Secondary analysis of dietary survey data of children's diets on the island of Ireland

The role of snacking and treat foods in the diets of children aged 2-12 years on the island of Ireland

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Foreword

Significant numbers of children on the Island of Ireland are overweight or obese, and compliance with important dietary goals are not being met. For example, many children are not eating the recommended amount of fruit and vegetables, whilst intakes of saturated fat and sugar are higher than generally accepted recommendations. Furthermore, there is evidence of imbalances in the amounts and types of foods eaten throughout the day, with snacks in particular identified as contributing to over a quarter of children's energy intake yet being very variable in quality and often consisting of treat foods. As eating habits developed in childhood establish patterns that continue into adulthood, it is very important that healthy eating patterns are established for children of this age group.

This research provides regional and national evidence for public health messages to support healthy eating among children aged 2-12 years and thereby support associated public health campaigns e.g., ***safe***food's START campaign. These analyses utilised the existing, publicly funded dietary survey data on the island of Ireland, including the National Diet and Nutrition Survey (NDNS NI) in Northern Ireland and the National Pre-School Nutrition Survey (NPNS) and National Children's Food Survey II (NCFS II) in the Republic of Ireland. There are two aspects to this analysis, both of which relate to the individual and collective position of snacks and treat foods in children's diets.

Initially, two rapid literature reviews critiqued the evidence base and informed the subsequent data analysis. For this second, comprehensive data analysis step, contemporary snacking and treat food intake patterns were characterised for the NDNS NI (2-12y) (2008-09-2016/17), NPNS (2-4y) (2010-2011) and NSFS II (5-12y) (2017-2018).

This report provides a deeper investigation into the types and quantities of snacks and treat foods consumed, while accounting for time of day and day of the week they were consumed, and does so in the context of dietary quality, food-related behaviours, body weight status and population demographics. This research enhances our understanding of the position of snacks and treat foods as consumed by children on the island of Ireland. It provides key evidence to underpin regional and national evidence for public health messages to support healthy eating among children.

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Executive Summary

The childhood years are a crucial period of growth and development during which a balanced and nutrient-dense diet is important to ensure optimal growth and development. It is widely acknowledged that dietary habits and preferences established during this period can track into later life and adulthood. A balanced diet and lifestyle during these formative years can support optimal health and aid in the prevention of diet-related diseases in later life. This research aims to provide an evidence base for the role of snacking and treat foods and their association with dietary quality, food related behaviours and body weight status in the diets of children aged 2-12 years on the island of Ireland.

Data for these analyses are derived from three nationally representative food consumption surveys of children carried out on the island of Ireland: the National Pre-School Nutrition Survey (NPNS) (2010 – 2011) and the National Children's Food Survey II (NCFS II) (2017 – 2018) in the Republic of Ireland (ROI) (www.iuna.net), and the National Diet and Nutrition Survey Northern Ireland (NDNS NI) (2008/09 – 2016/17) (https://www.food.gov.uk/research/national-diet-and-nutrition-survey/national-diet-and-nutrition-survey-ndns-report-for-northern-ireland). Treat foods were categorised according to the Food Based Dietary Guidelines (FBDG) and snacking was participant defined (ROI) and time defined (NI).

Treat foods

- Treat foods are consumed by all children aged 2-12 years both in Ireland and NI.
- The most popular treat foods consumed by children on the island of Ireland are 'biscuits' and 'soft drinks' followed by 'chocolate', 'savoury snacks', 'ice-creams and desserts' and 'cakes and buns'.
- Treat foods are a key contributor to energy intake in the diets of children on the island of Ireland, providing one fifth of energy intake in 2-4-year-olds (19%E) and between one-quarter and one-fifth of energy intake in 5-12-year-olds (21-25%E).
- Treat foods also contribute significantly to intakes of saturated fat and free sugars in 2-4-year-olds (19-24% and 52-56%, respectively) and 5-12-year-olds (26% and 61-65%, respectively) and contribute a relatively modest proportion of salt intakes (12-15%).

Snacks

- Snacks are consumed by almost all children aged 2-12 years both in Ireland and NI.
- The most popular snacks consumed by children on the island of Ireland are 'fruit', 'biscuits', 'chocolate', 'sweets', 'cakes and buns', 'savoury snacks' and 'water', 'milk' and 'soft drinks', for children aged 2-4 years and 5-12 years in both Ireland and NI. In addition,2-4-year-olds also commonly consumed 'yogurt and fromage frais', 'breads' and 'fruit juices' as snacks.
- Snacks contribute to over one-quarter of energy intake for 2-4-year-olds (25%E) and one-fifth of energy intake for 5-12-year-olds (23%E) in Ireland (and up to one-third of energy intake in NI (36-37%E), partially due to the definition of snacking occasions in the NDNS dataset).
- Snacks contribute significantly to intakes of saturated fat, free sugars and salt in 2-4-year-olds and 5-12-year-olds on the island of Ireland. They also make important contributions to intakes of other key nutrients, including protein, mono-unsaturated fatty acids, poly-unsaturated fatty acids, carbohydrate and dietary fibre, and make notable contributions to intakes of micronutrients.

