Public Health England

Protecting and improving the nation's health

Foods and drinks aimed at infants and young children: evidence and opportunities for action: Appendix 2

A rapid scoping review examining the role and impact of commercial baby foods and drinks on the diets of children aged 4-36 months

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Glossary

Cariogenic: causing tooth decay
Parity: the number of times a female is/has been pregnant and carried the pregnancies to a viable gestational age

Abbreviations and acronyms

BMI: Body mass index
JBI: Joanna Briggs Institute
OECD: Organisation for Economic Co-operation and Development
PHE: Public Health England
PRISMA: Preferred reporting items for systematic reviews and meta-analyses
RCT: Randomised controlled trial
SACN: Scientific Advisory Committee on Nutrition
SES: Socioeconomic status
WHO: World Health Organization

Definitions

Complementary feeding: the introduction of solid or semi-solid foods into the diet of a baby who is drinking breast milk or formula milk (1); typically covers from 6–24 months of age (2).

Commercial complementary foods: all industrially processed and pre-packaged, complementary feeding foods

Home-made complementary foods: all self-prepared, semi-solid, puréed or mashed foods made from scratch (3).

Added sugar: sugars and syrups that are added during manufacture or preparation but does not include the sugars present in unsweetened fruit juice or honey. Used in the US and by the European Food Safety Authority (4).

Free sugars: all monosaccharides and disaccharides added to foods by the manufacturer, cook or consumer, plus sugars naturally present in honey, syrups and unsweetened fruit juices. Lactose (milk sugar) when naturally present in milk and milk

products and sugars contained within the cellular structure of foods (particularly fruits and vegetables) are excluded (4).

Total sugars: the total amount of sugars from all sources (free sugars plus those from milk and those present in the structure of foods such as fruit and vegetables) (4).

Executive summary

The aim of this report was to provide a rapid scoping review of the published and unpublished evidence base to explore usage, marketing and impact of commercial infant and baby foods and drinks on the diets and health of children aged 4 to 36 months.

The review identified 34 studies providing evidence from 7 OECD countries. Twenty-five studies were cross-sectional surveys, 5 were longitudinal, 1 was a market review, 2 were qualitative interviews and 1 was a randomised controlled trial, providing data on a total of 48,466 participants (with study sample sizes ranging from 24 to 10,768, all including both boys and girls). Study duration ranged from 1 timepoint to 7 years follow-up.

Representativeness was assessed according to whether the study samples were randomly recruited from the study population with a response rate of at least 60% (or otherwise shown to be representative of the study population). Eighteen study samples were assessed as not representative, 12 were representative and in 4 cases it was unclear. The majority of studies recorded dietary intake using dietary recall which may have introduced additional bias; this bias may also have varied according to socio-demographic characteristics of the participants. The individual studies applied different criteria for defining and including types of commercial infant and baby foods and drinks, making comparisons across studies challenging.

Evidence showed that usage of commercial infant and baby foods and drinks peaked in infants aged 6-12 months, with evidence from large surveys suggesting that the percentage of these infants consuming commercial baby food was between 40 and 60%. Cereal-based commercial infant and baby foods were the most commonly consumed type of commercial food (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. Evidence suggests that consumption of commercial desserts, sweets and sugar sweetened beverages, not specifically marketed towards infants, may also increase during the second year of life.

There appears to be inconsistency between studies regarding changes over time in the consumption of various types of commercial infant and baby foods, and across different age groups.

There also appears to be variation in the consumption of commercial infant and baby foods and drinks according to whether infants and babies are breastfed, formula-fed or fed using a combination of both. In general, breastfed infants are less likely to be

consumers, and consume smaller amounts of commercial infant and baby foods and drinks, than formula-fed infants.

The majority of evidence described consumption of commercial infant and baby foods and drinks, by age, type and duration, with little data on the influence of external characteristics. One small US study looked at the influence of setting and found that the type of commercial complementary food was not significantly different between infants cared for by a parent or another form of childcare.

Only 2 qualitative studies (UK) were identified that considered consumer views, attitudes or opinions to commercial infant and baby foods and drinks, making it difficult to draw any conclusions. In addition, evidence on the impact of marketing was very limited.

There is limited and inconsistent evidence on the impact of consumption of commercial infant and baby foods and drinks on health outcomes such as weight status and dental health.

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 suggests 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 is some evidence to suggest that higher added sugar intake in infancy may predispose children to higher added sugar intake during later childhood.

The evidence is inconsistent regarding any association between consumption of commercial infant and baby fruit and vegetables at 6 months of age and consumption of fresh fruit and vegetables up to 7 years of age, although there may be differences in association between types of fruit and vegetables and by gender. The evidence across Europe and North America is inconsistent in relation to dietary diversity, particularly with regards to fruit and vegetables, with consumption of commercial infant and baby fruit and vegetable products being associated with both lower and higher diversity compared to non-commercial foods and drinks.

There remain questions as to how potential associations between consumption of commercial infant and baby foods and drinks (including changes in energy intake, total sugar intake, fruit and vegetable consumption and dietary diversity) impact on child health outcomes.

The overall lack of research in this area makes it difficult to draw conclusions relevant to current UK policy and practice.

Further research is required to improve our understanding of the marketing of commercial infant and baby foods and drinks, and how this impacts on consumption and child health. Research must move on from simply describing consumption of commercial infant and baby foods and drinks, to examining the impact of this consumption on health, especially adiposity and dental health. Further quantitative and qualitative research is required to improve our understanding of the context, role and impact of commercial snacks (both targeted and non-targeted at the infant market) on the health and diets of young children. This work is important to improve our understanding of the characteristics of the users of commercial infant and baby foods and drinks in the context of wider dietary habits.

Aims, objectives and research questions

Aim

To undertake a rapid scoping review of the published and unpublished evidence base, and to synthesise and report the evidence exploring usage, marketing and impact of commercial infant and baby foods and drinks (excluding formula milks) on the diets and health of children aged 4 to 36 months. This review will contribute to the evidence informing Public Health England's (PHE) advice to government on the opportunities for action to improve commercial baby foods and drinks.

Objectives

To determine how commercial infant and baby foods and drinks are used (for example timing of introduction, length of time used for, amount and frequency of use, setting of use, proportion of total dietary intake, differences across socio-demographic groups).

To determine how commercial infant and baby foods and drinks are marketed (product, place, price, promotion) and the impact this has on purchase, preference and usage.

To determine if there is an impact of the use of commercial infant and baby foods and drinks on the consumption of energy or total sugars, weight status or dental health.

Research questions

What are the characteristics of the users of commercial infant and baby foods and drinks?

What type of foods and drinks are used and by who, when, why, for how long and how often?

Does usage vary by parental/child characteristics such as age of child, level of parental education, working patterns of parents, type of childcare, ethnicity, socioeconomic status?

Does usage vary by external characteristics such as setting, type of foods and drinks (for example snacks, meals), time of day, weekday/weekend/holidays?

How are commercial infant and baby foods and drinks marketed?

Can we describe how commercial infant and baby foods and drinks are marketed and/or promoted?

Where are commercial infant and baby foods and drinks marketed and sold?

What is the impact of this marketing on purchase, preference (of the parent, the child and/or the parent's perception of the preference of the child) and consumption?

Does the impact of marketing vary by socio-demographic characteristics of the purchasers?

What is the impact of the use of commercial infant and baby foods and drinks?

Does the use of commercial infant and baby foods and drinks affect total energy consumption, total sugars and free sugars consumption?

Is there an impact on adiposity and/or dental health outcomes associated with the current or previous use of commercial infant and baby foods and drinks?

Methodology

A study protocol (Annexe 1) was developed in collaboration with PHE. The methods of the review are underpinned by the Joanna Briggs Institute (JBI) methodology for scoping reviews set out in the JBI Reviewers Manual (5).

The methodological quality of the studies was assessed by one reviewer using the Six Item Checklist Of Quality Of Execution adapted (6-8) from the Effective Public Health Practice Project Quality Assessment Tool for Quantitative Studies (9). This tool was chosen because it was developed to assess public health interventions; it enables reviewers to quality assess and synthesise evidence from a range of study designs and it is a widely used, valid and reliable tool (10). Quality assessment included (where applicable) representativeness of study samples, randomisation of participants, baseline comparability of groups, credibility of data collection tools, attrition rate and attributability.

Inclusion criteria

The search terms used for the review are detailed below in Table 1, using the Population, Concept and Context (PCC) technique recommended by JBI. Literature searches were conducted to identify research articles that met the following criteria:

Table 1. Inclusion Criteria

Inclusion Criteria using the Population, Concept and Context technique	
Population	Parent/carer of, and children aged between 4 and 36 months of age.
Concept	Rapid scoping review describing the evidence for the role and impact of commercial infant and baby foods and drinks. • infant formula milks considered out of scope and therefore related papers are excluded. • all study designs of any length • any process and outcome data to be extracted with particular interest in: purchasers/users views/attitudes/opinions; purchasing, marketing, consumption, adiposity and dental health • potential effect modifiers such as age, gender, ethnicity and socioeconomic status to also be extracted.
Context	Include all settings, with consideration of equity issues and cultural factors such as geographic location and socio-demographic characteristics of the setting. Prioritise studies from Western and Southern Europe, North America, Australia and

	New Zealand to capture evidence considered most relevant to the UK population. Exclude studies prior to 1995 and studies in countries that are not members of the Organisation for Economic Co-operation and Development (OECD)*. Exclude studies of specific populations where the evidence is not generalisable to the UK population.

* OECD: www.oecd.org/about/membersandpartners/

Search strategy

The literature searching consisted of electronic and grey literature searching. As recommended in all JBI types of research, a 3-step search strategy was utilized. The first step was an initial limited search of 2 online databases (Embase and MEDLINE). This initial search was followed by an analysis of the text words contained in the title and abstract of retrieved papers, and of the index terms used to describe the articles. Key research already identified by review authors was also used to build the search strategy.

A second search (Annexe 2) using all identified keywords and index terms was then undertaken across all included databases (Embase, MEDLINE, PsycINFO). Thirdly, the reference lists of all identified relevant reports and articles were searched for additional studies. As well as mainstream database searching, a Google Advanced search was carried out using keywords to identify relevant organisations, government websites and other relevant specialised databases, which were searched for grey literature.

Screening and data extraction

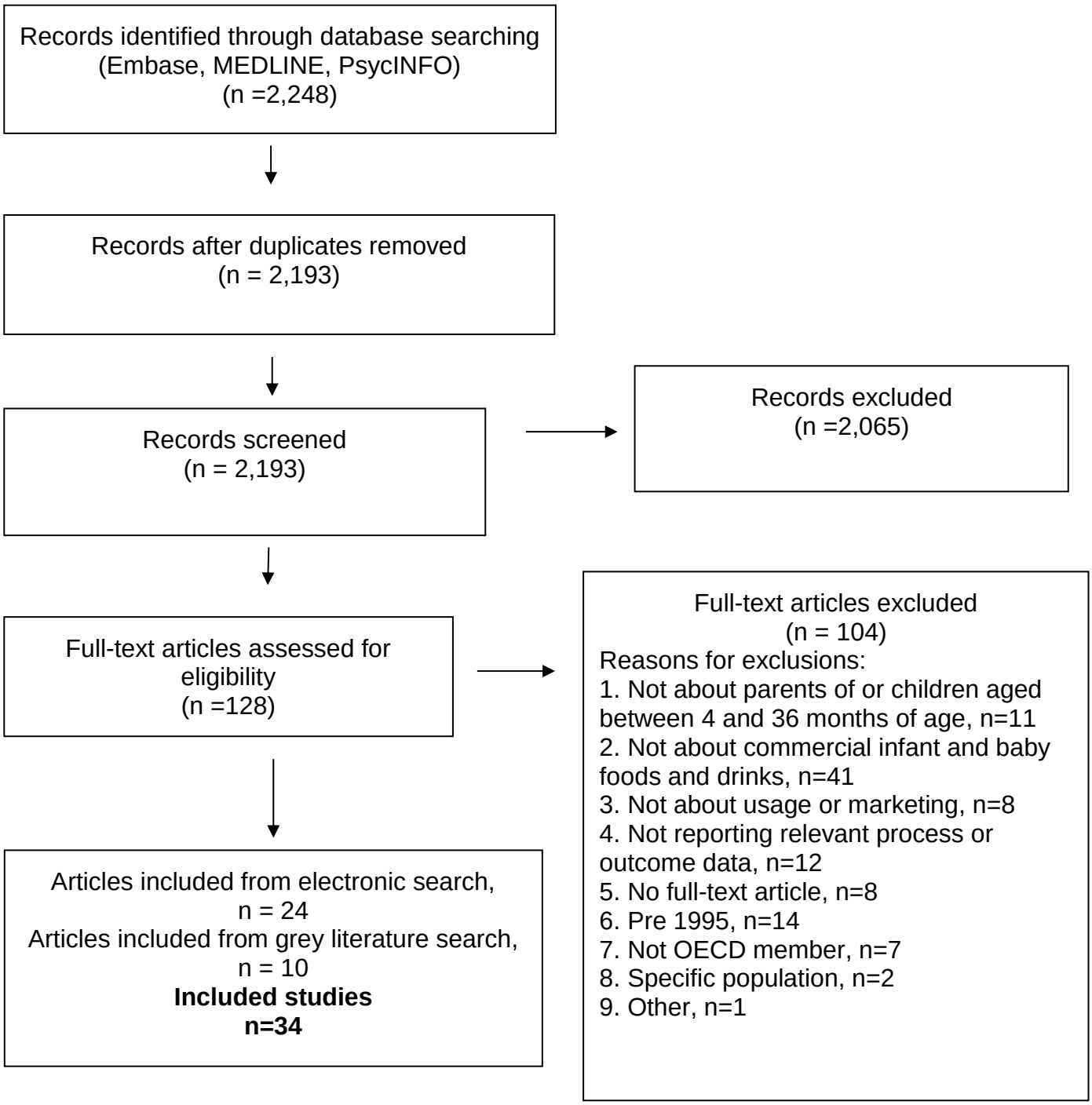
The titles and abstracts were screened by one reviewer who then screened the full-text articles using an inclusion/exclusion form (Annexe 3) that was developed in collaboration with PHE. Articles marked as ‘unclear’ for inclusion in the review were referred to PHE for final decision. Data extraction tables were developed to record participant and study characteristics, intervention components and outcomes. Quality assessments (using the Six Item Checklist Of Quality Of Execution) were carried out for each included study. All data was extracted by one reviewer. Evidence was appraised by grouping the studies according to outcomes, taking into account the setting, study design and quality.

Results

Literature review findings

Figure 1 shows the study flow. The database searches identified 2,193 articles after deduplication. The articles were retained within a Reference Manager database (version 12, www.refman.com); from 2,193 articles, 128 full-text articles were obtained and screened, of which 24 articles met the inclusion criteria. Grey literature searching, and reference list searching resulted in the identification of 10 further articles. In total, 34 studies were identified as appropriate for inclusion and 104 articles were excluded. All included and excluded studies (with reasons for exclusion) are listed in Annexe 4.

Figure 1 PRISMA Flow Diagram



Characteristics of included studies

The table in Annexe 5 reports study characteristics and the table in Annexe 6 reports study outcomes as well as detail about the types of commercial infant and baby foods and drinks that were included in each study.

The types of commercial infant and baby foods and drinks varied across the individual studies. For example, one qualitative study showed participants examples of specific commercial infant drinks (11) another study included 'infant dinners' defined as commercially prepared infant food, marketed as a meal, for example 'vegetables, beef and spaghetti' (12). In some studies the commercial food or drink was not further defined (13,14). In some studies, commercial food and/or drink was one component included within an observation of overall diet; in other studies the commercial food and/or drink was the focus of the study.

The included studies were based in 7 countries; 14 in the US, 9 in the UK, 6 in Germany, 2 in Australia and 1 each in Canada, Italy and Spain. The spread of countries is relatively narrow and partially explained by the fact that multiple studies used data from large national surveys such as the National Health and Nutrition Examination Survey (NHANES) (15-17), the Feeding Infants and Toddlers Study (FITS) (18-21, 34) the Avon Longitudinal Study of Parents and Children (ALSPAC) (13,22-24), and the Dortmund Nutritional and Anthropometric Longitudinally Designed Study (DONALD) (3,11,25-28).

Twenty-five studies were of cross-sectional design, including 4 with repeat cross-sectional samples. Five studies were longitudinal, 1 study was a market review, 2 studies were qualitative interviews and 1 was a randomised controlled trial (RCT). The majority of studies used survey data: 20 studies collected data via in-person interviews (in homes, clinics, mobile units), 8 studies interviewed participants via telephone, 2 studies used postal surveys only (22,29) and 1 study used a combination of postal, face-to-face and telephone methods (30). One study examined the nutritional profile of products in grocery stores in the US (31), 1 study reviewed the commercial infant and baby foods market in the UK (32) and 1 was an RCT (33). Only the 6 studies that used data from DONALD (3,11,25-28) used weighed dietary data, all other studies using surveys to record dietary intake used dietary recall.

Types of funders included government and research bodies, medical charities, research companies and commercial infant and baby food manufacturers. The majority of studies reported government and research funding; 6 studies reported funding solely from commercial companies (18-21,34,35), 3 studies reported a mix of type of funding (23,33,36) and 1 study reported receiving no funding (16). Only 1 study (14) failed to report source of funding. However, only a few studies explicitly reported the role of the funder within the process of the study; for example, 1 study examining the nutritional

profile of products targeted at babies and infants reported funding from the Alberta Children's Hospital and the BMO Financial Endowment in Healthy Living, and reported that the funders had no role in the design, analysis or writing of the article (31). Four studies that used data from FITS included authors that were or had been employees of Gerber/Nestle products, who contributed to the funding of FITS (18-20,34).

Eligibility criteria were not always sufficiently reported; the majority of studies reported scant details of parental socio-demographic characteristics or even baseline characteristics of the infants, with the exception of the number of participants, participant age and gender. The studies usually included mother and child, and commonly reported maternal age at birth.

The total analysed sample from all included studies was 48,466 participants; study sample sizes ranged from 24-10,768 participants. Study duration ranged from one timepoint to 7 years of follow-up. Baseline age of children was reported in all studies. The inclusion criteria age range of this scoping review was 4-36 months. Once follow-up was accounted for within the included studies, the ages of children ranged from birth to 7 years; only 7 studies analysed children aged over 24 months of age. All studies included boys and girls and the percentage of boys ranged from 50% to 54%.

Four studies reported on parental ethnicity and another 5 studies reported child ethnicity. Parental socio-demographic characteristics (mainly educational level) were clearly reported in 8 studies and child socio-demographics were reported in 2 studies.

Ten studies reported weight or body mass index (BMI) at baseline, 4 of which compared to reference samples. Carletti et al (37) reported that at 3 and 6 months, 70% and 75% of infants were within the normal range for BMI (15th-85th World Health Organization (WHO) percentile) respectively. It was reported that the mean birth weight standard deviation score of the children in the DONALD sample was slightly higher than that of the German reference population (3). The Diet and Nutrition Survey of Infants and Young Children (DNSIYC) reported that children from birth to 6 months of age were taller (longer), heavier and had larger head circumferences than the UK-WHO Growth Standard for their age and sex (38). Using data from ALSPAC, Noble et al reported that mean weight and distribution of size at birth were similar to the UK growth reference for 1990 (23).

Quality appraisal

The table in Annexe 7 reports the quality assessment for the 34 included studies. Representativeness was assessed according to whether the study samples were randomly recruited from the study population with a response rate of at least 60% (or otherwise shown to be representative of the study population). Eighteen study samples

were assessed as not representative, 12 were representative and in 4 cases it was unclear. Only 1 of the included studies was an RCT and so the issue of randomisation was not appropriate for the other 33 studies.

Comparability was assessed according to whether the baseline characteristics of the comparison groups within each study were comparable or whether important differences in potential confounders were appropriately adjusted for in the analysis. Twenty-six studies consisted of 1 study group and so this criterion could not be met. Of the 8 studies with more than 1 group, 3 studies were assessed as comparable, 1 study was assessed as not comparable and in 4 cases comparability was unclear.

Credibility was assessed according to whether data collection tools were shown to be valid and reliable. Twenty-seven studies were assessed as credible, 2 studies were assessed as not credible and in 5 cases credibility was unclear.

Attrition rate was assessed as being met if outcomes were studied in a group of respondents with an attrition rate of less than 30%. For 28 studies this criterion could not be met (mainly due to study design), attrition was met in one study, not met in 3 studies and in 2 cases attrition rates were unclear.

Attributability was assessed according to whether it was reasonably likely that the observed effects were attributable to the intervention under investigation. Attributability was assessed as having been met in 23 studies and in 11 studies this was unclear.

Outcomes

The table in Annexe 6 reports the included study outcomes for each individual study.

Consumer or user views, attitudes or opinions

Two qualitative studies, both based in the UK, examined consumer or user views, attitudes or opinions to commercial infant and baby foods or drinks.

One qualitative study (39) investigated the understanding of feeding practices detrimental to oral health, barriers to adopting safe feeding practices and commercial factors influencing feeding bottle and cup contents. The study took place in 2 areas of social deprivation in Cardiff, Wales. Mean age of the 33 mothers was 26 years (range 16-39 years), one-third of the mothers were of non-white ethnicity and 4 mothers required a translator. Mothers were shown 2 commercial drinks to aid discussion: Ribena Tooth Kind® and Sunny Delight®. The study authors concluded that mothers and carers could not easily differentiate between commercial drinks which differed in their cariogenic potential. Overall understanding of the prolonged effect of exposure to

sugared drinks in bottles and cups was poor and there were significant barriers to adopting only milk or water to drink.

Maslin et al (40) aimed to gain insight into parental perceptions of complementary feeding, specifically opinions on commercially produced infant and baby food. The study included 24 mothers from 2 towns in Surrey, England, who were white British, half of which were first-time mothers, and a third of which had experience of weaning infants with symptoms of cows' milk allergy. Mothers were shown several different infant and baby food products with a range of textures, prices and packaging. Within the small group of mothers recruited, the study defined 3 distinctive typologies, “relaxed”, “balanced” and “concerned”, characterised by different attitudes to weaning and commercial infant and baby foods, which the study authors believed may be influenced by parity, socioeconomic status and previous experience of weaning. The majority of mothers commenced the weaning process using homemade foods; study authors concluded that the mothers transitioned to include commercial infant and baby foods after 3-6 weeks due to a desire to move to foods containing multiple ingredients and to increase variety and tastes.

KEY POINT:
Only 2 qualitative UK studies were identified making it difficult to draw any conclusions about consumer views/attitudes/opinions to commercial infant and baby foods or drinks.

