World Health Organization
REGIONAL OFFICE FOR Europe

Commercial foods

for infants and young children in the WHO European Region

A study of the availability, composition and marketing of baby foods in four European countries

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ABSTRACT

In order to help Member States understand what commercial foods for infants and young children are currently on the market, and to support implementation of the *Guidance on ending inappropriate promotion of foods for infants and young children* at the European level, the WHO Regional Office for Europe developed a methodology for identifying commercial baby foods available in retail settings and collecting data on their nutritional content, as well as various aspects of their packaging, labelling and promotion. This publication describes the findings from a study conducted in four countries of the WHO European region based on this methodology.

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CONTENTS

Page

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Executive summary

Good nutrition in infancy and early childhood is key to ensuring optimal child growth and development, as well as better health outcomes later in life. Appropriate infant and young child feeding practices are important for the prevention of malnutrition in all its forms, including overweight, obesity and diet-related noncommunicable diseases (NCDs).

In response to the growing concern that inappropriate promotion of some commercially produced foods for babies and toddlers can undermine breastfeeding and optimal infant and young child nutrition, new global *Guidance on ending inappropriate promotion of foods for infants and young children* ("the Guidance") was agreed in 2016.

The Guidance seeks to reinforce the existing rules on marketing of breast-milk substitutes, agreed in the *International code of marketing of breast-milk substitutes* ("the Code"), which has been in place since 1981.

In order to help Member States understand what commercial foods for infants and young children are currently on the market, and to support implementation of the Guidance at the European level, the WHO Regional Office for Europe developed a methodology for identifying commercial baby foods available in retail settings and collecting data on their nutritional content, and various aspects of their packaging, labelling and promotion.

Following a successful pilot study in Copenhagen in 2016, this methodology was used to collect data between November 2017 and January 2018 on foods marketed for infants and young children in four cites of four countries in the WHO European Region (Vienna, Austria; Sofia, Bulgaria; Budapest, Hungary; Haifa, Israel). The overall aims of the study were:

a) to collect data on commercially available food products targeted at infants and young children (0–36 months);
b) to compare the composition of these products (including nutritional content) with WHO Guidance and national food-based dietary guidelines on infant and young child feeding;
c) to compare the methods used to promote these products (labelling, claims, price promotions) with WHO Guidance.

In total, data were collected on 7955 food or drink products for infants and young children (0–36 months) from 516 stores across the four countries.[a] These included duplicates of some products recorded in different stores in the sampling area. For the majority of the data analyses, these duplicates were eliminated from the sample, resulting in analysis of data on 1978 unique commercial foods for infants and young children, allocated to one of the following categories:

- Biscuits/wafers
- Cereal/porridge (ready to eat)
- Cereal/porridge (dry)
- Fruit and/or vegetable puree
- Juice/smoothie/tea/other drinks (ready to drink)
- Powdered drinks
- Meat- or fish-based meal
- Milkshake powder

[a] Data on infant formula, follow-on formula and young child formula/growing-up milks will be reported separately.

- Pureed dessert (e.g. pudding, custard)
- Soup
- Yoghurt or yoghurt-related
- Other

The study provided a snapshot of the foods on the market for infants and young children in the four cities. Information was obtained on the target age group for products, their nutritional quality (based on the nutrition information declared on labels) and how the products were promoted (including labelling and claims), and flavours used in products. In addition, the products available in low-income and high-income areas were compared.

Availability of commercial foods for infants and young children
The data suggest that commercial foods for infants and young children are widely available in Austria, Bulgaria and Hungary. A smaller sample size and less diverse range of products was obtained in Israel, which may suggest that fewer foods are specifically labelled as suitable for infants and young children.

Target age group
In all countries, a substantial proportion of products (ranging from 28% to 60%) were marketed as being suitable for infants under the age of 6 months. These products are in violation of the Code and the Guidance, both of which explicitly state that commercial complementary foods should not be marketed as suitable for infants under 6 months of age, and call on manufacturers and distributors to comply with the enshrined principles, irrespective of whether those principles have been implemented in national laws.

Nutritional quality of products
Foods for infants and young children are required to comply with various established nutrition and compositional criteria. Nonetheless, there are concerns that products that comply with the existing legal standards may still be too high in saturated fats, sugars or salt to promote health in childhood and later in life. Foods that are not in line with dietary guidelines for babies and toddlers are not suitable for promotion as foods for infants and young children.

The study recorded the values declared (where these were declared) on labels for energy (kilocalories and/or kilojoules), protein, carbohydrates, total sugars, lactose, total fat, saturated fat, trans-fatty acids, salt and sodium.[b]

Energy – some of the products provided less energy per 100 g than breast milk. This applied to many soups, some yoghurts and fish- or meat-based meals, and at least half of the fruit/vegetable purees. Low energy density can be problematic because infants' and young children's small stomachs mean that they can consume only relatively small amounts at meal times. It is important, therefore, that small quantities of foods, especially for infants, contain sufficient energy and nutrients. On the other hand, some products in the biscuits/wafers/crisps category have a very high energy density, increasing the risk of excess energy intake.

Protein – standards for protein content vary, depending on the type of product and the exact name of the product. On the basis of the categories in this study, it is difficult to draw

[b] Carbohydrate values are given in table form in the online annex. No values were recorded for lactose, and this issue is not dealt with any further in this report.

general conclusions about whether the protein levels were appropriate. More detailed product categories are required to make conclusions about protein content.

Sugars – results in all four countries showed high levels of total sugars.[c] In Austria, Bulgaria and Hungary, in around half or more of products, more than 30% of energy was provided by sugars and more than four in 10 products had 40% or more of energy from sugars. In Israel, levels were lower; nonetheless, nearly one in five products (18%) had more than 30% of energy from sugars (Fig. E1). Use of some kind of sweetening agent – most commonly "sugar" or "concentrated fruit juice" – was widespread, featuring in around a third or more of the products.

Furthermore, sweet taste predominates and this may encourage a lifelong preference for sweet foods, undermining healthy eating advice.

Fats – babies and toddlers do need fats in their diet, with total fat intake reducing as the child gets older (from 40–60% of total energy at around 6 months to 30–35% of total energy intake by 24 months). Overall, the total fat content of products in the study, however, appeared to increase, rather than decrease, as the age for which they were marketed increased. In Austria, Bulgaria and Hungary, substantial proportions of meat- or fish-based foods had high fat levels (over 30% energy from fat). In Israel, only the biscuits/wafers/crisps category had a sizeable proportion of products with more than 30% of energy from fats. In general, saturated fat levels were low, but some products did exceed 10% of total energy, most commonly in the biscuits/wafers/crisps and pureed dessert categories (in Bulgaria and Israel for the former, Austria and Bulgaria for the latter). Because the study relied on nutrient declarations, it was not possible to assess trans-fats levels in foods, since these were rarely declared on nutrition labels, although it should be noted that regulatory limits for trans-fats are in place in Austria and Hungary, and specific labelling is required if the food contains more than 2 g of fat and 0.5 g or more of trans-fatty acids in Israel.

Sodium – babies should not be given foods containing added salt. From 2 years of age, WHO recommends that the maximum sodium intake of 2 g per day (equivalent to 5 g per day of salt) be applied, but adjusted downwards for children's lower energy intakes. Some sodium is naturally present in foods and the study was unable to identify if and when salt had been added, but inclusion of salty ingredients, such as cheese or ham, was observed. Very high sodium[d] levels were rare, but a considerable proportion of the meat- and fish-based meals, soup, biscuits/wafers/crisps and "other" categories contained 50 mg of sodium or more per 100 kcal in at least one country. The results also suggest considerable variation within categories, suggesting that there is considerable scope to reduce salt/sodium levels in many products, and that levels below 50 mg per 100 kcal are possible. While high levels of salt/sodium were not common, there were products on the market which contained salty ingredients and/or were likely to encourage a preference for salty foods at an early age.

[c] This study reports on total sugars (which include the sugars naturally present in fruits, vegetables and dairy products), and added sugar or other sweetening agent, whereas WHO's recommendations relate to free sugars[c] and the European Union (EU) and Codex standards relate to added sugars. This was a practical decision based on the availability of data from the labelling. Nevertheless, it is important to recall that WHO recommends that free sugars should not provide more than 10% of energy, and suggests that further health benefits would be obtained by limiting free sugars further to 5% of energy. In addition, the *Guidance on ending inappropriate promotion of foods for infants and young children* stresses that addition of free sugars to such foods should be avoided.

[d] All values declared as salt (g) were converted to sodium (mg).

In conclusion, these findings suggest that some foods of inappropriate nutritional quality are being marketed for infants and young children.

Promotion of products (packaging, labelling, claims and price promotions)

All or nearly all products carried some type of statement on the product composition or its nutrition or health-related properties – between one third and three quarters carried statements relating to nutritional properties and between 13% and 35% carried at least one statement relating to health and/or child development. This is despite the fact that Codex guidelines state that foods for infants and young children should not carry nutrition or health claims (unless allowed by national laws), and both the Code and the WHO Guidance reinforce this and call on manufacturers to respect these rules.

A substantial proportion – from 16% to 53% – of products carried cartoon images on the packaging and were clearly designed to appeal to children. This can be seen as part of a wider trend for making children's food "fun" and could encourage so-called "pester power", thereby undermining optimal infant and young child feeding.

Other areas of inappropriate promotion – such as price promotions or use of imagery that would encourage bottle-feeding – were much less common but did occur. Such practices are damaging to the nutrition of babies and young children because they can undermine breastfeeding and parents' confidence in complementary feeding with home-cooked family foods, thus encouraging dependence on commercial food and drink products.

Other aspects of foods for infants and young children

Data collected on the flavours declared on product labels revealed that sweet flavours predominated and identified use of some flavours that did not reflect infant and young child feeding guidelines (e.g. honey, chocolate, stracciatella and peanut). There are concerns that use of these flavours could affect the development of children's taste preferences and their liking for sweeter foods or foods high in fat, sugar or salt as they grow up.

Conclusions

This study found evidence of widespread inappropriate promotion of commercial foods for infants and young children in four cities of four European countries. Despite globally agreed rules on the promotion of foods for infants and children – and nearly 40 years since the introduction of the Code – many companies that make and sell commercial baby foods fail to comply with these rules. Broadly similar results in three countries (Austria, Bulgaria and Hungary) and, to a lesser extent Israel, suggest that the problems identified are likely to extend across the Region.

Action is therefore required by Member States, with the support of the WHO Regional Office for Europe, to fully implement the Code and WHO's Guidance in order to prevent promotion of nutritionally inappropriate products and/or use of inappropriate promotional techniques.

To facilitate such action, a nutrient profile model that establishes nutrient thresholds for nutritionally appropriate foods for infants and young children should inform national and regional discussions on legislation and policies relating to these products.

It is particularly important to address the issue of high total sugars, use of sweet ingredients and misleading naming (i.e. savoury-sounding products that contain a lot of fruit and are high in total sugars). Sugar, fruit juice, concentrated fruit juice and other sweetening agents should not be added to foods for infants and young children. Consideration also needs to be given to whether the addition of fruit puree (to foods with other ingredients) should be considered as "adding sugar". Although foods that naturally contain sugars, such as fruits and vegetables, are appropriate for infant and young child diets, the very high level of sugars present in commercial products is a cause for concern and an issue that needs to be addressed. Careful thought is needed on how to inform parents or caregivers about these issues in a clear and understandable way while encouraging food manufacturers to reformulate their products.

Labelling of foods for infants and young children needs to be improved. Manufacturers and retailers should comply with the international Code and WHO Guidance. Composition, nutrition, health or development claims should not feature at all on these products in the European Region. Products should not be marketed as suitable for babies under 6 months of age. In addition, upper age limits are appropriate for some products – to encourage a timely transition to family foods and/or products with more texture.

Finally, guidance on complementary feeding practices needs to be updated to reflect the modern context where commercial foods make up a large proportion of the diets of babies and toddlers in Europe. Parents and caregivers need guidance on how to navigate the market and how to balance their child's diet in light of the products currently on the market.

Effective action on these issues – by Member States and by baby food manufacturers and retailers – offers great potential to improve infant and young child nutrition and to promote health throughout the life-course.

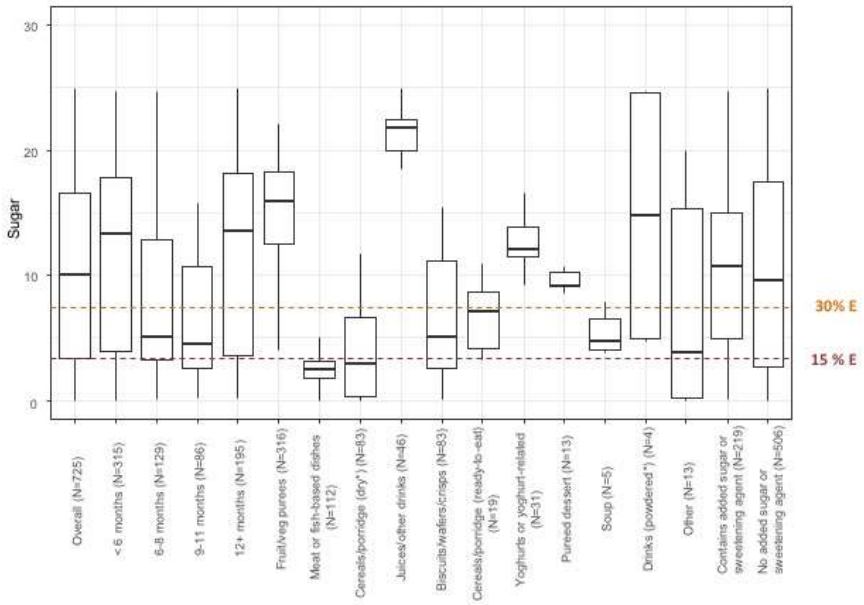
Summary of the key considerations from the findings

- A nutrient profile model that establishes nutrient thresholds for nutritionally appropriate foods for infants and young children may be developed. This would inform national and regional discussions on legislation and policies relating to these products, which are growing in importance in the European Region.
- Guidelines on complementary feeding practices may need to be updated in some Member States of the European Region to reflect the modern context where commercial foods make up a larger proportion of the diets of babies and toddlers than was the case previously.
- Parents and caregivers need guidance on how to navigate the market, how to balance their child's diet in light of the products currently on the market, and the continued importance of homemade foods.
- Labelling of foods for infants and young children needs to be improved. Manufacturers and retailers should comply with the international Code and the WHO Guidance, including for composition, nutrition, health or development claims or statements.
- Products should not be marketed as suitable for babies under 6 months of age.
- Food producers should look to produce more vegetable and savoury foods than fruit-based and sweet foods; reduce the total- and free-sugar content of foods; use no added

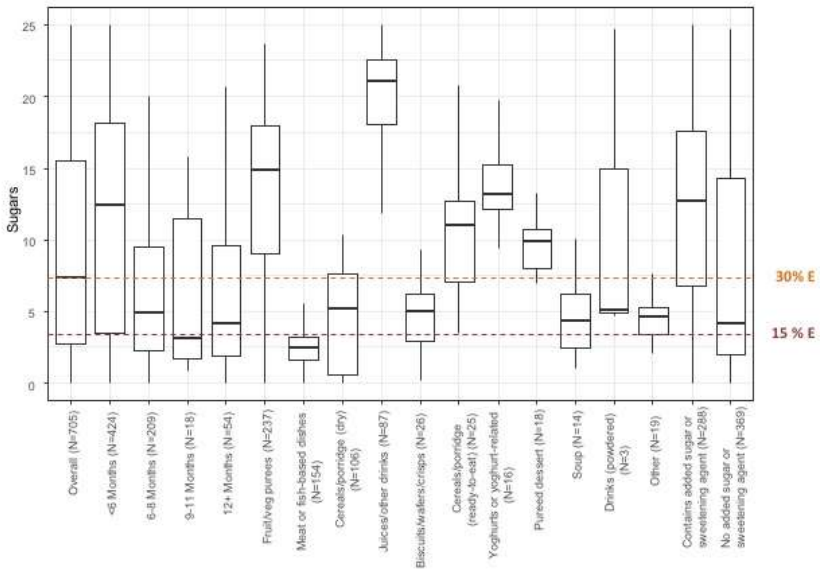
sugars or sweetening agents; use appropriate names; and avoid producing treats or desserts.

Fig. E1. Total sugar content of foods for infants and young children in four European cities (g per 100 kcal, by age group and category)

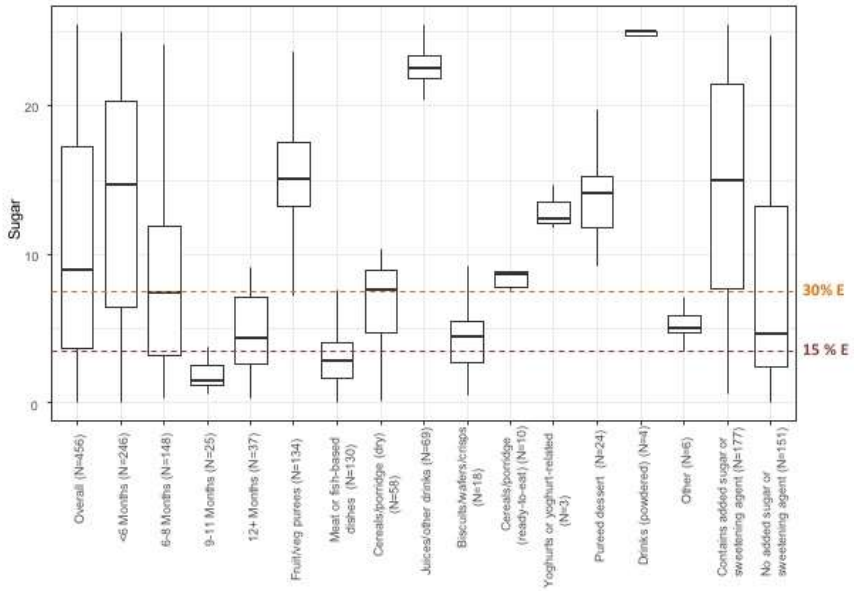
Vienna, Austria



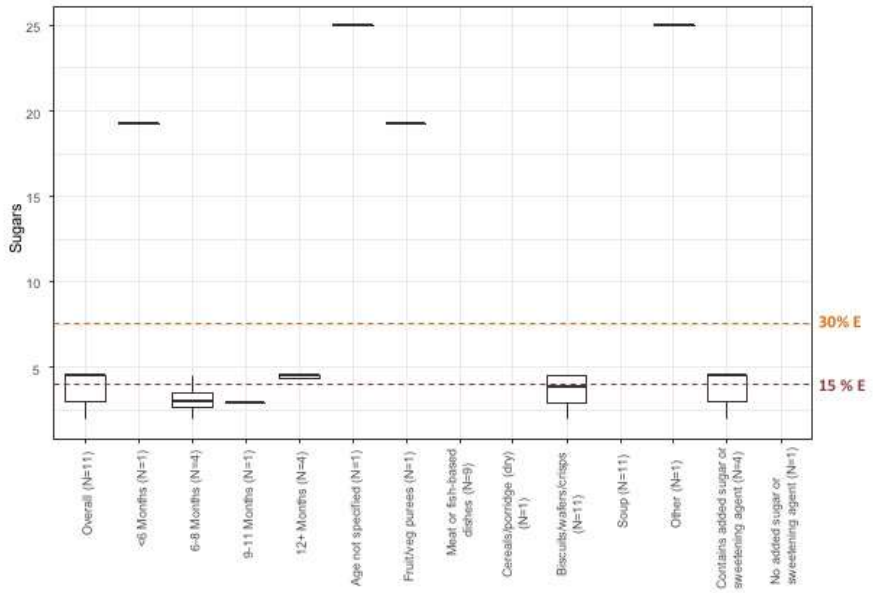
Sofia, Bulgaria



Budapest, Hungary



Haifa, Israel



Introduction

Good nutrition in infancy and early childhood is key to ensuring optimal child growth and development, along with better health outcomes later in life (*1*). Appropriate infant and young child feeding practices are important for the prevention of malnutrition in all its forms, including overweight, obesity and diet-related noncommunicable diseases (NCDs) (*2*).

WHO recommends that infants should be exclusively breastfed for the first 6 months of life and thereafter should receive nutritionally adequate and safe complementary foods while breastfeeding continues for up to 2 years of age or beyond (*1)*. Eating patterns and dietary preferences can also be established from an early age; thus, the first three years of life also present a window of opportunity to influence the learning of healthy dietary behaviours, with potential for positive impact throughout the life-course (*3*-*4*).

It has long been recognized that promotion of breast-milk substitutes undermines breastfeeding and optimal infant and young child feeding, and the marketing of such products has been covered by the *International code of marketing of breast-milk substitutes* (updated by numerous subsequent World Health Assembly Resolutions) since 1981 (*5*).

In recent years, however, there has been growing concern that inappropriate promotion of some commercial complementary foods has been undermining optimal infant and young child nutrition (*6*). There has been debate about the role of commercially produced baby and toddler foods[e] and whether they can undermine parents' and carers' confidence in home-produced foods, promote dietary habits that may encourage later obesity or NCDs, or undermine breastfeeding. The World Health Assembly has urged all Member States to "end inappropriate promotion of foods for infants and young children"(*6)* and, in 2016, new global guidance was issued to help countries take action on this issue (*7*-*8*).

The 2016 *Guidance on ending the inappropriate promotion of foods for infants and young children* ("the Guidance") sets out seven recommendations relating to the marketing of foods suitable for children up to 3 years of age (*see* Section 1.4). It aims to protect breastfeeding, prevent obesity and chronic diseases, and promote a healthy diet, as well as ensure that information provided about food products and infant and young child feeding is clear and accurate. Recommendation 3 states that foods for infants and young children "should be promoted only if they meet all the relevant national, regional and global standards for composition, safety, quality and nutrient levels and are in line with national dietary guidelines". In addition, it recommends development of nutrient profile models to guide decisions on which foods are inappropriate for promotion because of their nutritional composition.

In order to be able to put this Guidance into practice – and specifically to be able to define which products are inappropriate for promotion – it is important for Member States to know which commercial foods for infants and young children are currently on the market and how they are being promoted to parents and caregivers. Specific research questions that will help policy-makers take action on the Guidance include the following:

[e] This report relates to all commercially produced foods for infants (up to 12 months) and young children (up to 36 months). The terms "foods for infants and young children" and "baby and toddler foods" are used interchangeably within the report.

- What types of foods are on the market?
- What levels of nutrients do they contain?
- Which other ingredients do they contain?
- How are the products packaged?
- What images and words are used to make the products appeal to parents and caregivers?
- Do labels carry claims that imply health or other benefits from feeding the products to babies and toddlers?
- Do labels suggest that products are equivalent or superior to breast milk and/or home-made complementary foods?

In order to help Member States answer these questions and support the implementation of the Guidance at the European level, the WHO Regional Office for Europe has developed a methodology for collecting data on commercial baby foods, the stated nutritional content of such foods and how they are promoted. By providing a better picture of the commercially produced foods for infants and young children available across the Region, use of the methodology will help to identify the most pressing challenges that need to be addressed through policies to improve complementary feeding practices in Europe. This study is intended to reinforce and expand existing data and knowledge on the nutritional quality of commercial baby foods available in Europe by providing a detailed snapshot of commercial baby and toddler foods on the market in four countries, and their nutritional quality and promotion.

An initial pilot of data collection using the methodology was conducted in Copenhagen in 2016. This report documents the findings of a study conducted in four other European countries – Austria, Bulgaria, Hungary and Israel – between November 2017 and January 2018.

1. Background

1.1 Optimal infant and young child feeding for health throughout the life-course

WHO recommends that infants should be exclusively breastfed for the first 6 months of life and thereafter should receive nutritionally adequate and safe complementary foods while breastfeeding continues for up to 2 years of age or beyond.

Complementary feeding should be timely, adequate, safe and appropriate. Timely means that all infants should receive food in addition to breast milk from 6 months of age onward. The amount, frequency and consistency of the foods should be such that they are adequate to cover nutritional needs using a variety of foods. Foods should be safely prepared and given so that the risk of contamination with pathogens is minimized. In addition, children should be given foods that are of an appropriate texture for their age, and a responsive feeding approach should be applied.

WHO has previously provided detailed guidance on complementary feeding, as set out in the *Guiding principles for complementary feeding of the breastfed child (9)* and *Guiding principles for feeding of non-breastfed children 6–24 months of age* (*10*). These principles are summarized in Annex 1.

Parents require support and guidance on how to ensure that the foods they provide meet the nutritional needs of their baby, including counselling by health professionals. At the same time, it is also important to ensure that commercial baby foods have optimal composition and are packaged and promoted in an appropriate way.

1.2 National guidance on complementary feeding in the European Region

Of the 53 countries in the European Region, 46 have national recommendations on infant and young child nutrition (*11*). The majority (41) recommend exclusive breastfeeding for 6 months. Continued breastfeeding up to 24 months is recommended in 29 Member States, with eight countries recommending it up to 12 months and two countries recommending it for 18 months. The earliest age recommended for the introduction of complementary foods ranges from 16 to 30 weeks, while the ideal age ranges from 17 to 30 weeks.

There are national recommendations for dietary reference intakes in 25 countries. The most commonly recommended first food groups to introduce to infants are vegetables, cereals and fruits.

National guidance on infant and young child feeding exist in the four countries of the study:

- Austria: *Austrian recommendations for complementary feeding (2010); Austrian food-based dietary guidelines for 1- to 3-year old toddlers (2014),* issued by Healthy Eating from the Start!, the Austrian Agency for Health and Food Safety, the Austrian Ministry of Labour, Social Affairs, Health and Consumer Protection, and the Main Association of Austrian Social Security Institutions.
- Bulgaria: *Food-based dietary guidelines for healthy nutrition of infants* (2008), issued by the Ministry of Health, National Center of Public Health

- Hungary: *Feeding of healthy infants* (2009), *Feeding of toddlers* (2011), issued by the Pediatric Board of the Ministry of Health.
- Israel: *A guide to infant feeding* (2012), issued by the Ministry of Health and Pediatric Association.

1.3 The role of commercial baby and toddler foods in infant and young child nutrition

Sales of commercial baby and toddler foods have grown rapidly in recent years and the market in European countries is one of the biggest globally (*12*). The role of commercial baby and toddler foods in appropriate complementary feeding has been widely debated. There has been growing concern that the inappropriate promotion of foods for infants and young children has been undermining optimal infant and young child nutrition. There are a number of areas of potential concern.

- The promotion of foods for infants and young children may undermine breastfeeding, by encouraging their introduction before 6 months of age or by giving the impression that these products are superior or equivalent to breast milk. Labels that indicate that they are suitable for infants younger than 6 months or inclusion of any pictures, images or words that might lead people to believe that the product is suitable for babies under 6 months of age, therefore, may undermine breastfeeding. In addition, some products are marketed using brands, labels and packaging that are very similar to those used for infant formula, thereby effectively indirectly promoting those breast-milk substitutes.

- Marketing of foods for infants and young children could undermine the use of home-prepared foods, discourage caregivers from giving children a diverse diet or create a dependency on commercial products. Use of misleading health or nutritional claims, for example, can undermine caregivers' confidence that a diet based on home-prepared foods (which are usually less expensive) will result in the same health or educational outcomes for their children. Messages on labels or packaging, which imply that the product has been endorsed or approved by official authorities or health professional bodies, can undermine breastfeeding and confidence in home-prepared foods. Similarly, images of product ingredients and messages emphasizing the product's convenience could idealize commercial foods for infants and young children and undermine confidence in home-prepared foods.

  Recent evidence suggests that the nutritional content of some commercial baby and toddler foods may not correspond to the recommended levels of calories and/or certain nutrients (*13*,*14*,*15*,*16*,*17*). Concerns have been raised that the levels of salt, saturated or trans-fats and sugars in some baby and toddler foods are too high, and may be associated with the development of risk factors that can predispose the child to later development of NCDs (*18*,*19*, *20*,*21*). Others have expressed concern about the use of artificial sweeteners and other food additives in baby foods [f,](*9,21,22,23).*

- The taste of food products may influence later dietary preferences and habits (*4*,*24*,*25*,*26*). Research suggests that foods for babies and toddlers are predominantly sweet (even in dishes that are nominally savoury) and there is a lack of single food

[f] See, for example, the statements by the Institute of Medicine. Stallings VA, Yaktine AL, editors. Nutrition standards for foods in schools: leading the way toward healthier youth. Washington, DC: The National Academies Press, Institute of Medicine; 2007.

flavours or bitter vegetables *(17).* Similarly, there are concerns about the introduction of salty tastes to young palates, as well as introduction of flavours (e.g. chocolate or vanilla) not normally used in home-made foods for babies and young children. Furthermore, unusual flavour combinations (e.g. broccoli, pears and peas) may also encourage a preference for sweetness and/or mask the taste of the vegetable component(s), meaning that babies do not become accustomed to vegetable flavours.