Dietary quality, food-related behaviours and body weight status

- With regard to overall dietary quality, both high and low consumers of treat foods or snacks had similar overall intakes of total fat and saturated fat. However, high consumers of treat foods or snacks had higher free sugars intakes than low consumers of treat foods or snack foods.
- While some differences in consumption patterns for both treat foods and snacking emerged between demographic groups, for the most part there were no clear gradients that would prompt more focussed dietary advice within different groups for pre-school or school-aged children.
- Treat foods contributed not only to snacking occasions, but also to main meals. Foods eaten during snacking occasions included nutrient-dense foods and beverages as well as those that would be defined as treat foods. Both treat foods and snacks are consumed on all days of the week, with a slightly higher prevalence of both on Fridays to Sundays compared to weekdays.

- Treat foods and snacks are consumed mainly at home with much smaller contributions coming from the out of home environment. A notable exception to this is for children in NI, where snacking is very prevalent in the school environment. This is partially due to the definition of snacking occasions in the NDNS dataset and partially due to the provision of food at school in NI.

In summary, all children aged 2-12 years on the island of Ireland consumed both treat and snack foods irrespective of gender, social class, parental education or body weight status. While nutrient-dense foods such as 'milks' and 'fruit' feature as snacks, treat foods are widely consumed both as snacks and with meals, with associated implications for energy and key nutrients such as fat, saturated fat and free sugars. This report provides regional and national evidence for public health messages to support healthy eating among children and thereby support public health messaging on the island of Ireland.

Contents

1 Introduction

Childhood obesity is a global public health challenge. Itis associated with serious co-morbidities which can continue into adulthood, e.g., cardiovascular dysfunction, sleep apnoea, Type 2 diabetes and asthma[1-6]. Estimates of overweight and obesity in children on the island of Ireland range from 16-27%[7-11]. In response to this challenge, ***safefood*** has launched a five-year all-island public awareness campaign with the overall aim of maintaining a healthy weight in children[12]. Using a co-creation approach, this START campaign works with parents and key stakeholders to ensure relevance and realistic goals. Key dietary messages include minimising the intake of foods high in fat, salt and sugar (including sugary drinks); increasing the intake of fruit and vegetables; establishing milk and water as main drinks; and advocating appropriate child-sized portion sizes[12].

The START campaign has particularly highlighted the use of 'treats' and 'snacks' by parents and caregivers across Ireland, recently reporting that for young children, treats tended to be energy-dense, nutrient-poor foods with a more negative nutrient profile associated with increasing age of the child[13]. However, to further support START and any associated public health education campaigns, it is essential to distinguish between the terms 'treats' and 'snacks' and to fully characterise their patterns of consumption. While there is no standardised definition for snacks, snacking usually refers to food and beverages consumed between meals and can be associated with both healthy and unhealthy foods[14]. Treats, on the other hand, typically refer to foods (and beverages) high in fat, salt and sugar, are often part of the 'treat foods' food group and may be consumed at regular meals or at snacking occasions or both[13].

Data from nationally representative populations in the US and Australia showed that snacking contributed >25% of total energy intake in young children; and while snacks positively contributed to dietary fibre intake, they also contributed substantially to carbohydrate, added sugars and total fat intakes (32%, 39% and 26% respectively)[15-17]. Such snacks include a mix of healthy and unhealthy foods (e.g., water, cakes, pastries, sweets, beverages, milk, other dairy and fruit) with afternoon and evening snacks the most energy-dense snacking occasions[15]. These patterns mirror previous ***safefood***-funded preliminary

analysis of Irish children's diets. However, what is not known is how such eating patterns link with dietary quality, or what their relationships are with body weight status or other food related behaviours[18].

To maximise the effectiveness of key START campaign messages, this project aimed to explore actual consumption patterns of both snacks and treats by children on the island of Ireland using existing publicly funded datasets of food consumption: the National Pre-School Nutrition Survey (NPNS) (2010 – 2011) and the National Children's Food Survey II (NCFS II) (2017 – 2018) in the Republic of Ireland, and the National Diet and Nutrition Survey Northern Ireland (NDNS NI) (2008/09 – 2016/17).