Purchase/preference/consumption patterns related to usage

Age of use of commercial infant and baby foods and drinks

Twelve studies from various high income countries, using data spanning over 30 years, showed that peak usage of commercial infant and baby foods and drinks is in infants aged 6-12 months (14,15,17-19,26,29,30,34,35,38,41). The evidence from large surveys suggests that the percentage of infants aged 6-12 months consuming commercial baby food is between 40 and 60%. Studies were more likely to report commercial baby food as % consumed (rather than % of consumers) or percentage of consumers consuming particular types of commercial baby foods rather than % of all baby foods.

In the US Longitudinal Infant Feeding Practices Study II (2005 to 2007), the majority of mothers indicated that by the end of the first year, all or most of the food in each food group consumed was not commercial baby food. Forty-two per cent of the infants were fed primarily commercial baby juice at peak usage (9 months), and by 12 months, only 25% were (29).

An Australian study showed that commercial baby food (not further defined) was given to 59.4% of children aged from 0-36 months. The percentage of children who were given commercial baby food was highest in the 7-12 month age group, then there was a sharp reduction. Only 3.8% of children were given commercial baby food in the age group 25-36 months (14).

A Spanish study (35) showed that usage of baby food jars increased steadily with age until it reached a plateau between 8-15 months. By 15 months of age, 80 of 131 (61.1 %) babies had received jarred baby foods at some time. There were no statistically significant differences between the socioeconomic groups.

Data from the German DONALD study (26) showed that overall, complementary foods (CF) consumed by the study sample consisted of 59.3% commercial, 21.1% homemade, and 19.6% combined (commercial and homemade) . Both commercial and homemade CF showed opposing, nonlinear age trends. The percentage of commercial CF consumed showed a decrease between 6-12 months, followed by an increase after 12 months of age. At every age between 6-24 months, commercially produced CF (cCF) accounted for a larger proportion of the CF consumed than homemade CF (cCF 31% to 40% vs homemade CF 23% to 34%, combined 26% to 32%). Although the proportion of commercial CF consumed in the second year of life was higher (40%), there were a smaller number of consumers and a lower absolute amount of CF consumed in the second year of life.

Three studies using data from FITS 2002 showed that by 9 months of age, consumption of commercial infant and baby foods (including cereal, fruit, vegetables, meats, dinners and desserts) started to decline and be replaced with non-baby foods (18). For example, percentage of users of commercial baby food vegetables was 55% at 7-8 months of age, 35% at 9-11 months, 13% at 12-14 months and 2% at 19-24 months. Percentage of users of commercial baby food fruit was 68% at 7-8 months of age, 45% at 9-11 months, 16% at 12-14 months and 2% at 19-24 months (18). Non-milk foods included in the top 10 energy sources for infants aged 12-24 months (compared to less than 12 months) were notably different, reflecting increased consumption of foods from the family table (19). Overall consumption rates of commercial baby food fruits decreased during the second year of life (34).

A UK national survey (DNSIYC 2011) (38) showed that commercial infant and baby foods were consumed mainly by children under the age of 12 months, with those aged 12-18 months more commonly consuming non-infant specific commercial foods.

Two studies using data from NHANES showed that commercial infant and baby foods were a leading source of total energy and macronutrients in infants aged 0–11.9 months (15) and that peak use of commercial baby food fruit and cereal was between 6-11 months of age (17).

Cross-sectional US survey data from 2004 to 2005 of mothers receiving the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) showed that among infants younger than 6 months, 54% had consumed complementary foods in the previous 24 hours, of which 60% were commercial baby foods. In 6-12 month olds, 97% had consumed complementary foods in the previous 24 hours, of which 81% were commercial baby foods (41).

The 8th UK Infant Feeding Survey (IFS 2010) (30) showed that at 4-6 months of age, 58% of infants had ever been given 'ready-made' (commercial) baby food, and 38% had consumed it the previous day. At 8-10 months, 84% had ever been given ready-made baby food and 44% had consumed it the previous day. At 4-6 months of age, the majority of babies who had been given solids had been given baby rice (79%). Nearly two-thirds had been introduced to fruit or vegetables (66%).

By 8-10 months of age, baby rice was no longer the most common type of complementary food reflecting the fact babies had been exposed to a broader range of food types by that age. By that point virtually all babies had been given fruits or vegetables (98%) and 93% of babies had been given homemade foods and other types of food. Use of ready-made baby food at this age was lower, although it had still been given to more than 4 in 5 (84%) babies.

At 4-6 months of age, mothers were most likely to have given their babies fruits or vegetables on the previous day (46%), ready-made baby foods (38%), baby rice (31%) and home-made foods (28%). At 8-10 months of age, fruits and vegetables were still a key feature of babies' daily diets (77% of mothers gave these on the previous day), but mothers were much more likely to be giving their babies homemade foods (70%) than ready-made baby foods (44%). Most mothers (87%) were feeding their babies fresh foods on a daily basis, compared with 41% of mothers feeding their babies ready-made foods daily.

The use of ready-made foods was most common between the ages of 5-10 months (42% of babies aged 5-7 months, 45% of those aged 8-10 months, dropping to 31% of those aged 10 months or older) (30).

Two of these studies examined whether use of commercial infant and baby foods varied by parental/child characteristics. Data from the German DONALD study (26) showed that infants with high commercial CF consumption (percentage of commercial CF > median 62%) were significantly older ($P<0.0001$), showed shorter full and total breastfeeding duration ($P<0.0001$), and were more likely to have mothers with a lower educational status ($P=0.01$). The 8th UK IFS (2010) showed that mothers in managerial/professional occupations were less likely to provide regular servings of bought ready-made foods (45% of managerial/professional mothers increasing to 62% of mothers who had never worked). Mothers from Chinese or 'other' ethnic groups were

much less likely than other ethnic groups (white, mixed, Asian or Asian British, Black or Black British) to provide bought ready-made foods (25% compared with 53%) (30). Additional data from the US FITS 2008 showed that commercial baby food consumers were younger and more likely to be white, and non-consumers were more likely to be breastfed. Parental/caregiver income and education did not differ between the groups (20).

Type of commercial infant and baby foods and drinks by age

Cereal-based commercial infant and baby foods were the most commonly consumed type of commercial infant and baby food (excluding milk products) (16-19,34).

All types of commercial infant and baby foods (cereal, fruit, vegetables, meat, dinners) followed a similar pattern in terms of age at peak usage. DNSIYC 2011 (38) showed that over 50% of children aged 4 months consumed infant meat and fish-based commercial products and dishes during the 4-day food diary period, decreasing to 29% of those aged 12-18 months. Other commercial savoury-based foods and dishes, fruit-based foods and dishes, dairy based foods and dishes, and cereal based foods and dishes also showed a similar age pattern of consumption.

The exception to this was for desserts, snacks and sweetened beverages, consumption of which increased with age. Data from the UK (38) and the US FITS (18,19) and NHANES (16) showed that the only types of commercial food consumption to increase with age was for desserts, candy, and sweetened beverages (fruit flavoured drinks and carbonated sodas) that were not specifically marketed towards infants. The energy contribution of sweetened beverages (mainly fruit flavoured drinks) increased from 3% of total energy intake among 12-14 month olds to 6% among 19-24 month olds (19).

DNSIYC 2011 (38) showed that the only type of commercial infant and baby foods for which there was an increase in consumption with age was for snacks (sweet and savoury) where 34% of children aged 4-6 months consumed these, rising to 60% or over for those aged 7-11 months then falling to 42% of those aged 12-18 months. Mean consumption of infant specific snacks (sweet and savoury) ranged between 6-7g per day among consumers (38). By 19-23 months of age, the only types of commercial infant and baby foods consumed were cereal, snacks and sweets (16).

Type of commercial infant and baby foods and drinks over time

Three studies (2 US and 1 German) examined changes in consumption of all types of commercial infant and baby foods over time, using 2005-2008 and 2009-2012 data from NHANES (17), 2002 and 2008 data from FITS (21), and 2004 and 2012 data from DONALD (26). The results were inconsistent. FITS data showed there was a

significantly lower proportion of infants and babies consuming infant cereal at age 4-5.9 months and 9-11.9 months in 2008 compared to 2002. In 2008, 50.4% of 4-5.9 month old babies and infants consumed infant cereal compared to 64.5% in 2002 ($P<0.05$); and 51% of 9-11.9 month old babies and infants consumed infant cereal in 2008 compared to 63.8% in 2002. There was a significantly lower proportion of babies and infants in the 4-5.9 month old (16.8% vs 34.8%) and 6-8.9 month old age groups (50.2% vs 66.4%) consuming jarred baby food fruit in 2008 compared to 2002.

However, among children aged 18-20.9 months, there was a significantly higher proportion of infants consuming jarred baby food fruit in 2008 (10.3% vs 2.2%). There were no significant changes in jarred baby food vegetable consumption in 2008 compared with 2002 for any of the age sub-groups. Among children aged 9-11.9 months in 2008, there was an 80% decline in the percentage consuming commercial infant and baby food meats compared with 2002 (1.2% vs 5.9%), which was significant without a compensating increase in other protein sources. There were significant declines in the percentage consuming protein sources in commercial infant and baby food dinners for 9-11.9 month olds from 2002 (34.6% vs 24.9% in 2008). There were significantly lower percentages of children aged 6-8.9 months (2.8% vs 14.1%), 12-14.9 months (2.0% vs 6.1%), and 15-17.9 months (0.3% vs 3.2%) consuming commercial infant and baby food desserts in 2008 compared to 2002 (21).

NHANES data showed a marked decline in consumption of commercial infant cookies, teething biscuits, and animal crackers in both age groups over time (between 2005-2008 and 2009-2012); the prevalence decreased by 17.0% among 6-11 month olds ($P < 0.001$) and 12.2% among 12-23 month olds ($P =0.007$). Commercial baby food fruit consumption was 53-60% for 6-11 month olds and 6-9% in 12-23 month olds and did not change significantly over time within either age grouping. Seventy-one to 72% of 6-11 month infants and 13-15% of 12-23 month old infants consumed commercial infant cereal and these rates did not change significantly over time (17).

DONALD data examined child age and time trends for the different methods of preparation of complementary feeding (CF), calculated as percentage of total CF intake. No significant time trends could be found for any method of preparation during the study period, neither in the unadjusted nor in the adjusted models (26).

Consumption of commercial infant and baby foods and drinks by type of milk (breastfed and/or formula)

Three studies (20,23,26) showed differences in consumption of commercial infant and baby foods depending on whether infants were given formula milk or breastfed; the proportion of breastfed infants consuming commercial food was smaller than the proportion of formula fed infants.

A random sub-sample from the UK Avon Longitudinal Study of Parents and Children (ALSPAC), showed that breastfed infants were consuming less commercial infant and baby foods than formula fed infants. At 4 months old the most commonly consumed commercial foods were dried commercial infant foods (consumed by 70% of infants). There were significant differences ($P < 0.01$) by milk group in relation to the percentage of consumers of dried commercial infant food (particularly dried meat-based). The mixed-milk group had the largest percentage of consumers of dried commercial infant food (76%) and the breastfed group the smallest percentage (63%). There was no significant difference between the 3 groups for consumption of baby jars and tins (23).

Longitudinal data from DONALD (26) showed that participants with high commercial complementary food (CF) consumption (percentage of commercial CF > median 62%) showed shorter full breast-feeding (breast milk in combination with water or water-based drinks) and total breastfeeding (defined as full and partial that is breast milk in combination with formula or complementary feeding) duration (13.6 weeks versus 19.4 weeks full breastfeeding and 31.8 weeks versus 41.9 weeks total breastfeeding, $P<0.0001$).

Cross-sectional data from FITS (20) showed that non-consumers of any commercial baby food (commercial baby food fruit, baby food vegetable, or baby or toddler dinner on the 24-hour dietary recall, but not infant cereal) were more likely to be breastfed. Fifty-eight percent of non-consumers of commercial baby food reported breastfeeding compared to 39.7% of consumers of commercial baby food.

Evidence suggests that even when the proportion of infants consuming these types of commercial infant and baby foods are similar, the amount of commercial infant and baby food ‘dinners’ consumed may differ between infants that are breastfed and those that are not. An Australian cross-sectional survey (1991-2001) which was part of a longitudinal study on child growth (12) reported that, although similar proportions of breastfed and non-breastfed infants ate ‘infant dinners’ (commercially prepared infant food, marketed as a meal, for example ‘vegetables, beef and spaghetti’), the daily amounts consumed by the former were significantly lower; 59% breastfed infants consumed ‘infant dinners’, median 50g, 64% non-breastfed infants consumed, median 85g, $p<0.001$. However, it should be noted that over reporting of dietary data was more likely to occur when the mother was less than 30 years old, left high school early, had a household income below $AU 31,199 per annum, not to have breast-fed and to have introduced solids before 16 weeks (12).

Two studies, both using UK data from ALSPAC, showed variation in results for consumption of commercial infant drinks between formula or breastfed infants and for infants at different ages (23,24). A random sub sample from ALSPAC showed that 4-month old infants given formula milk were more likely to consume commercial infant and

baby drinks, compared with infants who were breastfed. Commercial infant and baby fruit drinks were consumed by 33% of infants overall, by 44% of the formula-fed group, by 15% of the breastfed group and by 28% of the combined group(23).

A different random subsample (Children in Focus, CIF) from ALSPAC showed that commercial infant and baby drinks were consumed by 5.6% of the study population of 18-month old infants. A child having no older siblings and mother age 30 years or over were both associated with increased use of commercial baby drinks but education, housing tenure, financial difficulties, breastfeeding and smoking were not associated with consumption of commercial infant and baby drinks at 18 months. There were no significant differences in the drinks consumed between boys and girls nor between the groups defined by difficulty affording food (24).

Type of commercial infant and baby foods and drinks by type of childcare

Evidence from 1 US study showed that types of complementary foods and drinks were not significantly different according to whether the infant was cared for by a parent or by another form of childcare. The Caretaker Research Advancing Youth Obesity and Knowledge (CRAYON) study (42) compared infant feeding practices and complementary food type between parent care (PC) and childcare (CC) settings among infants aged 2-8 months, of low-income mothers receiving the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). CC was defined as infants receiving 10 hours or more per week of care from a non–parental caregiver (defined as any non–parental caregiver such as a relative or home-based and centre-based caregiver).

The average age of introducing complementary foods or drinks (CF) did not differ significantly between the PC group and the CC group. Types of CF were not significantly different by PC vs CC. The universally consumed food amongst the 49 children was commercial infant cereals (100% of infants in both groups), followed in frequency by commercial infant and baby food fruits and vegetables, commercial infant cereal from a bottle, 100% fruit juice, commercial meat-based baby food, and chopped fruits and vegetables. Consumption of other types of CF was less frequently reported. Bread or crackers were consumed in similar frequencies by PC and CC infants, but 5 times as many CC infants (20.8%) consumed chopped/mashed meats as PC infants (4.0%), and over twice as many CC infants (16.7%) were fed non-infant cereal, pasta, rice, and muffins, compared with PC infants (8.0%). In contrast, almost twice as many PC infants (8.0%) were given fruit cocktail, fruit-flavoured drinks, or less than 100% fruit juice compared with CC infants (4.2%). There were no significant differences in age, sex, race/ethnicity, preterm delivery, and birthweight between the 2 study groups (42).

KEY POINTS:

Evidence from 12 studies from various high income countries, using data spanning over 30 years, showed that peak consumption of commercial infant and baby foods occurs between 6-12 months of age; the percentage of infants aged 6-12 months consuming commercial baby foods is between 40 and 60%.

Consumption of commercial infant and baby snacks (sweet and savoury) and sweets may continue longer, into the second year of life.

Evidence suggests that from 12–24 months of age there is an increase in consumption of commercial snacks and sweets and sweetened beverages, not specifically marketed towards infants.

The evidence is inconsistent for changes in consumption of commercial infant and baby foods and drinks over time.

Three studies showed differences in consumption of commercial infant and baby foods depending on whether infants were given formula milk or breastfed; the proportion of breastfed infants consuming commercial baby food was smaller than the proportion of formula fed infants.

One small US study of low income mothers of infants aged 2-8 months showed no difference in consumption of infant cereal or baby food according to whether the infant was cared for by a parent or received 10 hours or more per week of care from a non–parental caregiver.

Purchase/preference/consumption patterns related to marketing

One US cross-sectional survey studied satisfaction with and preference for a benefits programme (43), another US study examined the validity of marketing (31) and one UK review (32) studied the form of packaging and described the focus of marketing. However, none of these studies directly reported on the impact of marketing on purchase, preference or consumption.

A repeat cross-sectional survey – the California Nutrition Education and Food Package Impact (NEFPI) survey – and California Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) voucher redemption data was used to examine participant use and satisfaction with commercial jarred baby fruits or vegetables, assess preference for cash value vouchers (CVVs) for fruits or vegetables versus jarred baby fruits or vegetables, and examine whether preferences varied among selected ethnic groups. For women or caregivers with children aged 1-5 years CVVs were available to purchase fruit and vegetables. For infants aged 6-11 months old, jarred fruit and vegetable baby foods were available (but not CVVs).

Participants reported high satisfaction with the CVVs for fruits and vegetables and jarred baby foods. About two-thirds of all participants reported a preference for CVVs for fruits and vegetables (that is preference for fresh fruit and vegetables) over jarred baby foods. Redemption data indicated declining redemption rates for jarred fruits and vegetables with increasing age of the infant. Of the caregivers of 6-11 month old infants, 81.4% were ‘‘very satisfied’’ with the CVVs for fruit and vegetables that they received for themselves and/or their 1-5 year old child. There were statistically significant variations in caregiver satisfaction levels of fruit and vegetable CVVs across ethnic groups. Satisfaction with jarred baby foods was also high, with 83.7% of caregivers indicating they were ‘‘very satisfied’’ with vouchers for jarred baby foods. Across ethnic groups, there were no significant differences in satisfaction levels for jarred baby food. Despite the high satisfaction with jarred baby foods, if given a choice, 66.1% of participants reported they would prefer to have CVVs for fruits and vegetables for their 6-11 month old infant than continue to receive vouchers for jarred baby foods. CVVs for fruits and vegetables were preferred by about half of whites and African Americans, compared with more than two-thirds of Latinos and others (43).

Metcalfe et al (31) examined the nutritional profile of products targeted at babies and toddlers based on the presence/absence of nutritional symbols and the issuing body of nutritional symbols in grocery stores in the US. The researchers visited 9 stores in Philadelphia (5 grocery, 2 drug, 2 department stores) and purchased all packaged foods that were targeted for consumption by babies and toddlers. In general, products with and without nutritional symbols or nutritional symbols issued by different authorizing bodies did not differ in advertising characteristics or front-of-package nutritional claims. However, products with a nutritional symbol issued by government/health professionals

had a different nutrient profile than products with nutritional symbols issued by the manufacturer directly and products with no nutritional symbols. Products whose nutritional symbol was issued by government/health professionals contained significantly less sugar (P=0.004) per serving than products without a nutritional symbol and products whose nutritional symbol was issued by the manufacturer.

Crawley and Westland (32) reviewed the commercial infant and baby food market in the UK, focusing on foods sold in jars, pouches and trays for infants in the first year of life and considering the composition, ingredients, nutrition, texture, cost, packaging and claims of these products. The review highlighted that manufacturers used a range of marketing techniques to promote the use of commercial infant and baby foods, emphasising the convenience and healthiness of products. In the UK, almost half of all the baby foods for infants in the first year produced by the 4 biggest manufacturers of baby foods sold in jars and pouches (Cow & Gate, Ella's Kitchen, Heinz, Hipp Organic who represented 89% of the total market share of the baby foods and drinks market in the UK in 2015) were marketed for those under the age of 6 months. Baby food was marketed primarily in jars and pouches, with pouches becoming increasingly popular. However, pouches were a more expensive way to buy baby food, and there are risks that children will eat directly from the pouch. The review authors discuss the deleterious effects of children sucking directly from the pouches, including potential impact on oral health, not chewing but sucking instead, not allowing the children to see what they are eating and not allowing infants or caregivers to know how much the child has eaten.

KEY POINTS:

There is a paucity of available evidence on the impact of marketing on purchase, preference or consumption.

The focus of marketing in the UK (as determined by packaging and appearance of products) is convenience and healthiness of products.

Total energy consumption

Evidence from the US FITS 2002 study (19) showed that among babies and infants aged 6-11 months, non-milk foods included in the top 10 sources of energy are infant cereal, 100% fruit juice, commercial infant and baby food dinners, bananas, cookies, apples/apple sauce, and commercial infant and baby food desserts. Non-milk foods included in the top 10 energy sources for infants aged 12-24 months are notably different, reflecting increased consumption of foods from the family table: 100% fruit juice, sweetened beverages (mainly fruit-flavoured drinks), cheese, bread/rolls/biscuits/bagels/tortillas, chicken/turkey, butter/oil/margarine/other fats, non-infant cereals, cookies, and hot dogs/cold cuts/sausages/bacon. The energy

contribution of sweetened beverages increases as toddlers age, from 3% of total energy intake among 12-14 month olds to 6% among 19-24 month olds (19).

Another study using data from FITS showed that energy intake from complementary foods was not significantly different between consumers and non-consumers of commercial infant and baby foods (330 vs 521 kcal, P = 0.07), but consumers reported lower amounts of total complementary food, when measured by weight, than did non-consumers (481 vs 619 g, P =0.008). Among consumers, the average daily consumption of total commercial baby foods was 217 g, and 57% of total vegetable intake and 45% of total fruit intake were from commercial baby food. Commercial baby foods were defined as any commercial baby food fruit, baby food vegetable, or baby or toddler dinner (excluding infant cereal) (20).

Data from the US NHANES 2005-2012 showed that commercial infant foods contributed 13-17% of daily energy intake for children aged 4-11 months, compared to 6% in children aged 12-18 months (38). Total energy as % daily intake was: 0-5.9 months: 3.7% baby foods; 6-11.9 months: 16.5% baby foods, 1.5% baby beverages; 12-23.9 months: 2.6% baby foods (15).

Data from the German DONALD Study (3) showed that median percentage consumption of commercial complementary foods (%cCF) in infancy (6-9 months) was 57.7%. High (above the median %cCF >58.7%) and low (<58.7%) commercial complementary feeding consumers did not differ in maternal or early life baseline characteristic except total energy intake, in infancy was lower in high consumers than low consumers (651 vs 682 kcal).

Another study using data from DONALD showed that median energy density (kcal/100 g) was highest in commercial and home-made cereal–milk meals (89 kcal/100g) compared to savoury meals, cereal-fruit meals, vegetable meals, fruit meals and dairy-fruit meals. The energy density was significantly lower in commercial meals compared to home-made savoury and cereal–fruit meals(28).