- There have also been questions about the ways in which products are packaged and/or the food is delivered to the child. Promotion of products as being suitable for bottle-feeding is inappropriate, because it undermines breastfeeding, and bottle-feeding of complementary foods is not appropriate. Product labels should not, therefore, carry images of bottle-feeding, bottles or teats. It is important that the texture and consistency of foods is appropriate for the child's stage of development. As infants grow, the consistency of complementary foods should change from semisolid to solid foods and the variety of foods offered should increase. By 8 months, infants can eat "finger foods" and by 12 months, most children can eat the same types of food as the rest of the family.[g] Evidence suggests that many commercial baby and toddler foods are very smooth *(17,19)* and, because they are often marketed without an upper age limit, do not encourage the progression to foods of different textures that is important for developing eating skills and preferences (*27)*. The increasing provision of foods in pouches may result in children sucking the food directly from the nozzle of the pouch (even if this is not recommended by the manufacturer). This has raised concerns about the ease and speed of feeding in this way and whether it leads to children consuming too many calories too quickly, as well as concerns about the impact on oral health (*17*,*28)*.

1.4 Ending inappropriate promotion of foods for infants and young children

Recognizing some of the areas of concern outlined above, the World Health Assembly called on Member States to "end inappropriate promotion of foods for infants and young children" in May 2010 (*6).* WHO was asked in 2012 "to provide guidance and clarification" to help Member States take action on this issue.

Following a rigorous scientific and technical review (*29*) and a consultative process, the final Guidance was welcomed with appreciation by the World Health Assembly in May 2016 (*7).* The Assembly urged Member States to implement the recommendations in the Guidance (and monitor and evaluate their implementation). It also called on manufacturers and distributors to end all forms of inappropriate promotion, and on health-care professionals, the media and creative industries to act in accordance with the Guidance recommendations. Finally, it called on civil society to support, advocate for and monitor Member State action on this issue.

The Guidance covers all commercially produced foods or beverages that are specifically marketed as suitable for feeding infants from 6 months up to 36 months of age. It makes a distinction between marketing and promotion.

[g] See the summary of the Guiding principles for complementary feeding in Annex 1.

The Guidance defines "marketing" as including product promotion, distribution, selling, advertising, product public relations and information services. Products are considered to be "marketed as suitable" in this age range if they:

- are labelled with the words baby/babe/infant/toddler/young child;
- recommend an age of introduction less than 3 years;
- use an image of a child appearing 3 years of age or younger or feeding with a bottle; or
- are in any other way presented as suitable for children under the age of 3 years.

The Guidance defines "promotion" as being broadly interpreted to include the communication of messages that are designed to persuade or encourage the purchase or consumption of a product or raise awareness of a brand. Cross-promotion (also called brand crossover promotion or brand stretching) is a form of marketing promotion where customers of one product or service are targeted with promotion of a related product. This can include packaging, branding and labelling of a product to closely resemble that of another (brand extension).

Infant formula is not included in the scope of the Guidance, since this is already covered by the Code (*5)* and subsequent Resolutions (hereafter referred to as "the Code"), although it should be noted that the Code needs to be further implemented, regulated and enforced (*30*). In relation to follow-on or follow-up formula and so-called growing-up milks, the Guidance clarifies that these are covered by the Code. The Guidance includes seven specific recommendations (Box 1).

Box 1. Summary of recommendations in the *Guidance on ending inappropriate promotion of foods for infants and young children*

Recommendation 1. Optimal infant and young child feeding should be promoted based on the guiding principles for complementary feeding and feeding non-breastfed children 6–24 months of age (*see* Annex 1) with an emphasis on nutrient-rich, home-prepared and locally available foods.

Recommendation 2. Products that function as breast-milk substitutes should not be promoted.

Recommendation 3. Foods for infants and young children that are not products that function as breast-milk substitutes should be promoted only if they meet all the relevant national, regional and global standards for composition, safety, quality and nutrient levels, and are in line with national dietary guidelines.

Recommendation 4. The messages used to promote foods for infants and young children should support optimal feeding and should not include inappropriate messages.

Recommendation 5. There should be no cross-promotion for breast-milk substitutes indirectly via the promotion of foods for infants and young children.

Recommendation 6. Companies that market foods for infants and young children should not create conflicts of interest in health facilities or throughout health systems. Health workers, health systems, health professional associations and nongovernmental organizations should likewise avoid such conflicts of interest.

Recommendation 7. The WHO set of recommendations on the marketing of foods and non-alcoholic beverages to children (*31*) should be fully implemented, with particular attention being given to ensuring that settings where infants and young children gather are free from all forms of marketing of foods high in fats,[h] sugars or salt.

[h] While diets for young children should have adequate fat content, a 2008 joint FAO/WHO expert consultation proposed that no more than 35% of total energy should come from fat.

1.5 Implementation of the *Guidance on ending inappropriate promotion of foods for infants and young children*

It is clear that the operationalization of some aspects of the new Guidance is complex and needs to be implemented in a way that is appropriate to the national context. This means taking into account national guidelines on infant and young child feeding and existing national legislation to implement the International Code, Codex standards (*32*) and – for EU Member States – EU legislation (*33*).

The discussions during the development of the Guidance (*12)* and the World Health Assembly discussions on the Guidance in May 2016 recognized this complexity. As a result, WHA Resolution 69.9 requests WHO to provide technical support to Member States.

1.5.1 Defining nutrient levels for foods that are appropriate for marketing to infants and young children

One of the particular areas where such technical support may be required is Recommendation 3 (*see* Box 2), which involves Member States deciding which products "meet all the relevant national, regional and global standards for composition, safety, quality and nutrient levels and are in line with national dietary guidelines". The Guidance recognizes that existing Codex standards alone are inadequate for defining the foods that would be appropriate to promote for infants and young children. It recommends that Codex standards and guidelines be updated and expanded, particularly in relation to the addition of free sugars and salt.

Box 2. Guidance on ending inappropriate promotion of foods for infants and young children: Recommendation 3

Recommendation 3. Foods for infants and young children that are not products that function as breast-milk substitutes should be promoted only if they meet all the relevant national, regional and global standards for composition, safety, quality and nutrient levels, and are in line with national dietary guidelines. Nutrient profile models should be developed and utilized to guide decisions on which foods are inappropriate for promotion. Relevant Codex standards and guidelines (*32*) should be updated and additional guidelines developed in line with WHO's Guidance to ensure that products are appropriate for infants and young children, with a particular focus on avoiding the addition of free sugars and salt.

Recommendation 3 also recommends the development and use of nutrient profile models to help assess the nutritional quality of foods for babies and toddlers. Nutrient profile models enable an overall assessment of individual food products in relation to predefined nutritional criteria or thresholds.

To effectively implement this recommendation, it is necessary:

- to understand all the relevant national, regional and global standards for composition, safety, quality and nutrient levels, and national dietary guidelines for infant and young child feeding;
- to obtain a snapshot of the range of food and drink products marketed for infants and young children up to 36 months;
- to determine which foods meet all relevant standards and are in line with infant and young child feeding guidelines;
- to identify any discrepancies, i.e. identify products that are currently marketed but which do not meet these standards or are not in line with guidelines *and/or* products that do

comply with standards and are strictly in line with existing standards but may still give cause for concern due to their nutritional composition;
- to develop nutrient profile models and other tools to identify products that are considered inappropriate for promotion;
- to determine whether any relevant regulatory distinctions are needed in terms of how different products are marketed and/or promoted.

Box 3. Promotion of foods for infants and young children: a children's rights perspective

Inappropriate promotion of foods for infants and young children can impact on several children's rights. Infants and young children have the right to life, survival and development, and to the highest attainable standard of health, as well as to safe and nutritious foods.

Human rights law obliges countries to respect, protect and fulfil children's rights, and this includes providing all necessary support and protection to mothers and their infants and young children to facilitate optimal feeding practices (*34*). This means that countries have a legal obligation to take all necessary measures to protect, promote and support breastfeeding, and end the inappropriate promotion of breast-milk substitutes and other foods intended for infants and young children up to the age of 3 years. This includes measures to protect against biased and misleading information through inappropriate marketing practices of manufacturers and distributors of baby food products.

In 2016, UN human rights experts criticized the lack of progress made in, and urgent need for, the adoption of effective measures by States to eliminate harmful, inappropriate marketing and strategies (*34)*. Companies also have responsibilities to respect child rights, under the UN Guiding Principles on Business and Human Rights, irrespective of national laws and regulations. This includes ensuring that their promotional communications do not have an adverse impact on children and means that companies are expected to prevent, address and remediate any adverse impacts. They are also expected to make, and act on, policy commitments to support and contribute to the enjoyment of children's rights and ensure that their operations do not undermine countries' efforts to ensure these rights (*35)*.

1.6 Developing a picture of commercial baby and toddler foods on the market

In order for countries to progress with implementation of the Guidance, it is helpful to obtain a picture of what products for babies and toddlers are being marketed in a country, as well as which nutrients and other ingredients they contain (and at what levels) and how such foods are promoted.

To help develop this overall picture, the WHO Regional Office for Europe has developed a methodology for collecting data about baby and toddler foods on the market (Annex 2).

2 Study methodology

To support Member States in their efforts to implement and operationalize the Guidance, the WHO Regional Office for Europe developed a methodology for gathering information about available commercial baby and toddler foods.

Using this methodology, a study on the availability, composition and marketing of commercial food and drink products for infants and young children was conducted in four European countries between November 2017 and January 2018.

2.1 Aims of the study

The overall aims of the study were as follows:

(a) to collect data on commercially available food products targeted at infants and young children (0–36 months);
(b) to compare the composition of these products (including nutritional content) with WHO Guidance and national food-based dietary guidelines on infant and young child feeding;
(c) to compare the methods used to promote these products (labelling, claims, price promotions) with WHO Guidance.

To support countries, a user-friendly mobile questionnaire using open-source technology was developed. This mobile questionnaire was hosted on the KoBoCollect platform open-source and enabled researchers to visit retail outlets selling baby foods and record information about available products by simply entering data onto their mobile device via the KoBoCollect application. All the information entered can be found on the product label, packaging or price ticket, or in the retail environment. Photographs of the product packages and labels can also be uploaded to an online database. Use of the mobile questionnaire was optional and an Excel database was also generated to allow for manual data collection.

A pilot study using the mobile questionnaire was conducted in Copenhagen between 21 April and 25 May 2016. In total, 42 stores were visited and, of these, 27 were in a high-income area. Data were recorded on a total of 923 products, corresponding to 227 unique products.

Following the successful pilot of the methodology in Copenhagen, a study was conducted in four countries of the WHO European Region – Austria, Bulgaria, Hungary and Israel – between November 2017 and January 2018. In three countries (Bulgaria, Hungary and Israel), the data were collected using the mobile questionnaire. In Austria, data collection was performed conjointly with another project called Food in Spotlight (www.lebensmittellupe.at) without the use of the mobile questionnaire, by entering data directly onto the Excel spreadsheet provided. The study was conducted by WHO partner institutions in the four countries in both low-income and high-income districts of a major city in each country (Table 1).

Table 1. Country participation in the study

COUNTRY	PARTNER INSTITUTIONS	METHOD, CITY AND DISTRICTS FOR DATA COLLECTION	DATES OF DATA COLLECTION
Austria	Austrian Agency for Health and Food Safety	Data collected by entering data directly in the Excel spreadsheet provided Vienna: 1st district, high socioeconomic status and 15th district, low socioeconomic status	28/11/17–09/01/18
Bulgaria	National Centre of Public Health and Analyses	Data collected using the mobile app Sofia: Nadezdha, 13th district, low socioeconomic status; Lozenets, 9th district, high socioeconomic status	1–30/11/17
Hungary	National Institute of Pharmacy and Nutrition (OGYEI) Field workers: students of Semmelweis University Faculty of Health Science and OGYEI employees	Data collected using the mobile app Budapest, 9th district, low socioeconomic status and 12th district, high socioeconomic status	7–20/11/17
Israel	University of Haifa	Data collected using the mobile app Haifa: a mix of low- and high-income districts in the city	29/11–20/12/17

2.2 Study protocol

The study was conducted according to a protocol developed by the Regional Office (Annex 2). There were four stages:

1. Sampling – selection of project areas and retail outlets
2. Field worker training
3. Data collection
4. Analysis – cleaning and analysis of the data.

2.2.1 Sampling methods

A flexible approach involving purposive sampling was followed, with sampling methods agreed with each country prior to data collection.

In each case, low- and high-income areas in the city were sampled according to national socioeconomic data. In Austria, Bulgaria and Hungary, one administrative area/district was selected for each income bracket. In Bulgaria and Hungary, a central point was selected and a radius from the centre was defined. This then created a "buffer zone". Major retailers within this zone were mapped and field workers were instructed to visit those retailers and, as far as possible, all other stores that might sell food or other edible items. In Austria, a purposive sample was used of a minimum of 10 large stores (plus additional small stores) that sell commercial

foods for infants and young children per study district. The Federal Ministry of Labour, Social Affairs, Health and Consumer Protection contacted major retailers asking for permission to carry out the data collection in several stores in each study district. Field workers were instructed to visit the stores for which permission was received. In Israel (Haifa), where residential areas within the city boundaries are more mixed, a total of 10 large stores were sampled and the socioeconomic characteristic of the immediate environ was categorized as low or high. All types of retailers – such as supermarket, pharmacy, convenience store/corner shop, health food store, department store and minimarket – were included in all study areas.

Within the stores, all baby and toddler food and drink products (labelled or marketed as suitable for ages 0–36 months) were recorded. For the purposes of data collection, the products were defined as follows:

Infant formula
Any formula that is labelled for infants under 6 months of age. The age listed might be 0–6 months or 0–12 months. It may be labelled "Stage 1".

Follow-on formula (also called follow-up milk or follow-up formula)
Any milk product that is labelled for infants under 12 months of age but not under 6 months of age. The age listed might be 6–12 months or 6+ months. It may be labelled "Stage 2".

Growing-up milk (also called toddler milk)
Any milk product for which the target age range includes children under 36 months of age. In other words, any milk product labelled for children under 36 months of age and over 12 months of age. The age might be listed as, for example, 12–36 months or 1–5 years. It may be labelled "Stage 3".

Commercial complementary foods
There are many types of prepared products labelled as suitable for infants and young children up to 36 months of age or which are marketed for young children but do not specify an exact age range. These may include products sold in jars, cans or retort flexible "pouches", which do not require any cooking preparation other than heating. Examples are pureed fruits and vegetables, savoury meals, yoghurts, desserts and soups. In addition, there is a range of ambient products marketed as snacks and dried food options for reconstitution, including cereals. We included the following categories:

Biscuits/wafers/crisps
This category included the following: crackers, biscuits, rusks, rice cakes, corn or grain puffs, vegetable crisps, cereal bars.

Cereal/porridge
This category included rice, maize, millet, wheat, oat porridge (flavoured or non-flavoured). For data analysis, the category was split into two subcategories:

Cereal/porridge (ready to eat) – products that were already reconstituted with water, milk, yoghurt or other liquids;

Cereal/porridge (dry) – products that had to be reconstituted with water, milk, yoghurt or other liquids before feeding to a child.

Fruit or vegetable puree[i]
This category included 100% fruit purees, or purees based on a combination of fruits and vegetables.

Juice/smoothie/tea/other drinks
This category included 100% juice drinks labelled as suitable for this age group, or drinks with fruit and vegetable combinations. Waters and teas labelled as suitable for babies are also included alongside other drinks suitable for this age group. For data analysis, this was divided into two subcategories:

Drinks (ready to drink) – products in the above category that are ready to drink and do not require reconstitution with water and/or dilution;

Powdered drinks – drinks in dry/powdered form, which have to be reconstituted with water or other liquids.

Meat- or fish-based meal
This category included products that resemble versions of adult dishes, such as pureed versions of roast chicken, pureed meat with vegetables and pasta or sometimes a prepared meal in a tray for older infants. This was country specific, but researchers were advised that the product should be recognizable as a "meal".

Milkshake powder
Any powder that can be added to *cows'* milk and not specifically labelled as a growing-up milk, but labelled as suitable for children under 36 months of age. Could include flavours such as vanilla and chocolate.

Pureed dessert (e.g. pudding, custard)
This category included products that resemble versions of adult desserts, such as crumble, rice pudding, egg custard.

Soup
Any preparation of vegetables in soup form, which could include meat or cereals as additional ingredients, and was labelled as suitable for children under the age of 36 months. It included powdered products (i.e. requiring addition of milk or water).

Yoghurt or yoghurt-related
This category included products that were primarily labelled as yoghurts, but could include additional ingredients or flavours, such as fruit or some cereal.

Some products may straddle two or more categories (e.g. some cereal products can contain yoghurt and/or fruit or vegetable puree while some predominantly yoghurt products may contain some fruit puree and/or cereal). (*See* discussion of methodology issues in Section 4).

Details of the district selection and sampling process are provided in Annex 3.

[i] This includes products that have both fruit and vegetables.

2.2.2 Field worker training

Field workers responsible for data collection received training, during which the purpose of the study was outlined and the methodology explained. Field workers were provided with the study protocol translated into the relevant language and the KoBoCollect application was installed on their phones. Field workers then familiarized themselves with the application and experimented with test data collection. In Austria, where the Excel spreadsheet was used, field workers received training on how to perform data collection in the stores, and were instructed on how to record the product name, brand, net quantity, age from which products are marketed as being suitable, price and promotion information from all commercial foods for infants and young children on pre-made lists in every store and to take pictures of the products. The recorded data and product information from the pictures were entered directly in the Excel spreadsheet by the research personnel.

2.2.3 Data collection

Following training, data collection teams were provided with the mobile application for Android and IoS, along with a map of the assigned area with a highlighted route. Products were coded for 58 indicators, including:

- location information
- product category
- brand and product name
- age from which product is marketed
- nutritional composition
- marketing
- visual information.

Field workers, often working in pairs, carried out the following steps:

1. Input the name, affiliation and country.
2. Entered the address and geographical (global positioning system [GPS]) coordinates of the retail store.
3. Recorded the type of retail store, name of the retail store brand and whether it was located in a low-income or a high-income neighbourhood.
4. Found the aisle/chill cabinet with commercially produced baby food products. If the store did not have any such products, data collection teams moved on to the next retail store. If the store did have such products, this was recorded on the application ready for entry of product-by-product data. At this stage or earlier, the data collection teams presented their authorizations and information letters to shop managers and requested permission to carry out the data collection. If permission was refused, data collection teams left the store and recorded the refusal via the application.
5. Registration of information on commercially produced baby food for each product: data were entered for the first product on the name, brand name, food type and lowest age group for which the product was indicated.
6. Nutritional information: continuing with the same product, field workers recorded whether a nutrition information panel was available and, if so, whether it provided information on a per 100 g/mL and/or per serving basis. Declared nutrition information on energy, fat, saturated fatty acids, trans-fatty acids, carbohydrates, total sugars, lactose, protein, salt/sodium was entered, where available.

7. Visual information: further continuing with the same product, the presence of various types of visual information on the package was recorded. This included cartoons, pictures of infants/young children, pictures of mothers, pictures of bottles/teats, comparative claims, claims of endorsement by a professional body, hypoallergenic claims and other claims/visuals on the packaging.
8. Composition, nutrition and health claims: where health or nutrition claims had been identified, further details on the type of health and/or development claims and nutrient content claims were recorded.
9. Pictures of products and ingredients lists: having recorded that information, field workers took photographs of the front, back, left and right sides of the product, along with a clear picture of the ingredients list.
10. Details on sugars and flavours: given the difficulty in determining added sugars/sweeteners from nutrient declarations, the ingredients lists were then examined to record the presence/absence of a number of particular sugars/sweeteners (sugar, sweetener, fruit juice concentrate, corn syrup, cane syrup, dextrose, fructose, glucose, honey, lactose, malt, maltose, molasses, sucrose, trehalose, turbinado sugar, other or no added sugars/sweeteners specified in the ingredients list). Where the product was promoted as having a particular flavour, the flavour was recorded.
11. Price and promotion information: the current price and the normal price of the product were recorded, along with information on the local currency and the type of price promotions available with the product (price reductions, free give-aways, multi-buy discounts or other).
12. Complete product entry: any additional information that the field workers wished to record about that particular product was added in a box.
13. Steps 5 to 12 were repeated for all the products in the store.
14. When data on all baby food products in the store had been entered, the data were submitted (if online, otherwise saved and submitted once online).

The total number of products collected was 9487 from 516 stores across the four countries. When infant formula, follow-on formula and young child formula/growing-up milks were excluded (these will be reported on separately), the total sample comprised 7955 food or drink products for infants or young children, as shown in Table 2.

Table 2. Data collection by district and type of retail outlet

Country, city	District	Type of shops	Number of shops	Number of products
Austria, Vienna	1	Supermarket, health food store, other	10	2057
	15	Supermarket, health food store, minimarket and other	12	2036
		Total both districts	**22**	**4093**
Bulgaria, Sofia	9	Minimarket, pharmacy, drugstore, supermarket, baby goods store	32	953
	13	Minimarket, pharmacy, drugstore, supermarket, baby goods store	59	1596
	Total both districts		**91**	**2549**
Hungary, Budapest	9	Minimarket, pharmacy, drugstore, supermarket	20	633
	12	Minimarket, pharmacy, drugstore, supermarket, health food store	26	561
	Total both districts		**46**	**1194**
Israel, Haifa	Low socioeconomic status shops	Supermarket, pharmacy	4	63
	High socioeconomic status shops	Supermarket, pharmacy	4	56
	Total both districts		**8**	**119**
TOTAL			**516**	**7955**

2.2.4 Data cleaning and analysis

The data submitted via the mobile questionnaire was converted into an Excel database of results. The first round of data cleaning was performed by the study investigators in each country to eliminate any obvious inaccuracies and duplicates (e.g. multiple field workers entering the same product twice within the same store). The cleaned datasets were then reviewed by the WHO Regional Office for Europe to identify any anomalies or values that seemed implausible, and clarification was sought from country teams if needed.

Taking into account the observation that some products in the cereals and drinks categories were dry products that required reconstitution with liquid before consumption, while others were ready to be fed directly, some new categories were created at the analysis stage. Products in the cereals category were reallocated to “dry cereals” or “ready-to-eat cereals”. Some products in the juice/drinks category were reallocated to “dry (powdered) drinks”.

Data analysis was conducted by the country teams, Regional Office and report authors, according to the indicators predefined by the Regional Office. For the majority of variables, mean, median, first quartile, third quartile, maximum and minimum values were calculated, along with standard error, to be able to produce box plot figures where appropriate.

Additional indicators were constructed and included in the analysis. Nutritional indicators were constructed on the basis of the literature review and expert advice. For example, the proportion of products providing more than 15%, 30% and 40% of energy from total sugars was calculated. Aspects of product promotion were compared with the 2016 Guidance (*8)* and the Code (*5).*

3 Study results

This chapter details the key results of the study in relation to four areas:

- **overview of products** – types of products, whether purchased in a low- or high-income neighbourhood, and the target age groups for the products;
- **nutritional quality of products** – the amount of energy (calories), and protein, total sugars, total fats, saturated fat and sodium content for all products, by age group and by product category;
- **promotion of products** – findings in relation to promotional aspects of product packaging and use of nutrition and health claims;
- **flavours used in foods for infants and young children** – the different flavours used in foods for infants and young children.

More detailed results, in table format, can be found in the additional data annex available online.

The intention of this study was to collect data on available commercial foods for infants and young children and to compare these to national and international guidance. The intention was not to compare findings between the four different countries. For this reason – and given the differences in sample sizes and in sampling techniques – the results for each country are presented separately.

3.1 Overview of products

An overview of the numbers and types of products for which data were recorded, how many products were collected in low-income and high-income neighbourhoods, respectively, and the type of store in which products were purchased are shown in Tables 3 to 6.

In total, data were collected on a total of 9487 products. Of these, 7955 products were commercial foods for infants and young children, excluding infant formula, follow-on formula and growing-up milks. These included duplicate products – that is, identical products available in different shops. This complete dataset was used for comparisons between products bought in high-income and low-income neighbourhoods within countries.

For the analyses of nutritional content and promotional aspects, duplicate products were eliminated. In total, data were analysed on 1978 unique commercial foods for infants and young children in the four countries.

The most common products in Austria, Bulgaria and Hungary were fruit and vegetable purees, meat- or fish-based dishes and cereals/porridges (dry). In Austria, there were as many products in the biscuits, wafers and crisps category as in the cereals (dry) category. In Israel, the most common products were in the cereals, fruit and vegetable puree and biscuits/wafer/crisps categories.

Table 3. Overview of products recorded, by neighbourhood type, type of store and product category in Vienna, Austria

Products recorded	Total	Low income	High income	Stores purchased			
				Health food store	Mini market	Super-market	Other [a]
Total number of products for infants and young children recorded	4847	2430	2417	134	4	444	4265
Total number of commercial foods and drinks for infants and young children [b]	4093	2036	2057	117	1	342	3633
Total number of ***unique*** commercial foods and drink products for infants and young children [c]	736			93	1	58	584
Biscuits, wafers, crisps	83			8	0	12	63
Cereal/porridge (dry, to be reconstituted)	83			18	0	10	55
Cereal/porridge (ready to eat)	19			0	0	2	17
Drinks – juice/smoothie/tea/other drinks (ready to drink)	53			2	0	2	49
Drinks – juice/smoothie/tea/other drinks (powdered, to be reconstituted)	8			1	0	1	6
Fruit/veg. puree	316			56	1	16	243
Meat- or fish-based meal	112			7	0	12	93
Pureed dessert	13			0	0	0	13
Soup	5			0	0	0	5
Yoghurt or yoghurt-related	31			0	0	3	28
Other	13			1	0	0	12

(a) The "other" category for stores includes drugstores in addition to other types of shops that the researchers could not categorize as pharmacy, minimarket or supermarket.

(b) All products excluding infant formula, follow-on formula and growing-up milks.

(c) Duplicates of the same product found in different stores were eliminated. A sample of unique products was studied, excluding breast-milk substitutes, follow-on formula and growing-up milks.

Table 4. Overview of products recorded, by neighbourhood type, type of store and product category in Sofia, Bulgaria

Products recorded	Total	Low income	High income	Stores purchased			
				Pharmacy	Mini market	Super-market	Other [a]
Total number of products for infants and young children recorded	2996	1124	1872	141	6	1541	1308
Total number of commercial foods and drinks for infants and young children [b]	2549	1596	953	55	6	1358	1130
Total number of ***unique*** commercial foods and drink products for infants and young children [c]	722			12	0	326	384
Biscuits, wafers, crisps	29			0	0	16	13
Cereal/porridge (dry, to be reconstituted)	112			6	0	28	78
Cereal/porridge (ready to eat)	25			0	0	14	11
Drinks – juice/smoothie/tea/other drinks (ready to drink)	87			2	0	38	47
Drinks - juice/smoothie/tea/other drinks (powdered, to be reconstituted)	9			2	0	3	4
Fruit/veg. puree	239			1		123	115
Meat- or fish-based meal	154			0	0	79	75
Pureed dessert	18			0	0	5	13
Soup	14			0	0	10	4
Yoghurt or yoghurt-related	16			0	0	7	9
Other	19			1	0	3	15

(a) The "other" category for stores includes drugstores and baby stores in addition to other types of shops that the researchers could not categorize as pharmacy, minimarket or supermarket.

(b) Breast-milk substitutes, follow-on formula and growing-up milks were excluded (and will be reported on separately).

(c) Duplicates of the same product found in different stores were eliminated, resulting in a sample of unique products (although different flavours of the same product were included). Breast-milk substitutes, follow-on formula and growing-up milks were excluded.

Table 5. Overview of products recorded, by neighbourhood type, type of store and product category in Budapest, Hungary

Products recorded	Total	Low income	High income	Stores purchased			
				Pharmacy	Mini market	Super-market	Other [a]
Total number of products for infants and young children recorded	1423	787	636	161	257	653	352
Total number of commercial foods and drinks for infants and young children [b]	1194	633	561	24	255	602	313
Total number of ***unique*** commercial foods and drink products for infants and young children [c]	477			10	49	201	217
Biscuits, wafers, crisps	22			0	1	8	13
Cereal/porridge (dry, to be reconstituted)	58			9	0	23	26
Cereal/porridge (ready to eat)	10			0	0	4	6
Drinks – juice/smoothie/tea/other drinks (ready to drink)	84			1	16	32	35
Drinks – juice/smoothie/tea/other drinks (powdered, to be reconstituted)	4			0	0	0	4
Fruit/veg. puree	135			0	16	70	49
Meat- or fish-based meal	130			0	15	54	61
Pureed dessert	14			0	0	0	14
Soup	0			0	0	0	0
Yoghurt or yoghurt-related	0			0	0	0	0
Other	6			0	0	0	6

(a) The "other" category for stores includes drugstores in addition to other types of shops that the researchers could not categorize as pharmacy, minimarket or supermarket.

(b) Breast-milk substitutes, follow-on formula and growing-up milks were excluded (and will be reported on separately).

(c) Duplicates of the same product found in different stores were eliminated resulting in a sample of unique products (although different flavours of the same product were included). Breast-milk substitutes, follow-on formula and growing-up milks were excluded.