2 Aims and objectives

The overall aim of this study was to investigate the role of snacking and treat foods and their association with dietary quality, food-related behaviours and body weight status in the diets of children aged 2-12 years on the island of Ireland, using food consumption data from three food consumption databases: the National Pre-School Nutrition Survey (NPNS) (2010 – 2011) and the National Children's Food Survey II (NCFS II) (2017 – 2018) in the Republic of Ireland, and the National Diet and Nutrition Survey Northern Ireland (NDNS NI) (2008/09 – 2016/17). The specific objectives were:

- To conduct a rapid review to identify patterns of snacking and the position of snacks and treat foods in children's diets and their association with dietary quality, food related behaviours and body weight status.
- To conduct a rapid review of available food-based dietary guidelines and obesity prevention policies to identify how snacks and treat foods are described by governments and health authorities globally.
- To characterise patterns of snacking by children on the island of Ireland and their association with dietary quality, food-related behaviours and body weight status.
- To characterise consumption patterns of treat foods as snacks or as part of main meals by children on the island of Ireland and their association with dietary quality, food-related behaviours and body weight status.

3 Methodology

Literature reviews

Two rapid reviews of the existing literature were conducted. The first review identified patterns of snacking and the position of snacks and treat foods in children's diets. The second investigated the available food-based dietary guidelines with respect to treat foods and snacks for children globally. These reviews are included in Section 9 (Publications) and informed the quantitative analyses for this research.

Datasets

The analyses for this report are based on data from three national food consumption datasets of children aged 2-12 years on the island of Ireland, including the National Pre-School Nutrition Survey (NPNS) (2010 – 2011) and the National Children's Food Survey II (NCFS II) (2017 – 2018) in the Republic of Ireland (ROI), and the National Diet and Nutrition Survey Northern Ireland (NDNS NI) (2008/09 – 2016/17) in Northern Ireland (NI). Detailed information on the methodology of these surveys is available at www.iuna.net and https://www.food.gov.uk/research/national-diet-and-nutrition-survey/national-diet-and-nutrition-survey-ndns-report-for-northern-ireland. A brief overview of the methods relevant to this report are outlined below.

Food intake assessment and estimation of nutrient intakes

Food and beverage intake data were collected using 4-day food records (NPNS, NCFS II: weighed record, four consecutive days including at least one weekend day; NDNS: estimated record, four consecutive days). In the NPNS and NCFS II, the researcher made a number of visits to the participant and parents/guardians during the recording period: an initial training visit to demonstrate how to complete the food record and how to use the portable scales provided (Tanita KD-400, Japan); a second visit during the recording period to review the food record, check for completeness and clarify details regarding food descriptors and quantities; and a final visit 1-2 days after the recording period to review the final days of recording and to collect the food record. In both surveys, participants were asked to collect and provide the

packaging labels for all foods and beverages consumed by them over the recording period, to facilitate quantification and coding of foods. In the NDNS, interviewers carried out a food diary check visit with participants on the second or third day of recording, either in person or over the telephone, with the aim of collecting missing detail for foods recorded, improving recording for the remaining days and also providing encouragement to participants to continue recording. Interviewers then returned to collect the diary and check the remaining days no later than three days after the final day of recording.

Over 85% of foods and beverages consumed in the NPNS and 87% in the NCFS II were either weighed by the participants or quantified using weights provided on product packaging. The remaining food and beverage items were quantified using other methods (age-appropriate photographic food atlases, standard portion weights, household measures). For the NDNS, food and beverage items were quantified using age-appropriate photographic food atlases, household measures or manufacturers' weights.

In the NPNS and NCFS II, nutrient intakes were estimated using UK food composition tables, with modifications to include recipes of composite dishes, nutritional supplements, fortified foods, infant specific products and generic Irish foods that were commonly consumed. For the NDNS, nutrient intakes were estimated using in-house dietary assessment software, Diet in Nutrients Out (DINO), which is also based on UK food composition tables with appropriate modifications for certain foods in the UK including fortified foods.

Social class and parental education classification

For the NPNS and the NCFS II, information on social class and parental education were obtained from a 'health and lifestyle questionnaire' completed by the parent(s)/guardian(s) of the children. The questionnaire was informed by the questions used in the Irish census (Central Statistics Office, 2006) and coded by researchers into four categories for social class: 'professional workers', 'non-manual workers', 'skilled manual workers' and 'semi-skilled/unskilled workers'. There were three categories for highest level of parental education received: 'primary', 'secondary' or 'tertiary'. The social class and parental education category for each child was determined using the highest category from the parents/guardians within the household. In the NDNS, information on social class was also obtained by a questionnaire completed by the parent(s)/guardian(s) of the children with questions informed by the UK's Office for National Statistics, National Statistics Socio-Economic Classifications (NS-SEC) and

the income of the person in whose name the property is owned or rented. Responses were coded into three categories as per the NS-SEC: 'higher managerial, administrative and professional occupations', 'intermediate occupations' and 'routine and manual occupations'.

Weight status

This study used Body Mass Index (BMI) classification as a marker of weight status. In all three surveys, participants' height and weight were measured using standard procedures in the participants' homes. BMI was used to indirectly assess adiposity and was calculated as weight (kg) divided by height squared (m^2). The UK/World Health Organisation (WHO) age- and gender-specific BMI cut-off points were used for the NPNS, and the UK Growth References age- and gender-specific BMI cut-off points were used for the NCFS II and the NDNS, to classify children into the following categories: thinness, normal weight, overweight and obesity[20 -21].