A US-based trial randomised infants to receive: 1) early introduction of commercially prepared solid foods (commercial), 2) late introduction of commercial foods, 3) early introduction of parent’s choice of solid foods (choice), or 4) late introduction of choice. Infants in the early group were introduced to solid foods at 3- to 4-months of age, whereas the late group was introduced to solid foods at 6 months of age.

The RCT showed that, at 12 months, infants allocated to the commercial foods group consumed fewer calories from solid foods compared with the parent’s choice group (mean 471 kcal/d vs 634kcal/d; P <0.001). Infants in the commercial group consumed less total calories at 12 months (884 kcal/d vs 1022 kcal/d) compared with the choice group. Infants allocated to the commercial foods group also had a decreased caloric

intake from protein and fat at 12 months compared with the choice group. The contribution of commercially prepared solid foods to total energy intake was not different between commercial and choice groups at 6 months (13.0(se1.5)% vs 14.1(se1.5)%; P =0 .60); however, infants in the commercial group had a larger energy intake from commercially prepared foods at 9 months (40.8(se1.6)% vs 28.0(se1.6)%; P <0.001) and 12 months (45.3(se1.9)% vs 12.9(se1.9)%; P <0.001) compared with the choice group (33).

KEY POINTS:
Commercial baby foods contribute a significant proportion of total energy intake at 6-11 months, but much less at 12-24 months.

There is consistent trial and observational evidence (US, Germany) that commercial baby food consumers have lower energy intakes from complementary foods than non-consumers, possibly due to the lower energy density of commercial baby foods compared to home-prepared foods. There is weaker evidence that this may translate to lower total energy intakes among commercial baby food consumers.

Sugar

Evidence from 4 studies (Germany, UK, US) reported on total sugars, non-milk extrinsic sugars (NMES), and added sugars (15,27,28,38). Evidence suggests that commercial complementary infant and baby foods and drinks, particularly cereal or fruit based foods, make a significant contribution to total daily sugar intake (13-15%) between the ages of 6-12 months. In German infants, a higher proportion of commercial complementary infant and baby foods in the diet was associated with higher added sugar content and higher added sugar intake in pre-school and primary-school age children (34). Although infant and baby beverages contribute relatively less in terms of proportion to overall total sugar intake, one study showed that infant and baby beverages for 6-11.9 month olds contributed 3.6% and ranked 6th place in terms of largest contributor (22).

A UK national survey, DNSIYC (2011), showed that the main contributor to NMES for children aged 4-6 months and 7-9 months was the food group ‘commercial infant foods’ (44% and 34% respectively), particularly ‘fruit-based foods and dishes’ and ‘cereal based foods and dishes’.

For children aged 4-11 months, the main contributor to NMES intake for those whose parents/carers were in the managerial and professional group was the food group ‘milk and milk products’ not including consumption of infant formula or breast milk (39%), significantly higher than for those parents/carers in the routine and manual category

(29%). ‘Commercial infant foods’ made the greatest contribution to NMES intakes for children whose parents/carers were in the routine and manual category (36%) compared to those with parents/carers in the managerial and professional category (29%). For children aged 12-18 months the contribution to NMES from ‘commercial infant foods’ was significantly higher for those whose parents/carers were from the managerial and professional category (18%) than for those whose parents/carers were from the routine and manual category (14%) and the contribution from beverages was significantly higher for the intermediate (between routine/manual and managerial/professional) category (12%) compared to the managerial and professional category (9%).

For children aged 4-11 months, there was no significant difference in mean daily NMES intake by ethnicity, whereas for children aged 12-18 months mean daily NMES intake was significantly lower for South Asian children (15.3g, 5.9% energy) compared to white children (20.4g, 7.9% energy). For children aged 4-11 months, the main contributor to NMES intake for white children was the food group ‘milk and milk products’ (35%), significantly higher than for South Asian (26%) and children from ‘other’ ethnic backgrounds (30%). ‘Commercial infant foods’ was the main contributor to NMES intake for South Asian children (42%) and children from ‘other’ ethnic backgrounds (43%), compared to 30% for white children; the difference between white and children from ‘other’ ethnic backgrounds was significant. For children aged 12-18 months, the food group ‘milk and milk products’ was the greatest contributor to NMES intake for all children (26% to 32%), with no significant variation by ethnic group. ‘Commercial infant foods’ was the next largest contributor for South Asian and children from ‘other’ ethnic backgrounds at 18% and 21% respectively, compared to 16% for white children, for whom the food group ‘cereals and cereal products’ was the second largest contributor at 17%, significantly higher when compared to 13% for South Asian and 14% for children from ‘other’ ethnic backgrounds (38).

Data from the German-based DONALD study showed that added sugars (sugars and syrups that were added to foods during processing or preparation) were found in less than one-quarter of meals. The highest added sugar content was found in commercial dairy–fruit meals (third quartile: 7g/100g). In both cereal meal types (cereal-milk and cereal-fruit), added sugar contents were higher in commercial than homemade meals. With age (from 6 to 12 months), added sugar content in both types of commercial cereal-based meals consumed increased significantly, although the effect size was small (<0.1 g per 100g per month of age) (28).

In infancy, a higher %cCF was associated with odds for high added sugar intake from CF and for high total added sugar intake (>75th percentile, P<0·033). Prospectively, a higher %cCF was related to higher added sugar intake in both pre-school (P <0·041) and primary-school age children (P <0·039).These associations were attenuated in models adjusting for added sugar intake in infancy, which suggests that a higher %cCF

in infancy, by virtue of its high added sugar content, may predispose to higher added sugar intake in later childhood (27).

Data from the US-based NHANES showed the contribution of commercial baby foods to total sugars as % daily intake (≥1%) 0-5.9 months: 1.5% baby foods; 6-11.9 months: 13.3% baby foods, 3.6% baby beverages; 12-23.9 months: 2.2% baby foods, 1.2% baby beverages. Amongst 6-11.9 month olds, baby beverages were ranked 6th place for contribution to total sugars, contributing 3.6% (15).

KEY POINTS:
Evidence from 4 studies (Germany, UK, US) suggests that consumption of commercial infant and baby foods and drinks makes a significant contribution to total sugar intake (13-15%) between the ages of 6-12 months.

The main contributor to NMES intake for infants aged 4-9 months in the UK was the food group 'commercial infant foods', particularly 'fruit-based foods and dishes' and 'cereal based foods and dishes'.

Higher added sugars in infancy may predispose children to higher added sugar intake during later childhood.

Weight status

Only 2 studies (Canada, US) reported anthropometric outcomes (33,36), with inconsistent results for fat mass and percent body fat of infants between the 2 studies.

An observational analysis of an RCT of vitamin D supplementation in healthy breastfed (consuming ⩾80% of total milk volume) infants in Canada showed that exposure to home-prepared meat or fruit and vegetables by 9 months of age was associated with reduced adiposity up to age 3 years. Nutrient intakes were not affected. By 9 months, 21.5% (n=14) of infants had exclusively received homemade foods only, 21.5% (n=14) infants had exclusively received commercial foods only and 57% (n=37) infants had received both (reference group). Analyses were adjusted for potentially confounding covariates including family income (⩾$75 000), maternal education (college or university) and infant sex. The homemade foods group had 773g (95% CI: −1364, −182; P<0.01) lower whole-body fat mass and 7.1% (95% CI: −12.6, − 1.6; P<0.05) lower % body fat at 12 months compared with the reference group (combined homemade and commercial foods). Reduced whole-body fat mass in the homemade foods group persisted at 36 months (−696 g (95% CI: − 1341, − 52); P<0.05).

There was no difference between groups for changes in length-for-age, weight-for-age or body mass index-for-age, unadjusted and adjusted using combined group as the

reference group. It should be noted that the participants for this secondary analysis were recruited from an RCT of vitamin D supplementation and there is a potential confounding effect of Vitamin D supplementation (from the original trial) on linear growth, although the trial results found no effect of vitamin D supplementation on growth (36).

A US-based RCT considered whether early versus late introduction of solid foods and commercially prepared versus parent's choice of solid foods affects growth or body composition in the first year. Infants were randomised to receive: 1) early introduction of commercially prepared solid foods (commercial), 2) late introduction of commercial foods, 3) early introduction of parent's choice of solid foods (choice), or 4) late introduction of choice. Infants in the early groups were introduced to solid foods at 3-4 months of age, whereas the late groups were introduced to solid foods at 6 months of age. Infants in the commercial foods group were first introduced to single cereals, followed by multiple grain cereals, then fruits and vegetables. Parents in this group were asked not to offer foods that were not commercially prepared to their children. Infants in the choice groups were introduced to cereals followed by other foods as directed by the parents and/or paediatrician. No specific dietary recommendations were given by study personnel to this group. In addition to solid foods, infants in all groups were fed proprietary formula during the study period. However, infants were permitted to consume breast milk before randomization into study groups at 3 months of age. As described above, infants allocated to the commercial foods groups had a decreased total caloric intake but there was no effect on growth or body composition (weight, length, fat mass) at 12 months (33). Mean (standard error) % fat mass at 12 months was 30.3% (0.6) for the commercial group compared with 30.0% (0.6), P=0.65.

KEY POINTS:
Two studies (Canada, US) report inconsistent results for fat mass and percent body fat associated with consumption of commercial infant and baby foods.

An observational analysis in healthy breastfed infants in Canada showed that exposure to home-prepared meat or fruit and vegetables by 9 months of age was associated with reduced % body fat up to age 3 years. However, a US-based RCT of commercially prepared versus parent's choice of solid foods showed no significant difference between groups on % body fat up to 1 year.

Dental health

One UK qualitative study examined dental health. Chesnutt et al (39) investigated the understanding of feeding practices detrimental to oral health, barriers to adopting safe feeding practices and commercial factors influencing feeding bottle and cup contents. The study took place in 2 areas of social deprivation in Cardiff, Wales. Mean age of the

33 mothers was 26 years (range 16-39 years), one third of the mothers were of non-white ethnicity and 4 mothers required a translator. Mothers were shown 2 commercial drinks to aid discussion: Ribena Tooth Kind® and Sunny Delight®.

Mothers and carers could not easily differentiate between the cariogenic potential of these two commercial products. Overall understanding of the cariogenic effect of prolonged exposure to sugared drinks in bottles and cups was poor and there were significant barriers to adopting only milk or water a drinks. For example, offering water was seen as a sign of poverty.

KEY POINT:
Only 1 small UK qualitative study was identified which examined consumption of commercial infant and baby drinks in relation to dental health.

Fruit and vegetable intake

Nine studies (Germany, UK, US) examined intake of commercial infant and baby fruit and vegetable products; 6 studies examined consumption at one timepoint, 1 study examined changes over time and 2 studies examined the association between commercial complementary foods and fruit and vegetable intake up to 7 years of age.

The US FITS 2002 showed that commercial baby and infant foods were the leading source of vegetables in the diets of infants up to 7-8 months old. By 9-11 months, home cooked vegetables were more commonly consumed than commercial baby food vegetables. Commercial infant and baby foods were the leading source of fruits in infants' diets through 7-8 months of age. By 9-11 months, the percentages consuming commercial infant and baby food fruits and other fruits were roughly equivalent (18).

The US Longitudinal Infant Feeding Practices Study II (2005 to 2007) showed that at age 6-9 months, a majority of the mothers reported that all or most fruits and vegetables fed to their infant were as commercial baby food (29).

Data from the US NHANES (2009–2014) showed that commercial baby foods were the main source of fruit and vegetables for 6-11 month olds. However, by 19-23 months only baby food cereals and baby food snacks and sweets were consumed (16).

Cross-sectional US survey data from 2004 to 2005 of mothers receiving the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) showed that consumption of commercial baby foods (assessed by 24 hour recall) accounted for the majority of infant vegetable consumption between ages 3-5 months, peaked between 6-8 months, and then decreased with the introduction of non–commercial baby food vegetables between ages 9-12 months. Consumption of commercial baby foods accounted for nearly all fruit consumption between ages 3-5 months, increased through

age 8 months, and then decreased with the introduction of non–commercial baby food fruits (41).

The US FITS 2002 showed that 6-11 month Hispanic infants were less likely to be eating commercial baby food fruits, compared with non-Hispanics (42.9% vs 58.1%). Similarly, 6-11 month old Hispanic infants were less likely to eat commercial baby food vegetables compared with non-Hispanic infants (34).

Data from the US FITS 2008 showed that consumers of commercial baby foods aged 6-11.9 months were significantly more likely to report eating all vegetables (excluding white potatoes, 71% vs 51%), deep yellow vegetables (42% vs 18%), and fruits (79% vs 65%) and were less likely to report eating white potatoes (10% vs 24%), dark green vegetables (4% vs 20%), and sweets (23% vs 47%) than were non-consumers. Overall, commercial baby food consumers had a much higher intake of all vegetables when measured in grams. The smaller differences in calories from vegetables reflect that the vegetables eaten by commercial baby food consumers were lower in calories (20). In this analysis, infant cereal was not included in the definition of ‘consumers’ because the authors argued that doing so would have classified almost all children as baby food consumers, leaving no comparison group.

Evidence from the German-based DONALD study suggests that the preparation method (commercial vs homemade) of complementary foods is associated with different patterns of fruit and vegetable consumption in infancy (6 to 9 months) and possibly for boys into preschool (3-4 years) and school age (6-7 years). For boys, higher percentage consumption of commercial complementary feeding (%cCF) was associated with lower vegetable intake (grams per day) in infancy ($p < 0.0001$) and preschool age ($p = 0.036$) as well as lower total fruit and vegetable (FV) intake in preschool and school age ($p < 0.009$). For girls, higher %cCF was associated with lower vegetable intake ($p < 0.0001$) in infancy (3).

The UK ALSPAC study showed that frequency of consumption of commercial ready-prepared vegetables at 6 months was not positively associated with vegetable consumption at 7 years. Frequency of commercial ready-prepared fruit at 6 months was not positively associated with fruit consumption at 7 years. There was some evidence of a negative association between (higher) consumption of ready-prepared fruit and vegetables (FV) at 6 months and (lower) consumption of certain vegetables, in particular green and leafy vegetables, at 7 years. Children who were more often given home-cooked fruit or vegetables at 6 months were more likely to be eating a higher proportion of FV at 7 years, than those who were given home-cooked FV less often. The age of introduction to home-cooked vegetables moderated the relationship between frequency of consumption at 6 months and 7 years (22). When the age of introduction was early (1 standard deviation (SD) below the mean of 3.25 months), the frequency of

consumption of home-cooked vegetables at 6 months did not have a great impact on consumption of vegetables at 7 years. When the age of introduction to home-cooked vegetables was late (1 SD above the mean, 5.65 months), and the frequency of consumption of home-cooked vegetables was low at 6 months, then the frequency of consumption of vegetables was lower at 7 years. However, if age of introduction was late but frequency of consumption at 6 months was high, then at 7 years frequency of consumption of vegetables was also high.

KEY POINTS:
Commercial infant and baby products are the main source of fruit and vegetable consumption in US infants up to and peaking between 9-11 months of age.

Evidence suggests that consumers of commercial baby foods may consume different types of fruit and vegetables compared with non-consumers.

The evidence is inconsistent for the association between higher consumption of commercial infant and baby fruit and vegetables at 6 months of age and lower consumption of fresh fruit and vegetables up to 7 years of age. Evidence suggests there may be differences in association between types of fruit and vegetables and by gender.

Dietary diversity

Five studies from the UK, US, Germany and Canada, reported on dietary diversity and consumption of commercial infant and baby foods and drinks.

In a multivariate model using cross-sectional US survey data from 2004 to 2005 of mothers receiving the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), infants aged 6-12 months who received commercial baby foods consumed a greater variety of fruits and vegetables ($P<0.001$) than infants who did not. This was characterized by a diet that was lower in white potatoes (14% vs 22%) and higher in dark-green (6% vs 5%) and deep-yellow (35% vs 10%) vegetables (41).

Conversely, an observational analysis of an RCT in healthy breastfed Canadian infants showed that exposure to home-prepared meat or fruits and vegetables by 9 months of age was associated with increased complementary diet diversity during the first year of life. Anthropometric measurements and nutrient intakes were not affected. By 9 months, 14 infants had exclusively received homemade foods, 14 infants had exclusively received commercial foods and 37 infants had received both. The development of dietary diversity (number of WHO-recommended food groups) was higher (0.76 (95% CI: 0.14, 1.38); $P<0.05$) in the homemade foods group versus commercial foods group (36).

Data from the German DONALD study showed that fruit and vegetable variety scores showed no clear associations with percentage consuming commercial complementary foods in girls and boys (3).

Other study data from DONALD showed that vegetable variety was low in homemade as well as in commercial meals without any differences in total variety at 6 and 9 months of age. At 12 months of age infants fed with commercial meals got a higher vegetable variety than those fed with homemade meals. In homemade and commercial meals, carrot was used most often (carrot in 69% of commercial meals), whereas other vegetables were far below this frequency. In both homemade and commercial meals, poultry and beef were most often used whereas fish meals were rarely offered. Although used rarely, fish was fed more often in commercial meals than homemade meals (25).

Despite inconsistent evidence that commercial complementary baby foods contribute to greater dietary diversity, a UK qualitative study highlighted that mothers transitioned to include commercial baby foods due to a desire to move to foods containing multiple ingredients and to increase variety and tastes (40).

KEY POINT:
The evidence across Europe and North America is inconsistent in relation to dietary diversity, particularly with regards to fruit and vegetables, with consumption of commercial infant and baby fruit and vegetable products being associated with both lower and higher diversity compared to non-commercial foods and drinks.

Summary and conclusions

The aim of this review was to scope the available evidence to address a series of questions required to support policy and practice decision making. The findings will be considered by PHE as part of their review of the evidence and opportunities for action on foods and drinks targeted at babies and young children.

What are the characteristics of the users of commercial infant and baby foods and drinks?

What type of commercial infant and baby foods and drinks are used and by whom, when, why, for how long and how often?

Twelve studies from various high-income countries, using data spanning over 30 years, showed that consumption of most types of commercial infant and baby foods peaks between the ages of 6-12 months. Consumption of commercial infant and baby snacks (sweet and savoury) and sweets may continue for longer and into the second year of life. There is relatively less evidence regarding the consumption of commercial infant and baby drinks. Evidence demonstrates that a smaller proportion of breastfed infants consume commercial baby food compared with formula fed infants. Evidence relating to changes over time in consumption patterns was inconsistent and also varied according to the age of the child and the type of commercial infant and baby foods or drinks.

Does usage vary by parental/child characteristics such as age of child, level of parental education, working patterns of parents, type of childcare, ethnicity, socioeconomic status?

Nine studies reported on the association between socio-demographic characteristics and the consumption of commercial infant and baby foods and drinks. The results were inconsistent, and in addition many of the samples were not representative of the general population.

Evidence from a large UK observational sample suggests variation in the consumption of commercial baby foods and drinks, as a proportion of the contribution to NMES, by occupational status and at different ages of the infant. For children aged 4-11 months, there was no significant difference in mean daily NMES intake by ethnicity, whereas for children aged 12-18 months mean daily NMES intake was significantly lower for South Asian children.

Does usage vary by external characteristics such as setting, type of foods and drinks (for example snacks, meals), time of day, weekday/weekend/holidays?

Only one small study of low income mothers of infants aged 2-8 months in the US examined use of commercial infant and baby foods or drinks according to external characteristics. There was no difference in consumption of infant cereal or commercial baby food according to whether the infant was cared for by a parent or received 10 hours or more per week of care from a non–parental caregiver.

How are commercial infant and baby foods and drinks marketed?

How are commercial infant and baby foods and drinks marketed and/or promoted?

Two studies examined how commercial infant and baby foods and drinks are marketed. Metcalfe et al (31) examined the nutritional profile of products targeted at babies and infants based on the presence/absence of nutritional symbols and the issuing body of nutritional symbols in grocery stores in the US. In general, products with and without nutritional symbols or nutritional symbols issued by different authorizing bodies did not differ in advertising characteristics or front-of-package nutritional claims. However, products with a nutritional symbol issued by government/health professionals had a different nutrient profile than products with nutritional symbols issued by the manufacturer directly and products with no nutritional symbols, containing significantly less sugar (P=0.004) per serving.

Crawley and Westland (32) reviewed the commercial infant and baby food market in the UK, focusing on foods sold in jars, pouches and trays for infants in the first year of life and considering the composition, ingredients, nutrition, texture, cost, packaging and claims of these products. The review highlighted that manufacturers use a range of marketing techniques to promote the use of commercial baby foods, emphasising the convenience and healthiness of products. Almost half of all the commercial baby foods targeted for infants in the first year produced by the 4 biggest manufacturers of baby foods in jars and pouches were marketed for those under the age of 6 months, which is inconsistent with advice from the WHO (44) and the Scientific Advisory Committee on Nutrition (45) (SACN). Commercial infant and baby food was marketed primarily in jars and pouches, with pouches becoming increasingly popular. The marketing review points out that pouches are a more expensive way to buy baby food, and there are other concerns regarding oral health with eating directly from the pouch.

Where are commercial infant and baby foods and drinks marketed and sold?

No studies were identified that systematically examined where commercial infant and baby foods and drinks were marketed and sold.

What is the impact of this marketing on purchase, preference (of the parent, the child and/or the parent's perception of the preference of the child) and consumption?

One study examined the impact of marketing on preference in a group of low-income US mothers. Despite high satisfaction with cash value vouchers (CVVs) for fruit and vegetables and also for jarred baby foods, if given a choice, 66.1% of participants reported they would prefer to have CVVs for fruit and vegetables for their 6-11 month old infant than continue to receive vouchers for jarred baby foods.

Does the impact of marketing vary by socio-demographic characteristics of the purchasers?

One study examined the impact of marketing on preference in a group of low-income US mothers. Preference for CVVs varied by ethnic group. About half of whites and African Americans preferred CVVs for fruit and vegetables, whereas more than two-thirds of Latinos and others (not further stated) preferred CVVs for fruits and vegetables.

What is the impact of the use of commercial infant and baby foods and drinks?

Does the use of commercial infant and baby foods affect total energy consumption, total sugars and free sugar consumption?

Evidence from 4 studies based in the US/Germany, including one RCT, suggested that consumers of commercial infant and baby foods have lower energy intakes from complementary foods compared with non-consumers. Evidence that this may translate to lower total energy intakes among commercial baby food consumers was weaker. Commercial baby foods contribute a significant proportion of total energy intake at 6-11 months, but much less at 12-24 months.

The main contributor to NMES intake for infants aged 4-9 months in the UK was the food group 'commercial infant foods', particularly 'fruit-based foods and dishes' and 'cereal based foods and dishes'. Higher added sugars in infancy may predispose children to higher added sugar intake during later childhood.

Is there an impact on adiposity and or dental health outcomes associated with the current or previous use of commercial infant and baby foods and drinks?