Table 6. Overview of products recorded, by neighbourhood type, type of store and product category in Haifa, Israel

Products recorded	Total	Low income	High income	Stores purchased			
				Pharmacy	Mini market	Super-market	Other
Total number of products for infants and young children recorded	221	124	97	113	0	108	0
Total number of commercial foods and drinks for infants and young children [a]	119	63	56	66	0	53	0
Total number of ***unique*** commercial foods and drink products for infants and young children [b]	43			21	0	22	0
Biscuits, wafers, crisps	12			8	0	4	0
Cereal/porridge (dry, to be reconstituted)	14			9	0	5	0
Cereal/porridge (ready to eat)	0			N/A	N/A	N/A	N/A
Drinks – juice/smoothie/tea/other drinks (ready to drink)	0			N/A	N/A	N/A	N/A
Drinks – juice/smoothie/tea/other drinks (powdered, to be reconstituted)	0			N/A	N/A	N/A	N/A
Fruit/veg. puree	12			2	0	10	0
Meat- or fish-based meal	1			1	0	0	0
Pureed dessert	0			N/A	N/A	N/A	N/A
Soup	3			0	0	3	0
Yoghurt or yoghurt-related	0			N/A	N/A	N/A	N/A
Other	1			1	0	0	0

(a) All products excluding infant formula, follow-on formula and growing-up milks.

(b) Duplicates of the same product found in different stores were eliminated resulting in a sample of unique products (although different flavours of the same product were included). Breast-milk substitutes, follow-on formula and growing-up milks were excluded (and will be reported on separately).

3.1.1 Target age group of products

The youngest age for which each product specified that it could be used was recorded. WHO recommends that infants should be exclusively breastfed for the first 6 months of life. Under the Code, all products marketed for children under 6 months of age are considered as breast-milk substitutes and should not be promoted. Under European Union (EU) rules, however, the labelling of complementary foods as being suitable from 4 months of age is permitted (*36*).

In all countries, a substantial proportion of products were marketed as being suitable for infants under the age of 6 months (Austria 44%; Bulgaria 60%; Hungary 53%; Israel 27.9%). The most common categories for foods labelled as suitable from 4 months of age were fruit and vegetable purees, cereals/porridges, meat/fish-based dishes and drinks (Tables 7–10).

Table 7. Overview of target age group for products (the youngest age for which the product is indicated) by product category, in Vienna, Austria[j]

Products recorded	Total	Under 6 months	6–8 months	9–11 months	12 months and over	Unspecified
Total number of ***unique*** commercial foods and drink products for infants and young children [(a)]	736	325	129	86	196	0
Biscuits, wafers, crisps	83	0	23	6	54	0
Cereal/porridge (dry, to be reconstituted)	83	50	10	6	17	0
Cereal/porridge (ready to eat)	19	11	2	6	0	0
Drinks – juice/smoothie/tea/other drinks (ready to drink)	53	34	1	0	18	0
Drinks – juice/smoothie/tea/other drinks (powdered, to be reconstituted)	8	6	2	0	0	0
Fruit/veg. puree	316	183	48	12	73	0
Meat- or fish-based meal	112	37	31	25	19	0
Pureed dessert	13	1	1	11	0	0
Soup	5	0	5	0	0	0
Yoghurt or yoghurt-related	31	0	4	20	7	0
Other	13	3	2	0	8	0

(a) Duplicates of the same product found in different stores were eliminated resulting in a sample of unique products (although different flavours of the same product were included). Breast-milk substitutes, follow-on formula and growing-up milks were excluded (and will be reported on separately).

[j] Total number of unique commercial foods and drink products for infants and young children (all products excluding breast-milk substitutes, follow-on formula and growing-up milks and with duplicates eliminated)

Table 8. Overview of target age group for products (the youngest age for which the product is indicated) by product category, in Sofia, Bulgaria

Products recorded	Total	Under 6 months	6–8 months	9–11 months	12 months and over	Unspecified
Total number of ***unique*** commercial foods and drink products for infants and young children [a]	721	435	212	18	54	27
Biscuits, wafers, crisps	29	4	12	1	10	2
Cereal/porridge (dry, to be reconstituted)	112	51	54	2	5	0
Cereal/porridge (ready to eat)	25	18	7	0	0	0
Drinks – juice/smoothie/tea/other drinks (ready to drink)	87	75	9	0	3	0
Drinks – juice/smoothie/tea/other drinks (powdered, to be reconstituted)	9	7	1	0	0	1
Fruit/veg. puree	239	199	33	1	6	0
Meat- or fish-based meal	154	61	63	6	24	0
Pureed dessert	18	6	10	2	0	0
Soup	14	2	9	1	2	0
Yoghurt or yoghurt-related	16	6	4	4	2	0
Other	35	12	14	5	4	0

Table 9. Overview of target age group for products (the youngest age for which the product is indicated) by product category, in Budapest, Hungary

Products recorded	Total	Under 6 months	6–8 months	9–11 months	12 months and over	Unspecified
Total number of ***unique*** commercial foods and drink products for infants and young children [a]	477	252	148	25	38	14
Biscuits, wafers, crisps	22	2	8	1	7	4
Cereal/porridge (dry, to be reconstituted)	58	25	22	0	11	0
Cereal/porridge (ready to eat)	10	0	10	0	0	0
Drinks – juice/smoothie/tea/other drinks (ready to drink)	84	63	7	0	5	9
Drinks – juice/smoothie/tea/other drinks (powdered, to be reconstituted)	4	0	4	0	0	0
Fruit/veg. puree	135	110	23	2	0	0
Meat- or fish-based meal	130	35	61	22	12	0
Pureed dessert	24	15	9	0	0	0
Soup	0	0	0	0	0	0
Yoghurt or yoghurt-related	3	0	3	0	0	0
Other	7	2	1	0	3	0

(a) Duplicates of the same product found in different stores were eliminated resulting in a sample of unique products (although different flavours of the same product were included). Breast-milk substitutes, follow-on formula and growing-up milks were excluded (and will be reported on separately).

Table 10. Overview of target age group for products (the youngest age for which the product is indicated) by product category, in Haifa, Israel

Products recorded	Total	Under 6 months	6–8 months	9–11 months	12 months and over	Unspecified
Total number of ***unique*** commercial foods and drink products for infants and young children [(a)]	43	12	20	1	8	2
Biscuits, wafers, crisps	12	0	4	1	5	1
Cereal/porridge (dry, to be reconstituted)	14	5	9	0	0	0
Cereal/porridge (ready to eat)	0	N/A	N/A	N/A	N/A	N/A
Drinks – juice/smoothie/tea/other drinks (ready to drink)	0	N/A	N/A	N/A	N/A	N/A
Drinks – juice/smoothie/tea/other drinks (powdered, to be reconstituted)	0	N/A	N/A	N/A	N/A	N/A
Fruit/veg. puree	12	5	5	0	2	0
Meat- or fish-based meal	0	N/A	N/A	N/A	N/A	N/A
Pureed dessert	0	N/A	N/A	N/A	N/A	N/A
Soup	3	1	0	1	1	0
Yoghurt or yoghurt-related	0	N/A	N/A	N/A	N/A	N/A
Other	1	0	0	0	0	1

(a) Duplicates of the same product found in different stores were eliminated resulting in a sample of unique products (although different flavours of the same product were included). Breast-milk substitutes, follow-on formula and growing-up milks were excluded (and will be reported on separately).

3.2 Nutritional quality of products

Nutrient information was present on the label of between 96% and 100% of products, although there was some variation in the nutrients that were included in the nutrient declaration. There was very little labelling of trans-fatty acid content, reflecting in part the fact (in the three EU Member States) that such declarations are not required by EU labelling laws. At the time of data collection, saturated and trans-fatty acid labelling was required in foods with total fat content over 2% in Israel. While the content of sugars was declared on almost all of the products purchased in the three EU Member States, only 25% of the labels on products purchased in Israel declared the sugar content (it was not mandatory at the time of data collection).

On the basis of the information on the labels, the nutrient contents of the products were recorded. This included energy (kilocalories [kcal] and kilojoules [kJ]) and fat, saturated fat, trans-fats, carbohydrate, sugars, protein (g per 100 g), as well as sodium (mg per 100 g).[k] Where figures were declared as "<" a particular value, that value was recorded without the "<" symbol (e.g. 1 kcal was recorded rather than <1 kcal), meaning that some very low values may have been overestimated. No products were excluded from the analysis even if they were outliers, although all figures that were unusually high or low were verified and there were checks that the products were correctly categorized (outlier values are not shown in the box plots). In addition, the

[k] Some data were also collected on lactose content, but few values were recorded so the results are not reported.

presence of sugar, concentrated fruit juice or other sweetening agents on the ingredients list was recorded.

In addition, the nutrient values in g per 100 kcal were calculated. This is because some of the products are bought in a dry or powdered form, which requires them to be reconstituted with water or milk. The nutrient contents on labels are sometimes given on the basis of dry matter and are sometimes given for the product on a ready-to-eat basis, and it is problematic to compare these different figures (i.e. dry vs ready to eat) on a gram-for-gram basis. It is more meaningful to compare the nutrient contents of these products on a gram-per-calorie (or 100 kcal) basis.

For each value, the median, minimum, maximum, first and third quartiles were calculated and are shown on box plots (*see* Box 4 on interpreting figures). The energy (kcal per 100 g) box plots are shown in this report along with box plots for protein, sugars, total fat, saturated fat and sodium on the basis of g or mg per 100 kcal. Additional box plots were drawn for products that had sugar or other sweetening agents on the ingredients list and for products that did not have such ingredients listed.

Box 4. Interpreting the nutrient data and the box plot figures

Results are shown for energy, protein, total sugars, total fat, saturated fat and sodium. The energy density results are shown on a kcal per 100 g basis. As explained above, the other nutrients are presented on a g (or mg) per 100 kcal basis to enable valid comparisons between dry products that have to be reconstituted with water or milk before consumption and ready-to-eat products.

Separate box plots for each nutrient are shown for each country. Each box plot shows all the data for that nutrient in the country. On the left, the values for the total of all unique products – that is, excluding duplicates and infant formula/follow-on formula and "growing-up milks"/young child formula. The next four boxes show results for the products categorized according to the age group for which they are marketed. The boxes for each product category then follow. The final two boxes relate to products that listed sugar, concentrated fruit juice or another sweetening agent on the ingredients list (added sugar) and those that did not list a sweetening agent on the ingredients list.

For each box, the line inside the box represents the median, the top and bottom of the box are first and third quartiles, respectively, and the vertical lines (whiskers) show the minimum and maximum values excluding outliers.

Outlying values are not shown on the box plots because they distort the scale and make visual interpretation and comparisons difficult. A more complete picture of the total data set is described in the text, with description of the minimum and maximum values and notable outliers, as well as in the data tables which are available in the online annex.

With respect to the boxplots, there remains some variation in the scales on the Y-axis between figures. It is important, therefore, to pay careful attention to the scale indicated on the Y-axis of each figure. Although the outliers are not shown, the text refers to some of these high values and clarification is provided in places to help with interpretation. Dotted lines to illustrate some general reference values (e.g. 15% of energy from sugars) are also shown, and these should help with interpretation.

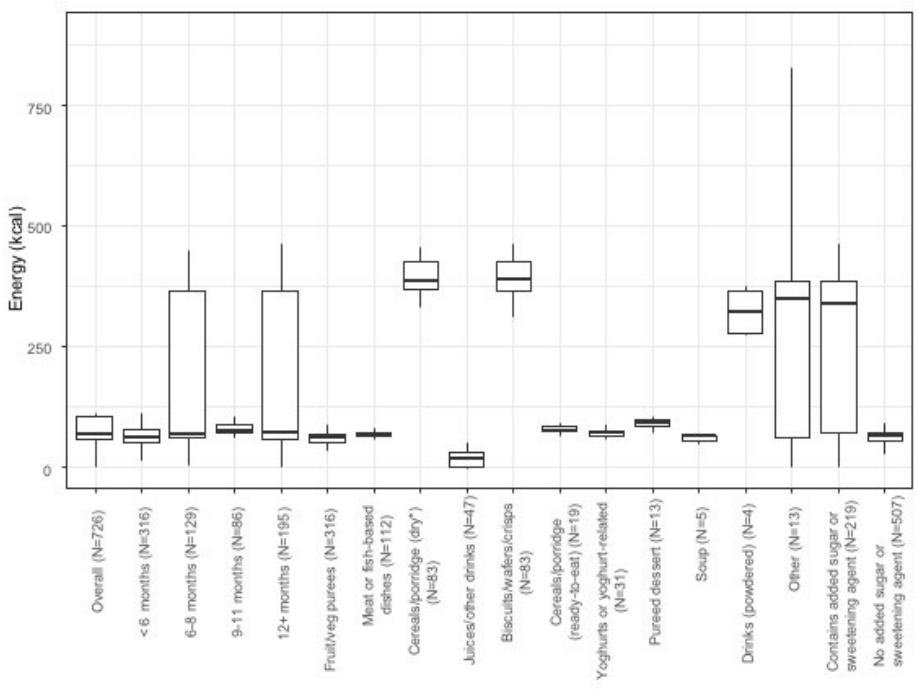
More detailed information – including the tabulated data for each nutrient on a per 100 g basis, the breakdown of values by age group for each product category, and values for total carbohydrates (not reported here) – are available in the online additional data annex.

3.2.1 Energy

The daily energy needs of children increase from approximately 600 kcal at 6–8 months of age to 900 kcal by 12–23 months of age (*see* Annex 1). Infants and young children need energy- and nutrient-dense food and drink as they can eat a limited volume of food at mealtimes. It can be argued that foods for infants should, in general, have an energy density (on a ready-to-eat basis) of at least the 69 kcal per 100 g provided by breast milk. On the other hand, foods that are very energy dense – particularly foods that are nutrient-poor and those that are consumed as snacks – may contribute to excess energy intake.

Interpretation of energy density values needs to take into account that some values are declared for a food in a dry or concentrated form – namely, cereal products and some concentrated or powdered drinks to which water or other liquid have to be added. For dry products, Codex recommends that the energy density should be at least 400 kcal per 100 g on a dry weight basis.

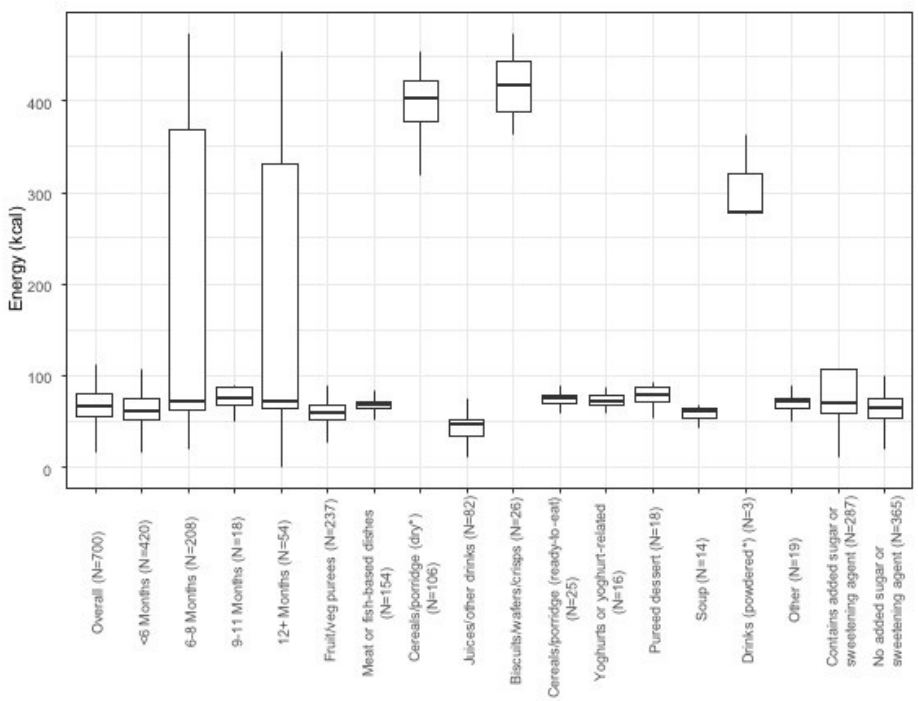
Fig. 1. Energy density of products, by age group and by product category, Austria (kcal per 100 g)



In Vienna, energy density (kcal per 100 g) ranged from 0 kcal for baby tea, to a *very* high 900 kcal (not shown) for an oil (in the "other" category) marketed as an addition to foods for infants and young children. In Austria, addition of small amounts of vegetable oil to home-made solid foods or ready-to-eat commercial foods that do not already contain oil is recommended in the national infant feeding guidelines and it is common to add vegetable oils to foods for infants and young children, if it is given as a main meal. There were a number of high outliers in the under 6-month and 9–11-month categories (up to 900 kcal and 449 kcal per 100 g, respectively). The range of products in the fruit/vegetable puree and meat- and fish-based meal categories was somewhat wider than shown due to outliers (18–105 kcal and 26–112 kcal, respectively).

All of the products in the drinks category and most of the products in the fruit and vegetable puree category were below 60 kcal/100 g. Some products in the soup, yoghurt and meat- or fish-based meals also provided less than 60 kcal per 100 g. More than half of the products in the dry cereal category provided less than 400 kcal per 100 g (on a dry weight basis). All of the dry drinks were below that threshold, although it is difficult to know how many calories 100 mL of the made-up drinks provided. Biscuits, wafers and crisps – foods that are by their nature dry (and thus calorie-rich) but which also tend to be micronutrient-poor – were very energy dense, with more than half of products supplying more than 390 kcal per 100 g (Fig. 1). Foods with sugar or other sweetening agents listed as ingredients had considerably higher energy density than those without such ingredients.

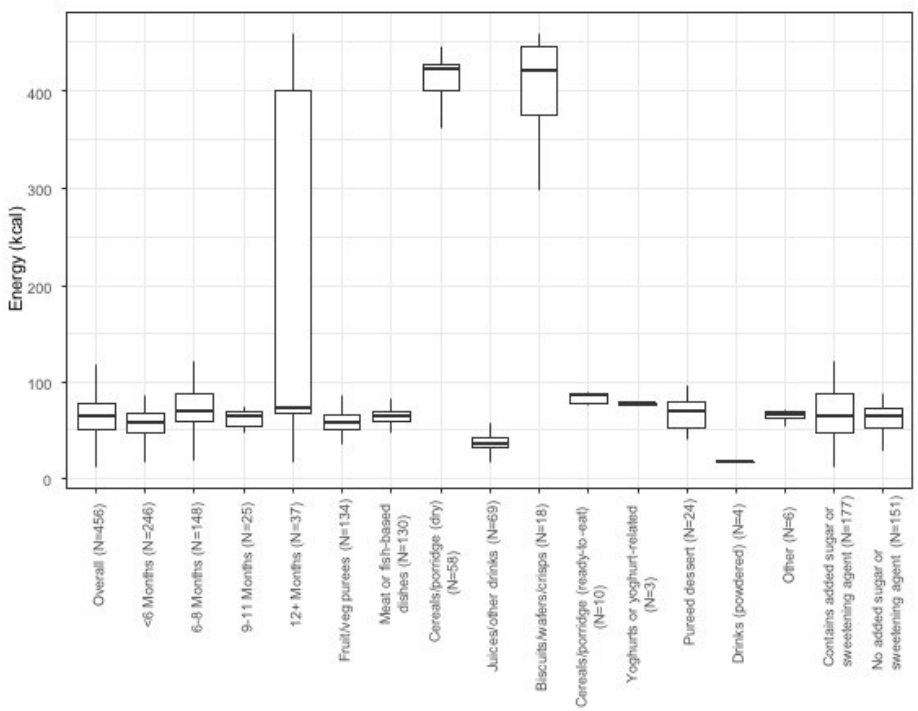
Fig. 2. Energy density of products, by age group and product category, Sofia, Bulgaria (kcal per 100 g)



In Sofia, values ranged from zero (baby water) to 488 kcal per 100 g (biscuits), a wider range than is shown in Fig. 2 because outliers have been excluded. For dry cereal products, some lower values are not shown (minimum 192 kcal per 100 g) and for meat- and fish-based meals, the full range, including outliers, was 36–112 kcal per 100 g.

Half of the juices/smoothies and other drinks and the fruit and vegetable purees provided less than 60 kcal per 100 g. In addition, half of the products in the dry cereal category provided less than 400 kcal per 100 g (on a dry weight basis). As in Vienna, the biscuits, wafers and crisps were very energy dense (half of the products supplying more than 419 kcal per 100 g) (Fig. 2). There was little difference between the energy density of the products with sugar/sweetening ingredients and those without, although the maximum levels were higher in the products that did contain such ingredients.

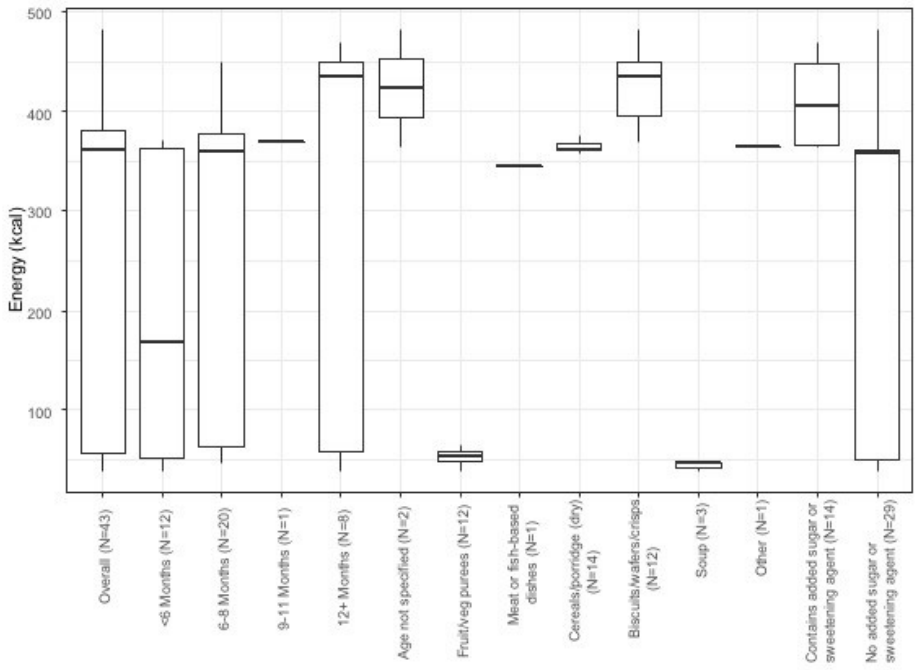
Fig. 3. Energy density of products, by age group and by product category in Budapest, Hungary (kcal per 100 g)



In Budapest, energy density ranged from zero ("baby water") to 463 kcal per 100 g (cakes). The high outliers at the top end of this range are not shown in the overall total box or for the age groups. It can be seen that the dry cereal products and the biscuits/wafers/crisps categories contributed to the high end of the range.

Three quarters of the juices and other drinks and half of the fruit and vegetable purees provided less than 60 kcal per 100 g. A quarter of the dry cereal products provided less than 400 kcal per 100 g dry weight. As in the other cities, products in the biscuits/wafers/crisps categories had very high energy density – more than half of these products provided more than 426 kcal per 100 g (Fig. 3). There was little difference between the energy density of the products with sugar/sweetening ingredients and those without such ingredients.

Fig. 4. Energy density of products, by age group and by product category in Haifa, Israel (kcal per 100 g)



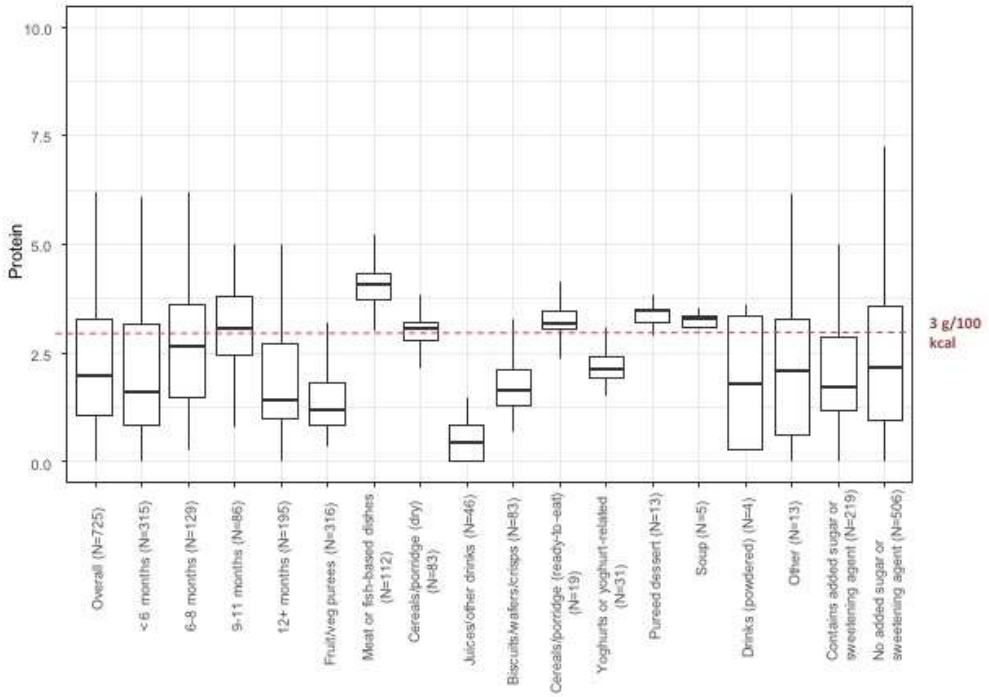
In Haifa, the energy density of products ranged from 39 kcal per 100 g (fruit or vegetable puree) to 482 kcal per 100 g (finger snacks). More than half of the fruit and vegetable purees and all of the soups provided less than 60 kcal per 100 g. More than three quarters of the dry cereals provided less than 400 kcal per 100 g on a dry weight basis. As elsewhere, the energy density was very high for products in the biscuits, wafers and crisps category (half of the products supplying more than 434 kcal per 100 g) (Fig. 4). There is a notably higher energy density in products listing sugar or other sweetening agents as ingredients than in products without such ingredients.

3.2.2 Protein

It is important that infants and young children obtain adequate amounts of high-quality protein. Daily intake is recommended of animal-source foods or a combination of grains and pulses (legumes). Existing Codex standards and EU regulations set minimum protein levels for some food categories (meat, fish, poultry or cheese-based meals or dishes, cereals with added protein, some dairy products) and these range from 3 g to 7 g per 100 kcal. The levels also vary depending on the prominence of a protein source in the product's name (i.e. where a meat, fish or poultry protein source is mentioned first in the name of a product, that named protein source must provide 4 g per 100 kcal or more of protein, and where the source is named but does not feature first in the name it must provide 3 g per 100 kcal of protein).

Upper limits for protein have not generally been established, although there are some concerns about whether high protein levels in the diets of infants and young children could contribute to later overweight and obesity (*18*,*37)*. Finding an appropriate balance between encouraging producers to include adequate protein while not leading to excess protein intake may be challenging. However, since meat, fish and other traditional sources of protein can add other important nutrients to the diet, especially for breastfed infants, the priority for addressing concerns about excess protein may be directed at protein intakes from formula marketed for infants and young children over 6 months of age.

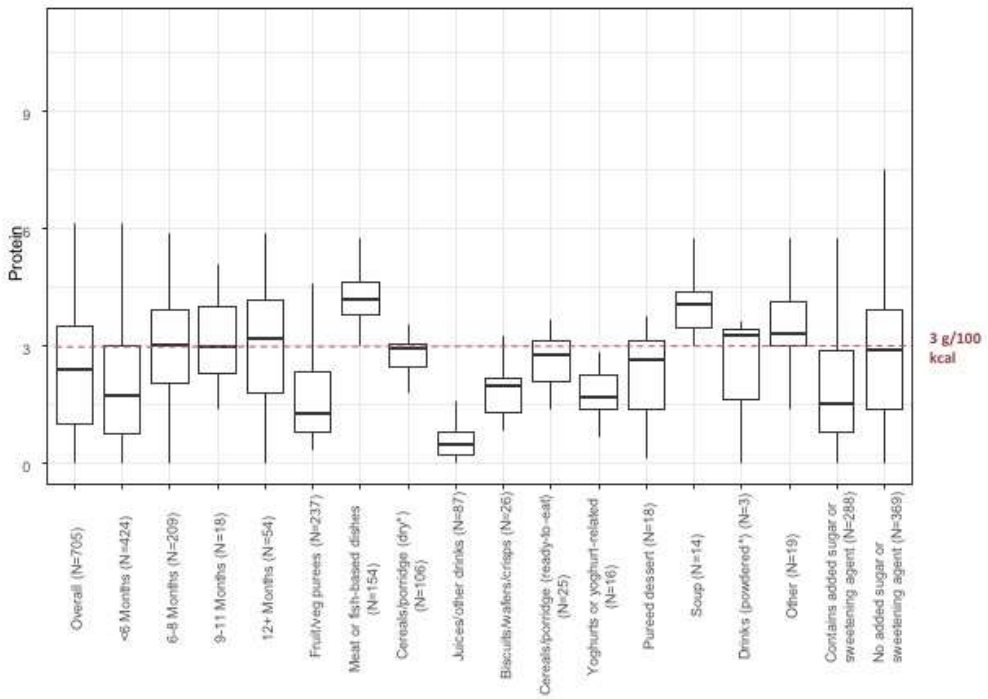
Fig. 5. Protein content of products, by age group and by neighbourhood, in Vienna, Austria (g per 100 kcal)



In Vienna, the protein content ranged from 0 g per 100 kcal to 10.3 g per 100 kcal (not shown). This outlier was found in meat/fish-based dishes marketed as suitable for babies under 6 months. The range of protein values for the fruit/vegetable puree category is also higher than shown, with values of up to 5.8 g per 100 kcal in outlier products. There is also an extremely high value (50 g per 100 kcal, not shown) coming from a tea product.[1] This value can be disregarded because the tea product only provides less than 1–2 kcal per mL and less than 0.5 g of protein per 100 g, and is an artefact of reporting on a per 100 kcal basis. For meat- or fish-based dishes, half of the products provided less than 4 g per 100 kcal of protein and the minimum and maximum values were 3 g and 10 g per 100 kcal, respectively. Three quarters of the dry cereal products provided less than 3 g per 100 kcal of protein (Fig. 5).

