Infants and Young Children (DNSIYC) provided detailed information on the food consumption, nutrient intakes and nutritional status of infants and young children aged from 4 to 18 months living in private households in the UK. Fieldwork was carried out between January and August 2011. This was a one-off survey and is the only source of high quality nationally representative data on the types and quantities of foods consumed by children aged from 4 to 18 months from which estimates of nutrient intakes are derived. The survey complements the National Diet and Nutrition Survey (NDNS) rolling programme.

The National Diet and Nutrition Survey Rolling Programme (NDNS RP) is a continuous programme of fieldwork designed to assess the diet, nutrient intake and nutritional status of the general population aged 1.5 years and over living in private households in the UK.

Appendix 2

The rapid scoping review is published as a separate document.

Appendix 3: Methodology summary for 'Weaning Discovery Research 2018'

Public Health England's Start4Life weaning[10] campaign aims to support parents in embedding healthy behaviours when introducing their babies to solid foods. To help inform the recent campaign and the development of products/tools, qualitative discovery research was commissioned from Define Research and Insight Ltd to build on insights from previous projects looking at elements of the weaning process.

The overall aims of the research were to provide an up to date read, and fill knowledge gaps, on key areas that the Start4Life campaign needed to deliver against and work with, and test example key messages.

Specific areas for exploration with participants were:

- sources of information (current sources; attitudes towards HCP/government/other guidance; search behaviour)
- knowledge and attitudes (moving on to solid foods; heathy eating and sugar; milk in diet at 1+)
- weaning process and experience (mealtimes; snacking/treats; portion sizes; emotional investment; persistence with food refusal; role of ready-made baby food in diet; use of pouches; use of follow-on formula)
- common/current drivers to weaning process and choice (influence of market; beliefs on baby's needs; desire to set up healthy habits; impact of other children/fitting in with family eating habits; attitudes towards/challenges with food preparation)

Research approach and sample

A total of 36 target audience mums were interviewed in either individual depth or friendship pair interviews (Table 1)

[10] The word 'weaning' is used in consumer-facing materials as this is the term most commonly used amongst non-professional audiences. Campaign materials define weaning as the process of introducing solid foods alongside breast milk or infant formula from around 6 months of age.

Table 1. Number and type of interviews conducted

	Pre-tasked depth interview (120 minutes)	Pre-tasked friendship pair interviews (120 minutes)
Mums of older children	12	3
New mums	12	3
Total session type	**24**	**6**

Research interviews were conducted in London, Dagenham, Croydon, Gillingham, Birmingham, Nottingham, Leeds and Oldham in May 2018.

Sample definitions and profile:

- new mums: to have a baby aged 7-12 months only (no other children) and to have started weaning
- mums of older children: to have at least one other child in addition to a baby aged 7-12 months only who they have started weaning
- friendship pairs: both to have a baby aged 7-12 months, at least one in pair to conform to older/new mum status as above, but friend may be either
- all C1C2D
- all used the internet – mix of devices represented
- all were sole of joint carers of children in household in which live currently
- all had sole or joint responsibility for household food shopping
- good spread of age and gender of child
- none rejected Start4Life or Change4Life
- at least half of mums were overweight currently and at least one third were a healthy weight
- mix of working or not working currently, single and two parent households
- 4 BAME respondents

Stimulus material included the Change4Life food scanner app and prompts on channels:

- voice search
- online Chat Bot
- helpline
- print materials
- social media
- parent forums
- official (NHS) websites

Testing of key messages covered a variety of topics:

- when to start Introducing a baby to solid foods
- introducing new textures
- using a spoon to feed pouches
- cooking from scratch rather than using ready-made jars and pouches
- introducing vegetables first/early in the weaning process
- how to feed a baby – importance of eye contact etc
- offering finger foods early in the weaning process
- avoiding offering snacks
- for drinks, offering milk and water only

Appendix 4: Methodology for analysis of sales and nutrition data for the baby food and drink market

Introduction

This appendix provides detailed information about data sources and methodology, including product categories, data preparation, coding and analysis. All data preparation and analysis was conducted in the R (2017) environment for statistical computing using package tidyverse (1.2.1)

Data sources

The analyses of retailer own label and manufacturer branded products conducted for this report use data from Kantar Nutrition's take-home consumer panel matched with nutrition information (derived from food labels on individual products or collected by third parties, Brandbank (15) and my.supermarket.com).