There is insufficient and inconsistent evidence to assess the impact of commercial infant and baby foods and drinks on adiposity. Only 2 studies reported on the use of commercial infant and baby foods and anthropometric outcomes with inconsistency in the results for fat mass and percent body fat between the 2 studies (the observational analysis but not the RCT showed a significant association between consumption of

commercial baby food and percentage body fat). There is also insufficient evidence to assess the impact of commercial infant and baby foods and drinks on dental health outcomes.

Limitations of this review

The searching, data extraction and quality assessment was carried out by only one reviewer. The search strategy may not have identified all relevant evidence, indicated by the fact that nearly a third of the evidence was identified via grey literature searching. This reflects the difficulty in identifying literature that is not appropriately indexed, or does not contain references to commercial infant and baby foods or drinks in the title, abstract or key words of the article. However, this is a scoping review intended to determine the size and scope of the body of literature and where the research gaps are.

Using a quality assessment tool which assesses quality criterion from a range of different study designs is useful to show the range of data but does not necessarily capture any nuances related to quality within individual studies. For example, although most of the studies used survey methods to capture dietary intake, some studies used weighed diet diaries whereas others relied on dietary recall. We have attempted to highlight this within the narrative.

There is the additional challenge of comparing evidence from different countries, in that each country provides different complementary feeding advice which potentially accounts for some of the variation in percentage of consumers and consumption of commercial baby foods and drinks.

In terms of outcomes, this scoping review concentrates on reporting of total energy consumption, total sugars and free sugar consumption; and impact on adiposity and dental health. We have not reported on data related to other macronutrients or any micronutrients. Aggregating data on sugar intake was challenging due to differences in presentation, for example as free sugar, added sugar, total sugar and NMES.

This scoping review highlights the overall lack of research examining the role and impact of commercial baby foods and drinks on the diets, nutrition and health of children aged 4-36 months. Many studies are based on old data, and this, together with the limited quantity and quality of evidence, makes it difficult to draw conclusions relevant to current UK policy and practice.

Research recommendations

Further research is required to progress understanding from simple descriptions of commercial baby and infant foods and drinks consumption to examine:

- the impact of consumption on diet, nutrition and health, especially adiposity and dental health, in both the short and longer term, using large representative population samples and weighed dietary data, with appropriate consideration of study quality especially potential confounders
- how these products are marketed, and the impact this has on preference, purchase and consumption
- how commercial infant and baby foods and drinks are used within the context of total dietary intake (that is contribution to overall nutrient and energy intake, and the impact and use of baby and infant targeted products compared to other non-targeted products), and how this may vary by sociodemographic characteristics

Future research must address the external validity of study samples, as more than half (n=18) of the studies included in this review used samples that were assessed as not representative, for example, survey populations characterised by their relatively high educational and socioeconomic status. This is critical as it has implications with regards to the generalisability of the existing evidence. Clarity should also be considered when defining and categorising commercial infant and baby foods and drinks - the individual studies included within this review highlight the variability in this area which makes comparisons across studies challenging.

There would be a clear benefit of taking a mixed method approach to future studies, so quantitative data can be contextualised within qualitative insights that would help determine why and how products are used.

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Annexes

Annexe 1 Protocol

Title

A rapid scoping review examining the role and impact of commercial infant and baby foods and drinks on the diets of children aged 4-36 months

Scoping review aim

To undertake a rapid scoping review of the published and unpublished evidence base, to synthesise and report the evidence exploring usage, marketing and impact of commercial infant and baby foods on the diets and health of children aged 4 to 36 months.

Objectives

To determine how commercial infant and baby foods and drinks are used (for example timing of introduction, length, amount and frequency of use, setting of use, proportion of total dietary intake, socio-demographic differences).

To determine how commercial infant and baby foods are marketed (product, place, price, promotion) and the impact this has on purchase, preference and consumption.

To determine if there is an impact of commercial infant and baby foods on the consumption of energy, total sugars, weight status or dental health.

Scoping review questions

What are the characteristics of the users of commercial infant and baby foods and drinks?

What type of foods/drinks are used and by whom, when, why, for how long and how often?

Does usage vary by parental/child characteristics such as age of child (for example, does usage vary according to the age of children or as children get older?), level of parental education, working patterns of parents, type of childcare, ethnicity, socioeconomic status?

Does usage vary by external characteristics such as setting, type of foods/drinks (for example snacks, meals), time of day, weekday/weekend/holidays?

How are commercial infant and baby foods and drinks marketed?

Can we describe how commercial infant and baby foods and drinks are marketed and/or promoted?

Where are commercial infant and baby foods and drinks marketed and sold?

What is the impact of this marketing on purchase, preference (of the parent, the child and/or the parent's perception of the preference of the child) and consumption?

Does the impact of marketing vary by socio-demographic characteristics of the purchasers?

What is the impact of the use of commercial infant and baby foods and drinks?

Does the use of commercial infant and baby foods affect total energy consumption, total sugars and free sugar consumption?

Is there an impact on adiposity and or dental health outcomes associated with the current or previous use of commercial infant and baby foods and drinks?

Systematic review methodology

The methods of the review will be underpinned by the Joanna Briggs Institute (JBI) methodology for scoping reviews set out in the JBI Reviewers Manual[1]. JBI assessment tools will be used to quality assess the studies, if it is not appropriate to quality assess any grey literature using the JBI assessment tools then this evidence will be marked as the lowest quality (ungraded).

The proposed search terms are detailed below in Table 1, using PCC technique (Population, Concept and Context) recommended by JBI.

Table 1. Population, Concept and Context

Population	Parent of and children aged between 4 and 36 months of age.
Concept	Scoping review describing the evidence for the role and impact of commercial infant and baby foods and drinks. Formula milks are excluded. All study designs of any length. As this is a scoping review any process and outcome data will be collected with particular interest in: purchasers/users, views/attitudes/opinions; purchasing, marketing, consumption (energy, sugar, macronutrients), adiposity and dental health. Potential effect modifiers such as age, gender, ethnicity and socioeconomic status will also be extracted.

Context	Setting will include all settings in all countries, with consideration of equity issues and cultural factors (geographic location and socio-demographic characteristics of setting). We will prioritise studies from Western and Southern Europe, North America, Australia and New Zealand. We will exclude studies prior to 1995 and studies in countries that are not members of the OECD. We will exclude RCTs as we are interested in usual practices rather than experimental conditions. We will exclude studies of specific populations where the evidence is not generalisable to the UK population.

As recommended in all JBI types of reviews, a 3-step search strategy is to be utilized. The first step is an initial limited search of at least 2 online databases (Embase and MEDLINE). This initial search is then followed by an analysis of the text words contained in the title and abstract of retrieved papers, and of the index terms used to describe the articles. Key research already identified by reviewers and PHE will also be used to build the search strategy.

A second search using all identified keywords and index terms will then be undertaken across all included databases (Embase, MEDLINE, PsycINFO). Thirdly, the reference list of all identified reports and articles will be hand searched for additional studies (this is also a potentially good source for identifying grey literature). As well as mainstream database searching a Google Advanced search will be carried out using keywords to identify and contact relevant organisations, government websites and other relevant specialised databases which will then be searched for grey literature.

The draft initial search strategy

Dates: no limits
Geography: no limits but English Language limit applied
Setting: no limits
Intervention terms: commercial infant/baby/toddler foods/drinks (possibly to include specific brands); weaning; complementary feeding; transition diets;
Outcomes: obes*, adipos*, overweight, over weight, sugar, energy, oral or dental health
Population: children aged 4 to 36 months of age (and their parents/care givers)
Publication types: no limits (any design including grey literature)

Data extraction

- author(s)
- year of publication
- origin/country of origin
- aims/purpose
- study population and sample size (if applicable) to include potential effect modifiers such as age, ethnicity, parental education, sex, socioeconomic status, rurality, geography
- setting

- methodology/methods of the study
- quality of the study
- type of food/drink (including brand, for example snack/meal, sweet/savoury)
- duration of the study
- outcomes including but not limited to:
  - consumers/users' views/attitudes/opinions
  - preferences/purchasing/consumption patterns
  - anthropometric outcomes
  - other health outcomes such as dental health
- key findings that relate to the scoping review questions

Definitions

Commercial complementary feeding: all industrially processed, pre-packaged, complementary feeding foods (from jars or packets).[2,3]

Home-made complementary feeding: all self-prepared, semi-solid, puréed or mashed foods made from scratch.[2,3]

Complementary feeding: the transition from exclusive breastfeeding to family foods, typically covers the period from 6–24 months of age.[4]

Added sugar: sugars and syrups that are added during manufacture and preparation but does not capture the sugars present in unsweetened fruit juice or honey. It is used in the USA and by the European Food Safety Authority.[5]

Free sugars: all monosaccharides and disaccharides added to foods by the manufacturer, cook or consumer, plus sugars naturally present in honey, syrups and unsweetened fruit juices. Under this definition lactose (milk sugar) when naturally present in milk and milk products and sugars contained within the cellular structure of foods (particularly fruits and vegetables) are excluded.[5]

Total sugars: the total amount of sugars from all sources (free sugars plus those from milk and those present in the structure of foods such as fruit and vegetables).[5]

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Annexe 2 Search strategies

Search strategies

Embase 1974 to 2018 October 17, plus Ovid MEDLINE(R) and Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Daily and Versions(R) 1946 to October 17, 2018

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1. complementary feeding.ti,ab.
2. weaning.ti,ab.
3. transition diet$.ti,ab.
4. commercial infant food$.ti,ab.
5. commercial baby food$.ti,ab.
6. infant drink$.ti,ab.
7. baby drink$.ti,ab.
8. *infant foods/
9. [brand name - anonymised for publication] .ti,ab.
10. [brand name - anonymised for publication] .ti,ab.
11. [brand name - anonymised for publication] .ti,ab.
12. [brand name - anonymised for publication] .ti,ab.
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43. [brand name - anonymised for publication] .ti,ab.
44. [brand name - anonymised for publication] .ti,ab.
45. or/1-44
46. *obesity/
47. obes$.ti,ab.
48. weight.ti,ab.
49. sugar$.ti,ab.
50. energy.ti,ab.
51. fruit$.ti,ab.
52. vegetable$.ti,ab.
53. dental.ti,ab.
54. oral health.ti,ab.
55. tooth decay.ti,ab.
56. caries.ti,ab.
57. or/46-56
58. 45 and 57
59. limit 58 to english language
60. limit 59 to ("infant (1 to 23 months)" or "preschool child (2 to 5 years)")
61. limit 60 to (infant or preschool child <1 to 6 years>)
62. remove duplicates from 61

PsycINFO (EBSCOhost Research Databases)
Ran 261018
S4 Limiters - English; Age Groups: Infancy (2-23 mo), Preschool Age (2-5 yrs)
S3 S1 AND S2
S2 MA obesity OR AB obes* OR AB weight OR AB sugar* OR AB energy OR AB fruit* OR AB vegetable* OR AB dental OR AB oral health OR AB tooth decay OR AB caries Search modes - Boolean/Phrase Interface - EBSCOhost Research Databases
S1 AB complementary feeding OR AB weaning OR AB transition diet* OR AB commercial infant food* OR AB commercial baby food* OR AB infant drink* OR AB baby drink* OR MA infant food Search modes - Boolean/Phrase Interface - EBSCOhost Research Databases
The online search for grey literature using advanced Google search tool was performed on 14.12.2018 using Google Chrome web browser (version 71.0.3578.98). The search was limited to pages in the English language, but, was not restricted based on any other filter such as region, file type or domain. The following keywords were used to identify

relevant organisations, government websites and other relevant specialised databases which were searched for grey literature:

1. complementary feeding
2. weaning
3. transition diet
4. commercial infant food
5. commercial baby food
6. infant drink
7. baby drink
8. infant food
9. obesity
10. weight
11. sugar
12. energy
13. fruit
14. vegetable
15. dental
16. oral health
17. tooth decay
18. caries

Annexe 3 Screening form

IN/OUT FORM – please circle YES/ NO/ UNCLEAR:

Author: **Year:** **Ref ID:** **Source:**	
1.Is it about parents of or children aged between 4 and 36 months of age?	YES/ NO/ UNCLEAR DETAILS:
AND	
2. **Is it about commercial infant and baby food and/or drink?** Please note formula milk is excluded.	YES/ NO/ UNCLEAR DETAILS:
AND	
3. A **Is it about usage?** (e.g. timing of introduction, length, amount and frequency of use, setting of use, proportion of total dietary intake, socio-demographic differences)	YES/ NO/ UNCLEAR DETAILS:
OR	
3. B **Is it about marketing?** (e.g. product, place, price, promotion) and the impact this has on purchase, preference and consumption)	YES/ NO/ UNCLEAR DETAILS:
AND	
4. **Does it report any process or outcome data?** (e.g. total energy consumption, total sugars, free sugars, adiposity, dental health, preference, purchases or consumption)	YES/ NO/ UNCLEAR DETAILS:
Please state study design	
Please state country and setting	
Please state outcomes reported	

If you have answered YES to Q1 to 4, then **INCLUDE.**
If you have answered NO to ANY of Q1 to 4, then **EXCLUDE.**
If you have answered unclear to any of these questions, then consider the paper as **PENDING**.
IS THE PAPER YES/ NO/ UNCLEAR?

Annexe 4 Included and excluded studies

List of included studies

1. Alexy U, Kersting M, Sichert-Hellert W, Manz F, Schoch G. Macronutrient intake of 3- to 36-month-old German infants and children: results of the DONALD Study. Dortmund Nutritional and Anthropometric Longitudinally Designed Study. Ann Nutr Metab 1999; 43(1):14-22.
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7. Crawley H, Westland S. Baby foods in the UK. A review of commercially produced jars and pouches of baby foods marketed in the UK. London: First Steps Nutrition Trust; 2017.
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12. Fox MK, Pac S, Devaney B, Jankowski L. Feeding Infants and Toddlers Study: What Foods Are Infants and Toddlers Eating? Journal of the American Dietetics Association 2004;104:S22-S30.
13. Fox MK, Reidy K, Novak T, Ziegler P. Sources of energy and nutrients in the diets of infants and toddlers. J Am Diet Assoc 2006; 106(1 Suppl 1):S28-S42.

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34. Wyne AH, Spencer AJ, Szuster FS. Infant and child feeding practices: a preliminary investigation. Aust Dent J 1997; 42(1):54-58.

List of excluded studies

Code

1: Not about parents of or children aged between 4 and 36 months of age
2: Not about commercial infant and baby food and/or drink
3: Not about usage or marketing
4: Not report relevant process or outcome data
5: Not full text or not study article
6: Pre 1995
7: Not OECD member
8: Specific population
9: Other - main focus is parental approach to weaning and eating behaviour

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Annexe 5 Characteristics of Included Studies Table

Characteristics of Included Studies	
Author Alexy 1999(11) **Design** Cross-sectional data from the Dortmund Nutritional and Anthropometric Longitudinally Designed Study (DONALD), 1985 to 1996 **Country** Dortmund, Germany **Setting** Clinic **Aim** To assess the macronutrient content of diets of young infants **Inclusion/exclusion criteria** Infants and children aged 3–36 months examined between 1985 and 1996 **Funding sources and independence of research from funders** Ministry of Science and Research of North Rhine Westphalia, Germany	**Study population and sample** Participants are recruited in the city of Dortmund and surrounding communities via personal contacts, maternity wards or paediatric practices. Every year, approximately 40 infants are newly recruited and first examined at the age of 3 months. Each child returns for 3 more visits in the 1st year, 2 in the 2nd year and then annually until young adulthood (age not stated). N=354 completed **Parent characteristics** NR **Child characteristics:** 3-36 months **Methods:** 3-day weighed dietary record, used only data from the first examination of the participant
Author Carletti 2017(37) **Design** Cohort, July 2007 to July 2008 **Country** Italy **Setting** Maternity hospital of Trieste **Aim** To assess complementary feeding practices, looking at timing, type, and compliance with World Health Organization (WHO) recommendations	**Study population and sample** N=400 mother-infant pairs enrolled, n=148 (37%) completed food timetable at 36 months. Participation fluctuated, at 24-month telephone interview, n=132 (67%). **Parent characteristics** Age: 33.7 (4.4) years Female: 100% Ethnicity: NR **Child characteristics:** 91% weighed 2500 g to 4199 g at birth; BMI at 3 and 6 months: 70% and 75% of infants within the normal range (15th to 85th

Characteristics of Included Studies	
Inclusion/exclusion criteria birth weight ≥2000 g, no congenital malformation nor severe diseases that required hospital admission, gestational age of 36 completed weeks or more, residence in the province of Trieste **Funding sources and independence of research from funders** Institute for Maternal and Child Health IRCCS Burlo Garofolo, Trieste, Italy	WHO percentile), 15% and 3% were below the 15th percentile, 15% and 21% over the 85th percentile, respectively. **Methods:** telephone interviews and self-reported diaries, weight and length/height of the child recorded by paediatricians at 1, 3, 6, 9, 12, 18, 24 and 36 months
Author Chestnutt 2003(39) **Design** Qualitative, semi-structured interviews 2001 to 2002; purposive sampling; **Country** Cardiff, Wales, UK **Setting** 2 areas of social deprivation (inclusion in Sure Start); interviewed in baby clinics or at home; **Aim** To investigate understanding of feeding practices detrimental to oral health, barriers to adopting safe feeding practices and commercial factors influencing feeding bottle and cup contents **Inclusion/exclusion criteria** parents or carers of children aged 3 years or younger (from socially deprived areas) **Funding sources and independence of research from funders** Cardiff Sure Start	**Study population and sample** Recruited from baby clinics at a general medical practice and playgroups; Recruited n=36; Completed n=33; **Parent characteristics** Age: mean 26 years (range 16-39 years) Female: 100% Ethnicity: white n=22; Pakistani n=7, Egyptian n=1, Yemeni n=1, Malaysian n=1, Bangladeshi n=1; **Child characteristics:** NR **Methods:** semi-structured interviews, audio recorded and transcribed (framework approach, 2 researchers). Interviews lasted 15 to 35 minutes, 4 participants' required interpreter, shown 2 commercial drinks to aid discussion: Ribena Tooth Kind® and Sunny Delight®.
Author Conn 2009(12)	**Study population and sample** Women were identified prior to 16 weeks of pregnancy through the antenatal clinic at a public hospital and through the rooms of

Characteristics of Included Studies	
Design Cross-sectional survey (1991 to 2001) as part of longitudinal study on child growth **Country** Australia **Setting** Home/research office **Aim** To describe the food and nutrient intakes of 9-month-old infants **Inclusion/exclusion criteria** Caucasian, aged at least 18 years, having a single baby who was conceived naturally and being free from insulin-dependent diabetes **Funding sources and independence of research from funders** Grants from the Dairy Research and Development Corporation of Australia, the Faculty of Health Sciences at the University of Adelaide, and the South Australian Channel 7 Children's Research Foundation	3 privately practising obstetricians. At the hospital, women were approached using a random schedule, while at the private practices all eligible women were invited to join the study. N= 505/557 (91%) completed; n=341 infants with 'plausible data' (not over or under reported) , comprising 68% of completers **Parent characteristics** Age: 31 years Female: 99% Ethnicity: NR Other: Over 90% of mothers lived with their partner and nearly two-thirds had more than one child. 29% mothers had not completed high school, 23% had a university degree. For almost 25% of households, total income before tax was less than $AU 31 199 per annum (low socioeconomic status). **Child characteristics:** **9 months; 255 girls, 250 boys;** median weight and length were 8.7 kg and 71.2 cm, respectively, for girls, and 9.5 kg and 72.9 cm for boys; **Methods:** primary caregiver structured interview of diet with 2 interviewers (piloted and protocol)
Author Coulthard 2010(22) **Design** Cohort (Avon Longitudinal Study of Parents and Children, ALSPAC) **Country** UK **Setting** Postal questionnaire **Aim** To extend the work of previous studies looking at the long-term consequences of early fruit and vegetable (FV) exposure.	**Study population and sample** N=13,978 eligible (after excluding multiple births n = 361 and ethnic minorities n = 609); 7821 completed questionnaires at both 6 months and 7 years (51.3%) **Parent characteristics** From participants who returned both questionnaires: 33.7% aged >30 years, 36% educated to 'O' level, 43% zero siblings, 82% owned house, 34% breastfed at least 6 months **Child characteristics:** 51.3% male, aged 6 months **Methods:** hierarchical linear regressions were used to predict FV consumption at 7 years from early feeding variables. Two questionnaires, one at 6 months and one at 7 years

Characteristics of Included Studies	
Inclusion/exclusion criteria Pregnant women resident in 3 Bristol-based health districts of Avon, South West England with an expected delivery date between April 1991 and December 1992. **Funding sources and independence of research from funders:** UK Medical Research Council, the Wellcome Trust and University of Bristol	
Author Cowin 2007(13) **Design** Cross-sectional study from a cohort (Children in Focus, CIF), nested within a larger cohort (Avon Longitudinal Study of Parents and Children, ALSPAC), January-June 1994 **Country** South-West England, UK **Setting** Clinic **Aim** To investigate the normal range of nutrient intakes and food consumption patterns in 18-month-old children **Inclusion/exclusion criteria,** All pregnant women resident in Avon with expected delivery date April 1991 to December 1992 **Funding sources and independence of research from funders** Supported by the Northern and Yorkshire regional Health Authority NHS Research and Development Programme on Cardiovascular Disease and Stroke	**Study population and sample** 10% children randomly selected from ALSPAC N=1341 invited/n=1183 attended/n=1026 dietary records completed (77%) **Parent characteristics** Age: NR Female: 100% Ethnicity: NR Other: low education mothers under-represented and middle education mothers over-represented **Child characteristics:** 18 months **Methods:** dietary assessment (3-day unweighed dietary record) compared with the National Diet and Nutrition Survey (NDNS)
Author Crawley & Westland 2017(32) **Design** Review	**Study population and sample** NA **Parent characteristics** NA **Child characteristics:** NA

Characteristics of Included Studies	
Country UK **Setting** Commercial UK baby food market **Aim** To review the commercial baby food market in the UK, focusing on foods sold in jars, pouches and trays for infants in the first year of life. The aim is to consider the composition, ingredients, nutrition, texture, cost, packaging and claims of these products **Inclusion/exclusion criteria** Foods in jars, pouches and trays marketed to infants by the 4 biggest baby food brands, but excludes fresh yoghurts. **Funding sources and independence of research from funders** First Steps Nutrition Trust (charity)	**Methods:** reviews the composition, ingredients, nutrition, texture, cost, packaging and claims of 343 products produced by the 4 main manufacturers of jars and pouches of baby food marketed for infants – Cow & Gate, Ella's Kitchen, Heinz and Hipp Organic – available on the UK market between August and October 2016. These 4 manufacturers represented 89% of the total market share of the baby foods and drinks market in the UK in 2015
Author Fein 2008(29) **Design** Longitudinal Infant Feeding Practices Study II (2005 to 2007) **Country** USA **Setting** Postal survey **Aim** To describe the transition from a milk-based diet to one that includes most food groups, the timing of the transition, how infants are fed, and the quality of their diet in relation to US infants **Inclusion/exclusion criteria** Mothers of healthy singletons from late pregnancy through 12 months postpartum	**Study population and sample** Sample sizes vary from around n=1600 to n=2400 depending on the particular question and questionnaire month **Parent characteristics** NR **Child characteristics:** 1 to 12 months **Methods:** Questionnaires at 1, 2, 3, 4, 5, 6, 7, 9, 10.5, and 12 months postpartum included food-frequency chart. In the 5 month through to 12-month questionnaires, the mothers were asked, "For each food category listed below, about how much of the food fed to your baby over the past 7 days was commercial baby food?" (A definition and examples were given.)