[1] This is also the case for sugars, total fat, saturated fat, and salt/sodium.

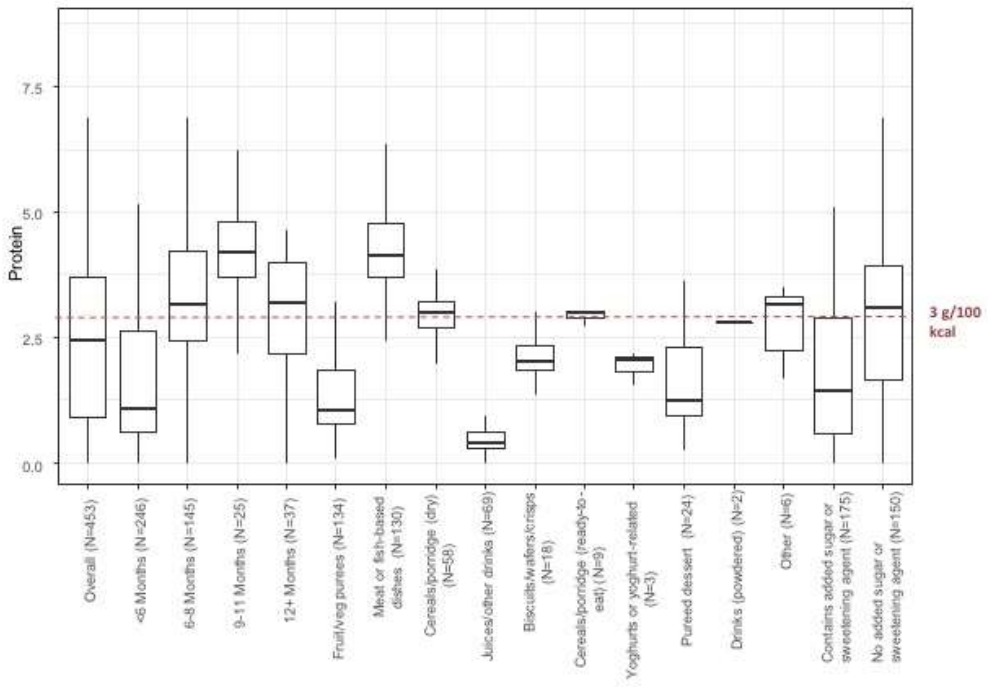
Fig. 6. Protein content of products, by age group and by neighbourhood, in Sofia, Bulgaria (g per 100 kcal)



In Sofia, the protein content of products ranged from 0 g to 11 g per 100 kcal. The full range of protein values, including outliers (not shown), for the meat- or fish-based dishes was 1.91–8.47 g per 100 kcal, for dry cereals 0.7–4.09 g per 100 kcal and for fruit/vegetable purees s 0.34–11.10 g per 100 kcal, the highest value being for a broccoli puree product.

Most, but not all, of the meat- or fish-based products provided more than 3 g per 100 kcal (average 4.3 g). Three quarters of the dry cereals and at least half of the ready-to-eat cereals provided less than 3 g of protein per 100 kcal (Fig. 6).

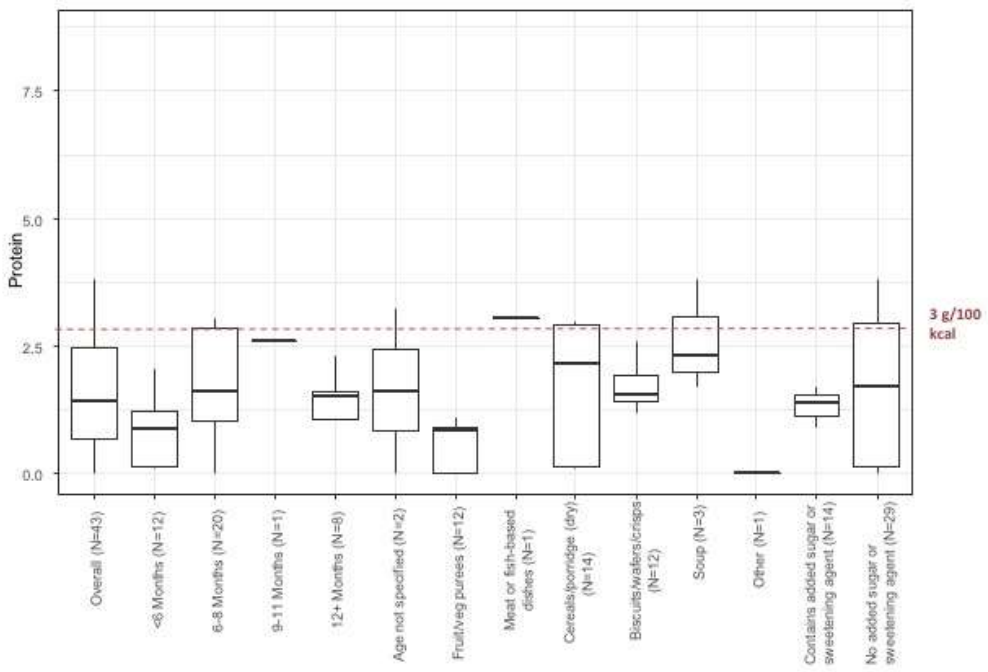
Fig. 7. Protein content of products, by age group and by neighbourhood, in Budapest, Hungary (g per 100 kcal)



In Budapest, the protein content of products ranged from 0 g to 8.64 g per 100 kcal (outliers not shown). The full range of values for fruit/vegetable puree was 0.12–5.17 g per 100 kcal, for meat/fish-based dishes values ranged from 2.45 g to 8.64 g, and for cereals/porridge (dry) from 1.06 to 4.38 g per 100 kcal.

More than half of the meat- or fish-based dishes contained less than 3 g per 100 kcal of protein and there were very few cereal products with more than 3 g of protein per 100 kcal (Fig. 7).

Fig. 8. Protein content of products, by age group and by neighbourhood, in Haifa, Israel (g per 100 kcal)



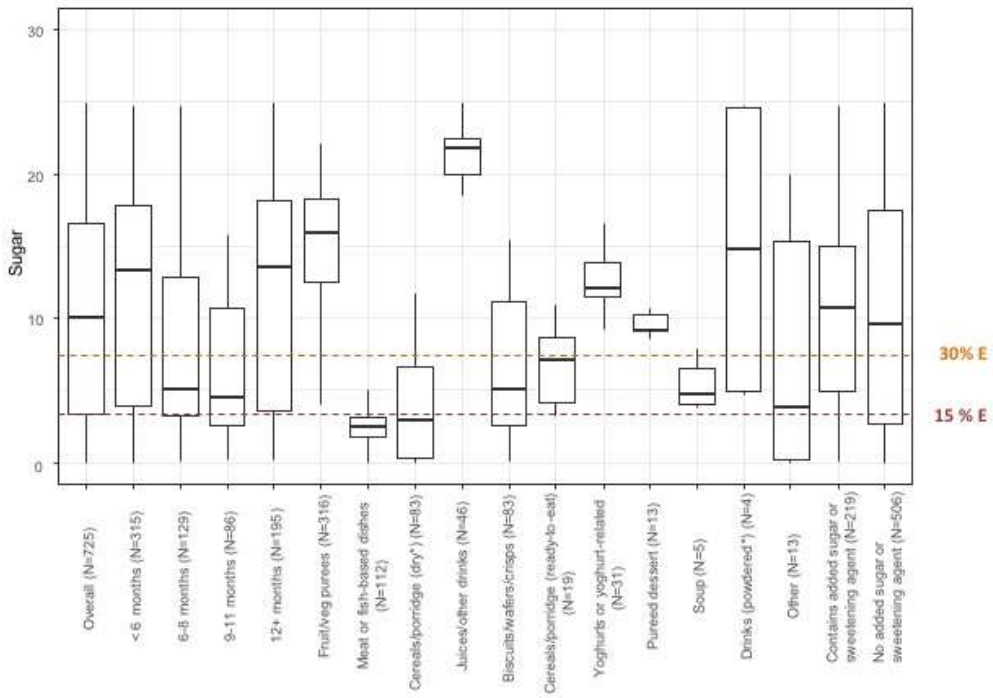
In Haifa, the protein content ranged from 0 g to 8.66 g per 100 kcal, with the highest value relating to a finger snack product (not shown). Almost all of the products contained less than 3 g of protein per 100 kcal. This largely reflects the fact that there were very few meat- or fish-based meals or dishes in the Israeli sample. The highest protein content was found in cheese finger snacks and in some soups (Fig. 8).

3.2.3 Sugars

The total sugar content of the products, where declared on the label, was recorded. It was not possible to determine the amount of free sugars (which are the basis for WHO guidelines) or added sugar (which are referenced in existing EU legislation) based on the nutrient declaration alone. To obtain a better picture of the added or free sugar content, additional information was captured from the label – namely, the presence of sugars or any other sweetening agents on the ingredients list.

Existing standards and legislation set some upper limits for added sugars in very limited categories (<7.5 g and <5.5 g per 100 kcal for dry or instant cereals, depending on whether a high protein food has also been added). These thresholds have been subject to much criticism for not being sufficiently strict (*38*).

Fig. 9. Total sugar content of products by age group and by product category, in Vienna, Austria (g per 100 kcal)



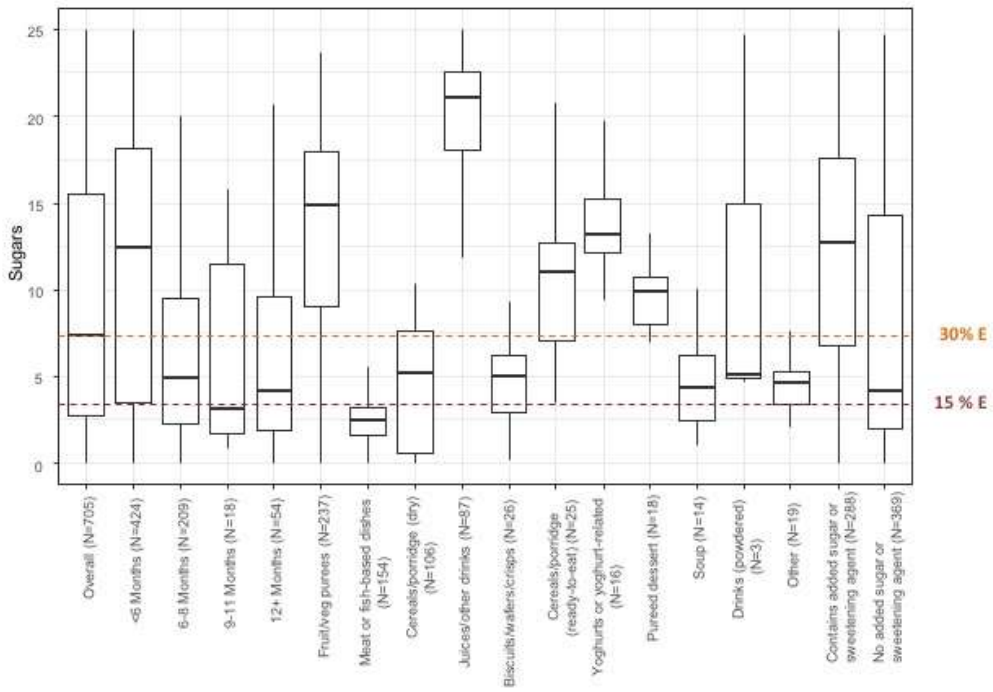
In Vienna, the maximum total sugar content ranged from 0 g per 100 kcal to 24.9 g per 100 kcal. The full range of fruit/vegetable purees was wider than shown, mainly because outlying values for products with lower sugar values were excluded (some products had 1.1 g of sugars per 100 kcal). Similarly, a small number of lower values for juices/other drinks are not shown in Fig. 9, while the maximum values for meat/fish-based meals and yoghurts are not shown (up to 11.2 g and 9.2 g per 100 kcal, respectively).

As Fig. 9 shows, overall, the products tend to have a relatively high sugars content, with more than two thirds (71%) of products providing more than 15% of energy (calories) from sugars, 57% providing more than 30% of energy from sugars, and half (50%) providing more than 40% of energy from sugars. In many products, the sugar content would be derived from the sugars naturally present in fruit or vegetable purees (which in some countries are considered as "free sugars"(*39*)) or milk. In almost a third (30%) of products, however, sugar or another sweetening agent was listed as an ingredient (Table 1). The most commonly added sweetening agents were "fruit juice concentrate" (16.7%) and "sugar" (6.6%), as well as sweetening agents in the "other" category (13.3%) and the median sugars levels were above 30% of calories in both products containing these ingredients and those without such ingredients (Fig. 9).

Table 11. Percentage of products containing added sugars or sweetening agents and percentage of products with more than 40%, 30% or 15% calories from total sugars in Vienna, Austria

Sugar content and use of sweeteners	Percentage of products (unique products and excluding infant formula, follow-up formula and growing-up milks)	Most commonly added sugars or sweetening agents (% of total products)
	% of products	
Products with sugars or other sweetening agents on the ingredients list	30	Fruit juice concentrate (16.7%) Other sugars/sweetening agent (13.3%) Sugar (6.6%)
Products with over 40% calories from sugars	50.5	
Products with over 30% calories from sugars	57.5	
Products with over 15% calories from sugars	71.0	

Fig. 10. Total sugar content of products by age group and by product category, in Sofia, Bulgaria (g per 100 kcal)



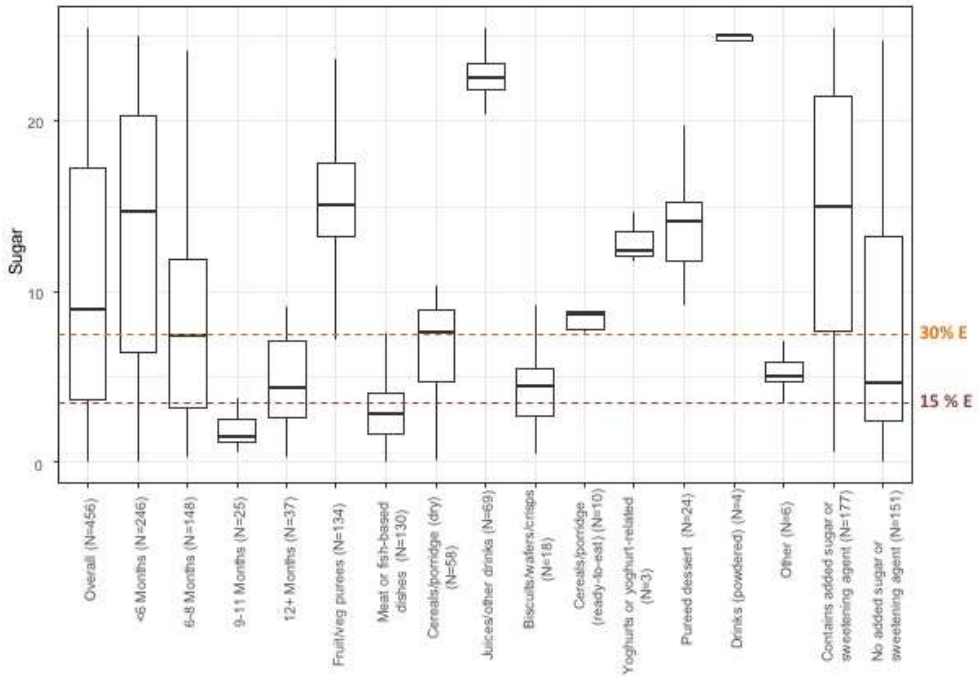
In Sofia, the total sugar content ranged from 0 g per 100 kcal to 25 g per 100 kcal (for grape juice) and this was the range for products in the juices/drinks category. The full range, including outliers (not shown) for biscuits/wafers/crisps was 0.19–14.64 g per 100 kcal; for meat- or fish-based dishes 0–7.96 g and pureed dessert 0–15.25 g per 100 kcal.

Overall, the products tended to have a relatively high sugar content (Fig. 10), with more than two thirds (67%) of the products providing more than 15% of energy (calories) from sugars, almost half (49%) providing more than 30% of energy from sugars, and 42% providing more than 40% of energy from sugars. While in many products the sugars content would be derived from the sugars naturally present in fruit or vegetables or milk, 41% of products had sugar or another sweetening agent as one of the ingredients, and this was reflected in the higher median total sugar levels in products containing added sweetening agents. The most commonly declared added sweetening agents were “sugar” (17.7%) and “fruit juice concentrate” (16.9%) (Table 12).

Table 12. Percentage of products containing added sugars or sweetening agents and percentage of products with more than 40%, 30% or 15% calories from total sugars in Sofia, Bulgaria

Sugar content and use of sweeteners	Percentage of products (unique products and excluding infant formula, follow-up formula and growing-up milks)	Most commonly added sugars or sweetening agents (% of total products)
	% of products	
Products with sugars or other sweetening agents on the ingredients list	41.4	Sugar (17.7%) Fruit juice concentrate (16.9%) Other (5.7%)
Products with over 40% calories from sugars	41.9	
Products with over 30% calories from sugars	49.4	
Products with over 15% calories from sugars	67.1	

Fig. 11. Total sugar content of products by age group and by product category, in Budapest, Hungary (g per 100 kcal)



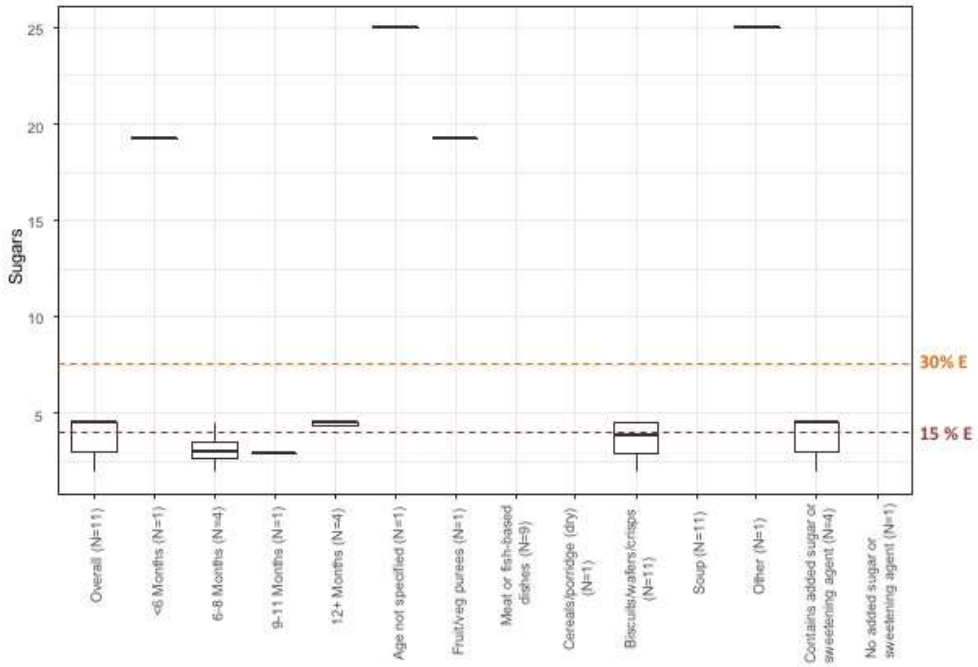
In Budapest, the maximum total sugar content ranged from 0 g per 100 kcal to just over 25 g per 100 kcal (for apple, carrot and banana juice). The full range of values, including outliers (not shown), for juices and drinks was 9.10–25.48 g per 100 kcal. For fruit/vegetable purees, values ranged from 0.65 g to 24.05 g and for meat/fish-based dishes it ranged from 0.04 g to 11.67 g per 100 kcal.

Overall, the products tended to have a relatively high sugar content (Fig. 11), with nearly three quarters (74.7%) of the products providing more than 15% of energy (calories) from sugars, more than half (56.8%) providing more than 30% of energy from sugars, and almost half (47.3%) providing more than 40% of energy from sugars. While in many products the sugar content would be derived from the sugars naturally present in fruit or vegetables or milk, over a third (37.5%) of products had sugar or another sweetening agent as one of the ingredients and this was reflected in the much higher median value for total sugars in products with added sweetening agents. The most commonly declared sweetening agents were “sugar” (19.7%) and “fruit juice concentrate” (12.6%) (Table 13).

Table 13. Percentage of products containing added sugars or sweetening agents and percentage of products with 40%, 30% or 15% or more calories from total sugars in Budapest, Hungary

Sugar content and use of sweeteners	Percentage of products (unique products and excluding infant formula, follow-up formula and growing-up milks)	Most commonly added sugars or sweetening agents (% of total products)
	% of products	
Products with sugars or other sweetening agents on the ingredients list	37.5	Sugar (19.7%) Fruit juice concentrate (12.6%) Fructose (3.1%)
Products with 40% or more calories from sugars	47.3	
Products with 30% or more calories from sugars	56.8	
Products with 15% calories or more from sugars	74.7	

Fig. 12. Total sugar content of products by age group and by product category, in Haifa, Israel (g per 100 kcal)



In Haifa, there were only 11 products with the sugar content declared on their labels, since including the sugar content on nutrition information panels was not mandatory. Hence, the sample was very small. The legislation has since changed and new labelling rules require front-of-pack labelling with the number of teaspoons of sugar and red warning labels for high sugar levels in foods, and back-of-pack labelling of sugars in follow-on formula for babies over 12 months.[m] Values ranged from 1.94 g per 100 kcal to 25 g per 100 kcal (grape sugar, not shown). Bearing in mind the small sample size, nearly two thirds (63.6%) of the products derived more than 15% of energy from sugars, 18.2% of products derived 30% of energy from sugars and 18.2% derived more than 40% of energy from sugars (Fig. 12). Nearly a third of the products declared sugar or another sweetening agent on the ingredients list, with "sugar" and "glucose" being the most common (Table 14).

[m] Regulations for the Protection of Public Health (Food) (Nutritional Labelling) 2017 will require labelling with the number of teaspoons of sugar and red warning labels for high sugar levels.

Table 14. Percentage of products containing added sugars or sweetening agents and percentage of products with more than 40%, 30% or 15% calories from total sugars in Haifa, Israel

Sugar content and use of sweeteners	Products (unique products and excluding infant formula, follow-up formula and growing-up milks) with sweetening agents or with high total sugar content	Most commonly added sugars or sweetening agents (% of total products)
	% of products	
Products with sugars or other sweetening agents on the ingredients list	32.6	Sugar (23.3%) Glucose (13.9%) Fruit juice concentrate (9.3%)
Products with over 40% calories from sugars	18.2	
Products with over 30% calories from sugars	18.2	
Products with over 15% calories from sugars	63.6	

3.2.4 Fats

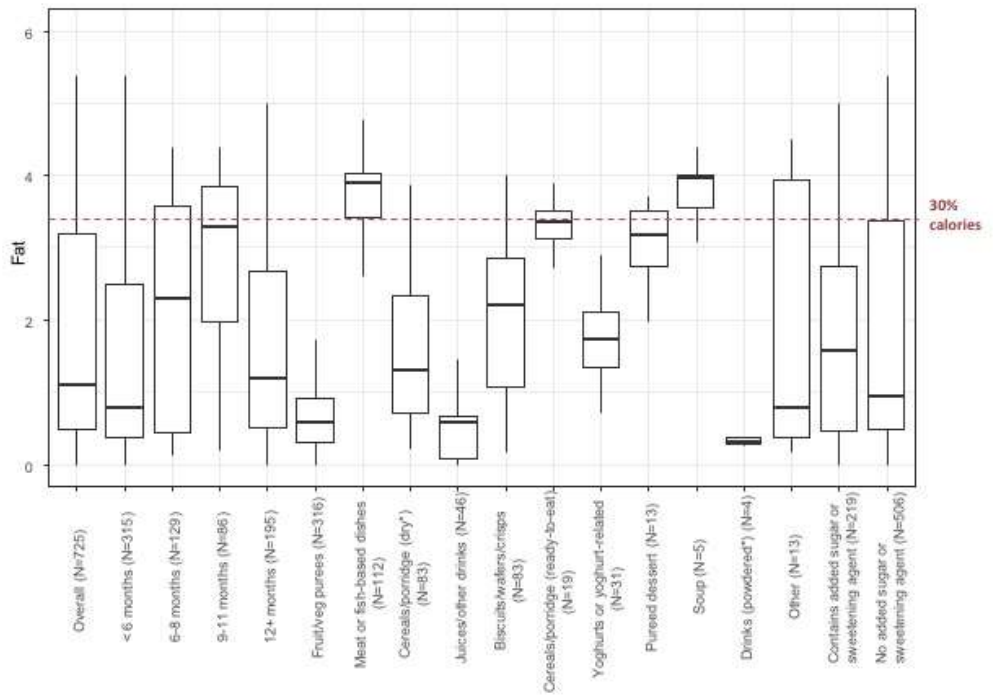
Data were recorded on the levels of total fat and saturated fat in products, and the results are shown in Fig. 13–20. In addition, the study intended to collect data on the trans-fatty acid content of products, but these data were generally not available from the nutrition information on labels.

3.2.4.1 Total fat

It is important that the diets of infants and young children contain adequate amounts of fat, which provides essential fatty acids and fat-soluble vitamins, as well as increasing energy density. At the same time, there are concerns that excessive intake of fats may contribute to higher energy intakes and increase the risk of childhood obesity and diet-related NCDs later in life (*40)*. It is recommended that, based on the existing evidence, total dietary fat intake should be reduced gradually, depending on the physical activity of the child, from 40–60% of total energy intake around 6 months of age to 30–35% of total energy intake at 24 months, and 25–35% from 2 years onwards throughout childhood (*see* Annex 1).

Existing EU legislation and Codex standards set upper limits for lipids in some food categories (<3.3 g per 100 kcal for dry cereals and rusks/teething biscuits and <4.5 g per 100 kcal for dry cereals with added high protein, fruit/vegetable purees, fruit with cereals or milk products, some meat- or fish-based meals, some dairy products, vegetable-based meals, juices and sweet or savoury snacks, and <6 g per 100 kcal for some meat-, fish- or cheese-based meals).

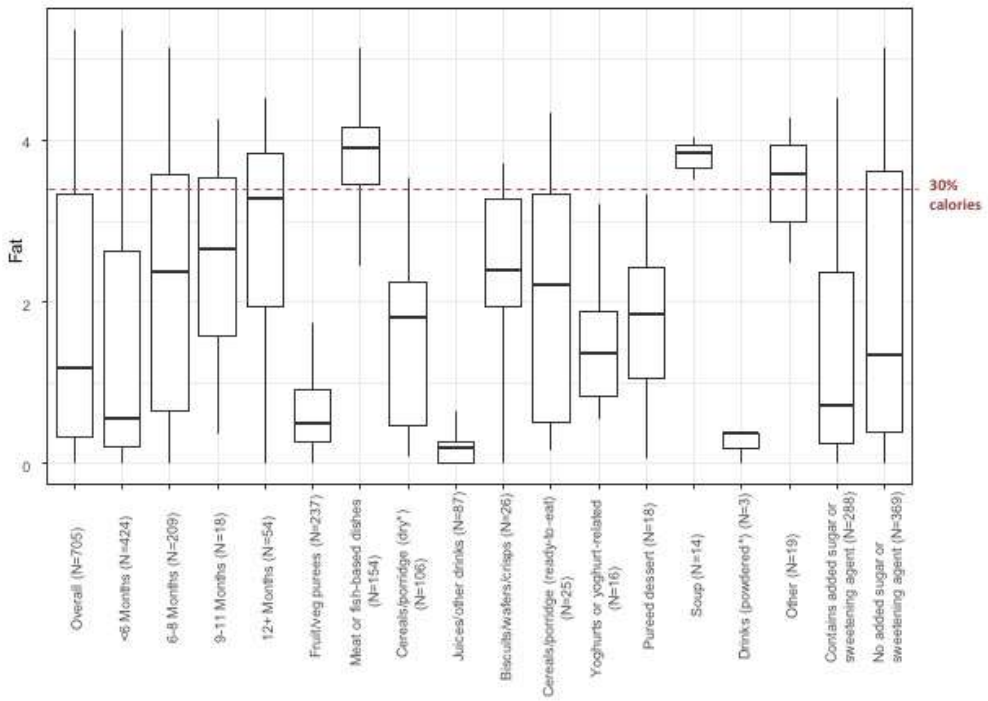
Fig. 13. Total fat content of products, by product category and by age group, in Vienna, Austria (g per 100 kcal)



In Vienna, the fat content of products ranged from 0 g to 11.1 g per 100 kcal (this extremely high value is not shown). This outlier relates to an oil product in the "other" category, marketed as suitable for babies under 6 months.