Kantar Nutrition is a global market research business which runs a continuous reporting panel of 30,000 households across Great Britain, recording details of all food and drink purchases brought in to the home, including volumes bought. The panel contains approximately 1,500 households with babies, defined as under 16 months old. The dataset used for this analysis contains volume sales and nutrition information for products specifically marketed at infants and young children (n=1243). This information is based on purchases from across the entire panel of 30,000 households, including those where there are no children present. Kantar Nutrition's sample of households reflects the demographic makeup of the British population. Demographic targets for the sample are based on region, social class, age of main shopper, household composition and household size. The data collected is weighted to provide a representative picture of total commercial baby food and drink purchasing in Great Britain over the time period for which data is provided. The dataset used in this analysis covers a 52 week period ending 9th September 2018.

Two stages of data analysis were undertaken:

- analysis of the characteristics of products aimed at infants and young children based on number of products and volume sales, including the types of products, recommended age of use, and packaging
- analysis of the nutrient content of products, including portion size

Where possible, additional analysis was undertaken to identify differences in purchases by socioeconomic status (SES) (34) .

Product categorisation

Kantar Nutrition categorises the commercial baby food market into four sectors: baby food; baby milk; baby finger food and baby drinks.

Baby milks (n=117) and products not specifically aimed at children under 36 months (n=6) were excluded from the dataset prior to analysis as they were considered to be out of scope of the programme.

PHE developed specific food and drink categories and sub-categories based on the range of products available on the market, information provided by stakeholders and information included in the Kantar Nutrition dataset (eg market sector and sub-sector, product categories and sub-categories). These are shown in Table 6 in the main report.

Data preparation: coding

Following the exclusion of baby milks and products not specifically aimed at children under 36 months, all remaining products (n=1120) in the dataset were coded into PHE baby food and drink categories and sub-categories using a combination of Kantar Nutrition long descriptions, product descriptions, brand, nutrition information and other relevant information in the dataset. Where required, publicly available product information was also used to help identify the appropriate category and sub-category.

Each product was coded by a PHE nutritionist. Product coding was checked by a second nutritionist, and any discrepancies or disagreements were discussed with a third nutritionist until agreement could be reached.

This dataset (n=1120 products) was used for the analysis of the characteristics of baby food and drink products.

Nutrition information

Product exclusions and data adjustments were required to ensure that the nutrient values included in the analysis of the nutrient content of commercial baby food drinks and results presented were accurate.

Real, cloned and imputed data

Where nutrition information has been collected by Kantar Nutrition via food labels, this is termed ‘real’ data. Where it has not been possible to gather nutrition information for a

product, nutrition values are either copied across from similar products ('cloned' data) or an average value for the category or product type is calculated and used instead ('imputed' data).

In the dataset adjusted to excluded out of scope products (n=1120 products), 61% of products had a real source of nutrient data, 34% had a cloned source of nutrient data and 5% had an imputed source of data. Where possible, to improve the accuracy of the data, PHE replaced imputed and cloned data with real nutrition information scraped from company websites (February 2019). This increased the proportion of products with usable (real) data to 89%, and reduced cloned and imputed data to 7% and 4% respectively. Only real data has been used in the analysis; n=76 products with cloned and n=44 products with imputed nutrition data which could not be updated were excluded.

As consumed

Kantar Nutrition typically collects nutrition information for products as they are sold. However, for products such as dry cereals some businesses/brands declare the nutrition information for the product as it is consumed. Therefore, to be able to analyse the nutrient content of products within the same category there was a need to source as consumed data. Where nutrition information was only available as 'as sold' values, efforts were made by PHE to source the 'as consumed' values via web searches (February 2019). Where no nutrition data for the product as consumed could be located, products were excluded from the analysis (n=8).

Data cleaning

After adjusting for 'as consumed' data and removing imputed and cloned data, specific data checks were carried out to identify and exclude implausible nutrient values. This included checking the highest (5 to 10) products and lowest (5 to 10) products in the range for each nutrient, that the energy values declared in kJ and kcal were comparable and ensuring the energy provided by carbohydrates, fat, and protein combined did not exceed that of the energy value declared in the dataset. Twenty-four products failed the data cleaning checks and were excluded from the analysis, resulting in a dataset of n=968 products to be used for analysis of the nutrient content of commercial baby foods and drinks.

Analysis

Once the data had been coded, cleaned, and exclusions applied, 1120 products were included in the market analysis and 968 products in the nutrient analysis. Table 1 shows the number and proportion of products in each product category and sub-category included in the market and nutrient analysis.