Characteristics of Included Studies	
Funding sources and independence of research from funders Food and Drug Administration, Centers for Disease Control and Prevention, Office of Women's Health, National Institutes of Health, and Maternal and Child Health Bureau in the US Department of Health and Human Services	
Author Foterek 2014(26) **Design** Longitudinal data from Dortmund Nutritional and Anthropometric Longitudinally Designed Study (DONALD) **Country** Dortmund, Germany **Setting** Clinic **Aim** To identify present trends in breast-feeding duration and weaning practices with special focus on preparation methods of complementary food (CF), that is, homemade and commercial (cCF) **Inclusion/exclusion criteria** Infants aged between 6 to 24 months with data collected between 2004 and 2012. Each infant had to have completed at least one 3-day diet record. **Funding sources and independence of research from funders** Ministry of Science and Research of North Rhine Westphalia, Germany	**Study population and sample** Participants are recruited in the city of Dortmund and surrounding communities via personal contacts, maternity wards or paediatric practices. Every year, approximately 40 infants are newly recruited and first examined at the age of 3 months. Each child returns for 3 more visits in the 1st year, 2 in the 2nd year and then annually until young adulthood. N=366 **Parent characteristics** NR **Child characteristics:** 6-24 months; (194 boys, 172 girls); full (n=339) and total breast-feeding duration (n=344) **Methods:** 3-day weighed dietary records (2004 to 2012). To investigate age and time trends, logistic regression and polynomial mixed regression models were used. Sub-samples were used for specific analyses depending on individual data availability.
Author Foterek 2015(3) **Design** Repeat cross-sectional data from Dortmund Nutritional	**Study population and sample** Participants are recruited in the city of Dortmund and surrounding communities via personal contacts, maternity wards or paediatric practices. Every year, approximately 40 infants are newly

Characteristics of Included Studies	
and Anthropometric Longitudinally Designed Study (DONALD Study) **Country** Dortmund, Germany **Setting** Clinic **aim** To examine the association between the infant's consumption of commercial Complementary Food (cCF) and Fruit (F) and Vegetable (V) intake and variety during infancy, preschool and school age **Inclusion/exclusion criteria** Availability of 3 pairs of plausible 3-day weighed dietary records at 0·5 and 0·75 (infancy), 3 and 4 (pre-school age), and 6 and 7 (primary school age) years of age. Participants who were still fully breast- or formula fed at the age of 0·5 years were excluded from this analysis **Funding sources and independence of research from funders** Ministry of Science and Research of North Rhine Westphalia, Germany	recruited and first examined at the age of 3 months. Each child returns for 3 more visits in the 1st year, 2 in the 2nd year and then annually until young adulthood (age not stated). N=281 born between 1985 and 2005 **Parent characteristics** Age: 32.5 years (maternal age at birth of child) Female: NR Ethnicity: NR Other: 29% of mothers had BMI ≥25 kg/m^2, 69% had ≥12 years of schooling **Child characteristics:** 0·5, 0·75, 3 and 4, 6 and 7 years of age; 132 girls (47%) and 149 (53%) boys; Mean birth weight-standard deviation score (SDS) of the children of our sample was slightly higher than that of the German reference population. **Methods:** 3-d weighed dietary records, interviews on lifestyle, anthropometric measurements and a medical examination.
Author Foterek 2016(27) **Design** Repeat cross-sectional data from Dortmund Nutritional and Anthropometric Longitudinally Designed Study (DONALD Study) **Country** Dortmund, Germany **Setting** Clinic	**Study population and sample** Participants are recruited in the city of Dortmund and surrounding communities via personal contacts, maternity wards or paediatric practices. Every year, approximately 40 infants are newly recruited and first examined at the age of 3 months. Each child returns for 3 more visits in the 1st year, 2 in the 2nd year and then annually until young adulthood (age not stated). N=288 born between 1985 and 2007 **Parent characteristics** Age: 32.6 (3.6) years (maternal age at birth of child) Female: NR Ethnicity: NR

Characteristics of Included Studies	
Aim To examine cross-sectional associations between commercial complementary food (cCF) consumption and added sugar intake in infancy as well as its prospective relationship to added sugar intake in pre-school and primary-school age children **Inclusion/exclusion criteria** Availability of 3 pairs of plausible 3-day weighed dietary records at 0·5 and 0·75 (infancy), 3 and 4 (pre-school age), and 6 and 7 (primary school age) years of age. Participants who were still fully breast- or formula fed at the age of 0·5 years were excluded from this analysis **Funding sources and independence of research from funders** Ministry of Science and Research of North Rhine Westphalia, Germany	Other: <30% of mothers had BMI ≥25 kg/m^2, 70% had ≥12 years of schooling **Child characteristics** 0·5, 0·75, 3 and 4, 6 and 7 years of age; 134 girls (46·5%) and 154 boys (53·5 %) **Methods:** 3-day weighed dietary records, interviews on lifestyle, anthropometric measurements and a medical examination. Individual cCF consumption as percentage of total cCF (%cCF) was averaged at 0·5 and 0·75 years. Individual total added sugar intake (g/d, energy percentage/d) was averaged for all 3 age groups. Multivariable logistic and linear regression models were used to analyse associations between %Ccf and added sugar intake.
Author Fox 2004(18) **Design** Cross-sectional, Feeding Infants and Toddlers Study (FITS) 2002 **Country** USA **Setting** Telephone survey **Aim** To describe the food consumption patterns of US infants and toddlers, aged 4 to 24 months **Inclusion/exclusion criteria** US children aged 6-24 months **Funding sources and independence of research from funders** NR but Pac (study author) is manager of regulatory affairs, Gerber Products	**Study population and sample** N=3022 **Parent characteristics** NR **Child characteristics** NR **Methods:** 24-hr dietary recall

Characteristics of Included Studies	
Author Fox 2006(19) **Design** Cross-sectional data from the Feeding Infants and Toddlers Study (FITS), March to July 2002 **Country** USA **Setting** Telephone **Aim** To determine the percentage contribution of foods and supplements to total intakes of energy, nutrients, and other dietary constituents **Inclusion/exclusion criteria** US children aged 4 to 24 months **Funding sources and independence of research from funders** Gerber Products Company, M. K. Fox is a senior researcher at Mathematica Policy Research, Inc, Cambridge, MA; at the time of the study, she was an independent consultant. K. Reidy is director of Nutrition and Regulatory Affairs, Gerber Products Co, Parsippany, NJ. P. Ziegler is an adjunct, assistant professor, Department of Foods and Nutrition, College of Saint Elizabeth, Morristown, NJ; at the time of the study, she was a principal scientist, Gerber Products Co, Parsippany, NJ. T. Novak is systems analyst, Mathematica Policy Research, Inc, Princeton, NJ.	**Study population and sample** Stratified random sample drawn from Experian's New Parent Database, February to May 2002. N=3022 **Parent characteristics** NR **Child characteristics:** 4 to 5 months (n=624), 6 to 11 months (n=1,395), 12 to 24 months (n=1,003) **Methods:** FITS data were collected by Mathematica Policy Research, Inc (Princeton, NJ).Trained interviewers conducted the 24-hour recalls over the telephone using the Nutrition Data System for Research (version 4.03, 2001, University of Minnesota Nutrition Coordinating Center, Minneapolis). An information packet was mailed to respondents a week to 10 days prior to the interview. The packet included a detailed two-dimensional booklet for use in reporting portion sizes. The booklet was designed specifically for FITS and was pilot-tested with mothers of infants and toddlers.
Author Grimes 2015(15) **Design** Cross-sectional, National Health and Nutrition Examination Survey (NHANES), 2005-2012 **Country** USA	**Study population and sample** N=2857 children aged from birth to 23.9 months agreed to participate, n= 2791 (98%) completed the 1st 24-h dietary recall. Participants with unreliable dietary recall data was excluded (n = 51). Analytic sample N= 2740 **Parent characteristics** NR

Characteristics of Included Studies	
Setting Household survey and Mobile Examination Centre (MEC) interview **Aim** To determine the dietary sources of total energy and 16 nutrients in a nationally representative sample of U.S. infants and toddlers aged 0–24 months **Inclusion/exclusion criteria** US children aged from birth to 23.0 months **Funding sources and independence of research from funders** Lead author received funding by the National Heart Foundation of Australia (Collaboration and Exchange Award No: 100734) to support travel to the U.S to complete this work	**Child characteristics** N=765 aged 0–5.9 months, N=854 aged 6–11.9 months and N=1121 aged 12–23.9 months 50.4% boys, non-Hispanic white (54.1%), high socioeconomic background (55.8%). On the day of the 24-h dietary recall, 41.5% of infants aged 0–5.9 months were either exclusively or partially breastfed. BMI-for-age: 0-5.9 months: 0.31 (se 0.04) 6-11.9 months: 0.46 (se 0.06) 12-23.9 months: 0.63 (se 0.05) **Methods:** 24-hour dietary recall
Author Hamner 2017(16) **Design** Cross-sectional, National Health and Nutrition Examination Survey (NHANES) 2009 - 2014 **Country** USA **Setting** Household survey and physical examination in a mobile examination centre (MEC) **Aim** To describe the consumption of selected food and beverage categories among a nationally representative sample of U.S. infant and toddlers from birth through 23 months of age, by age and race/Hispanic origin **Inclusion/exclusion criteria** US children aged from birth to 23 months **Funding sources and independence of research from funders** No funding was secured for this study	**Study population and sample** Stratified multistage probability design, response rates for children aged 1-5 years who underwent the physical examination were 86.8% in 2009–2010, 77.6% in 2011–2012, and 74.6% in 2013–2014. N=1824 ≤23 months **Parent characteristics** NR **Child characteristics** Male: 51.7% (95% CI: 48.9, 54.6). 23.7% 0-5 months, 27.2% 6-11 months, 30.4% 12-18 months, 18.7% 19-23 months old. 50.7%) non-Hispanic white, 13.2% non-Hispanic black, 27.5% Hispanic **Methods:** Two 24-hour dietary recalls; initial recall is collected in-person in the MEC, and the second, via telephone, 3-10 days later. For this analysis, the initial dietary recall was used and data is representative of a “given day’s” intake for the population. Dietary information is collected by trained interviewers using the Automated Multiple Pass Method (AMPM), a computer-assisted program designed to standardise data collection and increase the probability of complete reporting of all foods and beverages, including breast milk, consumed in the previous 24 hours. A

Characteristics of Included Studies	
	proxy (generally a parent) who is most familiar with the child's intake, completed the dietary recall.
Author Hilbig 2015(28) **Design** Cross-sectional data (with repeat cross-sectional data for majority of sample) from Dortmund Nutritional and Anthropometric Longitudinally Designed Study (DONALD Study) **Country** Dortmund, Germany **Setting** Clinic **Aim** To analyse the consumption frequency of commercial and home-made complementary meals and to calculate the nutrient content of home-made and commercial complementary meals **Inclusion/exclusion criteria** Infants aged between 6 to 12 months with data collected between 2004 and 2013. Each infant had to have completed at least one 3-day diet record **Funding sources and independence of research from funders** Ministry of Science and Research of North Rhine Westphalia, Germany	**Study population and sample** Participants are recruited in the city of Dortmund and surrounding communities via personal contacts, maternity wards or paediatric practices. Every year, approximately 40 infants are newly recruited and first examined at the age of 3 months. Each child returns for 3 more visits in the 1st year, 2 in the 2nd year and then annually until young adulthood. N=396 **Parent characteristics NR,** selected population with high educational attainment and socioeconomic status, no further details reported in this paper **Child characteristics:** 6, 9 and 12 months; 211 (53%) boys **Methods:** 3-day weighed dietary records (2004 to 2013). As a result of the longitudinal study design, the individual number of dietary records per subject ranged from 1 (n = 23) to 3 (n = 315)
Author Hurley 2010(41) **Design** Cross-sectional survey 2004-2005 **Country** USA **Setting** Telephone	**Study population and sample** N=33,804, random sample selected n=10,376, n=3285 attempted contact – 50% able to be contacted via WIC information; n=1209 eligible contacted, 65% completed interview; after exclusions, final analytic dataset, n=733 **Parent characteristics** Age: 27 (6.5) years

Characteristics of Included Studies	
Aim To examine the prevalence of commercial baby food consumption and its relationship with dietary variety **Inclusion/exclusion criteria** All Maryland WIC mothers with infants from birth to 12 months **Funding sources and independence of research from funders** Maryland WIC program	Female: 100% Ethnicity: NR Other: nearly 80% had at least a high school education, 55% were unemployed, 60% were single, 41% were primiparous **Child characteristics** 52% boys; 49% were white, 36% were African American, 15% were Hispanic; average infant birth weight was 3,259g (7 lb 3 oz) **Methods:** 24-hr dietary recall
Author Kim 2013(43) **Design** Repeat cross-sectional, California Nutrition Education and Food Package Impact (NEFPI) survey and California WIC voucher redemption data **Country** USA **Setting** Telephone and statewide data system **Aim** To examine participant use and satisfaction with jarred baby fruit or vegetable (F/V), assess preference for cash value vouchers (CVV) for F/V vs jarred baby F/V, and examine whether preferences varied among selected ethnic groups **Inclusion/exclusion criteria** Pregnant or breast-feeding, or a parent of a child (0–5 years of age), participating in the California WIC Program. Only participants who could complete the survey in English or Spanish and reported that they or a child in the household were enrolled in the WIC program, and were at least 18 years of age. **Funding sources and independence of research from funders** US Department of	**Study population and sample** N=2996 randomly selected; ratio of interviewed to contacted = 88.9%; percentage of interviewed as a proportion of the total sample = 50.3%. Of the 2,996 participants, 12% had infants aged 6- to 11-months and n=355 participants were asked questions about satisfaction with jarred baby foods **Parent characteristics** Age: 29 (6.74) years Female: 99% Ethnicity: 81% Latino Other: approximately 9% were pregnant and 14% were breastfeeding; 73% had at most a high school education **Child characteristics** 6-11 months **Methods:** repeated cross-sectional survey of California WIC participants' behaviours conducted at 3 time periods, twice before the food package change and once after the change. Questions about satisfaction with the new foods were asked only after the food package change (between March and April, 2010). This study focused on data collected at the third period after the food package change. Questions were written in English and translated into Spanish, pilot-tested, and revised accordingly. The Field Research Corporation, an independent public opinion research organization, conducted surveys. Auto-dialers were

Characteristics of Included Studies	
Agriculture, Food, and Nutrition Service through a grant for the WIC administered by the California Department of Public Health	used for anonymity and questionnaires were programmed onto a computer-assisted telephone interviewing system. The statewide California WIC data system tracks all vouchers issued to participants each month and tracks all vouchers that have been redeemed at WIC-authorized vendors exchange for the specific foods and quantities of foods listed on those vouchers. Redemption rates were calculated as a percentage of vouchers redeemed to the total of vouchers issued for the period from March to October 2010, the period 6–12 months after the addition of jarred baby food to the WIC food package. CVVs are not available for infants 6-11 months of age.
Author Kim 2015(42) **Design** 2-group, cross-sectional baseline survey from the Caretaker Research Advancing Youth Obesity and kNowledge (CRAYON), October 2009 to August 2011 **Country** USA **Setting** Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) office **Aim** To compare infant feeding practices and complementary food type between parent care (PC) and childcare (CC) settings among infants receiving the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) **inclusion/exclusion criteria,** infants 2-8 months, enrolled in WIC programme **Funding sources and independence of research from funders:** grant NRF-2011-330-B00190 from the National Research Foundation of Korea funded by the Korean Government, an internal grant at the University of Illinois, and a grant from	**Study population and sample** Mothers and infants were recruited by trained CRAYON research assistants in the waiting room at a Central Illinois WIC office. Initial response n=278, completers n=105 (38%) **Parent characteristics** Age: 26.0 (5.4) years Female: 100% Ethnicity: NR **Child characteristics** Mean 4.1 months (1.7 months) range 2-8 months **Methods:** A bivariate analysis was done on CC use and infant feeding practices, including types of complementary foods consumed. To analyse the food type of complementary foods, a subsample of infants who had already started complementary foods (n = 49) was used.

Characteristics of Included Studies	
the Illinois Council on Food and Agricultural Research	
Author Lennox 2013(38) **Design** Cross-sectional, Diet and Nutrition Survey of Infants and Young Children (DNSIYC 2011) **Country** UK (not Scotland) **Setting** Home (stage 1), clinic/mobile unit (stage 2) **Aim** • Provide detailed, quantitative information on the food and nutrient intakes, sources of nutrients, and nutritional status of a representative sample of infants and young children aged 4 to 18 months from the UK population, as a basis for developing government policy and measuring progress towards other government objectives. • Provide detailed, quantitative information on breast milk and breast milk substitutes consumed by the population group under study. • Describe the characteristics of participants with intakes and/or status of specific nutrients that are above and below national reference values, and evaluate the diet of this population compared to current national recommendations. • Produce a database of food consumption to provide the basis for the calculation of likely dietary intakes of natural toxicants, contaminants, additives and other food chemicals for risk assessment.	**Study population and sample** Additional recruitment was undertaken in Scotland and among those in receipt of Healthy Start (HS) vouchers in order to provide more detailed analysis of these populations. Data reported here does not include Scotland. N=4,451 sampled from Child Benefit Records, of which 97% were eligible, of which 62% completed 3-4 dietary recording days, n=2683. N=973 (44%) of eligible fully productive individuals (2,228 excluding Scottish boost) attended a clinic. At the clinic, 98% provided a skinfold thickness measurement, 87% completed the stable isotope component and 55% provided a blood sample. **Parent characteristics** NR **Child characteristics** After applying weighting factors, 82% of children in DNSIYC were white, 8% were Asian, 3% were black, and 7% were mixed or other. A fifth (21%) received Healthy Start (HS) vouchers. Boys and girls in Stages 1 and 2 of the Diet and Nutrition Survey of Infants and Young Children (DNSIYC) were, in general, taller (longer), heavier and had larger head circumferences than the UK World Health Organisation (UK-WHO) Growth Standard for their age and sex. **Methods** *Stage 1*: Carried out in the participant's home: Detailed face-to-face interview to collect background information on family dietary habits, socio-demographic status and health information, feeding practices, eating patterns, developmental stages, sunlight exposure and gastrointestinal symptoms. Dietary data collection (food diary, completed for 4 consecutive days) to provide a quantitative estimate of food consumption and nutrient intakes.

Characteristics of Included Studies	
• Provide length (height), weight and other body measurements and examine their relationship with dietary intake and status, and health and social factors. • Examine the extent to which feeding practices adopted by carers of this population group differ from national policy for infant health. • Provide some information on the dietary habits of the mother (and other key family members) and link this to the nutrient intakes and nutritional status of this population group. • Carry out stable isotopically-labelled water assessment in sub-samples of the survey group in order to estimate breast milk intake and body composition in children consuming any breast milk, as well as fluid intake and body composition in non-breastfed children. • Measure blood indices that give evidence of nutritional status and relate these to dietary, physiological and social data **Inclusion/exclusion criteria** 4-18 months living in private households in UK **Funding sources and independence of research from funders** Department of Health and Food Standards Agency	Physical measurements (height and weight of mother; length, weight and head circumference of child) *Stage 2:* Carried out in a clinic or mobile unit: Stable isotope assessment to estimate fluid intake, breast milk intake and body composition. Skinfold thickness to measure body composition. Blood sample collection for the analyses of iron and vitamin D status
Author Maslin 2015(40) **Design** Qualitative **Country** Surrey, England, UK **Setting** 2 towns, no other details	**Study population and sample** Recruited from consumer panel held by a market research company (Reveal Solutions) in addition to “snowballing” of contacts and recruitment from mother and baby groups, N=24 no further details **Parent characteristics** Age: NR Female: 100%, Ethnicity: 100% white British

Characteristics of Included Studies	
Aim To gain insight into parental perceptions of complementary feeding, specifically opinions on commercially produced baby food **Inclusion/exclusion criteria** Mothers of infants aged 4-7 months, intending to use commercially produced infant foods **Funding sources and independence of research from funders** School of Health Sciences and Social Work at the University of Portsmouth. One dietitian from the university and one independent dietician collaborated with the market research company but the company conducted all the focus groups.	Other: 50% first-time mothers, third had experience weaning infants with symptoms of cows' milk allergy **Child characteristics:** 4-7 months **Methods:** semi-structured interviews, participants split and grouped according to socioeconomic status, parity and experience of food allergy into 4 groups of 6 participants. Participants were shown several different baby food products with a range of textures, prices and packaging to stimulate discussion. Thematic analysis including mind maps by 2 experienced researchers from a market research company.
Author McAndrew 2012(30) **Design** Cross-sectional, Infant Feeding Survey 2010 (8th) **Country** UK **Setting** Postal (and online from 2010), telephone, face-to-face **Aim** • To establish how infants born in 2010 were being fed and to provide national figures on the incidence, prevalence and duration of breastfeeding and exclusive breastfeeding. These estimates are to be provided separately for England, Wales, Scotland and Northern Ireland, as well as for the UK as a whole; • To examine trends in infant feeding practices over recent years, in particular to compare changes between 2005 and 2010; • To investigate variations in feeding practices among different socio-demographic groups and the factors	**Study population and sample** A completely unclustered sample of 30,760 births was selected from all births registered in the period August to October 2010. In both Wales and Northern Ireland all births in the specified period were selected. Births were drawn at random from all those registered in England and Scotland during the defined sampling period. In England and Scotland, mothers from the most deprived quintile of each country's Index of Multiple Deprivation (IMD) were over-sampled. N=15,724 mothers returned the Stage 1 questionnaire, response rate 51%. At Stage 2 of the survey, postal questionnaires were despatched to mothers during January to April 2011, when their babies were around 4-6 months old. N=12,565 mothers completed the Stage 2 questionnaire, response rate 80%. At Stage 3 of the survey, postal questionnaires were despatched to mothers during May to August 2011, when their babies were around 8-10 months old. N=10,768 mothers returned the Stage 3 questionnaire, response rate 86%.