Defining treat foods

Treat foods were defined according to food-based dietary guidelines (FBDG) using the food pyramid for Ireland and the Eatwell Guide for NI, and categories were standardised across the three surveys for consistency of reporting [(21-24)]. Foods that were included as treat foods were:

- Biscuits: includes biscuits (sweet and savoury) and crackers
- Soft drinks (total/sugar-sweetened and no-added sugar): includes carbonated beverages, fruit juice drinks, and squashes and cordials
- Savoury snacks: includes crisps, popcorn and other savoury snacks
- Preserves and chocolate spreads
- Chocolate: includes all chocolate confectionery
- Cakes and buns: includes cakes, pastries and buns
- Ice-creams and desserts: includes all ice-creams and desserts (including chilled desserts)
- Sweets: includes all non-chocolate confectionery
- Cereal bars
- Sugar and sweeteners: includes table sugar and sweeteners

Defining 'snacking'

For the NPNS and NCFS II, snacking was participant-defined at the time of recording. Snacking occasions were then recoded into morning (06.00-11.59), afternoon (12.00-17.59), evening (18.00-23.59), and night snacks (00.00-05.59) by time of consumption. For the NDNS, snacking was not participant-defined at the time of recording, and was defined by time of consumption in keeping with other literature on snacking which used NDNS data[25-27]:

- Morning snacks: any food/beverages consumed between 09:00-12:00
- Afternoon snacks: any food/beverages consumed between 14:00-17:00
- Evening snacks: any food/beverages consumed between 20:00-06:00

To understand any discrepancies in findings that may arise when using the two definitions, snacking for the NPNS and NCFS II was also recoded using the NDNS definition and compared to the participant-defined approach (see table below). This highlighted a significant discrepancy between the two methods. As participant-defined snacking is a more accurate representation of snacking from the consumer perspective, the participant-defined definition was used throughout the report for Ireland. Hence, any direct comparison between Ireland and NI with respect to the role of snacking should be interpreted with caution, with methodological differences beyond our control affecting these results.

Overview of resullts obtained using two different snacking definions (time and participant) using data from the NPNS and NCFS II in Ireland

Time defined.2-4-year-olds

Time	Consumers (%)	MDI of energy (kcal)	Contribution (%) to energy
Total snacks	100	494	42.0
Morning snacks (09:00-12:00)	99.2	229	19.4
Afternoon snacks (14:00-17:00)	97.0	227	19.3
Evening snacks (20:00-06:00)	43.6	38.7	3.3

Time defined 5–12-year-olds

Time	Consumers (%)	MDI of energy (kcal)	Contribution (%) to energy
Total snacks	99.7	703	46.6
Morning snacks (09:00-12:00)	97.5	243	16.4
Afternoon snacks (14:00-17:00)	98.8	349	23.3
Evening snacks (20:00-06:00)	68.7	111	6.9

Participant defined 2–4-year-olds

Time	Consumers (%)	MDI of energy (kcal)	Contribution (%) to energy
Total snacks	99.1	304	42.0
Morning snacks	85.0	90.0	19.4
Afternoon snacks	93.4	136	19.3
Evening snacks	74.6	77.2	3.3

Participant defined 5–12-year-olds

Time	Consumers (%)	MDI of energy (kcal)	Contribution (%) to energy
Total snacks	99.7	360	23.4
Morning snacks	50.8	48.5	3.2
Afternoon snacks	90.0	176	11.5
Evening snacks	82.3	135	8.7

Statistical Analyses

Patterns of consumption of treat foods were assessed utilising descriptive statistics (i.e., frequencies, means and percentages). Descriptive statistics were used to describe the proportion of children who consumed treat foods over the four recorded days, and by meal type, day of the week (including school-day/non-school day for the NCFS II) and by eating

location. The contribution of treats (overall and by individual category) to the mean daily intake of energy and nutrients was also determined.

Participants were stratified into snack consumers for the total day and three snacking time periods (morning, afternoon, evening), with an additional time period (night) for the NPNS. As with treat foods, descriptive statistics (frequencies, means and percentages) were used to describe the proportion of children who consumed snacks over the four recorded days, and by day of the week (including school-day/non-school day for the NCFS II)) and by eating location. The contribution of snacks (total and by snacking occasion) to the mean daily intake of energy and nutrients was also determined.

Tertile analysis was also used to determine differences in overall diet quality by consumption of treat foods. Children were divided into three equal groups (low, medium and high consumers) based on their % energy derived from treat foods, and differences in the overall energy and nutrient intakes between high and low consumers of treat foods were determined. This was then repeated for snack foods, with three equal groups being formed based on % energy derived from snacks, and differences in the overall energy and nutrient intakes between high and low consumers of snacking were determined.