Table 1. number and proportion of products in each product category and sub-category included in the market and nutrient analysis

Product category/sub-category	Products included in market analysis		Products included in nutrient analysis	
	Number	Proportion (%)	Number	Proportion (%)
Baby Meals	**852**	**100**	**727**	**85.3**
Main meals	406	100	367	90.4
Fruit and vegetable first foods	220	100	170	77.3
Dry cereals/foods	85	100	66	77.6
Desserts and breakfasts	121	100	110	90.9
Soups & cooking sauces	6	100	5	83.3
Other	14	100	9	64.3
Baby finger foods	**247**	**100**	**224**	**90.7**
Savoury finger foods	85	100	77	90.6
Fruit and vegetable-based finger foods	47	100	43	91.5
Sweet finger foods	115	100	104	90.4
Baby drinks	**21**	**100**	**17**	**81.0**
Baby drinks	21	100	17	81.0
Total	**1120**	**100**	**968**	**86.4**

A range of descriptive statistics were calculated for product categories and sub-categories (types of products) including simple and sales-weighted averages, nutrient ranges across all and top selling products, number and proportion of products, and number and proportion of volume sales. Similar descriptives were calculated for products based on the age range the products were marketed at, and the packaging format the products were sold in.

Where sales weighted averages are presented, these were calculated by weighting the energy or nutrient level of individual products by their volume sales.

Estimated number of portions purchased

Single serve portion sizes have been estimated to calculate the number of portions purchased.

Single serve portion sizes have been pragmatically determined. Where food products are sold in single units, the weight of the product (as stated in the Kantar Nutrition dataset) has been used as the serving size. Where food products are obviously sold as a sharing packs, the manufacturer's recommended serving size has been used where available online (May 2019). For baby drinks a standard portion size of 150ml/150g was used for all products. Products where portion size could not be determined online or from the Kantar Nutrition dataset, were not included in the analysis (n =15).

Limitations

The Kantar Nutrition dataset provides a snapshot of the commercial baby food and drinks market, based on purchases made from September 2017 to September 2018.

Kantar Nutrition's fieldworkers collect nutrition information from retail stores on a rolling 4 month basis; however this process does not update the nutrition information for all products in the dataset each time. This means that products which are launched or reformulated between data collection periods may not always be picked up and reported on at the time that they occur. In addition, as the Kantar Nutrition data provided included purchases for the 52 weeks until 9th September 2018, products included in the dataset may no longer be available, and products launched or reformulated after this date would not have been captured. Finally, nutrition information and portion size information scraped from websites in February and May 2019 respectively may differ to that of products between September 2017 and September 2018.

None of the values presented in the report include confidence intervals since Kantar Nutrition do not provide confidence intervals with their data. However, as the data have been collected via a panel survey there will be some statistical variability in the estimates presented.

The number of products in some sub-categories (soups and cooking sauces, other) is small, and the number of products excluded from the nutrient analysis ranged from 8 to 36% (Table 1). This has implications for the reliability of the analysis, and some results should be treated with caution.

Quality assurance

Quality assurance measures were designed into the analysis plan, including standard processes to adjust and check the nutrition data before analysis was undertaken.

Kantar Nutrition have quality control measures built into their production process including monitoring the purchasing behaviours and health of the sample and minimum and maximum nutrient checks. In addition, PHE has carried out its own quality control checks of all data used and all analyses. This work focused primarily on increasing the number of products with "real" nutrition information and updating the nutrient data for "as consumed" products. Further quality assurance measures included:

- checking datasets for implausible values, and excluding those from the analysis
- exploratory analyses of energy and nutrient content ranges and distributions