Characteristics of Included Studies	
associated with mothers" feeding intentions and with the feeding practices adopted in the early weeks; • To establish the age at which solid foods are introduced and to examine practices associated with introducing solid foods up to 9 months; To measure the proportion of mothers who smoke and drink during pregnancy, and to look at the patterns of smoking and drinking behaviour before, during and after the birth; and • To measure levels of awareness of and registration on the Healthy Start scheme and understand how Healthy Start vouchers are being used. **Inclusion/exclusion criteria** Births registered August to October 2010 in England, Northern Ireland, Scotland and Wales **Funding sources and independence of research from funders** UK Health Departments	The response rate at Stage 3 of the survey based on the initial sample of mothers was 35%. **Parent characteristics** NR **Child characteristics** NR **Methods:** At Stages 2 and 3, mothers who had introduced solids were asked about the nature of foods they had **ever** given to their baby and the foods given on the **day before they completed the questionnaire** ("yesterday").
Author Mehta 1998(33) **Design** **Randomised controlled trial (RCT)** **Country** **USA** **Setting** Cincinnati Children's Hospital Medical Center **Aim** To determine whether early versus late introduction of solid foods and commercially prepared versus parent's choice of solid foods affects growth or body composition in the first year. **Inclusion/exclusion criteria** Only infants without cardiac, respiratory, hematologic, hepatic, gastrointestinal, or bone disease were enrolled. In	**Study population and sample** Recruited by mailings to parents of infants in the Cincinnati area.N=165 randomised, n=18 withdrawn, n=147 completed **Parent characteristics NR** Ethnicity: no differences in maternal educational level or ethnicity between groups. Other: mean maternal BMI was 27.9 6 0.9 kg/m2 and mean paternal BMI was 30.3 6 2.0 kg/m2 (no difference between groups). **Child characteristics** 100% white; **Methods:** Randomised to receive: 1) early introduction of commercially prepared solid foods (commercial), 2) late introduction of commercial foods, 3) early introduction of parent's choice of solid foods (choice), or 4) late introduction of choice. Infants in the early group were introduced to solid foods at 3- to

Characteristics of Included Studies	
addition, all infants were term (37- to 42-weeks gestational age as determined from last normal menstrual period) and the birth weight was not small for gestational age. **Funding sources and independence of research from funders** Gerber Products, Inc. and USDHD Grant #M01-RR08084 from the General Clinical Research Centers Program, National Center for Research Resources, National Institutes of Health.	4-months of age, whereas the late group was introduced to solid foods at 6 months of age. Infants in the commercial group were first introduced to single cereals, followed by multiple grain cereals, then fruits and vegetables. Parents in this group were asked not to offer foods that were not commercially prepared to their children. Infants in the choicegroup were introduced to cereals followed by other foods as directed by the parents and/or pediatrician. No specific dietary recommendations were given by study personnel to this group. In addition to solid foods, infants in all groups were fed proprietary formula during the study period. However, infants were permitted to consume breast milk before randomization at 3 months of age. Infant weight, length, and head circumference were measured at the Clinical Research Center (CRC) at 3, 6, 9, and 12 months of age. A 3-day diet record was mailed before each infant's CRC visit. Parents were verbally instructed by a registered dietitian on how to record all food and beverage intake, and written instructions were attached to the blank food record. Parents were requested to estimate portion sizes with the aid of measuring cups, spoons, or glasses, or by calculating weight or volume as indicated on packaging labels.
Author Mennella 2006(34) **Design** Cross-sectional, Feeding Infants and Toddlers Study (FITS), 2002 **Country** USA **Setting** Telephone survey **Aim** To assess the prevalence of breastfeeding and formula feeding, the age of introduction to specific foods, and the	**Study population and sample** Stratified random sample, n=371 Hispanic and n=2,637 non-Hispanic infants and toddlers; Hispanics: 4-5 months (n=84); 6-11 months (n=163); and 12-24 months (n=124) Non-Hispanic: 4-5 months (n=538); 6-11 months (n=1,228); 12-24 months (n=871) **Parent characteristics** NR **Child characteristics:** 4- to 11.9-month-old infants: Hispanic: mean age 7.3(0.2) months; Non-Hispanic mean age: 7.2(0.1) *months* 12- to 24-month-old toddlers

Characteristics of Included Studies	
types of foods and beverages consumed by Hispanic infants and toddlers compared with similarly aged non-Hispanic infants and toddlers living in the United States **Inclusion/exclusion criteria** US children aged between 4 and 24 months **Funding sources and independence of research from funders** Gerber Products Company; collaborative effort among Mathematica Policy Research, Inc staff (authors Briefel and Novak), author Mennella at Monell Chemical Senses Center, and staff (author Ziegler) for the Gerber Products Company.	Hispanic mean age: 18.2(0.4) months Non-Hispanic mean age: 17.8(0.1) months **Methods:** stratified random sampling, parents/primary caregivers interviewed via telephone by trained interviewers – 24-hour dietary recall
Author Mesch 2014(25) **Design** Cross-sectional, German DOrtmund Nutritional and Anthropometric Longitudinally Designed (DONALD) study **Country** Dortmund, Germany **Setting** Clinic **Aim** To identify differences in the vegetable variety in commercial vs. homemade complementary meals and to describe fish and meat variety in these meals in dietary practice in Germany. A further objective was to provide an overview of the food variety in commercial complementary vegetable-potato-meat/fish meals available on the German baby food market in 2012 **Inclusion/exclusion criteria** 3-day weighed dietary records collected between 2008 and 2012 from participants 6, 9 and 12 months of age	**Study population and sample** Participants are recruited in the city of Dortmund and surrounding communities via personal contacts, maternity wards or paediatric practices. Every year, approximately 40 infants are newly recruited and first examined at the age of 3 months. Each child returns for 3 more visits in the 1st year, 2 in the 2nd year and then annually until young adulthood (age not stated). N=222 **Parent characteristics** NR **Child characteristics** 6, 9 and 12 months, 48.7% female **Methods:** 3-day weighed dietary records 2008-2012, using a vegetable variety score plus market survey using online database ‘Nutrichild’ which is an online data base for complementary food on the German market that was initialised in the 1990s by the Research Institute of Child Nutrition Dortmund (FKE) and the University of Gießen to support parents and nutrition professionals searching for commercial complementary food and assessing the adequacy of the products.

Characteristics of Included Studies	
Funding sources and independence of research from funders: Ministry of Science and Research of North Rhine Westphalia, Germany	
Author Metcalfe 2014(31) **Design** Cross-sectional, October 2010 **Country** USA **Setting** 9x grocery, drug and department stores in Philadelphia **Aim** To examine the nutritional profile of products targeted at babies and toddlers based on the presence/absence of nutritional symbols and the issuing body of nutritional symbols (i.e. manufacturer versus government/health professionals/etc.) **Inclusion/exclusion criteria** All products marked as baby or toddler foods located in the baby and toddler aisle/section of the store were included, except for single-ingredient pureed fruits and vegetables. All beverage products, juices and infant formulas/cereals that are designed to be mixed with breast milk or water were also excluded. Duplicate products were not included in the study **Funding sources and independence of research from funders** Alberta Children's Hospital and the BMO Financial Endowment in Healthy Living. The Alberta Children's Hospital and BMO had no role in the design, analysis or writing of this article	**Study population and sample:** grocery (ACME, Super Fresh, Genuardi's Family Markets (Safeway), Shop-Rite, Whole Foods Market), drug (CVS Pharmacy, Walgreens) and department (Target, Wal-Mart) stores **Parent characteristics:** NA **Child characteristics:** NA **Methods:** The researchers visited 9 stores and purchased all packaged foods that were targeted for consumption by babies and toddlers

Characteristics of Included Studies	
Author Miles 2017(17) **Design** Cross-sectional data from NHANES (2005 to 2008 and 2009 to 2012) **Country** USA **Setting** Household survey **Aim** To describe the diets of 0- to 23-month-olds in the USA by examining recent trends in food and beverage consumption **Inclusion/exclusion criteria** 0-23 months with complete dietary data **Funding sources and independence of research from funders** National Institute of Child Health and Human Development grant T32-HD52468 (Miles). National Institutes of Health (NIH).	**Study population and sample** Nationally representative weighted sample, N=1285 **Parent characteristics** Age: maternal age at birth, 29-31% mean age 25-29 years Female: NR Ethnicity: NR **Child characteristics** 50-51% male. 22-27% 0-5 months, 27-28% 6-11 months, 46-50% 12-23 months **Methods:** Linear regression models to assess temporal trends, 2x24-hour dietary recall by trained interviewers
Author Mok 2017(36) **Design** Secondary analysis (longitudinal) from a randomised trial (of Vitamin D supplementation) March 2007 to August 2010 **Country** Canada **Setting** Maternity unit at a local tertiary care hospital and 5 paediatric clinics within the greater Montréal area **Aim** To examine whether provision of homemade complementary food is associated with the development of dietary diversity, nutrient intakes and quality of infant growth	**Study population and sample** Sample was from a double-blind randomised clinical trial conducted among 132 one-month-old healthy, term, breastfed infants from Canada, 2007 to 2010. Infants were followed up for 11 months (74% completed study). Participants were randomly assigned to receive oral cholecalciferol (vitamin D3) supplements of 400 IU/d (n=39), 800 IU/d (n=39), 1200 IU/d (n=38), or 1600 IU/d (n=16). N=132 enrolled in original RCT, n=102 returned for follow-up for this study (77%), complete dietary data available for n=65 (49%) **Parent characteristics** Age: 34 (4) years (maternal age) Female: NR Ethnicity: NR

Characteristics of Included Studies	
Inclusion/exclusion criteria Newborns ≤1 month old, healthy, term, singleton, appropriate size for gestational age and breastfeeding (consuming ⩾80% of total milk volume). Exclusion criteria included infants of mothers with gestational diabetes, hypertension in pregnancy, chronic alcohol use or malabsorption syndromes **Funding sources and independence of research from funders** Canadian Institutes of Health Research and the Nutricia Research Foundation for research funding, and Europharm International Canada Inc. for the in-kind provision of supplements. Infrastructure support was from Canada Foundation for Innovation.	**Child characteristics** Male: n=19/37 (51%) **BMI-for-age Z-score at 6 months** Homemade group: −0.12±1.01,n=14 Commercial group: 0.14±1.08, n=14 **Methods:** 3-day diet record prior to study visit at 6, 9 and 12 months of age; 24-hour recall at 36 months. Linear regression analysis.
Author Noble 2006(23) **Design** Cross-sectional, random sub sample from Avon Longitudinal Study of Parents and Children (ALSPAC), October 1993 to April 1993 **Country** South-West England, UK **Setting** Clinic **Aim** To focus on differences in feeding practice between breast- and formula fed infants **Inclusion/exclusion criteria** All pregnant women resident in Avon with expected delivery date April 1991 to December 1992; A proportion of the children born in the last 6 months of the recruitment period were chosen, at random. White singleton infants, 4 months of age	**Study population and sample** N=1191 invited, n=894 attended, n=852 dietary records completed (72%) **Parent characteristics** Age: NR Female: 436 Ethnicity: NR Other: Compared with the 1991 UK census data of women with children under 1 year living in Avon, mothers who completed the dietary diary were significantly more likely to: live in an owner occupied house (63% versus 86%); live in a household which had use of a car (72% versus 94%); or be over 30 years old (36% versus 54%). **Child characteristics** 4 months, 396 female, 456 males; mean weight and distribution of size at birth were similar to the UK growth reference for 1990 **Methods:** structured 1-day unweighed dietary record

Characteristics of Included Studies	
Funding sources and independence of research from funders MRC, the Wellcome Trust, Department of the Environment, Department of Health, DEFRA, MAFF, various medical charities and commercial companies.	
Author Northstone 2002(24) **Design** Cross-sectional study from a cohort nested within a larger cohort (Children in Focus, CIF), 10% children randomly selected from Avon Longitudinal Study of Parents and Children (ALSPAC) cohort **Country** South-West England, UK **Setting** Clinic **Aim** To examine the types of drinks consumed by children at 18 months of age, determine any associations with socio-demographic characteristics and investigate the use of a bottle for providing these drinks **Inclusion/exclusion criteria** All pregnant women resident in Avon with expected delivery date April 1991 to December 1992; 10% of the children born in the last 6 months of the recruitment period (June to December 1992) were chosen, at random. White singleton infants. **Funding sources and independence of research from funders** University of Bristol	**Study population and sample** N=1341 invited, 1183 attended, 1206 dietary records completed (77%) **Parent characteristics** NR, various socio-demographic characteristics examined as potential modifiers of drink consumption (see outcomes) **Child characteristics** 18 months **Methods:** drink assessment (1-day unweighed record)
Author Reidy 2018(20)	**Study population and sample** N=3274 (FITS sample), n=505 aged 6-11 months, final sample n=493, 98% (n=365 commercial baby food consumers, n=128 non-consumers of baby food. Data weighted.

Characteristics of Included Studies	
Design Cross-sectional, Feeding Infants and Toddlers Study (FITS) 2008 **Country** USA **Setting** Telephone **Aim** To describe food consumption patterns and micronutrient density of complementary foods consumed by infants fed commercially prepared baby food fruit, vegetables, and dinners and compared with those eaten by non-consumers of these products. **Inclusion/exclusion criteria** Living in the 50 states and District of Columbia, between 6 and 11.9 months of age, participating in the FITS study **Funding sources and independence of research from funders** Nestle; Reidy, O'Neil, and Johnson are employed by Nestle´. Deming was previously employed by Nestle´. Bailey has consulted for Nestle´. Carr and Lesniauskas are employed by Carr Consulting, which consults for Nestle´	**Parent characteristics** NR **Child characteristics** 6-11.9 months, sample aged 6-6.9 months were significantly different between 2 groups: 14.4% of commercial baby food consumers vs 10.9% non-consumers; 52% male commercial baby food consumers vs 55.5% non-consumers (all ages combined) **Methods:** 24-hr dietary recall telephone interviews. Grams and calories per capita from different types of vegetables were calculated by adding all grams or calories from each type of vegetable consumed by children in each group (consumers and non-consumers) and dividing by the number of children in the group
Author Siega-Riz 2010(21) **Design** Cross-sectional, Feeding Infants and Toddlers Study (FITS) **Country** USA **Setting** Telephone **Aim** To describe current infant-feeding practices and current food group consumption patterns of infants and toddlers and to	**Study population and sample** 2002 survey n=2,884, 2008 survey n=1,596; Among sampled households that could be reached to verify an age-eligible child, 60% responded to the recruitment interview. Among respondents who completed the recruitment interview, 78% completed a 24-hour dietary recall. The overall analytic response rate among those located with an eligible child is 47% (0.60x0.78x0.47). Data is weighted to account for nonresponse and under coverage of some subgroups of children not included in the sample frame and to reflect the US population. **Parent characteristics** NR

Characteristics of Included Studies	
compare 2008 data with 2002 data to identify shifts in these practices and food consumption over time **Inclusion/exclusion criteria** US children from birth to 4 years **Funding sources and independence of research from funders** This research project was a collaborative effort among Mathematica Policy Research, scientific advisors, and Nestlé scientists. Nestlé (authors D.M.D. and K.C.R.) through a contract with Mathematica Policy Research, Inc for the data collection, analysis, interpretation of results, and manuscript preparation (authors M.K.F., E.C., and R.R.B.) and its subcontractor, the University of Minnesota. A.M. Siega-Riz was a member of the advisory panel for the study design, analysis, and interpretation of results and was commissioned by Nestlé to write this paper. In this capacity, she received consultant fees and an honorarium.	**Child characteristics** In 2002 and 2008 there were 486 and 166 infants 4 to 5.9 months, respectively; 1,395 and 505 older infants aged 6 to 11.9 months, respectively; and 1,003 and 925 toddlers aged 12 to 23.9 months, respectively 2002: 52.4% male; 2008: 50.5% male; **Methods:** up to X3 telephone interviews between June 2008 to January 2009: a recruitment interview to determine whether there was an age-eligible child and to collect household and child characteristics, including child feeding patterns; a dietary interview, including a 24-hour dietary recall and questions on breastfeeding, and the introduction of foods; and a second 24-hour dietary recall 3 to 10 days following the first recall (on a subsample for the estimation of usual intake distributions Before the dietary interview, respondents (the primary caretaker of the selected child, typically the mother) were mailed a packet of materials, including a study letter, food model booklet, ruler, liquid measuring cup with instructions, and instructions for foods consumed while the child was in child care (see reference [9] for details on data collection methods and quality control). Dietary interviews were administered by certified dietary interviewers at the University of Minnesota's Nutrition Coordinating Center by telephone using the FITS 2008 protocol and the Nutrition Data System for Research. All study materials were available in English and Spanish. Respondents received a $20 incentive for participation in the first dietary interview and an additional $10 for the second 24-hour dietary recall. Approximately 26% of the dietary recalls were collected for weekend intakes (that is Saturday or Sunday) and 74% reflected intake on weekdays (that is Monday through Friday).

Characteristics of Included Studies	
Author Van den Boom 1995(35) **Design** Cross-sectional, interview **Country** Spain **Setting** Vaccination clinic **Aim** To observe how mothers in 3 different socioeconomic groups in Madrid carried out the introduction of complementary foods into their baby's diet and to compare their practices with guidelines **Inclusion/exclusion criteria** Infants attending vaccination centres in Madrid at 3, 5, 7, 15 and 18 months of age and stratified by socioeconomic group. Excluded were infants with severe illnesses in the neonatal or research period, those with a birth weight less than 2500 g, congenital abnormalities, neurological damage or a non-Spanish parent **Funding sources and independence of research from funders** Nutricia	**Study population and sample** N=344 **Parent characteristics** NR **Child characteristics:** NR, sample of children that attended clinic at 3, 5, 7, 15 and 18 months of age **Methods:** diet history via interview, infants were classified into high, middle and low socioeconomic groups according to the occupation of the head of the household, who was usually the father
Author Wyne 1997(14) **Design** Cross-sectional **Country** Australia **Setting** Child, Adolescent and Family Health Service centres	**Study population and sample** Random sampling from the South Australia Register of births, n=472 invited, n=160 participated **Parent characteristics** NR **Child characteristics:** Age groups: 0-3, 4-6, 7-12, 13-24, 25-36 months **Methods:** self-administered questionnaire with assistance if necessary and interpreter services

Characteristics of Included Studies	
Aim To examine the feeding practices of infants and preschool children in Adelaide and contribute to appropriate preventive dental strategies **Inclusion/exclusion criteria** 2 to <4 years whose parents had an address in the Adelaide Statistical District **Funding sources and independence of research from funders** NR	

NA: not applicable; NR: not reported

Annexe 6 Outcomes of Included Studies Table

Outcomes of Included Studies	
Author Alexy 1999(11) **Details of the commercial baby food/drink** Commercial weaning food (CWF) included all commercial weaning products (ready-to-eat), e.g. cereals, menus, fruit and juices	**Outcomes** **Consumption** Fat intake decreased from 3 months (breastfed boys and girls, 48%; formula-fed boys/girls, 41/44%) to 12 months (boys/girls, 33/36%) due to the increasing consumption of commercial weaning foods, and then increased again up to 36 months (boys/girls,40/43%). **Comment** Data on commercial weaning foods only available in a figure. Commercial weaning foods is not the main focus of the study and the paper is very short without much detail
Author Carletti 2017(37) **Details of the commercial baby food/drink** Consumption of commercial complementary baby food defined as 'high' if it covered at least 3 out of 5 food groups (fruit, vegetables, meat, fish, cereals, and milk products) at 6 months of age	**Outcomes** **Consumption** Most frequently used commercial baby foods types were: milk products (67%), fish (62%), sweets and desserts (61%), cured meat (52%), cereals (52%), meat (49%), fruit (27%), and vegetables (3%). 62% (n=92) mothers complied with the recommendation to limit the use of commercial baby foods. 38% had 'high' consumption of commercial complementary baby foods. **Comment** No statistical difference between completers and non-completers, but drop-out is high and may have influenced results
Author Chestnutt 2003(39) **Details of the commercial baby food/drink** Ribena Tooth Kind® and Sunny Delight®	**Outcomes** **Consumption** Mothers and carers could not easily differentiate between commercial products which differed in their cariogenic potential. Overall understanding of the prolonged effect of exposure to sugared drinks in bottles and cups was poor and there were significant barriers to adopting only milk or water to drink. For example offering water was seen as a sign of poverty. Commercial influences on choices was strong, products offered by baby food manufacturers were seen as safe but a recently marketed 'Toothsafe' drink was viewed with suspicion.

Outcomes of Included Studies	
	Comment Discussion on commercial drinks was only one element of the study
Author Conn 2009(12) **Details of the commercial baby food/drink** 'Infant dinners' refers to commercially prepared infant food, marketed as a meal, e.g. 'vegetables, beef and spaghetti'	**Outcomes** **Consumption** Although similar proportions of breastfed and non-breastfed infants ate infant dinners, the amounts consumed by the former were significantly lower: 59% breastfed infants consumed 'infant dinners', mean 66 (sd59) median 50g, 64% not breastfed infants consumed 'infant dinners' mean 102 (80), median 85 g, p<0.001. **Comment** Over reporting of dietary data was more likely to occur when the mother was less than 30 years old, left high school early, had a household income below $AU 31,199 per annum, not to have breast-fed and to have introduced solids before 16 weeks
Author Coulthard 2010(22) **Details of the commercial baby food/drink** The definition of ready-prepared fruit and vegetables (FV), given in the questionnaire, was prepared baby foods in tins, jars or packets.	**Outcomes** **Consumption** Frequency of consumption of ready-prepared vegetables at 6 months was not positively associated with vegetable consumption at 7 years. Frequency of ready-prepared fruit at 6 months was not positively associated with fruit consumption at 7.There was some evidence of a negative association between consumption of ready-prepared FV at 6 months and lower consumption of certain vegetables, in particular green and leafy vegetables, at 7 years. Children who were given home-cooked fruit or vegetables more often at 6 months were more likely to be eating a higher proportion of FV at 7 years, than those who were given home-cooked FV less often. There was no positive difference found in consumption of FV at 7 years according to how often ready-prepared fruits or vegetables were given at 6 months. The age of introduction to home-cooked vegetables moderated the relationship between frequency of consumption at 6 months and 7 years. **Comment** There were differences in all of the demographic variables (maternal age, maternal education, number of siblings, housing tenure, having a partner, financial difficulties, overcrowding, breastfeeding duration and age of introduction to solids), except the sex of the child, according to whether or not mothers returned both questionnaires. Ethnic minorities were under-represented in ALSPAC. Regarding specific types of FV: correlation coefficient required for a significant finding was very small, and these results may not be replicated in a smaller sample.