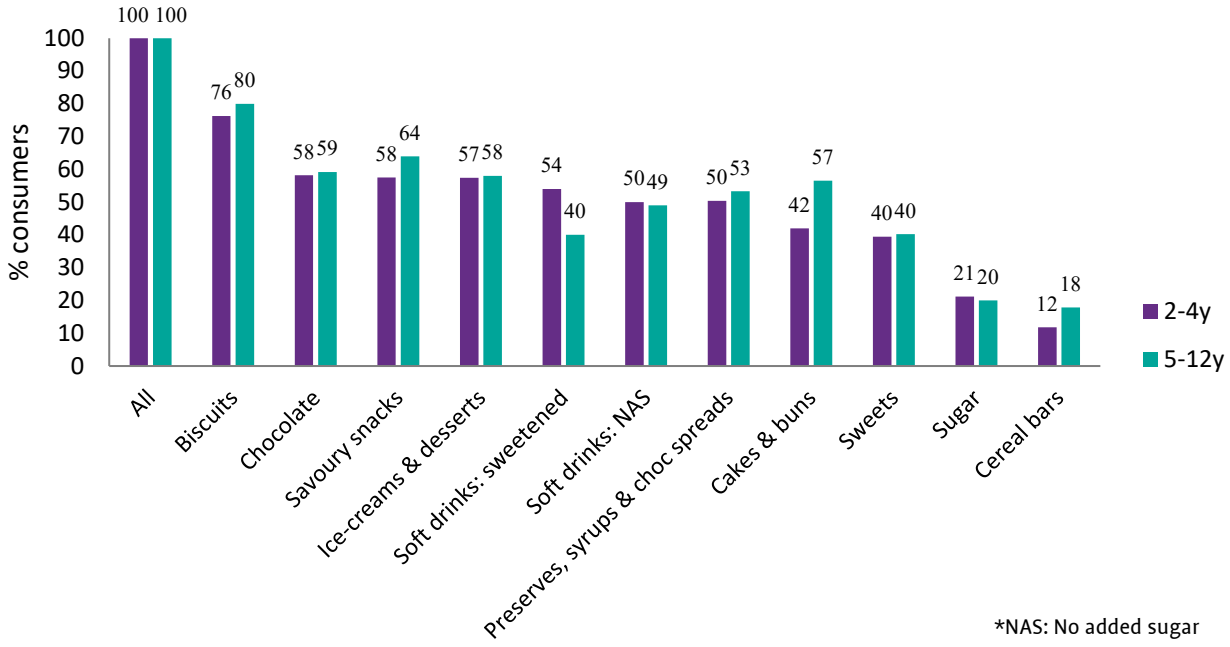
Chi-square tests and independent sample t-tests were used to determine differences in both treat foods and snack patterns (% consumers, contribution to energy and nutrient intakes and for tertile analyses) by age, sex, social class, parental education and weight status. To minimise type 1 errors (as a result of multiple testing), the Bonferoni adjustment was used and differences between groups were considered to be statistically significant if $p<0.001$.

4 Results: Treat foods

Patterns of consumption of treat foods (proportion of consumers and types of foods)

Treat foods typically refer to foods and beverages high in calories, fat, sugar and salt, but low in fibre, vitamins and minerals. However, there is no universal definition or term for 'treat foods' and how they are defined, and terminologies vary between countries and their individual food-based dietary guidelines (FBDG). Some FBDG refer to treat foods as 'discretionary choices/foods', others refer to 'food groups to limit', and many refer to these foods as 'foods high in fat, salt and sugar' (HFSS) (including Ireland and the UK)[21-24]. Additionally, FBDG in both Ireland and NI (UK) depict HFSS foods on their graphical representation. For example, in ROI these foods are referred to as 'top-shelf foods' as they are placed on top of the food pyramid and separated from the rest of the shelves to indicate indicate that these foods/beverages are not needed for good health, and that consumption should be limited to tiny amounts once a week for children under five years of age and a maximum of 1-2 times per week for all those aged over 5 years of age. Similarly, in the UK's Eatwell Guide, these foods are placed 'off plate' to indicate that these foods should be consumed less often and in small amounts[21-24]. This study found that 100% of children aged 2-4 years and 5-12 years in both Ireland and NI consumed treat foods of any type, with a wide variety of categories of treat foods being consumed for each age group (**Figures 1-2**).