Over half of the meat- or fish-based dishes and the soups, and half of the products in the "other" category ("baby oils") provided more than 30% of energy from total fat (Fig. 13).

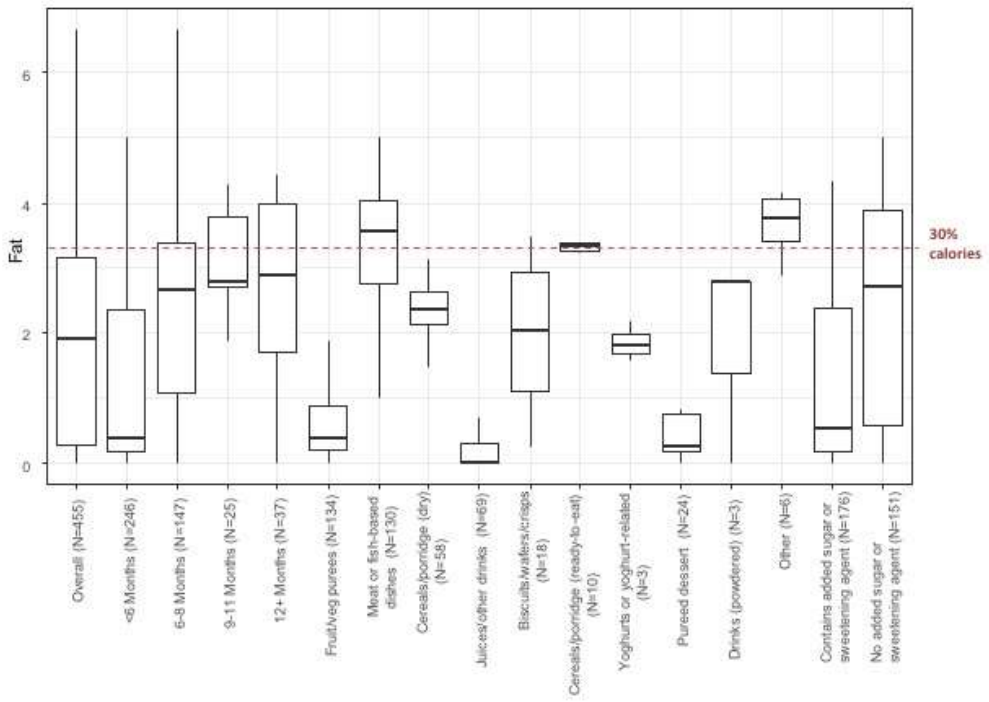
Fig. 14. Total fat of products, by product category and by age group, in Sofia, Bulgaria (g per 100 kcal)



In Sofia, the fat content of products ranged from 0 g per 100 kcal to 5.38 g per 100 kcal. The full range, including outliers (not shown), for fruit/vegetable puree products was 0–4.19 g per 100 kcal, for meat/fish-based dishes 0.36–5.38 g per 100 kcal and for soups 1.67–4.39 g per 100 kcal.

Just under half of the meat- and fish-based meals and soups, and over half of the puddings/desserts derived 30% or more of their calories from fat. Many products in the "other" category contained more than 3.3. g of fat (30% energy) and these were, typically, vegetable-based savoury meals (Fig. 14).

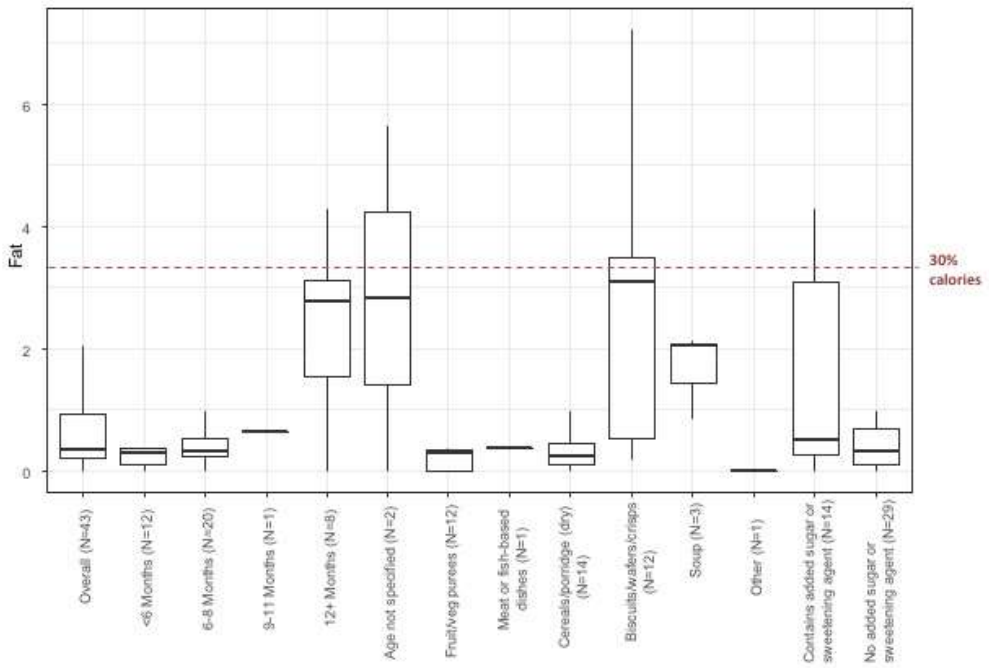
Fig. 15. Total fat content of products, by product category and by age group, in Budapest, Hungary (g per 100 kcal)



In Budapest, fat levels in foods for infants and young children ranged from 0 g to 6.67 g per 100 kcal, with the highest value referring to a savoury cheese and pasta dish. The full range of values, including outliers (not shown), for dry cereals/porridge was 0.56–3.13 g per 100 kcal. For fruit/vegetable purees values ranged from 0 g to 4.46 g per 100 kcal and for pureed dessert from 0 g to 4.34 g per 100 kcal.

Just under half of the meat- and fish-based dishes and products in the "other" category, as well as at least a quarter of the ready-to-eat cereals, had more than 30% of energy from fat. Many of the products in the "other" category had fat levels over 3.3 g per 100 kcal (30% energy) and these were mainly savoury vegetable-based dishes (Fig. 15).

Fig. 16. Total fat content of products, by product category and by age group, in Haifa, Israel (g per 100 kcal)

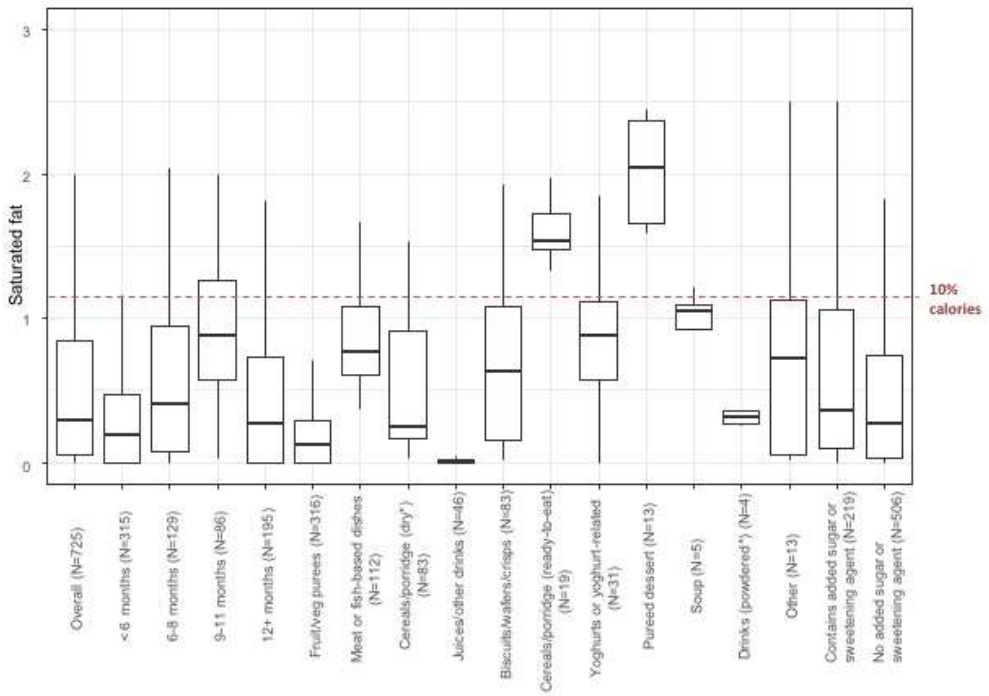


In Haifa, fat content ranged from 0 g to 7.22 g per 100 kcal, with the highest value being for a finger snack product. The only category with products providing more than 30% of their energy from fat was the biscuits, wafers and crisps category (although these accounted for less than a quarter of the products in the category) (Fig. 16).

3.2.4.2 Saturated fat

Current EU legislation and Codex standards do not set any limits for saturated fatty acids. More generally, for children over the age of 2 years and adults, WHO recommends that fewer than 10% of dietary energy should come from saturated fatty acids. For food products, 10% of calories from fat equates to 1.1 g of saturated fat per 100 kcal.

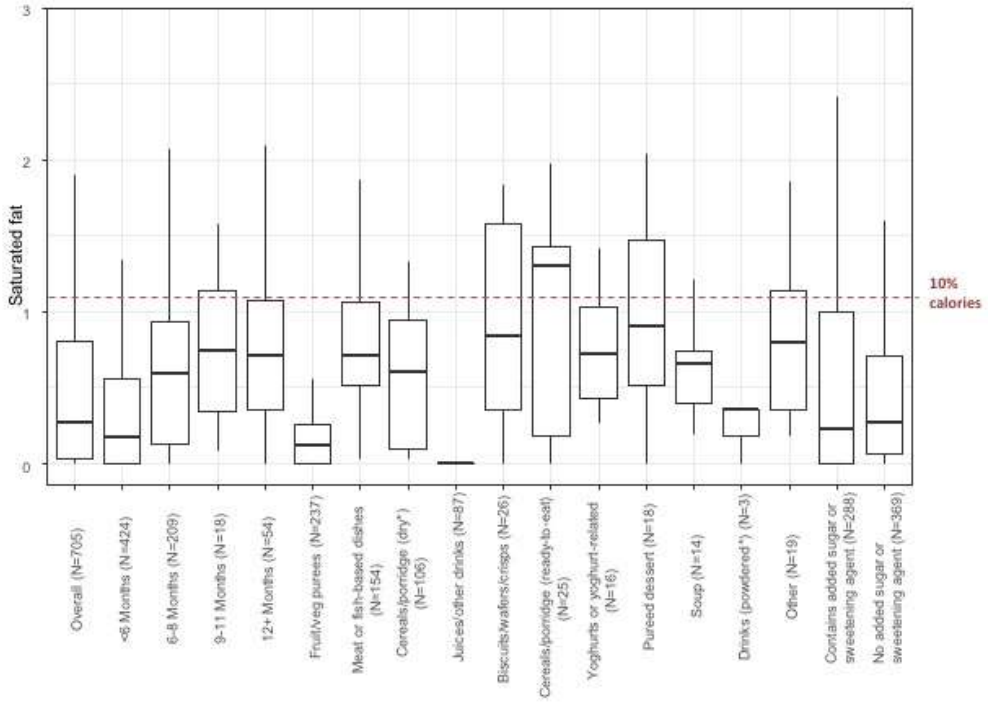
Fig. 17. Saturated fat content of products, by product category and by age group, in Vienna, Austria (g per 100 kcal)



In Vienna, saturated fat levels in products ranged from 0 g to 7.1 g per 100 kcal (not shown). Saturated fat values for fruit/vegetable purees ranged from 0 g to 2.15 g per 100 kcal, while for meat/fish dishes the range was from 0.37 g to 2.45 g and for ready-to-eat cereals from 0.26 g to 7.1 g per 100 kcal. For pureed desserts, some lower outlying values are not shown.

Almost all of the puddings/desserts and ready-to-eat cereal products contained more than 10% of energy from saturated fat (Fig. 17).

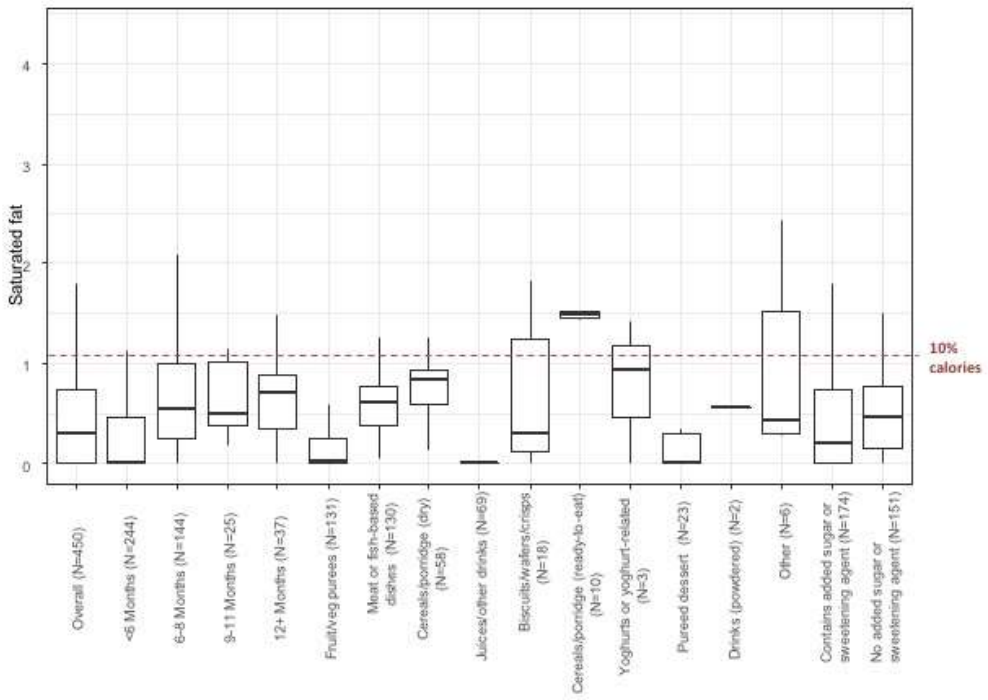
Fig. 18. Saturated fat content of products, by product category and by age group, in Sofia, Bulgaria (g per 100 kcal)



In Sofia, saturated fat levels of products ranged from 0 g to 2.86 g per 100 kcal. The full range of values in the fruit/vegetable puree category (including outliers, not shown) was 0 g to 2.86 g per 100 kcal. Outlying values also pushed the maximum values in yoghurts/yoghurt-related foods to 2.08 g, in meat or fish-based dishes to 2.45 g, soup to 2.09 and foods in the "other" category to 2.31 g per 100 kcal.

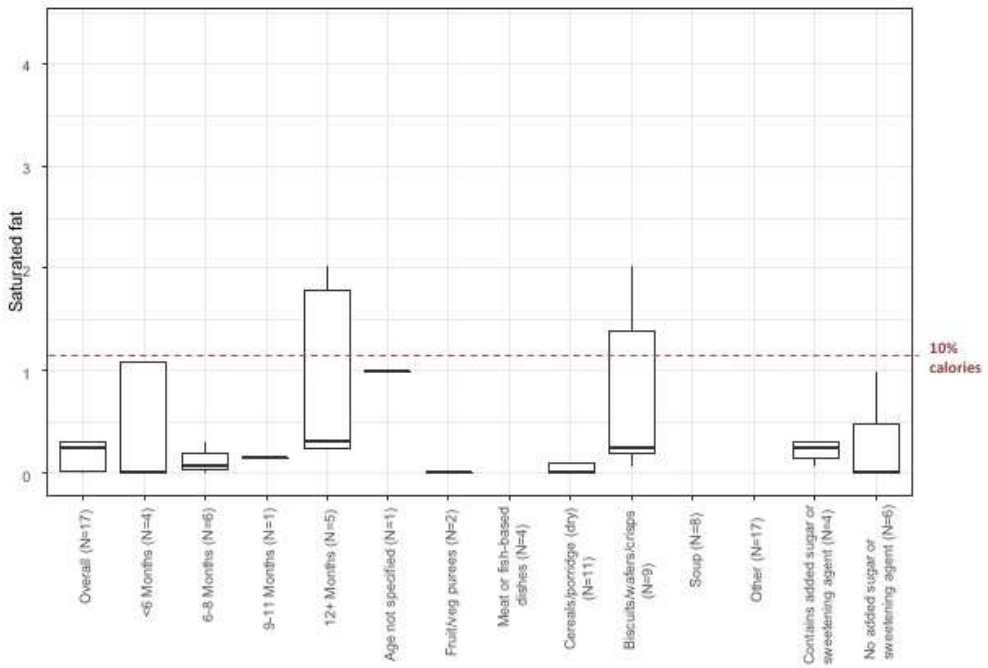
Substantial proportions of products in the biscuits/wafers/crisps, meat- or fish-based dishes, pureed desserts, ready-to-eat cereals/porridges and "other" categories derived more than 10% of their calories from saturated fat (Fig. 18).

Fig. 19. Saturated fat content of products, by product category and by age group, in Budapest, Hungary (g per 100 kcal)



In Budapest, saturated fat levels ranged from 0 g to 4.35 g per 100 kcal, with the maximum value (not shown) relating to a savoury salmon and chicken dish. Values in the juices/drinks category ranged from 0.06 g to 1.49 g per 100 kcal, in fruit/vegetable purees from 0.16 g to 1.83 g and in meat- or fish-based dishes from 0.63 g to 4.35 g per 100 kcal. Less than a quarter of the products in any category provided more than 10% of their calories from saturated fat (Fig. 19).

Fig. 20. Saturated fat content of products, by product category and by age group, in Haifa, Israel (g per 100 kcal)



In Haifa, saturated fat levels ranged from 0 g to 4.33 g per 100 kcal, with the highest value applying to a finger snack product in the biscuits/wafers/crisps category. More than a quarter of the products in the biscuits/wafers/crisps category provided more than 10% of energy from saturated fat (Fig. 20).

3.2.4.3 Trans-fats

The study intended to collect data on the trans-fatty acid content of products, but these data were generally not available from the nutrition information on labels. For Israel, trans-fat content was reported for 13 products, ranging from 0 g to 0.7 g per 100 g of product – the national legislation requires labelling of trans-fats if the food contains more than 2 g of fat and 0.5 g or more of trans-fatty acids.

Some of the countries involved in the study have set mandatory limits for trans-fats in foods:

> **Austria.** A 2009 Regulation set limits of 2 g industrially produced trans-fats per 100 g of a food item, 4 g per 100 g if a food product is composed of various ingredients and the total fat content of the product is less than 20%, and 10 g per 100 g if the total fat content of the food product is not more than 3%.

Hungary. In 2013, Hungary set a limit of 2 g of trans-fats for every 100 g of total fat content for oils, fats and fat emulsions intended for consumers, whether on their own or as ingredients in food products. For processed foods (with more than one ingredient), the limit is 4 g per 100 g for foods containing less than 20% total fat and 10 g per 100 g for foods containing less than 3% total fat.

It is not appropriate for foods for infants and young children to contain industrially produced trans-fatty acids. In its current design, this study has not been able to ascertain the extent to which products contain trans-fatty acids (whether industrially produced or naturally occurring). Future studies should consider inclusion of extra variables to record the presence, for example, of partially hydrogenated vegetable oil on the ingredients list. This is similar to the approach adopted for added sugars or sweetening agents in this study.

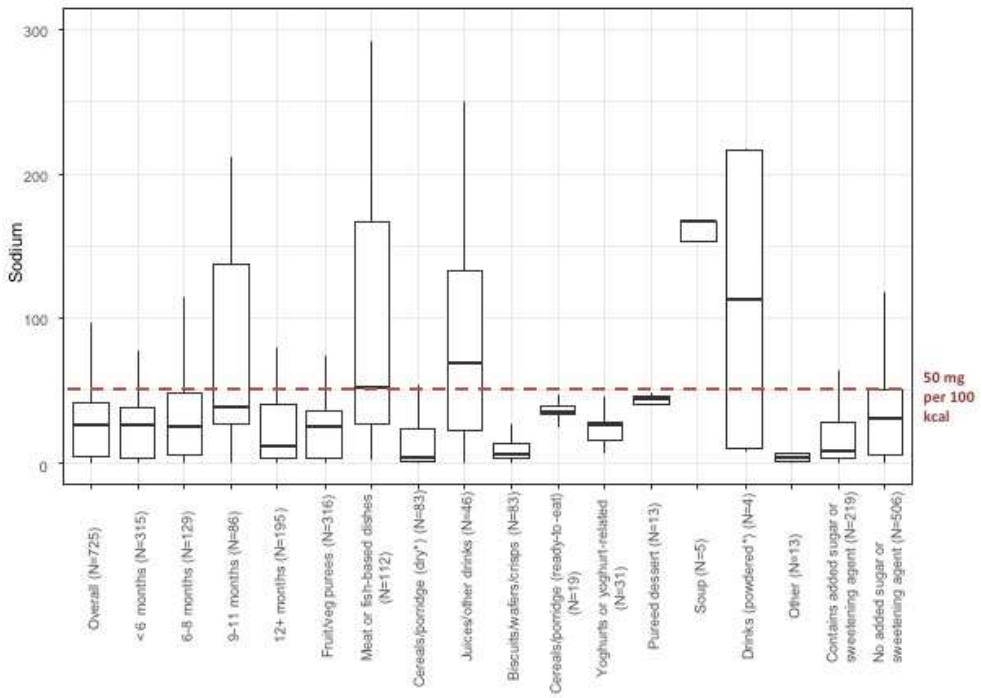
3.2.5 Salt/sodium

Data were collected on sodium and/or salt content, where declared on labels. Salt figures were converted to sodium, and all values were expressed as sodium in mg.

Babies should not be given foods containing added salt. From 2 years of age, WHO recommends that the maximum sodium intake of 2 g per day (equivalent to 5 g per day of salt) be applied, but adjusted downwards for children's lower energy intakes.

Current EU legislation and Codex standards do include some upper limits for sodium content in some food categories (<100 mg per 100 kcal for cereals, 200 mg per 100 kcal for fruit/vegetable purees and fruit/vegetable with cereal products, meat-, fish- or cheese-based meals, juices/drinks, sweet or savoury snacks).

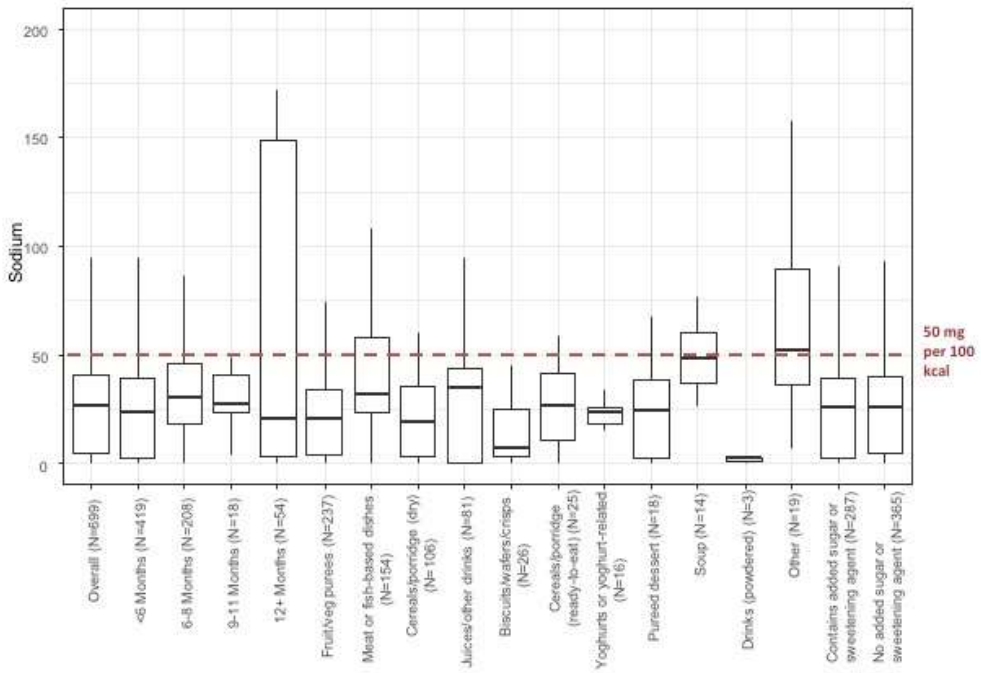
Fig. 21. Sodium content of products, by age group and product category, in Vienna, Austria (mg per 100 kcal)



In Vienna, sodium content ranged from 0 mg to 327 mg per 100 kcal (not shown). This outlier was found in the fruit/vegetable puree category. However, there were a substantial number of high outlier values (not shown). The full range for biscuits/wafers/crisps was from 0 to 97 mg per 100 kcal.

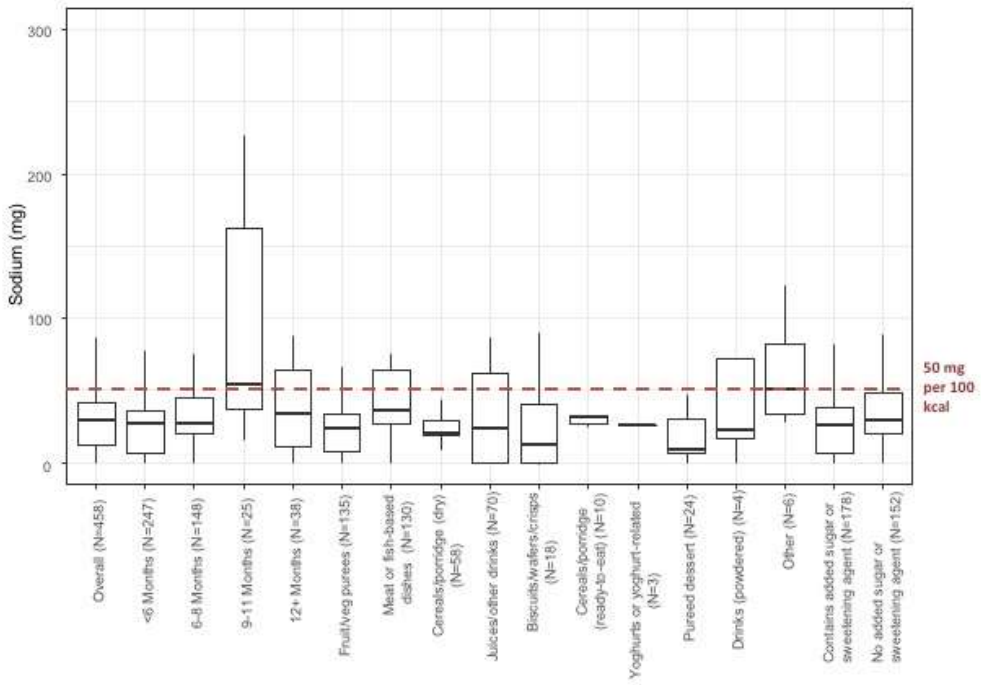
More than half of the products in the juices/drinks, dry/powdered drinks, meat- or fish-based meals, and soup categories contained more than 50 mg per 100 kcal (Fig. 21).