Appendix 5: Nutrition and market analysis: additional tables

Table 1. Volume sales by product sub-category and SES group

	Group AB		Group C1		Group C2		Group D		Group E		All Groups	
Product category/sub-category	Volume Sales	Proportion of volume sales (%)	Volume Sales	Proportion of volume sales (%)	Volume Sales	Proportion of volume sales (%)	Volume Sales	Proportion of volume sales (%)	Volume Sales	Proportion of volume sales (%)	**Total Volume Sales**	**Proportion of volume sales (%)**
Baby meals												
Main meals	4038	37.2	4495	41.2	3560	40.7	3291	41.4	1143	38.4	**16527**	**39.9**
Fruit and Vegetable first foods	2319	21.4	2191	20.1	1631	18.6	1459	18.4	791	26.6	**8391**	**20.2**
Dry cereals/foods	721	6.6	747	6.8	704	8.0	686	8.6	168	5.7	**3026**	**7.3**
Desserts and breakfasts	1429	13.2	1333	12.2	1051	12.0	1234	15.5	500	16.8	**5547**	**13.4**
Soups & cooking sauces	16	0.2	9	0.1	21	0.2	2.4	0.0	0.21	0.0	**48.61**	**0.1**
Other	49	0.5	48	0.4	38	0.4	36	0.5	12	0.4	**183**	**0.4**
Baby finger food												
Savoury finger food	320	3.0	263	2.4	172	2.0	138	1.7	27	0.9	**920**	**2.2**
Fruit and vegetable-based finger food	286	2.6	218	2.0	118	1.4	104	1.3	39	1.3	**765**	**1.8**
Sweet finger food	1306	12.0	1072	9.8	857	9.8	570	7.2	171	5.8	**3976**	**9.6**
Baby drinks												
Baby drinks	378	3.5	546	5.0	606	6.9	427	5.4	125	4.2	**2082**	**5.0**
Total [a]	**10862**	**100**	**10922**	**100**	**8758**	**100**	**7947**	**100**	**2976**	**100**	**41466**	**100**

[a] Totals differ to those in table 11 in the main report due to rounding

Table 2. Average and range of energy and nutrient content for baby meals

		Baby meals											
		Main meals		Fruit and vegetable first foods		Dry cereals/foods [a]		Desserts and breakfasts		Soups & cooking sauces		Other [b]	
Per 100g		All (n=367)	Top 10 products	All (n=170)	Top 10 products	All (n=66)	Top 10 products	All (n=110)	Top 10 products	All (n=5)	Top 10 products	All (n=9)	Top 10 products
Energy (kcal)	Average	71	67	55	60	108	107	76	73	46	n/a	375	n/a
	Min	32	62	23	50	45	96	37	63	20	n/a	352	n/a
	Max	254	75	96	85	156	128	147	89	67	n/a	395	n/a
Protein (g)	Average	3.3	2.9	0.7	0.4	3.4	3.6	1.7	1.8	1.2	n/a	8.8	n/a
	Min	0.0	2.4	0.0	0.0	0.8	1.9	0.6	0.6	0.9	n/a	7.3	n/a
	Max	13.0	3.5	3.5	1.0	5.4	5.2	2.9	2.8	1.4	n/a	11.0	n/a
Carbohydrates (g)	Average	8.7	8.6	11.5	12.7	17.2	17.2	13.2	13.0	4.6	n/a	81.2	n/a
	Min	2.8	5.8	3.7	10.0	9.5	14.6	6.9	10.0	0.7	n/a	72.0	n/a
	Max	32.3	10.3	20.2	18.0	25.8	20.9	21.4	15.5	8.6	n/a	87.6	n/a
Sugar (g)	Average	2.5	1.7	9.4	10.7	7.5	8.6	8.9	8.8	3.0	n/a	1.5	n/a
	Min	0.6	0.9	0.6	8.8	0.7	7.4	2.0	6.6	0.2	n/a	0.2	n/a
	Max	8.2	2.1	19.5	16.0	11	9.6	18.1	13.4	4.7	n/a	3.2	n/a
Fat (g)	Average	2.2	2.0	0.3	0.3	2.7	2.7	1.6	1.4	2.3	n/a	1.1	n/a
	Min	0.0	1.5	0.0	0.0	0.5	1.3	0.0	0.1	0.3	n/a	0.7	n/a
	Max	19.0	2.7	1.8	0.9	4.3	4.1	6.5	2.6	4.7	n/a	1.5	n/a
Saturates (g)	Average	0.8	0.5	0.1	0.1	1.1	1.2	1.0	0.9	0.8	n/a	0.3	n/a
	Min	0.0	0.1	0.0	0.0	0.1	0.6	0.0	0.0	0.1	n/a	0.1	n/a
	Max	4.1	1.6	1.7	0.7	2.3	1.9	5.5	1.7	2.3	n/a	0.6	n/a
Fibre (g)	Average	1.6	1.3	2.0	2.1	4.4	4.3	1.1	0.8	1.5	n/a	1.8	n/a
	Min	0.0	0.9	0.9	1.3	0.3	0.8	0.0	0.1	1.0	n/a	0.5	n/a
	Max	5.2	1.8	4.7	3.9	11.0	9.6	3.1	1.9	1.9	n/a	3.0	n/a
Sodium (g)	Average	0.03	0.01	0.00	0.00	0.03	0.03	0.01	0.00	0.00	n/a	0.00	n/a
	Min	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	n/a	0.00	n/a
	Max	0.20	0.10	0.06	0.00	0.04	0.04	0.10	0.00	0.00	n/a	0.00	n/a

n/a – figures not provided as number of products in the sub-category are below 10