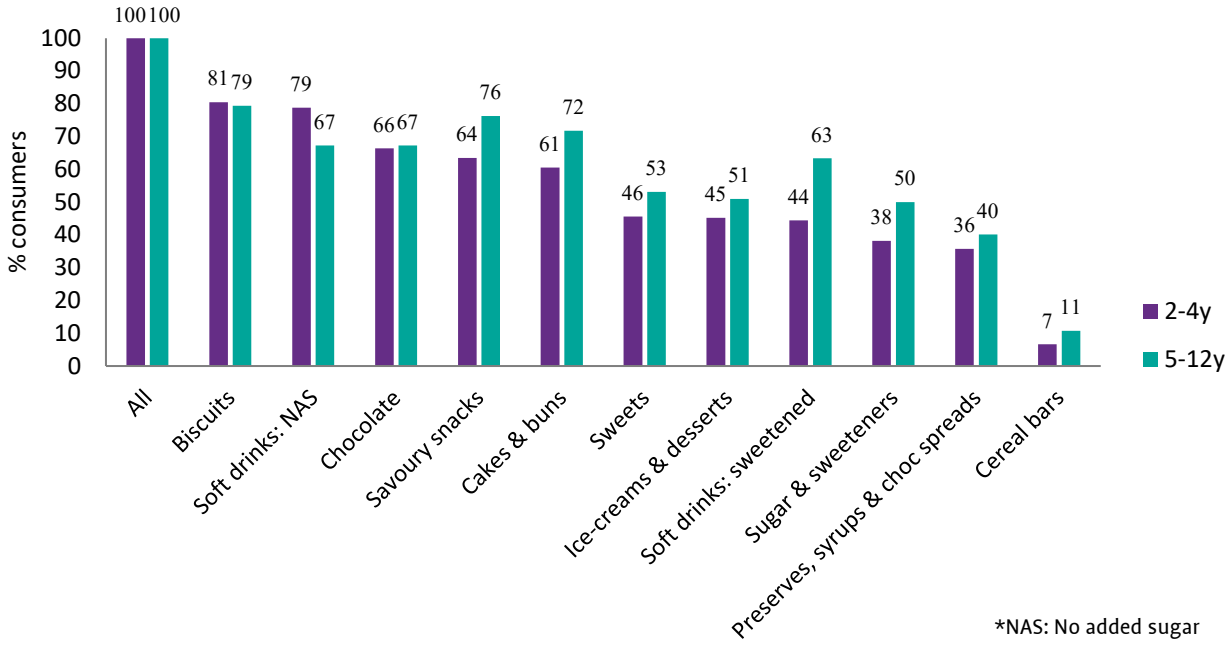
Figure 1. Proportion (%) of children consuming treat foods in the ROI



*NAS: No added sugar

In Ireland, 'biscuits' were the most consumed treat food for both 2-4-year-olds (76%) and 5-12-year-olds (80%) (**Figure 1**). 'Soft drinks' were consumed by 75% of 2-4-year-olds (sugar-sweetened: 54%, no added sugar: 50%) and 68% of 5-12-year-olds (sugar-sweetened: 40%, no added sugar: 49%) (**Table 1**). Interestingly, 'sugar-sweetened soft drinks' were consumed more by older children aged 9-12 years (48%) compared to younger children aged 5-8 years (32%). It is important to note that the data collected from both the NPNS and the NCFS II (2017-18) were collected before the sugar tax was implemented in Ireland (May 1st, 2018). Other treat foods that were consumed by significant numbers of children (>50%) included 'chocolate' (2-4y: 58%, 5-12y: 59%), 'savoury snacks' (2-4y: 58%, 5-12y: 64%) and 'ice-creams and desserts' (2-4y: 57%, 5-12y: 58%).

Figure 2. Proportion (%) of children consuming treat foods in NI



*NAS: No added sugar

In NI, 'biscuits' were also the most consumed treat food for both 2-4-year-olds (81%) and 5-12-year-olds (79%) (**Figure 2**). 'Soft drinks' were consumed by 91% of 2-4-year-olds (sugar-sweetened: 44%, no added sugar: 79%) and 89% of 5-12-year-olds (sugar-sweetened: 63%, no added sugar: 67%) (**Table 2**). Other treat foods that were consumed by significant numbers of children (>50%) included 'chocolate' (2-4y: 66%, 5-12y: 67%), 'savoury snacks' (2-4y: 64%, 5-12y: 76%) and 'cakes and buns' (2-4y: 61%, 5-12y: 72%).

Differences in patterns of consumption of treat foods

Differences by sex

All children in both Ireland and NI consumed treat foods regardless of sex, and overall there were very few differences in the proportion of boys and girls consuming any type of treat food (**Tables 3 and 4**).

In Ireland, among those aged 2-4-years, more boys consumed 'soft drinks' (78%), 'sugar-sweetened soft drinks' (57%) and 'savoury snacks' (61%) compared to girls (73%, 50% and 54%, respectively) (**Table 3**). More girls consumed 'chocolate' (62%) and 'ice-creams and desserts' (63%) compared to boys (55% and 52%, respectively). Among those aged 5-12 years, there were no differences in the proportion of boys and girls consuming any treat foods.

In NI, there were no differences in the proportion of boys and girls consuming treat foods (of any type) at any age (2-4y, 5-12y, 5-8y or 9-12y) (**Table 4**).

Differences by social class

All children in both Ireland and NI consumed treat foods regardless of social class grouping (**Tables 5 and 6**). While there were some differences in the proportion of children consuming treat foods between social class groups in Ireland, there was no clear pattern by social class gradient.