Fig. 22. Sodium content of products, by age group and product category, in Sofia, Bulgaria (mg per 100 kcal)



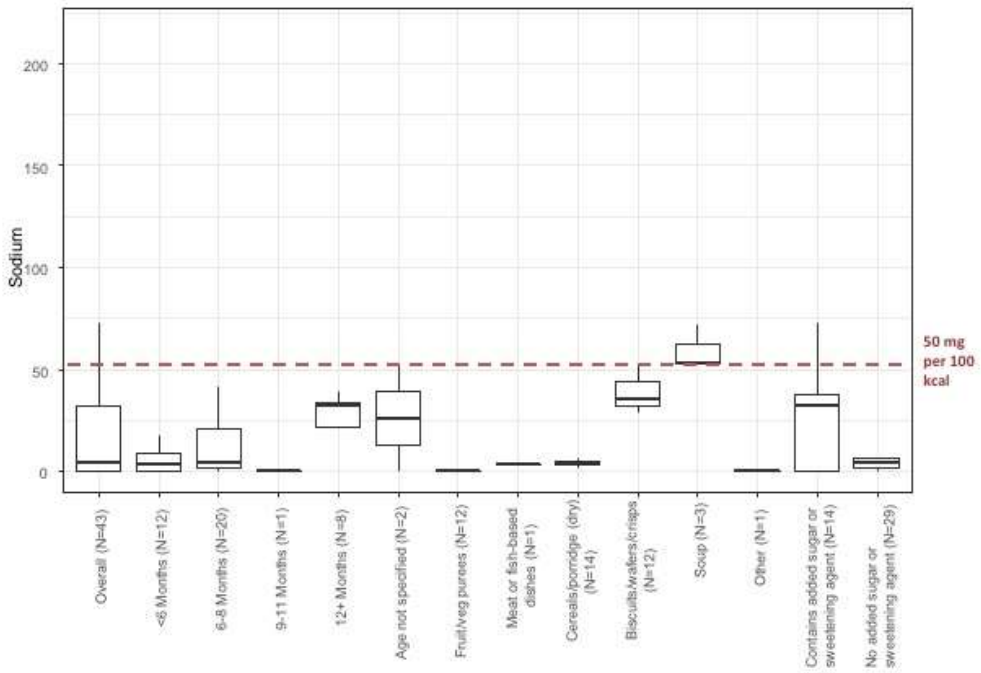
In Sofia, sodium levels ranged from 35 mg per 100 kcal to 1166 mg per 100 kcal (this high outlier [not shown] refers to an oral rehydration therapy product in the "other" category). Half of the "other" products and a quarter of the meat- or fish-based dishes contained more than 50 mg per 100 kcal (Fig. 22).

Fig. 23. Sodium content of products, by age group and product category, in Budapest, Hungary (mg per 100 kcal)



In Budapest, sodium levels ranged from 0 mg to 1166 mg per 100 kcal (as in Bulgaria, this high value [not shown] relates to an oral rehydration product in the juices/drinks category). More than a quarter of the products in the juices/drinks, powdered drinks, meat- or fish-based meals and "other" categories contained more than 50 mg per 100 kcal of sodium (Fig. 23).

Fig. 24. Sodium content of products, by age group and product category, in Haifa, Israel (mg per 100 kcal)



The sodium content of products in Haifa ranged from 0 mg to 216 mg per 100 kcal, with the highest values found in a finger snack product in the biscuits/wafers/crisps category (Fig. 24).

3.3 Promotion of products

Criteria relating to visual aspects of the product, packaging and labels were recorded, along with information on price and other promotions.

These aspects of the way a product is marketed are important because they could constitute inappropriate promotion of foods for infants and young children if they interfere with breastfeeding, contribute to obesity and NCDs, undermine the use of suitable home-prepared or local foods and/or create a dependency on commercial products. Promotion is also considered to be inappropriate if it is misleading, confusing or could lead to inappropriate use, by, for example, carrying claims that idealize products or imply that they are better than family foods.

In summary, this means that, under the Guidance, product packaging and labels on foods for infants and young children should not:

- include any image, text or other representation that might suggest use for infants under the age of 6 months;

- include any image, text or other representation that makes a comparison to breast milk such that is likely to undermine or discourage breastfeeding, or that suggests that the product is nearly equivalent or superior to breast milk;
- recommend or promote bottle-feeding;
- convey an endorsement or anything that may be construed as an endorsement by a professional or other body, unless this has been specifically approved by relevant national, regional or international regulatory authorities;
- carry health and composition/nutrition claims.

In addition, messages about commercial foods for infants and young children should always:

- include a statement on the importance of continued breastfeeding for up to 2 years or beyond and the importance of not introducing complementary feeding before 6 months of age;
- include the appropriate age of introduction of the food (must not be less than 6 months);
- be easily understood by parents and other caregivers, with all required label information being visible and legible.

3.3.1 Visual information on labels

A number of the visual aspects of product labels and packaging that relate to inappropriate promotion were recorded.[n] These included:

- carrying a comparative claim;
- use of images of bottles/teats;
- pictures of ingredients;
- use of images of mothers and/or infants/young children;
- use of cartoon images;
- carrying a claim of endorsement by a professional body;
- carrying a claim of being hypoallergenic.

[n] *See* Section 1 for discussion of how these elements might impact on optimal infant and young child feeding.

Table 15. Visual information on product packaging in Vienna, Austria

Aspect of visual information	Number of products where present (*n*=736)	Percentage of products where present (%)
Carrying a comparative claim	0	0
Use of images of bottles	1	0
Pictures of ingredients	719	98
Use of images of teats	0	0
Use of images of mothers	0	0
Other	4	1
Use of images of infants and young children	2	0
Use of cartoon images	309	42
Carrying a claim of endorsement by a professional body	0	0
Carrying a hypoallergenic claim	1	0

In Vienna, almost all product labels carried pictures of ingredients and 42% also carried cartoon images. The other aspects of promotion were present only rarely, if at all (Table 15).

Table 16. Visual information on product packaging in Sofia, Bulgaria

Aspect of visual information	Number of products where present (*n*=771)	Percentage of products where present (%)
Use of cartoon images	408	52.9
Use of images of infants and young children	67	8.7
Use of images of mothers	3	0.4
Use of images of bottles	0	0.0
Use of images of teats	1	0.1
Pictures of ingredients	728	94.4
Carrying a comparative claim	3	0.4
Carrying a claim of endorsement by a professional body	0	0.0
Carrying a hypoallergenic claim	1	0.1
Other	115	14.9

In Sofia, use of pictures of ingredients (94.4%) and cartoon images (52.9%) was also prevalent. The "other" visual information related to various claims including "quality", "bio" (i.e. organic) and various other nutrition and health claims. Images of infants and young children were present on 32 products (6.9%) marketed as suitable for babies under 6 months of age – this is specifically in violation of the Code because images of babies are not permitted on breast-milk substitutes, and any product marketed as suitable for babies under 6 months is, according to the Code, a breast-milk substitute (Table 16).

Table 17. Visual information on product packaging in Budapest, Hungary

Aspect of visual information	Number of products where present (*n*=473)	Percentage of products where present (%)
Carrying a comparative claim	1	0.2
Use of images of bottles	10	2.1
Pictures of ingredients	408	86.3
Use of images of teats	1	0.2
Use of images of mothers	9	1.9
Other	6	1.3
Use of images of infants and young children	137	29.0
Use of cartoon images	177	37.4
Carrying a claim of endorsement by a professional body	2	0.4
Carrying a hypoallergenic claim	3	0.6

In Budapest, once again pictures of ingredients (86.3%), use of cartoon images (37.4%) and images of infants and young children (29%) were the most common. Use of images of feeding bottles, which can undermine breastfeeding, were present on over 2% of products. The "other" category included organic and other environment-related claims (Table 17).

Table 18. Visual information on product packaging in Haifa, Israel

Aspect of visual information	Number of products where present (*n*=43)	Percentage of products where present (%)
Use of cartoon images	7	16.3
Use of images of infants and young children	25	58.1
Use of images of mothers	0	0.0
Use of images of bottles	0	0.0
Use of images of teats	0	0,0
Pictures of ingredients	36	83.7
Carrying a comparative claim	0	0.0
Carrying a claim of endorsement by a professional body	0	0.0
Carrying a hypoallergenic claim	0	0.0
Other	14	32.6

In Haifa, use of pictures of ingredients (83.7%), use of images of infants and young children (58.1%) and use of cartoon images (16.3%) were the most common. The "other" category related to graphical representation of fruits, smileys or vegetables (Table 18).

3.3.2 Composition, nutrition and health or development claims

Statements about the composition[o] or nutritional content of foods or about supposed health or development benefits associated with a food or drink product can idealize products, mislead consumers and/or undermine breastfeeding or complementary feeding with family and local foods. The Codex guidelines on nutrition and health claims state that such claims[p] shall not be

[o] Usually made as statements relating to whether one or more ingredient(s) or additive(s) is present or not.

[p] Codex defines nutrition claims as "any representation which states, suggests or implies that a food has particular nutritional properties, including but not limited to, the energy value and to the content of protein, fat and carbohydrates, as well as the content of vitamins and minerals. The following do not constitute nutrition claims: (a) the mention of substances in the list of ingredients; (b) the mention of nutrients as a mandatory part of nutrition labelling; (c) quantitative or qualitative declaration of certain nutrients or ingredients on the label if required by national legislation." The European Union definition of a nutrition claim is " any claim which states, suggests or implies that a food has particular beneficial nutritional properties due to: (1) The energy (calorific value) it (a) provides, (b) provides at a reduced or increased rate or (c) does not provide; (2) The nutrients or other substances it (a) contains, (b) contains in reduced or increased proportions or (c) does not contain."
Health claims are defined as "any representation that states, suggests, or implies that a relationship exists between a food or a constituent of that food and health. Health claims include the following: Nutrient function claims – a nutrition claim that describes the physiological role of the nutrient in growth, development and normal functions of the body; Other function claims – These claims concern specific beneficial effects of the consumption of foods or their constituents, in the context of the total diet on normal functions or biological activities of the body. Such claims relate to a positive contribution to health or to the improvement of a function or to modifying or preserving health; Reduction of disease risk claims – Claims relating the consumption of a food or food constituent, in the context of the total diet, to the reduced risk of developing a disease or health-related condition." The European Union defines a health claim as "any claim that states, suggests or implies that a relationship exists between a food category, a food or one of its constituents and health" and a reduction of disease risk claim means "any health claim that states, suggests or implies that the consumption of a food category, a food or one of its constituents significantly reduces a risk factor in the development of a human disease."

permitted for foods for infants and young children, except where specifically provided for in relevant Codex standards or national legislation (*41*).

Table 19. Presence and type of statements about composition or nutritional properties of products in Vienna, Austria

Statement about compositional or nutritional properties	Number of products where present (*n*=736)	Percentage of products where present (%)
No artificial sweeteners	0	0
Fortified with vitamins/minerals	171	23
No artificial flavours[q]	418	57
Organic	590	80
No genetically modified organisms (GMOs)	5	1
No artificial colours[r]	297	40
No added starch	2	0
Unsalted/no salt/no added salt	170	23
No artificial preservatives[s]	291	40
Gluten free	380	52
No added sugar/low in sugar	394	54
Other	447	61
ANY NUTRITION OR COMPOSITION STATEMENT	**731**	**99**

q This included “no flavours” claims.
r This included “no colours” claims.
s This included “no preservatives” claims.

Table 20. Statements about health and/or child development on foods for infants and young children in Vienna, Austria

Statements about health and/or child development	Number of products where present (*n*=736)	Percentage of products where present (%)
Strengthens immune system	17	2
Helps to reduce/prevent allergies	0	0
Helps/supports growth	27	4
Improves cognitive ability	109	15
Other	71	10
ANY HEALTH/DEVELOPMENT STATEMENT	**147**	**20**

In Vienna, statements about composition and/or nutritional properties were present on 99% of the products recorded, and 54% of the products carried a statement about no added/low sugar while 23% carried a message about low or no salt. The most common messages were in the organic (80%), no artificial flavours (57%), gluten free (52%), no artificial preservatives (40%) and no added sugar/low in sugar categories (Table 19). Statements in the "other" category (61%) included those on the presence of lactic acid cultures, galacto- and fructo-oligosaccharides and omega 3 fatty acids, as well as stating that ingredients such as thickening agents, fruit juice concentrates, flavour enhancers or milk protein were not present.

Health or development statements were present on 20% of products, with claims relating to improvement of cognitive ability being the most common (15%), followed by claims to help or support growth (4%) and strengthen the immune system (2%). The "other" category of statements (10%) included a variety of messages relating to, for example, protection of cells from oxidative stress, iron absorption, nervous system function, red blood cell formation, energy-yielding metabolism and thyroid function (Table 20).

In summary, nearly all products carried a statement on composition or nutrition, with more than half of the products carrying nutrition messages (54% on sugars, 23% relating to salt levels plus some categorized as "other"), and a fifth carried statements on health or development (20%), despite the Codex guidelines that foods for infants and young children must not carry nutrition or health claims (unless regulatory authorities specifically approve particular claims).

Table 21. Presence and type of statements about composition or nutritional properties of products in Sofia, Bulgaria

Statement about compositional or nutritional properties	Number of products where present (*n*=772)	Percentage of products where present (%)
Unsalted/no salt/no added salt	267	34.6
No added sugar/low in sugar	204	39.4
No artificial sweeteners	16	2.1
Fortified with vitamins/minerals	322	41.7
No artificial preservatives[s]	401	51.9
No added starch	76	9.8
No artificial colours[r]	416	53.9
No artificial flavours[q]	314	40.7
No genetically modified organisms (GMOs)	64	8.3
Gluten free	482	62.4
Other	105	13.6
Organic	267	34.6
ANY COMPOSITION OR NUTRITION STATEMENT	**755**	**97.8**

Table 22. Statements about health and/or child development on foods for infants and young children in Sofia, Bulgaria

Statements about health and/or child development	Number of products where present (*n*=772)	Percentage of products where present (%)
Helps/supports growth	13	1.7
Strengthens immune system	28	3.6
Improves cognitive ability	29	2.6
Helps to reduce/prevent allergies	5	0.6
Other	59	7.6
ANY HEALTH/DEVELOPMENT STATEMENT	**101**	**13.1**

In Sofia, statements on composition or nutrition were present on nearly all (97.8%) of the unique products examined. Gluten free was the most common (62.4%), followed by no artificial colours (53.9%) and no artificial preservatives (51.9%). Specifically in relation to nutrition, 41.7% carried a statement about vitamin/mineral levels, 39.4% mentioned sugar levels and just over a

third (34.6%) referred to salt levels (Table 21). Health or development messages were present on 13.1% of products, with claims to strengthen the immune system being the most common. Statements in the "other" category were present on 7.6% of products, accounting for 58.4%. These covered a wide range of topics, including, for example, bone development, thyroid function, iron absorption, energy-yielding metabolism, brain and nerve tissue development, gastrointestinal tract function and nervous system function (Table 22).

In summary, nearly all products carried a statement on composition or nutrition and at least 40% carried messages on nutrition (relating to sugar, vitamins, minerals and salt) and more than one in eight of all products (13%) carried a statement relating to health or development.

Table 23. Statements about health and/or child development on foods for infants and young children in Budapest, Hungary

Statement about compositional or nutritional properties	Number of products where present (*n*=477)	Percentage of products where present (%)
No artificial sweeteners	9	1.9
Fortified with vitamins/minerals	115	24.1
No artificial flavours[q]	246	51.6
Organic	114	23.9
No genetically modified organisms (GMOs)	80	16.8
No artificial colours[r]	202	42.3
No added starch	34	7.1
Unsalted/no salt/no added salt	153	32.1
No artificial preservatives[s]	195	40.9
Gluten free	338	70.9
No added sugar/low in sugar	167	35.0
Other	169	35.4
ANY COMPOSITION OR NUTRITION STATEMENT	**455**	**95.4**

Table 24. Statements about health and/or child development on foods for infants and young children in Budapest, Hungary

Statements about health and/or child development	Number of products where present (*n*=772)	Percentage of products where present (%)
Other	68	14.3
Strengthens immune system	75	15.7
Helps to reduce/prevent allergies	1	0.2
Helps/supports growth	34	7.1
Improves cognitive ability	78	16.4
ANY HEALTH/DEVELOPMENT STATEMENT	**169**	**35.4**

In Budapest, statements relating to composition or nutrition were present on 95.4% of the products in the sample. The most common were gluten free, no artificial colours and no artificial preservatives. Nutrition-specific messages were present on 35% of products in relation to sugars, 32.1% of products in relation to salt levels and 24.1% in relation to vitamins or minerals (Table 23).

Health and development statements were found on 35.4% of products, with claims to improve cognitive ability being the most common (16.4%), followed by strengthening the immune system (15.7%). The "other" category included, among others, claims to help brain and nervous system development, iron absorption, red blood cell formation and thyroid function (Table 24).

In summary, nearly all products carried statements on composition or nutritional aspects, with at least a third of the products carrying messages specifically relating to nutrition and over a third (35%) of products overall carrying messages relating to health or development.

Table 25. Presence and type of statements about composition or nutritional properties of products in Haifa, Israel

Statement about compositional or nutritional properties	Number of products where present (*n*=43)	Percentage of products where present (%)
Unsalted/no salt/no added salt	6	14.0
No added sugar/low in sugar	21	48.8
No artificial sweeteners	0	0.0
Fortified with vitamins/minerals	31	72.1
No artificial preservatives[s]	24	55.8
No added starch	0	0.0
No artificial colours[r]	17	39.5
No artificial flavours[q]	12	27.9
No genetically modified organisms (GMOs)	0	0.0
Gluten free	3	7.0
Organic	2	4.7
Other	32	74.4
ANY COMPOSITION OR NUTRITION STATEMENT	**43**	**100**

Table 26. Statements about health and/or child development on foods for infants and young children in Haifa, Israel

Statements about health and/or child development	Number of products where present (*n*=43)	Percentage of products where present (%)
Helps/supports growth	5	11.6
Strengthens immune system	5	11.6
Improves cognitive ability	0	0.0
Helps to reduce/prevent allergies	0	0.0
Other	0	0.0
ANY HEALTH/DEVELOPMENT STATEMENT	**9**	**20.9**

In Haifa, all products carried statements relating to composition or nutrition, with the most common relating to fortification with vitamins and minerals (72%), followed by no artificial preservatives (55.8%). Nutrition messages, specifically, were present on at least 72% of products

(vitamins and minerals), with almost half of the products (48.8%) claiming low sugar/no added sugar and 14% carrying statements relating to salt. The "other" category included statements relating to antioxidants, probiotics, fibre, omega 3 fatty acids, trans-fats, cholesterol and calcium (Table 25).

Just over one in five (20.9%) products in Haifa carried a statement relating to health or development, with half of those related to helping or supporting growth and half relating to strengthening the immune system. These were present only on cereal/porridge products (Table 26).

In summary, all products sampled in Haifa carried a statement relating to composition or nutrition, with at least 72% of all products carrying nutrition-specific messages and a fifth of all products carrying health or development messages (21%).

It is clear that nearly all foods for infants and young children sampled in Austria, Bulgaria, Hungary and Israel carried a statement relating to composition or nutrition, and a substantial proportion (at least a third to three quarters) carried nutrition and/or health statements (13–35%). Products carrying nutrition or health claims are in contravention of the Codex rules on labelling and WHO's Guidance.

3.3.3 Types of promotion

There are concerns that provision of free products, samples, or reduced-price foods for infants and young children – whether directly or through health workers – can induce families to buy these products, thereby potentially undermining breastfeeding and complementary feeding with home-made or local foods. The Guidance states that companies marketing such foods should not provide free products, samples or reduced-price foods for infants or young children to families through health workers or give any gifts or coupons to parents, caregivers and families.

Information was collected on techniques used to promote foods for infants and young children in the retail outlets where they were purchased. This included free give-aways, price reductions and multibuy discounts, as well as other types of promotion.

In Vienna, price reductions were found on 82 products (2%) and free give-aways were offered on seven products (<1%). In Sofia, price reductions were found on 27 products (3.5%); other types of promotion were very rare. In Budapest, Hungary, price reductions were offered on 1.7% of products and there was one example of a multibuy discount being offered. No price promotions, multibuy discounts or free give-aways were found on products in the Haifa sample of foods for infants and young children.

3.4 Flavours used in foods for infants and young children

In addition to the nutritional content and aspects of promotion, data were collected on the flavours declared on product labels. It is clear that sweet flavours predominate – often relating to fruit and sweet vegetables. In addition, a number of flavours were mentioned that do not reflect infant and young child feeding guidelines. Examples include:

- vanilla
- cinammon
- honey

- chocolate
- stracciatella
- peanut.

There are concerns that the use of these flavours may affect children's development of taste and preference, increasing the likelihood that they will prefer sweeter foods or foods high in fat, sugar or salt as they grow up.

In addition, there were many examples of unusual flavour combinations (apple with potato, apple puree with chicken, apple–mango truffle), which point to the use of fruit to sweeten and/or mask the taste of other ingredients in products.

3.4.1 Other aspects of foods for infants and young children

There are other aspects of foods for infants and young children that warrant consideration, but were not captured with the current methodology.

It is important, for example, that the texture of the food, including the presence or otherwise of lumps, is appropriate for the age group for which it is marketed.

There are also issues relating to packaging. Pouches are increasingly preferred to jars for wet foods in many countries. While pouches are convenient, there are concerns that babies may be allowed to suck directly from the pouch nozzle and this can result in overeating or contribute to tooth decay, while not encouraging children to learn eating skills. It is important that such products carry warnings that children should not be fed directly from the pouches or allowed to suck from the pouch.

3.5 Comparison of products bought in low-income and high-income neighbourhoods

The nutrient content (energy density, protein, carbohydrate, total fat, saturated fat, total sugars and salt/sodium) of foods for infants and young children was compared between the low-income and high-income neighbourhoods in the four participating countries. Statistical analysis was based on *all* the products bought in these areas (i.e. including duplicate products) in order to take into account the extent of availability and variety of products. Box plots of those results were produced.

Very few differences were observed between the products purchased in the low-income areas and high-income areas. In Haifa, there appeared to be more differences than elsewhere: sugars appeared to be higher in the low-income areas while salt content appeared to be higher in the products purchased in high-income neighbourhoods.

In the absence of a discernible pattern of difference between products available in low-income and high-income areas, the detailed results are not reproduced here.

4 Discussion

4.1 Methodology issues

The methodology used enabled collection of data on the composition and marketing of foods for infants and young children in retail settings. The mobile application was a valuable tool for data collection, although the option of manually completing the data in an Excel spreadsheet also provided a good alternative. As a large number of products was available in Austria, recording data directly in the Excel spreadsheet provided was deemed more efficient. This method was chosen because product information on items appearing in multiple stores could simply be copied and pasted. Therefore, data entry was consistent and easily controllable.

Feedback from the country data collection teams suggests that the sampling approach was clear and there was a valid rationale for including low- and high-income areas. The idea of a buffer zone and mapping all retailers within a specific area worked well. This ensured that different types of outlets were included, potentially selling different products and targeting different consumers and that, secondly, the data collected represented products available on the market and most widely on shelves at that point in time.

A number of adjustments to the tool would enable collection of some additional relevant data and/or improve the accuracy (and thus comparability) of the data collected. Examples include:

- presence of water, salt or (partially) hydrogenated vegetable oil on the ingredients list;
- information on the type of packaging (i.e. glass jar; pouch with spout);
- additional aspects of promotion, such as cross-promotion[t] of breast-milk substitutes, inclusion of messages about breastfeeding, and optimal infant and young child feeding;
- clarification about whether each product is sold as dry (to be reconstituted) or wet (ready to feed), along with more detail on the basis of the nutrition declarations (as reconstituted or not, reconstituted with what) and the portion size information needed to convert the nutrient declarations of dry products to "as consumed" values;
- additional information to enable the price per portion to be calculated (e.g. information on the cost of one packet, jar or container where possible);
- inclusion of the possibility of registering "<" values and to deal with these in analyses;
- more detailed clarification of the age group definitions;
- more detailed explanation on how to record and categorize claims/statements on composition, nutrition and health/development;
- more precise information about the brands and manufacturers (whether multinationals or local).

Each decision about the inclusion of an additional item, however, has to be weighed against considerations of ease of use for data collection teams and time requirement per product entered.

In addition, a small number of adjustments to the ways in which data are recorded would facilitate the data cleaning and analysis process. There is a need to review the food categories. At the time of designing the study, there was no widely accepted typology of food categories for commercial complementary foods, and existing legislative categories did not reflect the modern

[t] Where the packaging, branding or labelling of a food or drink product closely resembles that of a breast-milk substitute, or particular promotional activities for a food or drink product promotes a breast-milk substitute.

market. More precise food categories with clearer definitions would be useful to enable country comparisons – although more complicated definitions would increase the complexity of data collection. The methodology has to be flexible enough to be appropriate in all national contexts. It is hoped that this study can inform the development of clearer food categorization for future research and policy purposes.

It is also important to recognize that there is an element of interpretation involved in the data collection and that this reflects, in part, local attitudes to infant and young child feeding. This particularly relates to the classification of food products. As highlighted in the methodology and above in relation to the definition of product categories, there are some hybrid products that combine, for example, fruit, cereals and dairy ingredients. Depending on the relative amounts of each ingredient in the food and the role of such foods in complementary feeding in a particular country, the product could be classified as yoghurt- or yoghurt-related, fruit puree, ready-to-eat cereal or pudding/dessert. However, WHO discussed categorization with each of the teams, provided clarification on the recommended classification and encouraged the teams to categorize foods systematically and consistently once an approach was agreed upon. Nevertheless, it will be important to address this potential limitation of the methodology in future by providing additional guidance on the categorization of products if datasets from countries are to be pooled and intercountry comparisons of product categories are to be conducted.

While the methodology provides a snapshot of the situation in four different countries, the differences in sampling and sample sizes mean that it is not possible to make comparisons between countries or to pool all the data into a single dataset. If such comparisons are an important objective in future studies using this methodology then efforts to standardize the sampling methodology and sample size will be required.

A more detailed discussion of the methodology and recommendations for future development are given in Annex 4.

4.2 Discussion of the findings

Data were collected on the availability, composition and promotion of foods for infants and young children in four cities of the WHO European Region. These data provided a snapshot of the commercial foods available for babies and toddlers in each city. It is important to remember that, due to differences in sampling and sample size, the data are not suitable for cross-country comparisons and the four datasets cannot be pooled into a single dataset.

Data were collected on infant and young child formula products (“milks”), but these results have been excluded from this analysis and will be reported elsewhere.

This research reinforces the findings of other studies on the nutritional quality of commercial foods for infants and young children in Europe (*17,21)* and other international studies (*14,16,42*,*43)*. It also expands and enhances that knowledge base by providing a detailed snapshot of products available at the time of the study to parents/caregivers in four countries, and by covering aspects of how products are packaged, labelled and promoted as well as their nutritional composition.

4.2.1 Availability and age of marketing of foods for infants and young children

The data suggest that commercial foods for infants and young children are widely available in Austria, Bulgaria and Hungary. A smaller sample size and less diverse range of products was obtained in Israel and there are several reasons for this. One possible reason is that, because of the regulatory context in Israel, fewer foods are labelled as being suitable for babies and toddlers, even though such foods for general consumption/older children are marketed in other ways (such as advertising) as being suitable for young children. It was noted by the research team in Israel that foods not labelled as suitable for this age group (including savoury corn snacks, peanut snacks and confectionery) are widely given to infants and young children during the complementary feeding period.

In all countries, a substantial proportion of products (ranging from 28% to 60%) were marketed as being suitable for infants under the age of 6 months, meaning that they are in violation of the Code and the WHO Guidance. It is important to point out that even where the legislation in place in a country permits the marketing of complementary foods to babies under 6 months (as is the case in EU Member States), both the Code and the Guidance call on manufacturers and distributors to comply with the principles enshrined in those documents. Nonetheless, this research shows that many companies continue to flout the internationally agreed rules of the Code and the Guidance.

4.2.2 Nutritional quality of foods for infants and young children

Foods for infants and young children are required to comply with various established nutrition and compositional criteria. Nonetheless, there are concerns that some products that comply with the legal standards may be too high in saturated fats, sugars or salt to promote health in childhood and later in life. Foods that are not in line with dietary guidelines for babies and toddlers are not suitable for promotion as foods for infants and young children.

Energy density
In general, at least half of the products in the fruit and vegetable purees and juices/drinks categories provided less than 60 kcal per 100 g (which is just below the energy density of breast milk). In addition, many soups and some yoghurts and fish- or meat-based meals were also below this threshold. Sizeable numbers of the dry cereal products were below the 400 kcal per 100 g energy density level recommended by Codex.

Low energy density can be problematic because infants' and young children's small stomachs mean that they consume only relatively small amounts at mealtimes. It is important, therefore, that small quantities of foods, especially for infants, contain sufficient energy and nutrients. Ideally, the increased energy should come from nutrient-rich sources and not, for example, free sugars. A related issue is the addition of water to commercial foods for babies and toddlers – water reduces the energy and nutrient density of products. For example, water may be added to food sold in pouches with spouts to ensure that it can be squeezed (or even sucked) out. It would be useful for any future research with this methodology to include "water listed as an ingredient" as an additional criterion.

While there are concerns that some products are not energy dense enough, there are some products in the biscuits/wafers/crisps category that have a very high energy density. Since these

products are dry, it is logical that they will be calorie dense on a weight basis, but it is a matter of concern that many of these products tend to be eaten as snacks (rather than meals).

Another area of concern is the marketing of teas and sweet beverages with very low nutrient values and very sweet flavours or high levels of sugar substitutes for infants. These can displace more nutrient-rich foods from the diet and should not be recommended as the liquid part of infants' diets when continued breastfeeding is recommended.