Outcomes of Included Studies	
Author Cowin 2007(13) **Details of the commercial baby food/drink** Baby foods and baby drinks, not further defined	**Outcomes** **Consumption** Intakes of most foods were similar in the 2 surveys (Children in Focus, CIF vs National Diet and Nutrition Survey, NDNS). However, consumption of baby foods was higher in CIF. Mean daily quantities: Baby foods 14.9 g and 19.1% consumers (CIF) vs 2g and 4% NDNS Baby drinks 4.1g and 7.2% CIF (dry weights) vs 12.2g and 8% NDNS (Weights include water) **Comment** NDNS includes children aged 18 months to 54 months – so difference in age (and SES) between the 2 survey samples may account for difference in consumption of baby foods
Author Crawley & Westland 2017(32) **Details of the commercial baby food/drink** Cow & Gate, Ella's Kitchen, Heinz, Hipp Organic	**Outcomes** **Marketing** **Labelling and marketing** Manufacturers use a range of marketing techniques to promote the use of commercial baby foods, emphasising the convenience and healthiness of products. In the UK, almost half of all the baby foods for infants in the first year produced by the 4 biggest manufacturers of baby foods in jars and pouches are marketed for those under the age of 6 months. **Cost of commercial baby foods** Commercial baby food varies in price across brands, with food in pouches costing significantly more per 100g of product than food sold in jars. **Packaging** Baby food is marketed primarily in jars and pouches, with pouches becoming increasingly popular. However, pouches are a more expensive way to buy baby food, and there are risks that children will eat directly from the pouch. **Comment** None
Author Fein 2008(29) **Details of the commercial baby food/drink** In the month 5 through month 12 questionnaires, the mothers were asked, "For each food category	**Outcomes** **Consumption** At 6 months through to 9months of age, a majority of the mothers reported that all or most fruits and vegetables fed to their infant were via commercial baby food, whereas more than half used commercial baby food meats or combination dinners only at 9 months. By the end of the first year, the majority of the mothers indicated that all or most of the food in each food group was not commercial baby food.

Outcomes of Included Studies	
listed below, about how much of the food fed to your baby over the past 7 days was commercial baby food?"	Less than 42% of the infants were fed primarily commercial baby juice at peak usage (9 months), and by 12 months, only 25% were. **Comment** Sample drawn from nationally distributed but not nationally representative consumer panel
Author Foterek 2014(26) **Details of the commercial baby food/drink** Complementary food defined as all semisolid, pureed, or mashed foods fed with a spoon during weaning. Commercial complementary foods defined as all industrially processed, prepackaged CF (from jars or packets).	**Outcomes** **Consumption** Overall, 59.3% commercial, 21.1% homemade, and 19.6% combined CF was consumed by the study sample. Subjects with high commercial CF consumption (percentage of commercial CF > median 62%) were significantly older (P<0.0001), showed shorter full and total breastfeeding duration (P<0.0001), and were more likely to have mothers with a lower educational status (P=0.01). Both commercial and homemade CF showed opposing, nonlinear age trends. The percentage of commercial CF consumed showed a decrease, followed by an increase after 12 months of age. At every age between 6 and 24 months, commercially produced CF accounted for a larger proportion of the CF consumed than homemade CF. No time trends could be found. **Comment** Participants in the DONALD study are characterised by their relatively high educational and socioeconomic status; the way in which CF is prepared has only been recorded since 2004. The time period considered in this analysis, therefore, may be too short to detect any underlying time trends, also 12-24 months there were smaller number of consumers and therefore a lower absolute amount of CF consumed at this age
Author Foterek 2015(3) **Details of the commercial baby food/drink** Commercial complementary foods (cCF), low cCF: median < 58.7 %; high cCF: median > 58.7 %	**Outcomes** **Consumption** Low and high commercial CF consumers did not differ in maternal or early life baseline characteristics except energy intake in infancy but not preschool or school age Energy intake, kcal in infancy: 682 (low cCF) vs 651 (high cCF), P=0.003 The median %cCF during infancy (0.5 and 0.75 yrs) was 58.7%. In girls as well as in boys, a higher %cCF was strongly associated with a lower vegetable intake (p < 0.0001). A higher %cCF in boys was associated with a lower total fruit and vegetable (FV) intake (p = 0.024), but only in the basic model. For girls, a positive association between %cCF and FV juice intake (p = 0.001) was found. Regarding the variety scores, data from girls and boys were taken together in one model. While total FV and fruit variety scores showed a significant positive association with %cCF in the basic models (p < 0.05) meaning that a higher commercial CF proportion is related to a

Outcomes of Included Studies	
	higher FV variety in infancy; both associations did not stay significant in the fully adjusted models. In our sample, no associations between %cCF in infancy and later FV intake in preschool or school age could be found in the fully adjusted models for girls. For boys, there was an inverse relationship between %cCF and total FV intake as well as FV juice intake ($p < 0.017$) in preschool and school age. Thus, the boys' tertile with the highest commercial CF consumption had a significantly lower total FV intake as well as a lower FV juice intake in preschool and school age than those with a low commercial CF consumption. For boys at preschool age, a higher %cCF was also associated with a lower vegetable intake ($p = 0.036$). There were no significant prospective associations between %cCF and FV variety at preschool or school age. Solely, the vegetable variety score at school age decreased with higher %cCF ($p = 0.029$). **Comment** Participants in the DONALD study are characterised by their relatively high educational and socioeconomic status
Author Foterek 2016(27) **Details of the commercial baby food/drink** Commercial complementary foods	**Outcomes** **Consumption** The median %cCF in infancy (0·5 and 0·75 years) was 57·7%. In infancy, a higher %cCF was associated with higher odds ratio for high added sugar intake from CF and for high total added sugar intake (>75th percentile, P<0·033). Prospectively, a higher %cCF was related to higher added sugar intake in both pre-school (P <0·041) and primary-school age children (P <0·039), although these associations were attenuated in models adjusting for added sugar intake in infancy. A higher %cCF in infancy may predispose to higher added sugar intake in later childhood by virtue of its added sugar content. **Comment** Participants in the DONALD study are characterised by their relatively high educational and socioeconomic status
Author Fox 2004(18) **Details of the commercial baby food/drink** Infant cereals, baby foods	**Outcomes** **Consumption** Infant cereals By 4-6 months of age, 66% of infants consumed infant cereals and small percentages consumed other types of grain products. Infant cereals continued to be the predominant

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	grain-based food in infants' diets through 9 to 11 months. After 9 to 11 months, the percentage of infants consuming infant cereals began to decline. Vegetables Commercial baby foods were the leading source of vegetables for infants up to 7 to 8 months old. By 9 to 11 months, cooked vegetables were more commonly consumed than baby food vegetables. Fruit Commercial baby foods were the leading source of fruits in infants' diets through 7 to 8 months of age. By 9 to 11 months, the percentages consuming baby food fruits and other fruits were roughly equivalent. Protein Fewer than 15% of infants under the age of 7 months consumed meats and other foods high in protein. When these foods did begin to appear in the diet, they were most commonly consumed in commercial baby food dinners. Fewer than 5% of infants of any age consumed plain baby food meats. By 9 to 11 months, the percentage of children consuming non-baby food meats, poultry, and fish equalled that of commercial baby food dinners. Desserts, sweets, sugar sweetened beverages (SSBs), salty snacks Before 9 months of age, the most commonly consumed desserts were commercial baby food desserts and cookies specifically marketed toward infants (for example, arrowroot cookies, animal crackers/cookies, and teething biscuits). Beginning at 9 months, children consumed a number of other desserts, candy, and sweetened beverages (fruit flavoured drinks and carbonated sodas). The percentages of children consuming these foods increased steadily as age increased. **Comment** None
Author Fox 2006(19) **Details of the commercial baby food/drink** Infant cereals, baby foods; baby food dinners assigned own food group rather than disaggregated to track contribution to nutrient intakes.	**Outcomes** **Consumption** Infant cereal and commercial baby food dinners are in the top 10 sources of energy aged 6 to 11 months. For infants 4 to 11 months, the most important non-milk contributor to protein intake is infant cereals. Among infants 6 to 11 months, commercial baby food dinners and chicken/turkey each contribute about 5% to 6% of protein intake. By 12 to 24 months, infant cereals and commercial baby food dinners have been replaced by cheese and beef as leading non-milk contributors to protein intake. Among infants 6 to 11 months, non-milk foods

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	included in the top 10 sources of energy are infant cereal, 100% juice, commercial baby food dinners, bananas, cookies, apples/applesauce, and commercial baby food desserts. Non-milk foods included in the top 10 energy sources for toddlers 12 to 24 months are notably different, reflecting increased consumption of foods from the family table: 100% juice, sweetened beverages (mainly fruit-flavoured drinks), cheese, bread/rolls/biscuits/bagels/tortillas, chicken/turkey, butter/oil/margarine/other fats, noninfant cereals, cookies, and hot dogs/cold cuts/sausages/bacon. Full-strength juices and sweetened beverages are the second and third most important sources of energy in this age group. The energy contribution of sweetened beverages increases as toddlers age—from 3% of total energy intake among 12- to 14-month-olds to 6% among 19- to 24-month-olds (data not shown). **Comment** None
Author Grimes 2015(15) **Details of the commercial baby food/drink** What We Eat in America (WWEIA) food category classification system: “Baby beverages” is a major food category which includes 2 sub-major food categories: “Baby juice” and “Baby water”. These sub-major food categories include juice and water products that are specifically marketed as baby beverage products within the US food supply.	**Outcomes** **Consumption** **Total energy as % daily intake (≥3%):** 0-5.9 months: 3.7% baby foods, 6-11.9 months: 16.5% baby foods, 1.5% baby beverages, 12-23.9 months: 2.6% baby foods **Protein as % daily intake (≥1%):** 0-5.9 months: 4.4% baby foods, 6-11.9 months: 16.1% baby foods 12-23.9 months: 1.9% baby foods **Fat as % daily intake (≥1%):** 6-11.9 months: 5.0% baby foods 12-23.9 months: 1.2% baby foods **Saturated fat as % daily intake (≥1%):** 6-11.9 months: 3.1% baby foods **Total carbohydrate as % daily intake (≥1%):** 0-5.9 months: 6.9% baby foods, 6-11.9 months: 25.0% baby foods, 2.8% baby beverages 12-23.9 months: 3.8% baby foods **Total sugars as % daily intake (≥1%):** 0-5.9 months: 1.5% baby foods,

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6-11.9 months: 13.3% baby foods, 3.6% baby beverages
12-23.9 months: 2.2% baby foods, 1.2% baby beverages
Summary: baby foods were a leading source of total energy and macro nutrients in infants aged 0–11.9 months. Amongst 6-11.9 month olds, baby beverages were ranked 5th and 6th place for contribution to total carbohydrate and total sugars respectively contributing 2.8% and 3.6%
Comment
None

Author
Hamner 2017(16)
Details of the commercial baby food/drink
Any baby food

Outcomes
Consumption
Summary: The 6 to 11 month age group is the largest consumer of all types of baby foods. Baby food fruits, vegetables, cereals and dinners are the main source of fruit, vegetables, grains and protein (respectively) for this age group (data not shown here). By 19 to 23 months only baby food cereals and baby food snacks and sweets are consumed. Among the whole population of children and children up to 11 months, baby food cereal is the most consumed.

Percentage of U.S. children birth to 23 months of age[1] consuming any baby food NHANES 2009 - 2014

	Total population (n=1824)	0 to 5 months (n=512)	6 to 11 months (n=584)	12 to 18 months (n=445)	19 to 23 months (n=283)
	% (95% Confidence Interval)				
Baby food: Fruit	16.8 (14.3, 19.6)	7.0 (5.0, 9.9)	46.8 (40.7, 53.0)	6.3 (4.2, 9.4)	*
Baby food: Vegetables	14.9 (12.5, 17.6)	6.8 (5.2, 8.9)	42.2 (36.9, 47.7)	5.1 (2.7, 9.6)	*
Baby food: Meat and dinners	9.3 (7.6, 11.3)	*	20.7 (16.5, 25.6)	10.1 (6.4, 15.7)	*
Baby food: Yogurt	4.8 (3.2, 7.3)	*	9.0 (5.8, 13.8)	5.9 (3.3, 10.5)	*
Baby food: Cereals	26.5 (23.8, 29.3)	20.9 (16.9, 25.4)	62.5 (56.9, 67.8)	11.0 (8.1, 14.7)	6.3 (3.4, 11.5)

Outcomes of Included Studies	
	Baby food: Snacks and sweets 16.5 (14.3, 19.1) 1.0 (0.5, 2.1) 35.4 (29.9, 41.2) 17.8 (13.4, 23.2) 6.9 (3.2, 14.2) Baby food: Juice 9.9 (8.2, 11.9) 2.1 (1.2, 3.8) 19.9 (15.7, 24.8) 10.9 (7.0, 16.4) * Baby food: Water 6.2 (5.0, 7.7) 6.6 (4.7, 9.2) 12.5 (9.3, 16.5) 3.2 (1.8, 5.6) * [1] Age in months at time of exam in Medical Examination Center (MEC). *Estimate is not presented because the relative standard error (RSE) ≥40%. A zero value indicates no consumption of food group. **Comment** data for baby foods extracted directly from a NHANES supplementary table – nothing in the text of the paper specific to commercial baby foods (aggregated with non-baby food data)
Author Hilbig 2015(28) **Details of the commercial baby food/drink** Commercial complementary meals were defined as all industrially processed, prepackaged products (from jars or packets) intended for infants or toddlers.	**Outcomes** **Consumption** 74% (n = 6077) comprised commercial meals or mixtures of commercial complementary foods and fresh ingredients and 26% (n = 2149) comprised home-made meals. The percentage of commercial meals was similar within all 6 meal types except dairy–fruit meals, where >90% comprised commercial meals. Overall, median portion size of both commercial and home-made savoury meals was 190 g. However, adjusted for age, sex and time of recording, portion size of home-made meals was significantly lower (8.9 g per meal) as a result of some high-consumers of commercial savoury meals (>400 g per meal) (data not shown). Median energy density (kcal 100 g–1) was highest in commercial and home-made cereal–milk meals (89 kcal 100 g–1). In home-made savoury and cereal–fruit meals, the energy density was significantly higher compared to their commercial counterparts. Median protein contents were highest in savoury and cereal–milk meals (>2.5 g 100 g–1) and dairy–fruit meals (2–4 g 100 g–1). Added sugars were found in less than a quarter of meals. Highest median sodium contents were found not only in commercial savoury meals (median 38 mg 100 g–1) and vegetable meals (32 mg 100 g–1), but also in home-made cereal–milk meals (36 mg 100 g–1). Both median fat and iron contents were higher in home-made meals compared to commercial savoury and cereal–fruit meals. With the exception of the higher sodium content in commercial savoury meals (which was particularly found in meals for older infants), the lower fat content in commercial savoury and cereal–fruit meals, and the added sugars content in commercial dairy–fruit meals, the

Outcomes of Included Studies	
	comparison of commercial and home-made complementary meals did not reveal any serious inadequacy in the context of the current German Food Based Dietary Guidelines for infant Nutrition - the effect sizes throughout are small. **Comment** Participants in the DONALD study are characterised by their relatively high educational and socioeconomic status
Author Hurley 2010(41) **Details of the commercial baby food/drink** Commercial baby food	**Outcomes** **Consumption** Among infants younger than age 6 months, 54% had consumed complementary foods in the previous 24 hours, 60% as commercial baby foods. In 6-12 month olds 97% had consumed complementary foods in previous 24 hours of which 81% were commercial baby foods. Consumption of commercial baby food vegetables in the past 24 hours accounted for the majority of infant vegetable consumption between ages 3 and 5 months, peaked between 6 and 8 months, and then decreased with the introduction of non–baby food vegetables between ages 9 and 12 months. Consumption of commercial baby food fruits in the past 24 hours accounted for nearly all fruit consumption between ages 3 and 5 months, increased through age 8 months, and then decreased with the introduction of more non–baby food fruits. In a multivariate model adjusting for infant age, race/ethnicity, maternal education, and typicality of infant consumption, infants aged 6 to 12 months who received commercial baby foods consumed a greater variety of fruits and vegetables (P<0.001) than infants who did not, characterized by a diet that was lower in white potatoes (14% vs 22%) and higher in dark-green (6% vs 5%) and deep-yellow (35% vs 10%) vegetables. Overall the percentage of infants consuming commercial baby foods did not differ by race/ethnicity. **Comment** None
Author Kim 2013(43) **Details of the commercial baby food/drink** Jarred baby food	**Outcomes** **Consumption** Participants reported high satisfaction with the cash value vouchers for fruits and vegetables and jarred baby foods, with statistically significant variation across ethnic groups. About 2 thirds of all participants reported a preference for cash value vouchers for fruits and

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	vegetables over jarred baby foods. Redemption data indicated declining redemption rates for jarred fruits and vegetables with increasing age of the infant across all ethnic groups. **Comment** WIC participants in California receive WIC vouchers for the purchase of the specific foods listed on each cheque. Mothers of infants 6–11 months of age receive a voucher for the purchase of jarred F/V, infant cereal, and fresh bananas regardless of whether they are fully breast-feeding, ‘‘combination’’ feeding (both breastfeeding and feeding infant formula), or formula feeding. Fully breastfeeding infants receive a voucher that covers the purchase of both jarred F/V and jarred baby meats.
Author Kim 2015(42) **Details of the commercial baby food/drink** Complementary food was defined as any cereal or baby food in jars or prepared foods.	**Outcomes** **Consumption** The average age of introducing complementary foods did not differ significantly between the Parent Care (PC) group and the Child Care (CC) group. Types of complementary food were not significantly different by PC vs CC. The universally consumed food was infant cereals (100% for both groups), followed in frequency by baby food of fruits and vegetables, infant cereal from a bottle, 100% fruit juice, meat-based baby food, and chopped fruits and vegetables. There was much less frequent consumption of other types of complementary foods. Of those, grains (bread or crackers) were consumed in similar frequencies by PC and CC infants, but 5 times as many CC infants (20.8%) consumed chopped/mashed meats as PC children (4.0%), and over twice as many CC infants (16.7%) were fed grains (noninfant cereal, pasta, rice, and muffins) as PC infants (8.0%). In contrast, almost twice as many PC infants (8.0%) were given fruit cocktail, fruit-flavoured drinks, or less than 100% fruit juice as CC infants (4.2%). There were no significant differences in age, sex, race/ethnicity, preterm delivery, and birthweight between the 2 study groups. **Comment** CC was defined as infants receiving 10 hours or more per week of care from a non–parental caregiver. CC providers were defined as any non–parental caregivers such as relatives, home-based caregivers, and centre-based caregivers. Low-income population; mothers who completed a study questionnaire (not validated) were given a gift certificate upon completion**.**

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Author **Lennox 2013(38)** **Details of the commercial baby food/drink** Commercial infant foods	**Outcomes** **Consumption** Commercial infant foods were consumed mainly by children under the age of 12 months, with those aged 12 to 18 months more commonly consuming non-infant specific foods. Over 50% of children aged 4 to 11 months consumed infant meat and fish based products and dishes during the 4-day food diary period, decreasing to 29% of those aged 12 to 18 months. Other savoury based foods and dishes, fruit based foods and dishes, dairy based foods and dishes, and cereal based foods and dishes also showed a similar pattern of consumption. The only type of commercial infant foods for which there was an increase with age was for snacks (sweet and savoury) where 34% of children aged 4- 6 months consumed these, rising to 60% or over for those aged 7 to 11 months then falling to 42% of those aged 12 to 18 months. Mean consumption of infant specific snacks (sweet and savoury) ranged between 6g to 7g per day among consumers. For children aged 4 to 11 months, the main contributor to NMES intake for those in the managerial and professional (39%) was the food group 'milk and milk products', significantly higher than for those in the routine and manual category (29%). The food group 'commercial infant foods' made the greatest contribution for children in the routine and manual category (36%) compared to the managerial and professional category (29%). NMES: For children aged 12 to 18 months the contribution from the food group 'commercial infant foods' was significantly higher for the managerial and professional category (18%) than for routine and manual category (14%) and the contribution from beverages was significantly higher for the intermediate category (12%) compared to the managerial and professional category (9%). NMES: For children aged 4 to 11 months, there was no significant difference in mean daily NMES intake by ethnicity, whereas for children aged 12 to 18 months mean daily NMES intake was significantly lower for South Asian children (15.3g, 5.9% energy) compared to white children (20.4g, 7.9% energy). For children aged 4 to 11 months, the main contributor to NMES intake for white children was the food group 'milk and milk products' (35%), significantly higher than for South Asian (26%) and 'other' children (30%). The food group 'commercial infant foods' made the greatest contribution to South Asian at 42% and 'other' children at 43%, compared to 30% for white children, the difference between white and 'other' children was significant. For children aged 12 to 18 months, the food group 'milk and milk products' was the greatest contributor to NMES intake for all children (26% to 32%), with no significant variation by ethnic group. The food group 'commercial infant foods' was the next largest contributor for South Asian and 'other' children at 18% and 21% respectively,

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	compared to 16% for white children, for whom the food group ‘cereals and cereal products’ was the second largest contributor at 17%, significantly higher when compared to 13% for South Asian and 14% for ‘other’ children. Summary: Over half (58%) of children who had food other than milk had eaten a commercial baby or toddler meal. 72% of 4-9 month olds, 67% of 10-11 month olds, and 44% of 12-18 month olds ever ate commercially prepared baby food. Parents also reported that 36% of infants aged 4-6 months ‘always’ or ‘almost always’ ate a commercially prepared baby or toddler meal for the main meal of the day. This proportion steadily decreased with age so that, for those aged 12-18 months, only 5% ‘always’ or ‘almost always’ ate a commercially prepared baby or toddler meal for the main meal. Commercial infant foods (meat, fish, fruit, dairy or cereal based) were consumed by a greater proportion of children aged 4 - 11 months compared to children aged 12 - 18 months. These foods contributed 13% to 17% of daily energy intake for children aged 4 - 11 months, compared to 6% in children aged 12 to 18 months. Commercial infant foods contributed 15% to total sugar intake for infants aged 7-9 months. The main contributor to NMES for children aged 4 -6 months and 7- 9 months was the food group ‘commercial infant foods’ (44% and 34% respectively), particularly ‘fruit based foods and dishes’ and ‘cereal based foods and dishes’. **Comment** None
Author Maslin 2015(40) **Details of the commercial baby food/drink** Mothers were shown several different baby food products with a range of textures, prices and packaging	**Outcomes** **Consumption** Within the small group of mothers recruited, the study defined 3 distinctive typologies, “relaxed”, “balanced” and “concerned”, characterised by different attitudes to weaning and commercial baby food, which may be influenced by parity, socioeconomic status and previous experience of weaning. The majority of mothers commenced the weaning process using homemade foods, but transitioned to include commercial baby foods after 3-6 weeks but transitioned to include commercial baby foods after 3-6 weeks due to a desire to move to foods containing multiple ingredients and to increase variety and tastes. Commercial baby food was perceived as more convenient to homemade baby food by the majority and as superior and "safer" by some mothers. Although there were concerns raised about the identity of ingredients, few concerns were