In Ireland, among those aged 2-4 years, significantly more children of professional and skilled manual workers consumed 'biscuits' (83-85%) compared to children of non-manual (71%) and semi-skilled/unskilled workers (55%) (**Table 5**). More children of non-manual and skilled manual workers consumed 'soft drinks' (82-83%) compared to children of professional (68%) and semi-skilled/unskilled workers (73%). More children of non-manual, skilled manual and semi-skilled/unskilled workers consumed 'sugar-sweetened soft drinks' (55-60%) compared to children of professional workers (45%) and more children of non-manual workers consumed 'no-added sugar soft drinks' (60%) compared to all other groups (42-50%). More children of semi-skilled/unskilled workers consumed 'chocolate' (68%) compared to all other groups (52-57%). More children of non-manual workers consumed 'savoury snacks' (64%) compared to children of professional and semi-skilled/unskilled workers (54-59%). More children of semi-skilled/unskilled workers consumed 'ice-creams and desserts' (64%) compared to all other groups (55-59%).

Among those aged 5-12y, fewer differences were noted by social class grouping, with no differences noted in the proportion of consumers of 'biscuits', 'total soft drinks', 'no-added sugar soft drinks', 'savoury snacks' or 'chocolate' across social class groups (**Table 5**). More children of skilled manual workers consumed 'sugar-sweetened soft drinks' (57%) compared to children of professional workers (33%) and more children of professional and non-manual workers consumed 'ice-creams and desserts' (61-65%) compared to children of semi-skilled/unskilled workers (37%).

In NI, there were no differences in the proportion of children aged 2-4 years or 5-12 years consuming treat foods (of any type) by social class group (**Table 6**).

Differences by parental education

Data regarding parental education level was available for Ireland surveys only and all children (2–4-year-olds and 5-12-year-olds) consumed treat foods regardless of parental education level (**Table 7**). As with social class, there were some differences observed in the proportion of children consuming treat foods between parental education groups; however, there was no clear pattern.

Among those aged 2-4 years, more children of parents with intermediate education consumed 'biscuits' (88%) compared to children of parents with tertiary education (77%) and secondary (66%) education. More children of parents with secondary education consumed 'soft drinks' (87%) and 'no-added sugar soft drinks' (67%) compared to children of parents with tertiary education (75% and 48%, respectively) and intermediate education (55% and 36%, respectively). More children of parents with secondary and tertiary education consumed 'sugar-sweetened soft drinks' (51-56%) compared to children of parents with intermediate education (36%). More children of parents with intermediate education consumed 'chocolate' (74%) compared to children of parents with tertiary education (56%). There were no differences in the patterns of consumption of 'savoury snacks' or 'ice-creams and desserts' by parental education group.

Among those aged 5-12 years, fewer differences were found in the proportion of children consuming treat foods by parental education group. More children of parents with secondary education consumed 'sugar-sweetened soft drinks' than children of parents with tertiary education (37%), while there were no differences in the proportion of children consuming

'biscuits', 'total soft drinks', 'no added sugar soft drinks', 'savoury snacks' or 'chocolate' by parental education group.

Differences by weight status

All children in both Ireland and NI consumed treat foods regardless of Body Mass Index (BMI) classification. Overall there were very few differences, in terms of consuming any type of treat food, in the proportion of children that fall into a BMI category classified as normal weight or overweight/obese (**Tables 8 and 9**).

In Ireland, among those aged 2-4 years, there were very few differences in the proportion of children consuming treat foods by BMI classification (**Table 8**). However, more children classified as normal weight consumed 'ice-creams and desserts' (59%), 'chocolate spreads' (14%) and 'sugar' (23%) compared to children classified as overweight/obese (54%, 9% and 16%, respectively). There was no difference in the proportion of children consuming 'total soft drinks' or 'sugar-sweetened soft drinks' by BMI classification. However, more children children living with overweight and obesity consumed 'no-added sugar soft drinks' (57%) compared to children classified as normal weight (48%).