Protein
In relation to protein content, it is difficult from the data collected to assess whether all the products contained appropriate amounts of protein. This is because the standards for protein content vary, depending on the type of product and the exact name of the product. More detailed product categories – in addition to very precise details of product names and descriptions – are required to make conclusions about protein content. Other studies have highlighted that some commercially available baby foods have protein levels below the protein content of foods or recipes recommended in national guidelines (*21).*

Sugars
Results in all four countries show high total sugar levels. Even products that are ostensibly in the "savoury" categories contain high levels of total sugars. In Austria, Bulgaria and Hungary, in around half or more of the products, more than 30% of energy was provided by sugars and more than four in 10 products had 40% or more of energy from sugars. In Israel, levels were lower; nonetheless, nearly one in five products (18%) had more than 40% of energy from sugars.

In all countries, around a third or more of products had some kind of sweetening agent included on the ingredients list – most commonly sugar or concentrated fruit juice. This tallies with the findings of other research, which found that between a third and a half of baby foods contained at least one type of added or free sugars as an ingredient, and that fruit juice concentrates and fruit powders are widely added in most categories of baby food *(21).*

Although foods that naturally contain sugars such as fruit and vegetables can be appropriate for infant and young child diets, the very high levels of sugars present in commercial products is a cause for concern. A high sugar intake can increase the risk of overweight and dental caries. Sugary drinks, including fruit juices, contribute little other than energy, and can displace more nutrient-rich foods from the diet. In addition, it is also of concern that these high levels of sugars indicate, in general, very sweet products and that these promote a preference for sweet foods at an early age, which can be carried through into later life.

The addition of sugars, fruit juice, fruit juice concentrate or other sweetening agents to foods for infants and young children is not appropriate. Sugary drinks and very sugary foods should not be promoted for infants and young children. The existing EU legal limits for added sugar content have been criticized as being too lenient and new thresholds are under consideration. Child health advocates have called for much stricter thresholds for sugar content *(44)*.

It is important to acknowledge that this study reports on total sugars, added sugars and sweetening agents, whereas WHO's recommendations relate to free sugars,[u] and EU and Codex

[u] WHO defines free sugars as including monosaccharides and disaccharides added to foods and beverages by the manufacturer, cook or consumer, and sugars naturally present in honey, syrups, fruit juices and fruit juice concentrates.

standards relate to added sugars. This was a practical decision based on the availability of data from the labelling. Nevertheless, it is important to recall that WHO recommends that free sugars should not provide more than 10% of energy, and suggests that further health benefits would be obtained by limiting free sugars further to 5% of energy *(45)*. In addition, the Guidance stresses that addition of free sugars to foods for infants and young children should be avoided.

Total sugars include the sugars naturally present in fruits, vegetables and dairy products. However, a paper describing Public Health England's practical interpretation of the definition of free sugars has clarified that blended, pulped, puréed or extruded fruit is considered free sugars, which is a logical extension and interpretation of the WHO definition.

As such, the presence of intrinsically sweet food ingredients in these products, such as fruit purees, is an issue that needs to be addressed.

Fats
Babies and toddlers do need fats in their diet and it is recommended that total dietary fat intake be gradually reduced, from 40–60% of total energy intake around 6 months of age to 30–35% of total energy intake at 24 months. However, in all four countries, the total fat content of the products appeared to increase, rather than decrease, as the age for which they were marketed increased.

What constitutes an appropriate fat intake depends, to a degree, on the role of that food in the diet and the other foods consumed. In Austria, Bulgaria and Hungary, substantial proportions of meat- or fish-based foods had high fat levels (over 30% energy from fat). In Israel, it was only in the biscuits/wafers/crisps category that a sizeable proportion of products had more than 30% of energy from fats.

In general, there were relatively few products with more than 10% energy from saturated fat, but where levels did exceed 10% this was most commonly in the biscuits/wafers/crisps and pureed dessert categories (in Bulgaria and Israel for the former, Austria and Bulgaria for the latter). Other studies have also identified that saturated fat levels are highest in baby biscuits and rusks (*21).* Given the "snack" or "dessert" role of some of these foods in the diet, lower saturated fat levels would be appropriate.

It is not appropriate for foods for infants and young children to contain industrially produced trans-fatty acids. The study was not able to ascertain the extent to which products contained trans-fatty acids (whether industrially produced or naturally occurring) because trans-fats levels were rarely declared on nutrition labels. Future studies should consider recording the presence, for example, of partially hydrogenated vegetable oil on the ingredients list.

Sodium/salt
Infants and young children should not be given foods with added salt, and there are concerns that early exposure to salt-containing foods encourages the development of a preference for salty taste *(46)*.

In line with the findings of other research *(21)* the results suggest a considerable variation in the sodium content of foods within categories. The results vary between countries but a sizeable proportion of the meat- and fish-based meals, soups, biscuits/wafers/crisps and "other" categories contained 50 mg of sodium or more per 100 kcal in at least one country. The variation

in sodium levels suggests that there is considerable scope for reducing salt/sodium levels in many products.

Some sodium is naturally present in foods and the study was unable to identify if and when salt had been added. Nonetheless, inclusion of salty ingredients (such as cheese or ham) was observed.

Limits are required for sodium in foods, which preclude addition of salt but allow for natural sodium content. This may vary by category, but 50 mg per 100 kcal seems feasible across all product categories (i.e. there were products in each category at that level or below). Higher thresholds may be required for foods where cheese is mentioned in the name.

4.2.3 Promotion of foods for infants and young children

The results clearly show that foods for infants and young children are frequently inappropriately promoted in all four participating countries.

In addition to the large proportion of products being marketed as suitable for infants under 6 months of age (which violates the Code and the WHO Guidance), there was frequent use of claims. Nearly all product labels carried some kind of statement about the product composition or its nutritional or health-related properties – with at least a third to three quarters carrying a message relating to nutrition– and between 13% and 35% carried a message relating to health or child development. The use of nutrition or health claims can lead to these products having a "health halo" and undermine parents' confidence in breastfeeding and their ability to feed their child with home-prepared food. Frequent use of statements about nutritional or health-related properties is contrary to the Codex guidelines, which state that foods for infants and young children should not carry nutrition or health claims, and both the Code and the WHO Guidance reinforce this and call on manufacturers to respect these rules.

A substantial proportion of products carried cartoon images on the packaging, ranging from 16% in Israel to 53% in Bulgaria. These products are clearly designed to appeal to children – as part of a wider trend for making children's food "fun" *(47)* – and could encourage so-called "pester power" by young children, thereby undermining optimal infant and young child feeding.

Other aspects of inappropriate promotion were less common, but some examples were observed. Use of images of feeding bottles or teats, for example, was rare, but there were some occurrences. Price promotions (reduced price, multibuys or free giveaways) were also rare, although they did occur.

4.2.4 Other aspects of foods for infants and young children

Other aspects of foods for infants and young children are relevant for current and future health. Adequate intake of vitamins and minerals is essential for healthy growth and development, but this study did not collect data on the micronutrient content of commercial foods for infants and young children. It is vital that products are safe for infants and young children, and that they carry clear instructions on safe usage and storage. It is also important, for example, that babies and toddlers are given food that is appropriate in texture for their stage of development. Emerging issues include the appropriate use of different types of packaging (such as pouches). In addition, there is evidence that tastes and preferences developed in early childhood carry forward

into adulthood. For this reason, foods that promote sweet or salty taste preferences at an early age can be considered inappropriate.

This study did not examine the safe usage instructions, texture or packaging aspects of the foods. It did assess the sugar and sodium levels in products and also looked at the different flavours/tastes of foods. Flavours that did not reflect infant and young child feeding guidelines had been used, such as cocoa, chocolate and stracciatella.

4.2.5 Comparing foods for infants and young children in low-income and high-income neighbourhoods

Given the importance of infant and young child nutrition for health in later life, it is important that poor complementary feeding does not contribute to health inequalities. For this reason, the sampling procedure was designed to enable some comparison of the availability and quality of products purchased in high-income areas with those purchased in low-income areas. The initial analysis revealed very few differences between high-income and low-income areas and did not identify any discernible pattern.

5 Conclusions

The methodology used in this study is a useful tool for providing a snapshot of the retail availability, quality and marketing of commercially available foods for infants and young children in defined locations.

Use of this methodology in four countries of the WHO European Region enabled collection of data on 7955 foods marketed for infants and young children (excluding milk products) in four cities:

- Vienna, Austria
- Sofia, Bulgaria
- Budapest, Hungary
- Haifa, Israel.

There has been growing concern that inappropriate promotion of some commercially produced foods for babies and toddlers can undermine breastfeeding and optimal infant and young child nutrition by weakening parents' and carers' confidence in home-produced foods, promoting dietary habits that may encourage later obesity or NCDs and/or undermining breastfeeding. The World Health Assembly has urged all Member States to "end inappropriate promotion of foods for infants and young children" (*6)* and in 2016, new global guidance was issued to help countries take action on this issue *(7)* and reinforce the existing rules on marketing of breast-milk substitutes agreed in the Code in place since 1981.

This study found evidence of widespread inappropriate promotion of commercial foods for infants and young children. Despite globally agreed rules on the promotion of foods for infants and children – and more than 30 years since the introduction of the Code – many companies that make and sell commercial baby foods fail to comply with these rules.

A substantial proportion of foods – ranging from 28% to 60% – were marketed as being suitable for children under 6 months of age. All or nearly all products carried some type of composition, nutrition or health message – between one third and three quarters carried a statement about nutritional properties and between 13% and 35% carried at least one statement about health or child development. Other areas of inappropriate promotion – such as price promotions or use of imagery that encourages bottle-feeding – were much less common but did occur. Such practices are damaging to the nutrition of babies and young children because they can undermine breastfeeding and parents' confidence in complementary feeding with home-cooked family foods, thus encouraging dependence on commercial food and drink products.

The study also found that foods of inappropriate nutritional quality were being marketed for infants and young children. The high levels of total sugars in products give particular cause for concern, with sugars accounting for 40% or more of the calories in up to four in 10 products. Although not all of these sugars are free sugars, a significant proportion of products (around one third) did contain added sugars or sweetening agents – most commonly "sugar" or "concentrated fruit juice" – and the use of fruit puree as an ingredient was widespread. WHO recommends that free sugars should contribute less than 10% of total energy intake for adults and children (or up to 5% for additional health benefits) (*45)* and warns against the addition of free sugars to foods for infants and young children (*7).* Sweet tastes predominate and this may encourage a lifelong preference for sweet foods, undermining healthy eating advice. High levels of salt/sodium were much less common; nonetheless, there are products on the market which contain salty

ingredients and/or are likely to encourage a preference for salty foods at an early age. Some products on the market did not appear to provide enough energy (calories) per 100 g, increasing the risk that babies will feel full and stop eating before they have consumed enough nutrients. Energy-dense foods that are designed as snacks are likely to increase the risk of excess energy intake. Because the study relied on nutrient declarations, it was not possible to assess trans-fats levels in foods – adjustments to the methodology are required to address this issue in future research.

In conclusion, this study suggests that inappropriate promotion of commercial foods for infants and young children continues to be widespread in Europe, despite global commitments to tackle this issue. Broadly similar results in three countries (Austria, Bulgaria and Hungary) and, to a lesser extent in Israel, suggest that the problems identified are likely to extend across the Region.

Action is required, therefore, by Member States, with the support of the WHO Regional Office for Europe, to implement WHO's Guidance in order to prevent promotion of nutritionally inappropriate products and/or use of inappropriate promotional techniques.

To facilitate such action, a nutrient profile model that establishes nutrient thresholds for nutritionally appropriate foods for infants and young children should inform national and regional discussions on legislation and policies relating to these products, which are growing in importance in the European Region.

It is particularly important to address the issue of high total sugars, use of sweet ingredients and misleading names (i.e. savoury-sounding products that contain lot of fruit and high total sugars). Sugar, fruit juice, concentrated fruit juice and other sweetening agents should not be added to foods for infants and young children. Consideration also needs to be given to whether the addition of fruit puree (to foods with other ingredients) should be limited in some categories of food, as some countries consider fruit purees to be free sugars. While the consumption of fruit and vegetables is encouraged for infants and young children, care needs to be taken when this is given in a commercially pureed form, which is likely to be higher in free sugars and have a sweeter taste than home-prepared versions of smooth and mashed fruit and vegetables. Careful thought is needed on how to inform parents or caregivers about these issues in a clear and understandable way while encouraging food manufacturers to reformulate their products.

Labelling of foods for infants and young children needs to be improved. Manufacturers and retailers should comply with the international Code and the WHO Guidance. Composition, nutrition, health or development claims should not feature at all on these products in the European Region. Products should not be marketed as suitable for babies under 6 months of age. In addition, upper age limits are appropriate for some products – to encourage a timely transition to family foods and/or products with more texture.

Finally, guidance on complementary feeding practices needs to be updated in Member States of the European Region to reflect the modern context where commercial foods make up a large proportion of the diets of babies and toddlers in Europe. Parents and caregivers need guidance on how to navigate the market and how to balance their child's diet in light of the products currently on the market.

Effective action on these issues – by Member States and by baby food manufacturers and retailers – offers great potential to improve infant and young child nutrition and promote health throughout the life-course.

ANNEXES

ANNEX 1. WHO's Guiding principles for complementary feeding

Principles for complementary feeding

For complementary feeding of breastfed children:

- Practise exclusive breastfeeding from birth to 6 months of age, and introduce complementary foods at 6 months of age (180 days) while continuing to breastfeed.
- Continue frequent, on-demand breastfeeding until 2 years of age or beyond.
- Practise responsive feeding, applying the principles of psychosocial care.
- Practise good hygiene and proper food handling.
- Start at 6 months of age with small amounts of food and increase the quantity as the child gets older, while maintaining frequent breastfeeding. The energy needs from complementary foods for infants with "average" breast milk intake in industrialized countries are estimated to be 130, 310 and 580 kcal/day at 6–8, 9–11 and 12–23 months, respectively.
- Gradually increase food consistency and variety as the infant gets older, adapting to the infant's requirements and abilities. Infants can eat pureed, mashed and semi-solid foods beginning at 6 months. By 8 months, most infants can also eat "finger foods" (snacks that can be eaten by children alone) moving on to the same types of food as the rest of the family by 12 months. Avoid foods that may cause choking.
- Increase the number of times that the child is fed complementary foods as he/she gets older, depending on the energy density of the local foods and the usual amounts consumed. For the average healthy breastfed infant, complementary foods should be provided 2–3 times per day at 6–8 months of age and 3–4 times per day at 9–11 and 12–24 months of age, with additional nutritious snacks offered 1–2 times per day, as desired.
- Feed the child a variety of foods to ensure that nutrient needs are met. Meat, poultry, fish or eggs should be eaten daily, or as often as possible. Vitamin A-rich fruits and vegetables should be eaten daily. Provide diets with adequate fat content.[v] Avoid giving drinks with low nutrient value, such as tea, coffee, and sugary drinks such as soda. Limit the amount of juice offered so as to avoid displacing more nutrient-rich foods.
- Use fortified complementary foods or vitamin–mineral supplements for the infant, as needed.
- Increase fluid intake during illness, including more frequent breastfeeding, and encourage the child to eat soft, varied, appetizing, favourite foods. After illness, give food more often than usual and encourage the child to eat more.

Most of the principles for the non-breastfed child are the same, but there are a few differences and more detail is provided on the variety of foods required:

- Ensure that energy needs are met. These needs are approximately 600 kcal per day at 6–8 months of age, 700 kcal per day at 9–11 months of age, and 900 kcal per day at 12–23 months of age.
- For the average healthy infant, meals should be provided 4–5 times per day, with additional nutritious snacks offered 1–2 times per day, as desired.
- Feed the child a variety of foods to ensure that nutrient needs are met:
  - Meat, poultry, fish or eggs should be eaten daily, or as often as possible.
  - If adequate amounts of other animal-source foods are consumed regularly, the amount of

[v] The *Guidance on ending inappropriate promotion of foods for infants and young children* clarifies that, based on existing evidence, total dietary fat intake should be reduced gradually, depending on the physical activity of the child, from 40–60% of total energy intake at around 6 months of age to 30–35% of total energy intake at 24 months. It also states that complementary foods should contain no industrially produced trans-fats.

milk needed is ~200–400 mL/day; otherwise, the amount of milk needed is ~300–500 mL/day. Acceptable milk sources include full-cream animal milk (cow, goat, buffalo, sheep, camel), ultra-high temperature (UHT) milk, reconstituted evaporated (but not condensed) milk, fermented milk or yogurt, and expressed breast milk (heat-treated if the mother is HIV-positive).

- If milk and other animal-source foods are not eaten in adequate amounts, both grains and legumes should be consumed daily, if possible within the same meal, to ensure adequate protein quality.
- Dairy products are the richest sources of calcium. If dairy products are not consumed in adequate amounts, other foods that contain relatively large amounts of calcium, such as small fish that include the bones (dried or fresh, with the bones crushed or otherwise processed so that they are safe to eat) and lime-treated maize tortillas, can fill the gap. Other foods such as soybeans, cabbage, carrots, squash, papaya, dark green leafy vegetables, guava and pumpkin are useful additional sources of calcium.
- The daily diet should include vitamin A-rich foods; vitamin C-rich foods consumed with meals to enhance iron absorption; and foods rich in the B vitamins, including riboflavin (e.g. liver, egg, dairy products, green leafy vegetables, soybeans), vitamin B6 (e.g. meat, poultry, fish, banana, green leafy vegetables, potato and other tubers, peanuts) and folate (e.g. legumes, green leafy vegetables, orange juice).
- Provide diets with adequate fat content.[v] If animal-source foods are not consumed regularly, 10–20 g of added fats or oils are needed unless a fat-rich food is given (such as foods or pastes made from groundnuts, other nuts and seeds). If animal-source foods are consumed, up to 5 g of additional fats or oils may be needed.
- Avoid giving drinks with low nutrient value, such as tea, coffee and sugary soft drinks. Limit the amount of juice offered to avoid displacing more nutrient-rich foods.

- Non-breastfed infants and young children need at least 400–600 mL/day of extra fluids (in addition to the 200–700 mL/day of water that is estimated to come from milk and other foods) in a temperate climate, and 800–1200 mL/day in a hot climate. Plain, clean (boiled, if necessary) water should be offered several times per day to ensure that the infant's thirst is satisfied.

ANNEX 2. Methodology for data collection of commercially produced baby food products available in the marketplace within the WHO European Region

The aim

This study aimed to evaluate the nutritional composition of commercially produced foods targeting infants and young children (0–36 months of age) available in the marketplace and compare them to the WHO Guidance as well as the national food-based dietary guidelines for infants and young children. It also evaluated the methods used to promote these foods in selected Member States within the WHO European Region.

Study design

This was a cross-sectional study of the availability and nutritional composition of commercially produced products targeting infants and young children (0–36 months of age). It was designed to provide data on the food products available in different districts within one of the largest (most populous) cities/metropolitan areas of each country.

Inclusion/exclusion criteria

"Commercially produced products targeting infants and young children aged 0–36 months" are defined as those that:

a. are labelled with the words "baby", "infant," "toddler" or "young child";

b. are labelled as suitable or recommended for introduction at an age of less than 36 months;

c. have a label with an image of a child who appears to be younger than 36 months of age or feeding with a bottle; or

d. are in any other way presented as being suitable for children under the age of 36 months.

These are likely to be found in the non-perishable section of the store designated for infant and young child foods (the "baby food aisle"). Some may also be found in the refrigerated or frozen sections of the store.

Products that do not fall under this scope (and were excluded from this study) are as follows:

a. products not specifically marketed for children younger than 36 months of age;

b. vitamin and mineral food supplements, whether to be consumed as tablets/drops or added to foods at home (e.g. home fortification products such as micronutrient powders).

Sampling methods

These were agreed with each country prior to data collection so as to clarify which areas were to be canvassed during data collection. One of the objectives of the research was to understand if there was a difference between products available in high- and low-income areas. As such, consideration was given as to how to best capture this difference in each country context (*see* Annex 3).

Sampling aimed to include a variety of types of stores, both large and small. Large stores would include national chain grocery stores, supermarkets and baby stores. Small stores would include minimarkets and convenience stores.

Authorization

Upon entering selected stores, field workers explained the purpose of the study and that they would be taking photographs of materials related to baby foods. It was pointed out that the information collected would be kept anonymous and would not be tied to the facility in any publication.

If the store owner/manager did not provide permission to conduct the store visit or asked field workers to leave the store before they had completed data collection, then this was noted. Field workers left the store and substituted it with another store.

Data collection

In order to ease the data collection process, increase validity and reliability, shorten the data transfer process and minimize human error, a user-friendly mobile phone application was developed and used for data collection in some countries.

Data entry using the mobile app

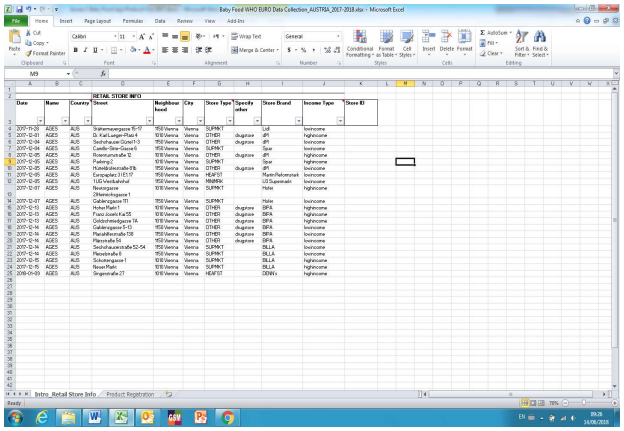
The step-by-step guide to data entry using the mobile app is summarized below:

1. Welcome, introduction and country selection
2. Retail store location and registration
3. Retail store type
4. In-store navigation to find the baby food aisle(s)
5. Registration of information on commercially produced baby food
6. Nutritional information
7. Visual information
8. Health and nutrition claims
9. Pictures of products and ingredients lists
10. Details on sugars and flavours
11. Price and promotion information.

A similar process was followed for data entry using the Excel spreadsheet, but the data were manually entered into the spreadsheet.

Step-by-step guide

STEP 1: Retail store location and registration



Registering stores

- Enter your name.
- Enter the name of the country for which you are collecting data.
- Enter the date.
- Enter the address (street, neighbourhood and city).
- Select the retail store type:
    - Examples of retail shops: supermarket, pharmacy, convenience store/corner shop, health food store, department store and minimarket.
- Enter the name of the retail store brand.
- Indicate the income type of the neighbourhood (this information will be shared with you and available on the map with the highlighted route).
- Assign a unique store ID.

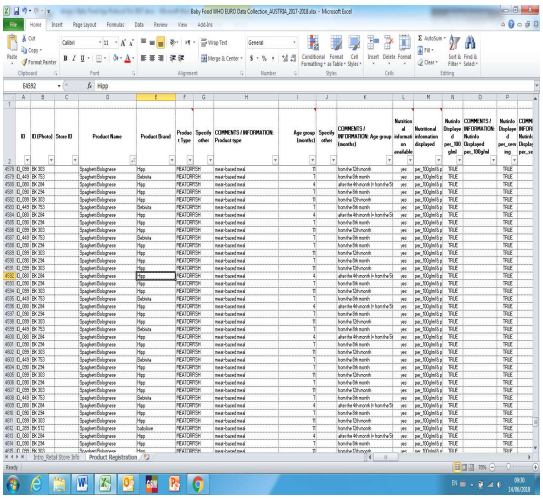
STEP 2: In-store navigation to find the baby food aisle(s)

In-store navigation to find the baby food aisle(s)

- Find the aisle with commercially produced baby food products. We also recommend you check the chill cabinets and freezers for baby food products.
- If you cannot find the aisle, then ask the shop assistant.
- If the retail store does not have any commercially produced baby food products then move on to the next retail store on your route.
- If the store *does* has baby food products, click “yes”, and then “OK” on the “add new group every time”.
- We suggest you approach the staff in the store, explain the study objectives and procedures, and ask for their general oral consent to collect information. You may explain that no commercially sensitive data would be collected and that the information would be kept anonymous and not linked to the particular outlet in any publication.

STEP 5: Registration of information on commercially produced baby food products

STEP 5



Registration of information on commercially produced baby food products

- Create a unique ID for the food product.
- Link this ID to a photo ID.
- **Please take photographs of the product.**
- *Front, back, left and right sides.*
- *Please also take a clear picture of the ingredients list.*
- Enter the name of the product. Try to be consistent.
- Enter the brand name. Try to be consistent.
- Select the food type of the product.*
- Select the lowest age group that the product is indicated for.

<u>* Please note</u>

Record all commercially produced baby food products, including:

- biscuits/wafers/crisps
- breast-milk substitute
- cereal/porridge
- follow-on formula or growing up-milk
- fruit or vegetable puree
- juice/smoothie/tea/other drinks
- meat- or fish-based meal
- milkshake powder
- pureed dessert (e.g. pudding, custard)
- soup
- yoghurt or yoghurt-related.

If there are different *flavours* of the various products, these should be recorded as individual products. If multiple pack sizes of *identical* products are available (e.g. infant formula tins), then please choose the medium-sized option for inclusion only.

Nutritional information available

- Check if there is a nutrition declaration available.

- If you find it, please select “yes”. This will allow you to enter information per 100 g/mL and/or per serving.
- If information is displayed in both forms, please enter both.

Visual information on the package

- We are also interested in the visual information contained on the package, notably any promotional message that may be used.
- Please indicate which visual information is found on the package.

Health and nutrition claims

- If you identify a claim on the package, please select “yes”.
- Indicate what kinds of health and nutrient content claims are displayed on the product packaging.

Add details on sugars/sweeteners in the product and flavours used

- Sometimes it is difficult to understand from the nutrient declaration if the manufacturer has added sugars or sweeteners to the product.
- We are also interested in knowing about the flavours used in baby products, as this is important for development of children’s taste preference.
- Please answer the questions on sugars.
- If from the label the product appears to have a specific flavour, please provide details.

Price and price promotions

Here you can register the prices of the products.

- Enter the current price of the product.
- Enter the normal price of the product. If the current price is the normal price, then please enter it again.
- Enter the currency used in your country.
- Indicate what kinds of price promotions are available with the product.

Definitions of terms

Breast-milk substitute (also known as infant formula)
Any formula that is labelled for infants under 6 months of age. The age might be listed as suitable for those 0–6 months or 0–12 months. It may be labelled "Stage 1".

Follow-on formula (also called follow-up milk or follow-up formula)
Any milk product that is labelled for infants under 12 months of age but not under 6 months of age. The age might be listed as suitable for those 6–12 months or 6+ months. It may be labelled "Stage 2".

Growing-up milk (also called toddler milk)
Any milk product for which the target age range includes children under 36 months of age. In other words, any milk product labelled for children under 36 months of age and over 12 months of age. The age might be listed as, for example, 12–36 months or 1–5 years. It may be labelled "Stage 3".

Commercial complementary foods
There are many types of prepared products labelled as suitable for infants and young children 6–36 months. These may include products sold in jars, cans or retort flexible "pouches", which do not require any cooking other than heating. Examples are pureed fruits and vegetables, yoghurts, desserts and soups. We included the following categories:

Biscuits/wafers/crisps
This category may include the following: crackers, biscuits, rusks, rice cakes, corn or grain puffs, vegetable crisps, cereal bars.

Cereal/porridge[w]
This category may include rice, maize, millet, wheat or oat porridge (flavoured or non-flavoured).

Fruit or vegetable puree
This category may include 100% fruit purees, or purees based on a combination of fruits and vegetables.

Juice/smoothie/tea/other drinks[x]
This category may include 100% juice drinks labelled as suitable for this age group, or drinks with fruit and vegetable combinations. Teas labelled as suitable for babies should also be included alongside other drinks suitable for this age group.

Meat- or fish-based meal
This category may include products that resemble versions of adult dishes, such as pureed versions of roast chicken, pureed meat with vegetables and pasta or sometimes a prepared meal in a tray for older infants. It will be country specific, but should be recognizable as a "meal".

Milkshake powder
Any powder that can be added to cow's milk and not specifically labelled as a growing-up milk, but labelled as suitable for children under 36 months of age. May include flavours such as vanilla and chocolate.

Pureed dessert (e.g. pudding, custard)

[w] This category was later divided into ready-to-eat cereals and dry cereals that required reconstitution with water or milk.
[x] This category was later divided, so that there was a subcategory of dry/powdered drinks that required reconstitution with water or milk.

This category may include products that resemble versions of adult desserts, such as crumble, rice pudding, egg custard.

Soup
Any preparation of vegetables in soup form, which may include meat or cereals as additional ingredients, and is labelled as suitable for children under the age of 36 months. It may be powdered (i.e. requiring the addition of milk).

Yoghurt or yoghurt-related
This category may include products that are primarily labelled as yoghurts, but may include additional ingredients or flavours such as fruit.