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	expressed regarding nutritional quality or allergen content, even by mothers with experience of weaning an infant with food allergic symptoms. **Comment** Mothers were grouped according to SES parity and experience of food allergy, so this might have helped to shape the typologies. Also conducted by private market research company. Research group is specifically interested in food allergy.
Author McAndrew 2012(30) **Details of the commercial baby food/drink** Cereal, baby rice and rusk are reported separately from 'baby food' (i.e. jars/tins) in the sample questionnaires, although baby food is not defined	**Outcomes** **Consumption** At 4-6 months of age, 58% had ever been given ready-made baby foods, 38% had consumed it previous day. At 8-10 months 84% had ever been given ready-made baby foods and 44% consumed it previous day. At Stage 2 (4-6 months), the majority of babies who had been given solids had been given baby rice (79%). Nearly two-thirds had been introduced to fruit or vegetables (66%). Nearly 3 in 5 had been given ready-made baby food (58%), while over half (53%) had been given home-made foods. By Stage 3, (8-10 months) baby rice was no longer the most common type of food mothers had given, reflecting the fact babies had been exposed to a broader range of food types by the time they were 8 to 10 months. By that point virtually all babies had been given fruit or vegetables (98%) and 93% of babies had been given home-made foods and other types of food. Use of ready-made baby food was lower, although it had still been given to over 4 in 5 (84%) babies. At Stage 2 (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%). By Stage 3 (when babies were aged 8 to 10 months), fruit and vegetables were still a key feature 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%). By Stage 3, 87% of mothers were feeding their babies fresh foods on a daily basis, compared with 41% of mothers feeding their babies ready-made foods. The use of ready-made foods was most common between the ages of 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). Mothers in managerial/professional occupations were less likely to provide regular servings of bought ready-made foods (45% of managerial/professional mothers increasing to 62% of mothers who had never worked). Mothers from Chinese or

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	"other" ethnic groups were much less likely than other ethnicities to buy/purchase bought ready-made foods (25% compared with 53%). **Comment** Assume 'ready-made' always refers to baby food
Author Mehta 1998(33) **Details of the commercial baby food/drink** Infants in the commercial group were first introduced to single cereals, followed by multiple grain cereals, then fruits and vegetables. Parents in this group were asked not to offer foods that were not commercially prepared to their children.	**Outcomes** **Consumption** There were no differences between the commercial versus choice group for anthropometric measurements or body composition at 3, 6, or 12 months of age. Also, there were no differences between these groups for gain in weight, gain in length, or gain in head circumference at 12 months of age. There were no significant differences between commercial and choice groups for calories from formula intake at 3, 6, 9, or 12 months and calories from solid foods intake at 3, 6, or 9 months. However, at 12 months infants in the commercial group consumed fewer calories from solid foods compared with the choice group (471 (se26) kcal/day vs 634 (se27) kcal/day; *P* <.001). The contribution of commercially prepared solid foods to total energy intake was not different between commercial and choice groups (13.0 (se1.5)% vs 14.1 (se1.5)%; *P* =0 .60) at 6 months; however, infants in the commercial group had a larger energy intake from commercially prepared foods at 9 months (40.8 (se1.6)% vs 28.0 (se1.6)%; *P* <0.001) and 12 months (45.3 (se1.9)% vs 12.9 (se1.9)%; *P* <0.001) compared with the choice group. At the 3-month baseline, infants in the commercial group consumed fewer total calories and fewer calories from protein. Because of these baseline differences, the 6-, 9-, and 12-month data was analysed by multiple regression analysis, using the 3-month energy intake as a covariate, as well as *t* tests. Because multiple regression analysis did not alter the findings when compared with standard *t* tests, the means and *P* values below are presented as calculated by standard *t* tests. There were no differences between commercial and choice groups in distribution of energy intake from carbohydrate, fat, or protein at 6 months. Infants in the commercial group consumed fewer calories from protein than infants in the choice group at 9 (80 (se3) kcal/day vs 88 (se3) kcal/day; *P* =0.02) and 12 months (101 (se5)kcal/day vs 148 (se5) kcal/day; *P* <0.001). In addition, infants in the commercial group had a lower fat (263 (se10) kcal/day vs 343 (se10) kcal/day; *P* <0.001) and total caloric intake (884 (se24)kcal/day vs 1022 (se25) kcal/day; *P* <0.001) at 12 months. **Comment** Unclear if sample is representative.

Outcomes of Included Studies	
Author Mennella 2006(34) **Details of the commercial baby food/drink** Baby food fruits include single fruits (majority of fruits reported) as well as mixtures with the named fruit as the predominant fruit, for example applesauce-blueberry mixture, bananas with apples and pears. Baby food fruits with tapioca and other baby food dessert fruits were counted as desserts. Baby food vegetables include single vegetables (majority of vegetables reported) as well as mixtures with the named vegetable as the predominant vegetable, for example broccoli and cauliflower or broccoli and carrots.	**Outcomes** **Consumption** Overall consumption rates of baby food fruits decreased during the second year of life. Six- to 11-month-old Hispanic infants were less likely to be eating baby food fruits, when compared with similarly aged non-Hispanics.42.9% vs 58.1%. Infant cereal consumption similar across groups and peaked at 6-11 months at 74%; 6- to 11-month-old Hispanic infants were less likely to eat baby food vegetables when compared with similarly aged non-Hispanic infants.34.4% vs 47.6%. Hispanic infants were less likely to eat baby food dinners when 6 to 11 months of age as compared with non-Hispanics.24.7% vs 35.3% no difference between groups for baby food desserts – around 16-17% consumption at 6-11 months (peak). **Comment** Cannot used pureed data as includes both commercial and home-made, cannot use fruit juice data as includes adult and infant products. Hispanic group is much smaller compared to non-Hispanic group across all age groups so unclear if powered to detect statistically significant changes
Author Mesch 2014(25) **Details of the commercial baby food/drink** Commercial complementary meals were defined as all industrially	**Outcomes** **Consumption** The vegetable variety was low in homemade as well as in commercial meals without any differences in total variety at 6 and 9 months of age. At 12 months of age infants fed with commercial meals got a higher vegetable variety than those fed with homemade meals. In homemade and commercial meals most often carrot was used, whereas other vegetables were far below this frequency. In both meals, poultry and beef were most often used whereas

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processed, pre-packaged complementary meals in jars or pots. In the commercial meal group, pure vegetable meals or meals with only 2 components (e.g. vegetables and potatoes) consisted exclusively of commercial complementary food components and the 'vegetable-potato-meat meals' contained at least 2 commercial complementary food components.	fish meals were rarely offered. Fish was rarely used in the homemade and commercial meal group, although it was fed more often in the latter. Vegetable variety in 3 recorded days was low in both, homemade as well as commercial meals without any significant differences in the 2 younger age groups. Only at the age of 12 months infants fed with commercial meals got a significantly higher vegetable variety compared to infants fed with homemade meals. In dietary practice most often poultry and beef were used, fish meals were rare in homemade and commercial meals. **Comment** Have not extracted data regarding market survey as its about market availability rather than consumer behaviour
Author Metcalfe 2014(31) **Details of the commercial baby food/drink** Prepared foods with multiple ingredients targeted at toddlers and babies.	**Outcomes** **Marketing** Products whose nutritional symbol was issued by government/health professionals contained significantly more Ca (P=0.002), fibre (P=0.001), protein (P=0.005), vitamin A (P=0.011), vitamin C (P<0.001) and Zn (P<0.001) and less sugar (P=0.004) per serving than products without a nutritional symbol and products whose nutritional symbol was issued by the manufacturer. Despite no front-of-package claims to specifically promote this, products whose nutritional symbols were issued by the manufacturer had significantly more Fe (P=0.001) and vitamin E (P<0.001) per serving than products without a nutritional symbol or products whose nutritional symbol was issued by government or health professionals. In general, products with and without nutritional symbols or nutritional symbols issued by different authorizing bodies did not differ in advertising characteristics or front-of-package nutritional claims. However, products with a nutritional symbol issued by government/health professionals had a different nutrient profile than products with nutritional symbols issued by the manufacturer directly and products with no nutritional symbols.

Outcomes of Included Studies	
	Comment It is unknown how this evidence influences consumer behaviour
Author Miles 2017(17) **Details of the commercial baby food/drink** Not specifically defined: 'infant cookies, teething biscuits, animal crackers', 'infant cereal', 'baby-food fruit'	**Outcomes** **Consumption** There was a marked decline in consumption of infant cookies, teething biscuits, and animal crackers in both age groups: the prevalence decreased by 17.0% among infants 6- to 11-months-old (P < 0.001) and 12.2% among 12- to 23-month-olds (P =0.007). Baby food fruit consumption was 53-60% for infants 6-11 month old and 6-9% in infants12-23 months old, did not change significantly over time. Infant cereal was 71-72% in infants 6-11 months old and 13-15% in infants 12-23 months old and did not change significantly over time. **Comment** Contains a lot of data that we cannot use including (Sugar Sweetened Beverages) SSB's but not reported if SSBs were targeted at babies/infants
Author Mok 2017(36) **Details of the commercial baby food/drink** Commercial baby food was defined as industrially processed, pre-packaged food prepared specifically for infants (from jars or packets) excluding milk and infant cereals. The homemade group included infants who had received homemade but no commercial. The commercial group included infants who had received commercial but no homemade. The combination group included infants who had received both homemade and commercial.	**Outcomes** **Consumption** This observational analysis of an RCT in healthy breastfed infants in a high-income country is the first to show that exposure to home-prepared meat or fruit and vegetable by 9 months of age is associated with increased complementary diet diversity during the first year of life and reduced adiposity up to age 3 years. Anthropometric measurements and nutrient intakes were not affected. By 9 months, 22% (n=14) of infants had exclusively received homemade, 14 infants had exclusively received commercial and 37 infants had received both. The development of dietary diversity (number of World Health Organization-recommended food groups) was higher (0.76 (95% CI: 0.14, 1.38); P<0.05) in the homemade group versus commercial. Energy and nutrient intakes did not differ by group over time. The homemade group had 773 g (−1364, − 182; P<0.01) lower whole-body fat mass and 7.1% (−12.6, − 1.6; P<0.05) lower % body fat at 12 months compared with the reference group (both homemade and commercial). Reduced whole-body fat mass in the homemade group persisted at 36 months (−696 g (95% CI: − 1341, − 52); P<0.05). There were no differences between groups for changes in growth Z-scores (length-for-age, weight-for-age and body mass index-for-age, unadjusted and adjusted using combined group as the reference group).

Outcomes of Included Studies	
	Comment Data from an RCT of vitamin D supplementation in breastfed infants, very small study, n=65 with complete data but there are growth outcomes. Not a generalisable sample, participants of the original RCT were characterized by a relatively high educational and socioeconomic status, and a breastfed infant population. Cannot rule out potential confounding effect of Vitamin D supplementation (from original trial) on linear growth, although the trial results found no effect of vitamin D supplementation on growth.
Author Noble 2006(23) **Details of the commercial baby food/drink** **Commercial infant food and drink**	**Outcomes** **Consumption** At 4 months of age the most commonly consumed foods were dried commercial infant foods (70%). Jars and tins of infant foods were used by 30%. Rusks were the next most used food (17%). Commercial infant fruit drinks were consumed by 33% of the infants. Infants given formula milk were more likely to consume commercial infant drinks, compared with infants who were breastfed. There were significant differences ($P < 0.01$) by milk group in relation to dried commercial infant food (particularly meat-based), and commercial infant drinks. The mixed-milk group had the largest percentage of consumers of dried commercial infant food (76%). The formula-fed group had the largest of commercial infant fruit drinks (44%). The breastfed group had the smallest percentage of consumers of dried commercial infant food particularly meat-based (63%). There was no significant difference between the 3 groups for consumption of baby jars and tins of infant foods (significant difference is the dried foods specifically meat based) breastfed:7%, formula-fed: 16%, mixed-milk: 18% - this is based on % of consumers but when you look at actual amount consumed there is not much difference between the groups. Summary: infants given formula milk were more likely to consume commercial infant drinks, compared with infants who were breastfed. Breastfed infants were consuming less commercial infants foods. **Comment** Notes: ALSPAC cohort is broadly geographically representative but mothers attending the clinics tended to be more highly educated, older and more likely to live in owner occupied accommodation when compared with the whole ALSPAC sample. Relatively older sample that started weaning at 4 months so may not be generalisable to current UK population

Outcomes of Included Studies	
Author Northstone 2002(24) **Details of the commercial baby food/drink** Commercial baby drinks	**Outcomes** **Consumption** Commercial baby drinks were consumed by 5.6% of the population group. A child having no older siblings and mother age 30 years or over were associated with increased use of commercial baby drinks but education, housing tenure, financial difficulties, breastfeeding and smoking were not associated with consumption of commercial baby drinks. There were no significant differences in the drinks consumed between boys and girls nor between the groups defined by difficulty affording food. **Comment** The factors considered in this analysis were the sex of the child, the highest educational level of the mother (GCSE or less, vocational, O level, A level, degree), housing tenure (owned=mortgaged, council (public housing) or rented), smoking status of the mother during pregnancy. Also included was the degree of financial difficulty experienced by the mother, based on a score calculated from a list of 5 items (food, clothing, heating, rent=mortgage and things for the child) that she may have had difficulty affording (2 categories were created: many or some=none). Difficulty affording food was also considered separately in the analysis. Also included was the age of the mother at the birth of her child, the duration of breastfeeding and the number or older siblings. The mothers of those attending the clinics showed a bias towards the higher educational groups, older mothers and those in owner-occupied housing, compared to the whole ALSPAC sample.
Author Reidy 2018(20) **Details of the commercial baby food/drink** Baby food consumers were defined by reported use of any commercial baby food fruit, baby food vegetable, or baby or toddler dinner on the 24-hour dietary recall. Excluded infant cereal	**Outcomes** **Consumption** Energy intake from complementary foods was not significantly different among consumer and non-consumers (330 vs 521 kcal, P = 0.07), but consumers reported less complementary food, when measured by weight, than did nonconsumers (481 vs 619 g, P =0.008). Among consumers, the average consumption of total baby foods was 217 g, and 57% of total vegetable intake and 45% of total fruit intake were from baby food. Consumers of commercial baby foods were significantly more likely to report eating all vegetables (excluding white potatoes, 71% vs 51%), deep yellow vegetables (42% vs 18%), and fruits (79% vs 65%) and were less likely to report eating white potatoes (10% vs 24%), dark green vegetables (4% vs 20%), and sweets (23% vs 47%) than were non-consumers.

Outcomes of Included Studies	
	Overall baby food consumers had a much higher intake of all vegetables when measured in grams. The smaller differences in calories from vegetables show that the vegetables eaten by baby food consumers were lower in calories. Baby food consumers were younger and more likely to be white, and non-consumers were more likely to be breastfed. Income and education did not differ between the groups. **Comment** Potential confounder is that infant cereal is excluded in order to have a comparison group. Approximately 80% of the infants classified as commercial consumers also consumed infant cereal, vs 38% of non-consumers.
Author Siega-Riz 2010(21) **Details of the commercial baby food/drink** Baby food not formally defined in paper, 'jarred' baby food fruit	**Outcomes** **Consumption** There were a significantly lower proportion of infants consuming infant cereal at age 4 to 5.9 months and 9 to 11.9 months in 2008 compared to 2002. In 2008, 50.4% of 4-5.9 month infants consumed infant cereal compared to 64.5% in 2002 (P<0.05); 51% of 9-11.9 month infants consumed infant cereal in 2008 compared to 63.8% in 2002. There was a significantly lower proportion of infants in the 4- to 5.9-month-old (16.8% vs 34.8%) and 6- to 8.9-month-old age groups (50.2% vs 66.4%) consuming jarred baby food fruit in 2008 compared to 2002. However, among children aged 18 to 20.9 months, there were a significantly higher proportion of toddlers consuming jarred baby food fruit in 2008 (10.3% vs 2.2%). There were no significant changes in baby food vegetable consumption in 2008 compared with 2002 for any of the age sub-groups. Among children aged 9 to 11.9 months in 2008, there was an 80% decline in the percentage consuming baby food meats (1.2% vs 5.9% in 2002), which is significant without a compensating increase in other protein sources. There were significant declines in the percentage consuming protein sources in baby food dinners for 9- to 11.9-month-olds from 2002 (24.9% vs 34.6%). There were significantly lower percentages of children aged 6 to 8.9 (2.8% vs 14.1%), 12-14.9 (2.0% vs 6.1%), 15-17.9 (0.3% vs 3.2%) months consuming baby food desserts in 2008 compared to 2002. Summary: Significant changes in consumption of baby food (cereal, fruit, vegetables, dinners, desserts) have occurred over time and in various age sub-groups. Changes have occurred in terms of potential benefit and harm and changes have been bidirectional for some food types depending on age subgroup.

Outcomes of Included Studies	
	Comment Compared to the 2002 population, in 2008 there was a higher proportion of Hispanics and non-Hispanic blacks, a higher proportion of children participating in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), a lower proportion of parents married, more mothers working, and a higher proportion of families with household incomes in the upper categories. Some subgroups of food groups inadequately powered.
Author Van den Boom 1995(35) **Details of the commercial baby food/drink** 'Baby jars', Nestle, Alter, Hero	**Outcomes** **Consumption** In Spain, 2 types of commercial baby jars were available at the time of the study: whole meals and fruit varieties. These products were generally given at weekends and on holidays; only a minority of mothers gave jars daily to their babies. Usage of baby jars increased steadily with age until it reached a plateau between 8 and 15 months. By 15 months 80 of 131, (61.1 %) (95% confidence limits 52.8-69.4) babies had received baby jars at some time. There were no statistically significant differences between the socioeconomic groups. **Comment** The sample did not reflect the proportions of the socioeconomic groups of the population in Madrid, as it was stratified to obtain about one-third of the sample from each socioeconomic group.
Author Wyne 1997(14) **Details of the commercial baby food/drink** Commercial baby food not further defined	**Outcomes** **Consumption** Commercial baby food was given to 59.4%, percentage was highest in 7-12 month age group. Then there was a sharp reduction. Only 3.8% of children were given commercial baby food in the age 25-36 months. **Comment** Data in text does not correspond to data in table 3 of the paper

Annexe 7 Quality Assessment of Included Studies Table

STUDY ID	Representativeness*	Randomisation**	Comparability***	Credibility+	Attrition++	Attributability+++
Alexy 1999(11)	N	NA	NA	Y	NA	Y
Carletti 2017(37)	U	NA	NA	U	N	Y
Chestnutt 2003(39)	N	NA	NA	Y	NA	Y
Conn 2009(12)	N	NA	NA	Y	NA	U
Coulthard 2010(22)	N	NA	NA	Y	NA	U
Cowin 2007(13)	N	NA	NA	Y	NA	U
Crawley & Westland 2017(32)	Y	NA	NA	Y	NA	Y
Fein 2008(29)	N	NA	NA	Y	NA	Y
Foterek 2014(26)	N	NA	NA	Y	NA	Y
Foterek 2015(3)	N	NA	NA	Y	NA	U
Foterek 2016(27)	N	NA	NA	Y	NA	U
Fox 2004(18)	Y	NA	NA	Y	NA	Y
Fox 2006(19)	Y	NA	NA	Y	NA	Y
Grimes 2015(15)	Y	NA	NA	Y	NA	Y
Hamner 2017(16)	Y	NA	NA	Y	NA	Y
Hilbig 2015(28)	N	NA	NA	Y	NA	Y
Kim 2013(43)	Y	NA	NA	Y	NA	Y

STUDY ID	Representativeness*	Randomisation**	Comparability***	Credibility+	Attrition++	Attributability+++
Kim 2015(42)	N	NA	Y	N	NA	U
Hurley 2010(41)	N	NA	NA	Y	NA	Y
Lennox 2013(38)	Y	NA	NA	Y	U	Y
Maslin 2015(40)	N	NA	NA	U	NA	U
McAndrew 2012(30)	U	NA	NA	Y	N	Y
Mehta 1998(33)	U	Y	U	Y	Y	Y
Mennella 2006(34)	Y	NA	U	Y	NA	Y
Mesch 2014(25)	N	NA	NA	N	NA	U
Metcalfe 2015(31)	U	NA	NA	U	NA	Y
Miles 2017(17)	Y	NA	Y	Y	NA	Y
Mok 2017(36)	N	NA	Y	Y	N	U
Noble 2006(23)	N	NA	U	Y	NA	Y
Northstone 2002(24)	N	NA	NA	Y	NA	Y
Reidy 2018(20)	Y	NA	N	Y	NA	U
Siega-Riz 2010(21)	Y	NA	U	Y	NA	Y
Van den Boom 1995(35)	N	NA	NA	U	U	U
Wyne 1997(14)	Y	NA	NA	U	NA	Y

* Representativeness: Were the study samples randomly recruited from the study population with a response rate of at least 60% or were they otherwise shown to be representative of the study population?

** Randomisation: Were participants, groups or areas randomly allocated to receive the intervention or control condition? Not applicable (N/A) for all study designs except controlled trials.

*** Comparability: Were the baseline characteristics of the comparison groups comparable or if there were important differences in potential confounders were these appropriately adjusted for in the analysis? If there is no comparison group this criterion cannot be met. Not applicable (N/A) for all study designs except controlled trials.
+Credibility of data collection instruments: Were data collection tools shown to be credible, e.g. shown to be valid and reliable in published research or in a pilot study, or taken from a published national survey, or recognized as an acceptable measure.
++ Attrition Rate: Were outcomes studied in a panel of respondents with an attrition rate of less than 30%?
+++ Attributability to intervention: Is it reasonably likely that the observed effects were attributable to the intervention under investigation? This criterion cannot be met if there is evidence of contamination of a control group in a controlled study. Equally, in all types of study, if there is evidence of a concurrent intervention that could also have explained the observed effects and was not adjusted for in analysis, this criterion cannot be met.
Randomisation and comparability are not applicable (N/A) for all study designs except controlled trials.
N:no; NA:not applicable; U:unclear; Y:yes