[a] Values shown are for foods as consumed

[b] Values shown are for foods as sold

Table 3. Average and range of energy and nutrient content for baby finger foods and baby drinks

		Baby finger foods						Baby drinks	
		Savoury finger foods		Fruit and vegetable-based finger foods		Sweet finger foods		Baby drinks	
Per 100g		All (n=77)	Top 10 products	All (n=43)	Top 10 products	All (n=104)	Top 10 products	All (n=17)	Top 10 products
Energy (kcal)	Average	441	470	344	328	415	409	19	19
	Min	362	428	248	275	280	378	8	8
	Max	532	532	497	395	553	424	26	26
Protein (g)	Average	9.2	6.9	2.8	3.2	7.5	8.0	0.1	0.1
	Min	2.7	2.9	0.8	1.2	4.0	6.4	0.0	0.0
	Max	20.1	12.1	9.3	5.5	12.2	10.0	0.3	0.1
Carbohydrates (g)	Average	67.7	66.9	68.4	67.6	71.7	68.1	4.1	4.1
	Min	50.0	62.0	44.3	61.5	29.9	53.0	1.4	1.4
	Max	91.0	78.0	81.2	80.3	92.8	86.0	5.6	5.6
Sugar (g)	Average	3.8	3.9	47.5	43.2	17.0	23.4	3.9	4.0
	Min	0.0	1.0	13.0	23.0	0.8	9.5	1.4	1.4
	Max	13.1	7.3	67.7	67.5	29.0	29.0	5.2	5.2
Fat (g)	Average	14.0	18.7	5.5	3.8	10.0	10.7	0.1	0.2
	Min	0.8	11.0	0.0	0.2	0.5	1.0	0.0	0.0
	Max	29.3	29.3	26.8	11.1	32.7	15.5	0.3	0.3
Saturates (g)	Average	2.2	2.6	1.6	0.8	2.7	2.6	0.0	0.0
	Min	0.2	1.3	0.0	0.0	0.1	0.3	0.0	0.0
	Max	10.0	7.1	12.6	2.8	20.8	4.5	0.1	0.1
Fibre (g)	Average	3.6	3.0	6.2	5.4	3.8	4.7	n/a	n/a
	Min	0.0	1.7	1.5	3.0	0.0	0.7	n/a	n/a
	Max	12.7	4.1	14.1	8.0	18.0	7.9	n/a	n/a
Sodium (g)	Average	0.14	0.17	0.04	0.04	0.07	0.06	0.00	0.00
	Min	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Max	1.04	0.40	0.32	0.12	0.30	0.20	0.01	0.01

n/a – data not available

Appendix 6: Stakeholder engagement

Table 1 shows which organisations were invited to, and which attended, the series of meetings convened by PHE between September 2018 and October 2018. Businesses were invited to attend 1:1 meetings. A joint meeting was held for trade associations and non-governmental organisations (NGOs).

Table 1. Stakeholder engagement

Business/organisation name	Businesses that were sent an invitation to a 1:1 meeting	Businesses, trade associations and NGOs that attended a 1:1 meeting
Retailers		
Aldi	✓	
Asda	✓	✓
Boots	✓	
Lidl Organic	✓	✓
Sainsbury's	✓	✓
Manufacturers		
Annabel Karmel	✓	
Babease Baby Plan	✓	✓
Bear Nibbles	✓	✓
Cow and Gate (Danone)	✓	✓
Ella's Kitchen Organic	✓	✓
Hipp Organic	✓	✓
Kiddylicious	✓	✓
Kraft Heinz	✓	✓
Little Dish	✓	✓
Nestle	✓	✓
Organix	✓	✓
Trade associations		
British Retail Consortium	✓	
British Specialist Nutrition Association	✓	✓
Food and Drink Federation	✓	✓
Non-governmental organisations		
British Dental Association	✓	✓
British Dietetic Association	✓	✓
First Steps Nutrition Trust	✓	✓
Obesity Health Alliance (represented by RCPCH and UKHF).	✓	✓