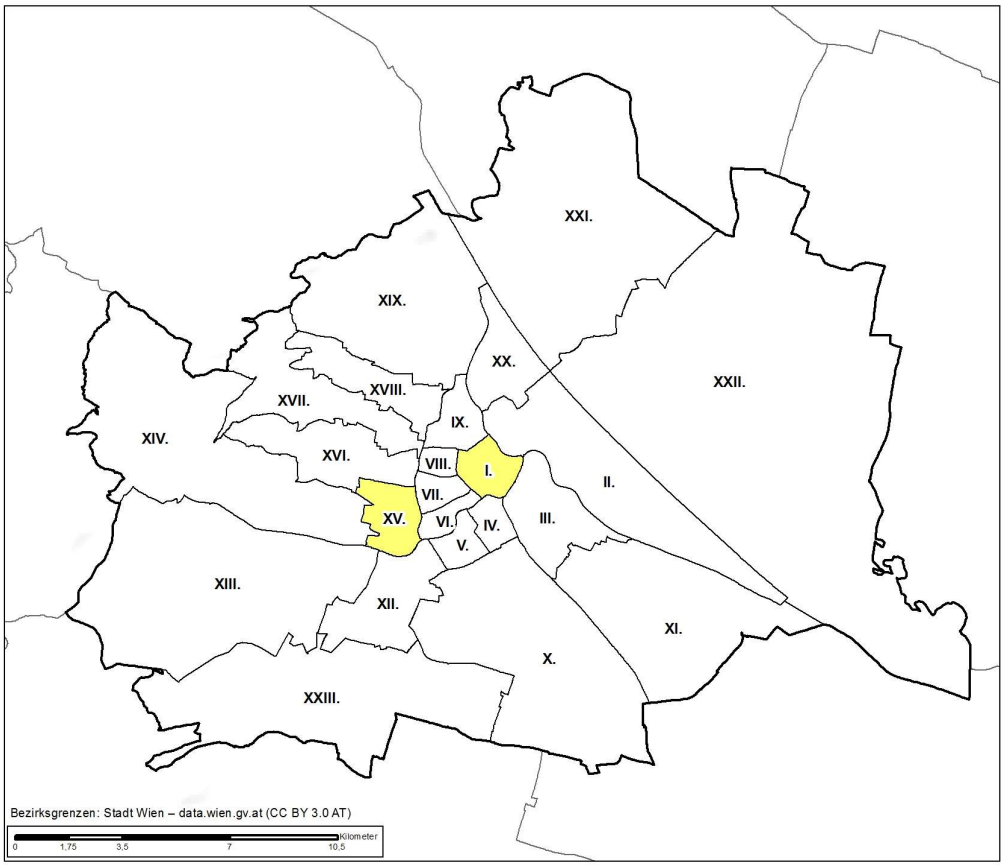
ANNEX 3. Sampling: cities, districts and study areas in all four countries

The cities, districts and study areas in the four participating countries are summarized as follows.

Austria, Vienna

Data collection took place in two districts of Vienna with different (high and low) socioeconomic status (SES); namely, the 1st (Innere Stadt, high SES) and 15th (Rudolfsheim-Fünfhaus, low SES) districts.

Fig. A1. Selected districts of Vienna



Some of the socioeconomic indicators of the two districts are summarized in Table A1.

Table A1. Demographic and SES indicators of the 1st and 15th districts of Vienna

Indicator	1st district	15th district
Area, km^2 (2017)	2.87	3.92
Relative proportion of the total city population (2017)	0.9%	4.2%
Population (2017)	16 465	78 999
proportion of the population between the ages of 0 and 5 years	4.8%	6.0%
proportion of the population between the ages of 6 and 9 years	2.6%	3.2%
proportion of the population between the ages of 10 and 19 years	6.9%	8.8%
proportion of the population between the ages of 20 and 29 years	12.1%	19.6%
proportion of the population between the ages of 30 and 44 years	18.9%	24.5%
proportion of the population between the ages of 45 and 59 years	22.9%	19.6%
proportion of the population between the ages of 60 and 74 years	19.9%	12.4%
proportion of the population aged 75 years and above	11.8%	5.8%
Live births (2016)	118	989
Deaths (2016)	153	603
Natural increase, decrease (2016)	–35	386
Proportion of the population with tertiary education (university, university of applied sciences, college) between the ages of 25 and 64 years (2014)	47.6%	21.3%
Proportion of the population with compulsory education or less between the ages of 25 and 64 years (2014)	10.7%	31.5%
Index of the average net salary per employee (2015) *[*with total Vienna being 100]*	148.2*	79.1*

Selecting the sampling area

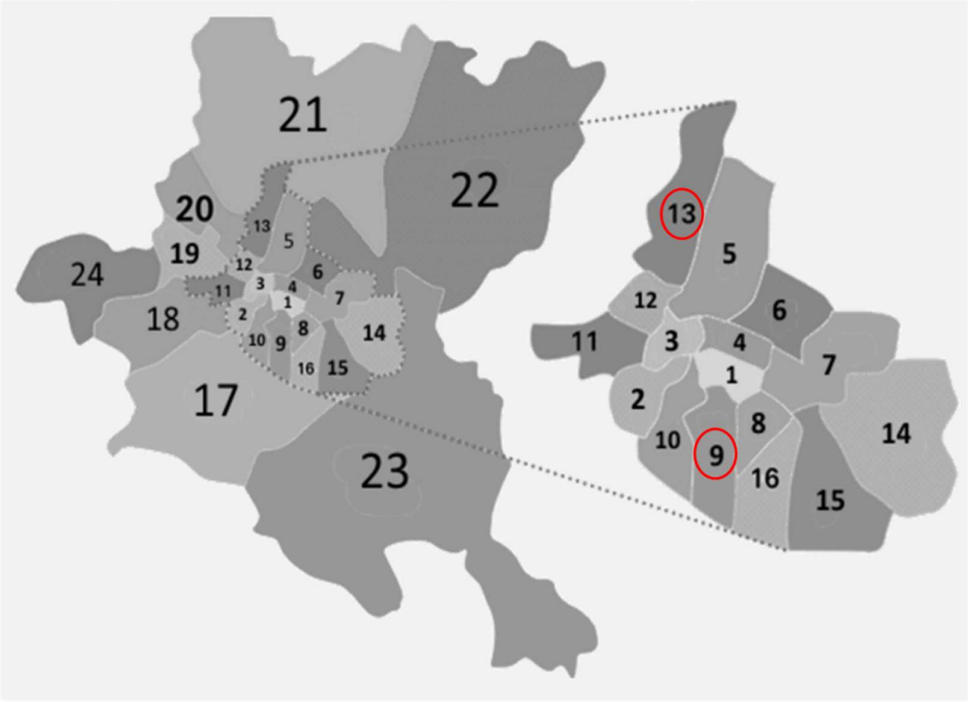
In the 1st district, 10 large stores (supermarkets, drugstores and health food stores) and in the 15th district, 11 large stores (supermarkets, drugstores and health food stores) plus one additional small store (minimarket) were sampled.

Addresses of specific stores in which data collection was allowed were provided directly by the retailers.

Bulgaria, Sofia

Data collection took place in two districts of Sofia with different (high and low) levels of socioeconomic development; namely, the 13th (Nadezhda, low SES) and 9th (Lozenets, high SES) districts (Fig. A2).

Fig. A2. *Selected districts of Sofia*



Some of the socioeconomic indicators of the two districts are summarized in Table A2.

Table A2. Demographic and SES indicators of the 9th and 13th districts of Sofia

Indicator	9th district	13th district
Area, km^2*	9.24	19.3
Relative proportion of the total city population*	4.1%	5.3%
Population, 2011*	53 080	67 905
proportion of the population between the ages of 0 and 14 years*	11%	12%
proportion of the population between the ages of 15 and 39 years*	41%	36%
proportion of the population between the ages of 40 and 59 years*	25%	28%
proportion of the population aged 60 years and above*	23%	24%
Educational level of the population (for those aged ≥7 years)*	49 794	63 710
proportion of the population with first and second stages of tertiary education*	50%	23%
proportion of the population with post-secondary non-tertiary education*	3%	4%
proportion of the population with upper secondary education*	36%	53%
proportion of the population with lower secondary education*	6%	13%
proportion of the population with primary education and below*	5%	7%
Proportion of families in which the head of the family is unemployed**	6.4%	13.1%

Sources: *Bulgarian National Statistical Institute (NSI). 2012. (http://statlib.nsi.bg:8181/isisbgstat/ssp/fulltext.asp?content=/FullT/FulltOpen/P_22_2011_T3_KN23.pdf, accessed 14 February 2019). (In Bulgarian).

**Municipality plan for the development of Sofia 2014–2020. 2014. http://www.sofproect.com/OPR2014_2020/OPR_final_2014/OPR%202014-2020%20%20text_tablici%20okonchatelen%20pr/1%20OPR_Sf-2014-20_okonchat_proect_Razsh%20Doclad1.pdf, accessed 14 February 2019). (In Bulgarian).

Selecting the sampling area

Google maps were used to define the sampling area within the two chosen districts. Small parts of neighbouring districts were also included.

A circle with a radius of 1.0 km was drawn with its centre defined as the location allowing the inclusion of the largest area within the district (Fig. A3 and A4.)

Fig. A3. 9th district of Sofia – marked area

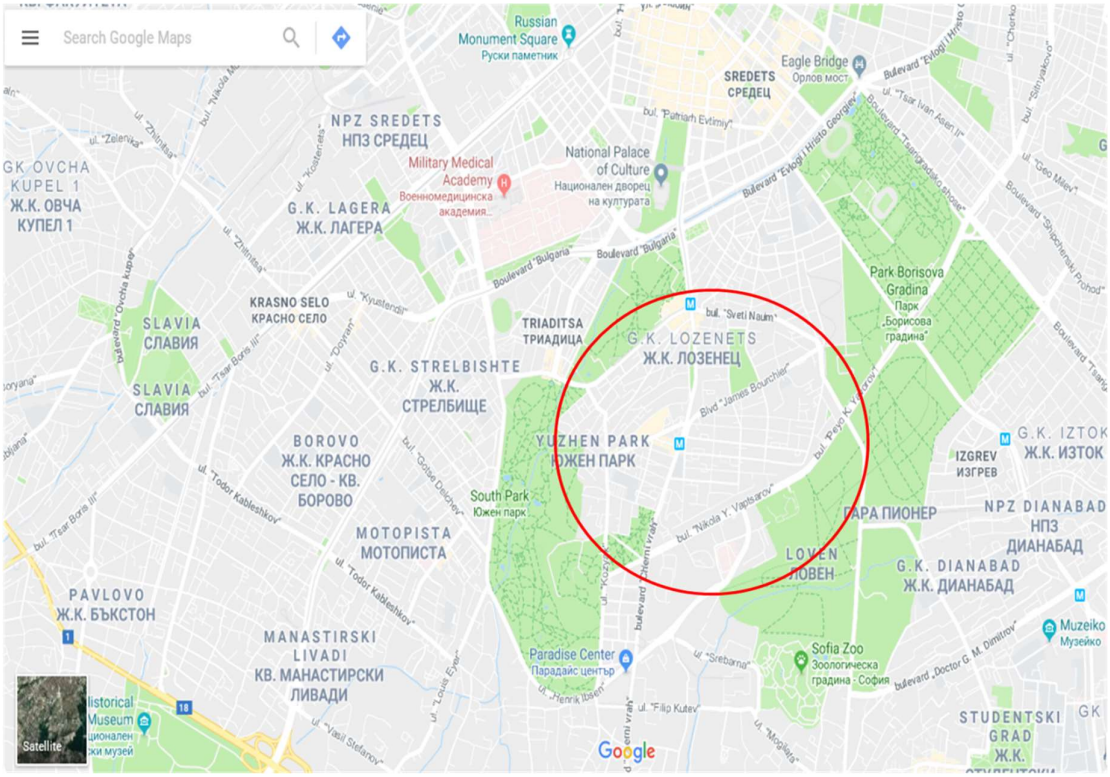
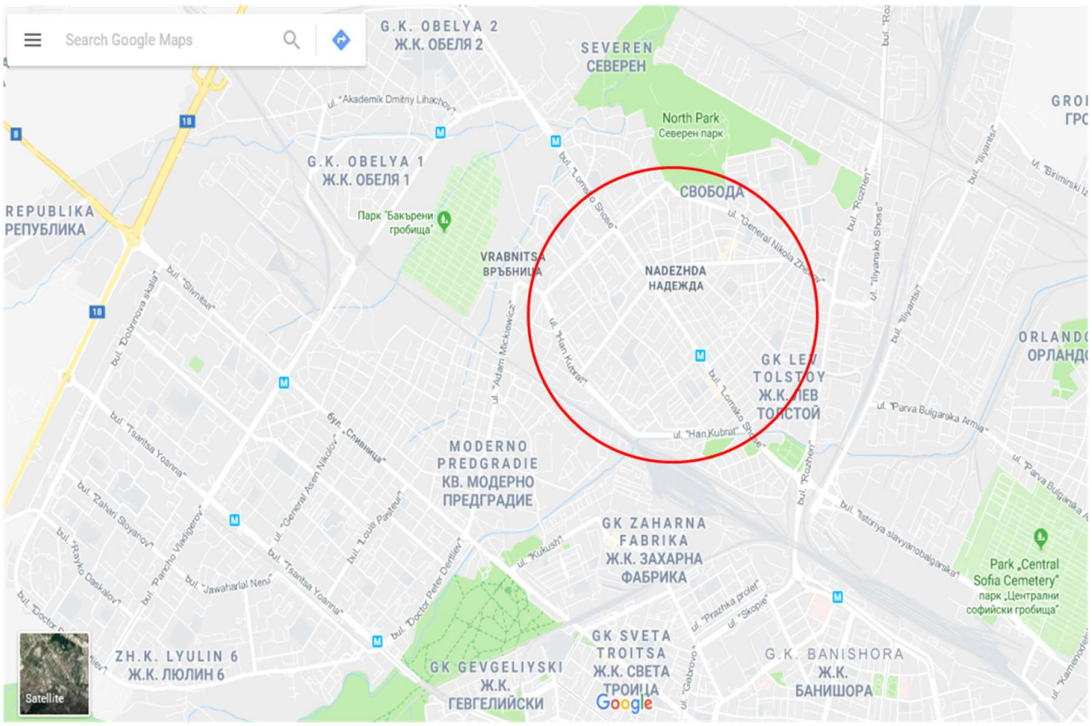


Fig. A4. 13th district of Sofia – marked area



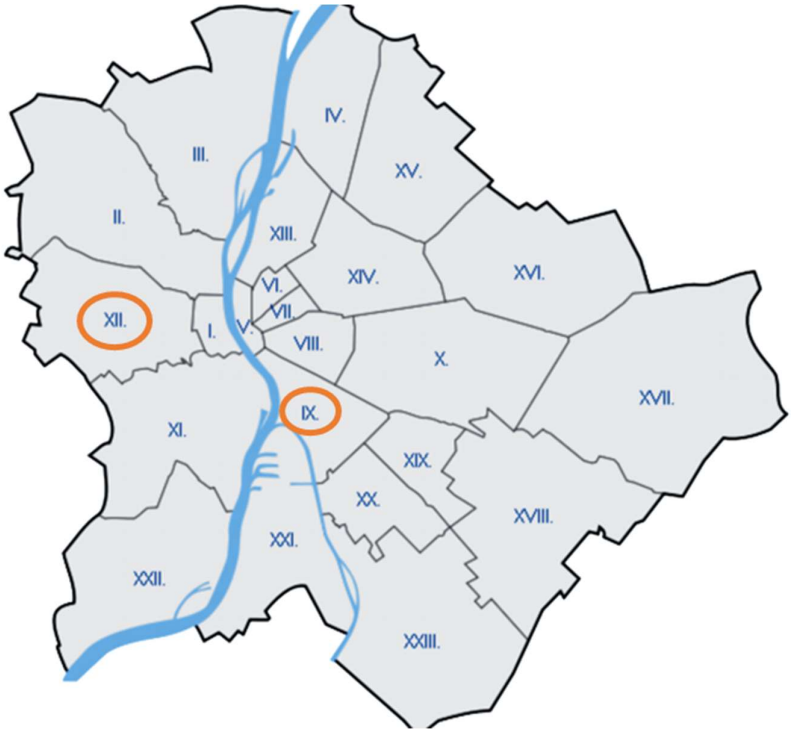
Addresses of a minimum of 10 big store branches of supermarket, drugstore and pharmacy chains for each district were collected by web search within the territory defined by the circle. Maps, lists of addresses and names of the stores were given to data collectors. Additionally, they were instructed to walk along the study areas and record as many small-scale stores as possible that might be selling commercially produced baby food products.

Hungary, Budapest

Selection criteria of project areas

Data collection took place in two districts of Budapest at different (high and low) levels of socioeconomic development; namely, the 12th and 9th districts (Fig. A5).

Fig. A5. Selected districts of Budapest



Some of the socioeconomic indicators of the two districts are summarized in Table A3.

Table A3. Demographic and SES indicators of the 9th and 12th districts of Budapest

Indicator	9th district	12th district
Area, km^2	12.53	26.67
Population, 2017	59 483	57 656
proportion of the population between the ages of 0 and 14 years, 2017	11%	17%
proportion of the population between the ages of 15 and 39 years, 2017	41%	28%
proportion of the population between the ages of 40 and 59 years, 2017	25%	24%
proportion of the population aged 65 years and above, 2017	23%	32%
Live births per 1000 inhabitants, 2014*	10.2	10.6
Deaths per 1000 inhabitants, 2014*	12.2	13.9
Natural increase, decrease per 1000 inhabitants, 2014*	–1.9	–3.3
Deaths under 1 year of age per 1000 live births, 2014*	1.7	3.2
Registered jobseekers by district, December 2014*	1062	513
Number of taxpayers per 1000 inhabitants, 2013*	415	402
Personal income tax per taxpayer, 2013 (thousand Hungarian Forint [HUF])*	420	693
Occupants per 100 dwellings, 2015*	148	174
4 and more room dwellings, 2015*	6.3%	21.7%
Number of family paediatricians' services, 2014*	11	12
Number of registered corporations and unincorporated enterprises by industry, legal form and district, 2014*	14 292	18 155
Number of retail shops by district, 2014	2039	612
Number of shops and stores with food dominance, 2014*	701	229
Number of public pharmacies, 2014*	23	19

Source: *Hungarian Central Statistical Office. Statistical yearbook of Hungary, 2014. 2015 (http://www.ksh.hu/docs/hun/xftp/idoszaki/evkonyv/budapest_evk_2014.pdf, accessed 14 February 2019).

Selecting the sampling area

We used Google maps to define the sampling area within the two chosen districts.
We drew a circle with a radius of 1.5 km with its centre being in the most densely populated living space (Fig. A6 and A7).

Fig. A6. 9th district of Budapest – marked area

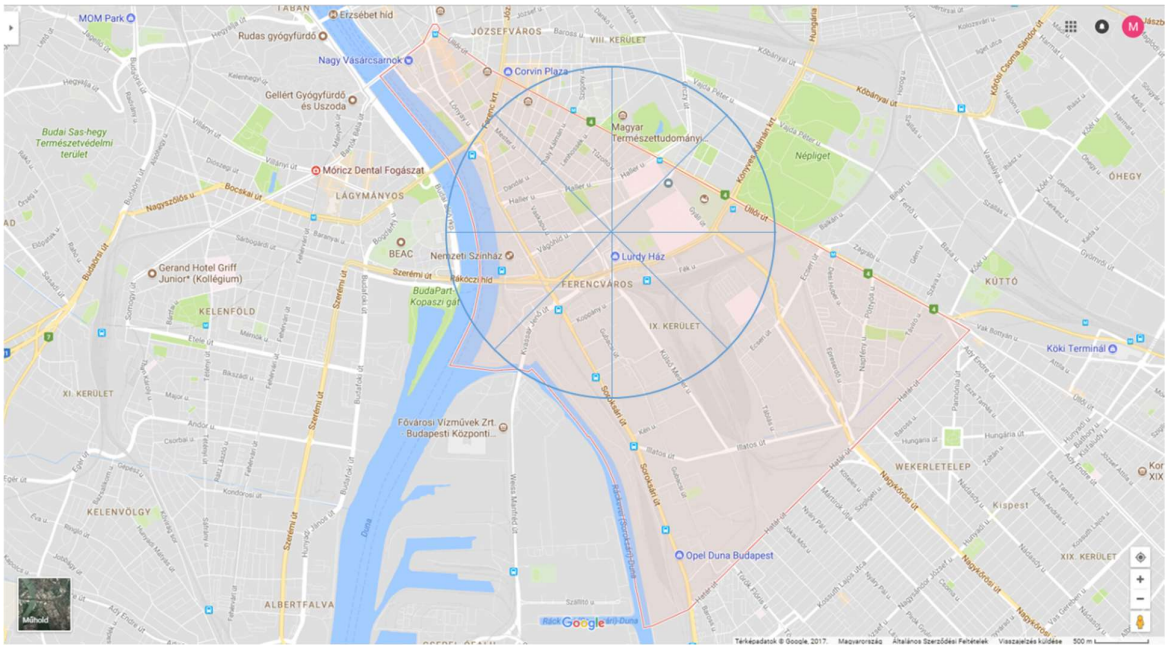
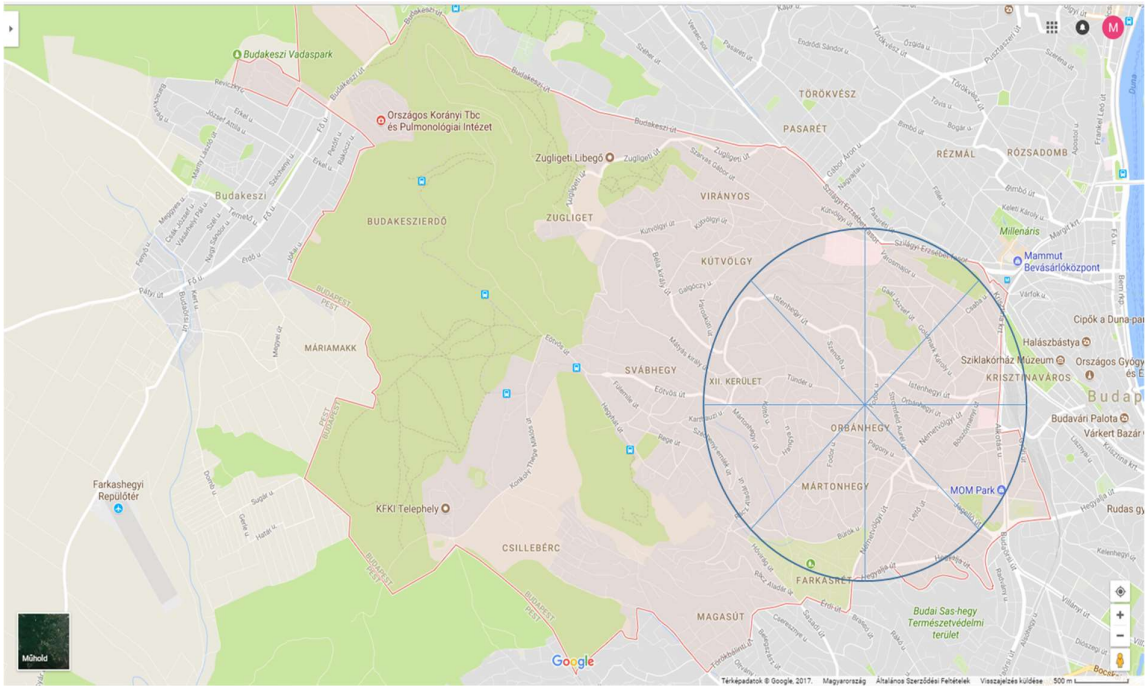


Fig. A7. 12th district of Budapest – marked area



Within the circle, we collected the addresses of supermarkets, drugstores and pharmacies by web search. We gave the list of addresses to data recorders whose main task was to visit these shops and others nearby, if possible.

Israel, Haifa

In Israel (Haifa), residential areas within the city boundaries are more mixed in terms of their SES, so a different sampling approach was adopted.

Rather than identifying two areas with a different socioeconomic status, a total of 10 large stores were sampled and the socioeconomic characteristic of the immediate environment was categorized as low or high.

The 10 stores sampled were described thus:

- **Supermarket 1**. The supermarket was located in a high SES neighbourhood called Carmellia. This neighbourhood is located in Carmel Ridge, which is itself an area with a population of high SES.
- **Pharmacy 1**. This pharmacy is also located in a commercial centre in Carmel Ridge (*see above*).
- **Supermarket 2**. This supermarket is also located in a centre in Carmel Ridge.
- **Supermarket 3**. This supermarket is located in an area called Carmel Zarfati, also of high SES, but also serves the population of nearby low SES neighbourhoods.
- **Supermarket 4**. This supermarket is located in a high SES neighbourhood called Ramat Almogi. This neighbourhood is located in Carmel Ridge, which itself has a high SES population.

- **Pharmacy 2**. This pharmacy is located in a high SES area called Ahuza. This neighbourhood is located in Carmel Ridge.
- "**Shufersal**", "**Macabi pharme**", "**Super pharme**". These retailers are located in the same commercial area with many shops of all kinds (fast food outlets, restaurants, banks, pubs, etc.). The population that uses this centre tends to be of low SES, although it is likely that a higher SES population also shops in this area.

ANNEX 4. Recommendations for future development of the study methodology

The methodology used was effective in collecting data on the composition and marketing of foods for infants and young children in retail settings. The mobile application was a valuable tool for data collection, although the option of manually completing the data in an Excel spreadsheet was a good alternative. The methodology was able to provide information on an important topic for which limited data were previously available.

Country team feedback

Feedback on the methodology was provided by the country teams. Some key messages emerged:

- The sampling approach was clear and there was a valid rationale for including low- and high-income areas. The idea of a buffer zone and mapping all retailers within a specific area worked well. This ensured that different types of outlets were included, potentially selling different products and targeting different consumers, and that the data collected represented products available on the market and most widely on shelves at that point in time.
- The flexibility in the study design, particularly in relation to the sampling approach and the size of the sampling area, was highly appreciated. Similarly, the option of using the smartphone application or entering data directly onto the Excel spreadsheet (which enabled copying and pasting of information on duplicate products) was also welcomed.
- Challenges to data collection included the following:
    - the long time necessary to enter data for a large array of products;
    - limited space in the stores (especially given that it was of critical importance that field workers did not disturb customers as they shopped);
    - the data collection period was in winter, sometimes creating difficult conditions for field workers;
    - the different specifications of field workers' phones resulted in some variability in the quality of the photos taken, capacity for data storage, etc. Power banks had to be provided to guarantee continuity of work.
- Factors identified as important for obtaining authorization from shops to perform data collection included official letters from the Ministry of Health, with reference to WHO, and a respectful approach from field workers that encouraged cooperation. The involvement of nutrition professionals and/or students can ensure a high level of enthusiasm and adherence to the study protocol.

Possible adjustments to the methodology

The experience of the four countries involved in this study, along with the earlier Copenhagen pilot study, highlighted a number of areas where the methodology could be adjusted to ease the process and/or improve the results.

Proposed adjustments to the data to be collected

A number of adjustments would enable collection of some additional relevant data, such as:

- presence of water, salt or (partially) hydrogenated vegetable oil on the ingredients list;
- information on the type of packaging (i.e. glass jar, pouch with spout);
- additional aspects of promotion, such as cross-promotion of breast-milk substitutes, inclusion of messages about breastfeeding and optimal infant and young child feeding;
- clarification about whether each product is sold as dry (to be reconstituted) or wet (ready to feed), along with the basis of the nutrition declarations and the portion size information needed to convert the nutrient declarations of dry products to "as consumed" values;
- additional information to enable the price per portion to be calculated.

Each decision about the inclusion of an additional item, however, has to be weighed against considerations of ease of use for data collection teams and time requirement per product entered.

Possible adjustments to better guide field workers and improve recording of data

In addition, a small number of adjustments to the ways in which the data were recorded and the guidance given to field workers would improve accuracy and comparability between datasets, as well as facilitate the data cleaning and analysis process. These include the following:

- updated and more precise food categories with clearer definitions would be useful to improve accuracy and enable country comparisons and comparisons with other datasets. However, it is important to note that more complicated definitions would increase the complexity of data collection. The methodology has to be flexible enough to be appropriate in all national contexts;
- inclusion of the possibility of registering "<" values and dealing with these in analyses;
- more detailed clarification of the age group definitions and how these relate to the text on the label;
- more detailed explanation on how to record and categorize claims/statements on composition, nutrition or health/development.

Possible adjustments to improve the data analysis process

A number of automated functions could be added to the Excel database of products generated after data collection in order to speed up and facilitate the data analysis process. These could include:

- automated highlighting of outlier values (based on the database obtained through this study);
- automated cross-checking and completion of kcal and kJ values, and conversion of salt to sodium values;
- calculation of nutrient values per 100 kcal;
- automated elimination of duplicates for the unique product dataset (although some manual elimination of duplicates would still be required).

Developing the methodology to enable comparisons and monitor trends

While the methodology has been effective in providing a snapshot of the situation in four different countries, the differences in sampling and sample sizes mean that it is not possible to make comparisons between countries or to pool all the data into a single dataset. If such

comparisons are an important objective in future studies using this methodology, then efforts to standardize the sampling methodology and sample size will be required.

Some flexibility in the methodology should be maintained to enable countries to conduct the study for their own reasons (which may not include comparison with other countries), and according to the resources available and the particular context.

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