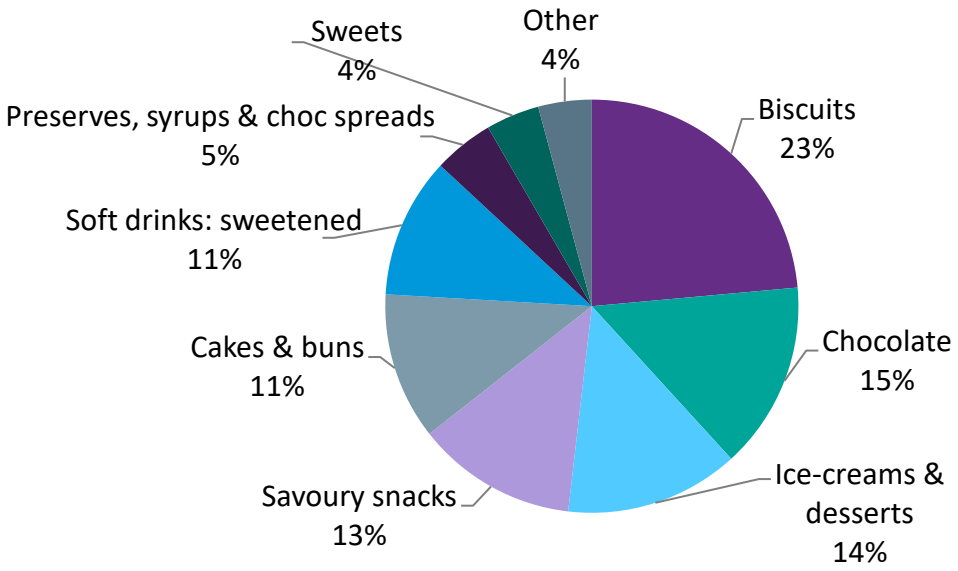
Among those aged 5-12 years, there were very few differences in the proportion of children consuming treat foods by BMI classification (**Table 8**). However, more children classified as normal weight consumed 'cakes and buns' (60%) compared to those classified as overweight/obese (39%).

In NI, there were no differences in the proportion of children consuming treat foods of any type by BMI classification at either 2-4 years or 5-12 years of age (**Table 9**).

Contribution of treat foods to energy intake

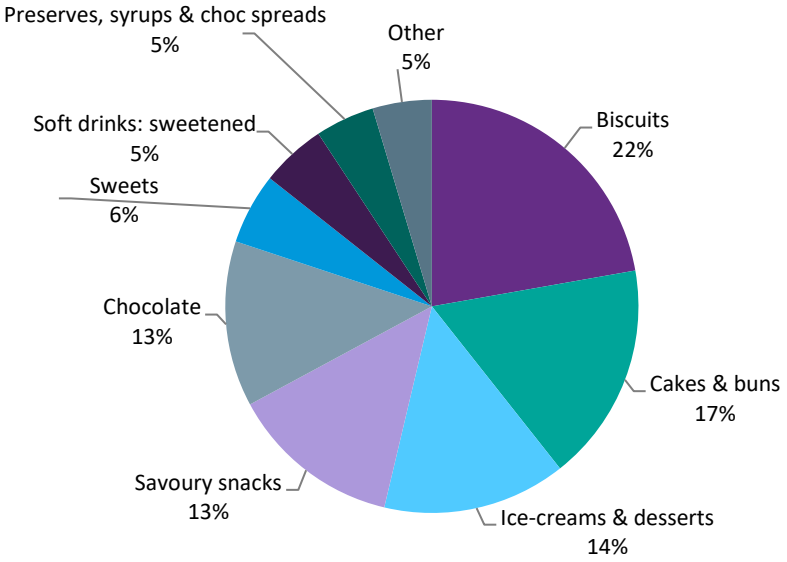
Overall, across both Ireland and NI, treat foods contributed approximately one-fifth of the mean daily intake of energy for those aged 2-4 years (19% energy (%E) in both ROI and NI), and between one-fifth to one-quarter of the mean daily intake of energy for those aged 5-12 years (ROI: 21%E, NI: 25%E) with significant contributions coming from a variety of different treat foods (**Figures 3-6**).

Figure 3. Contribution (%) of treat food groups to energy intake from all treat foods in 2-4-year-old children in the ROI (19%E)



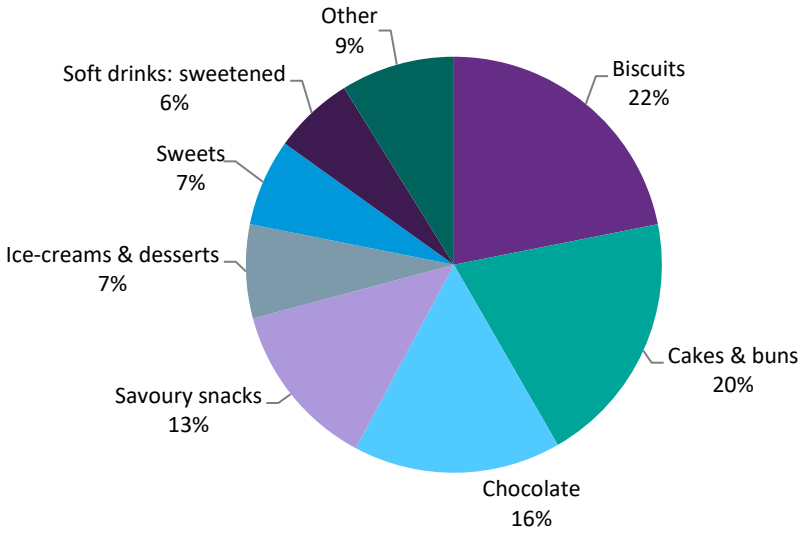
In Ireland, among those aged 2-4 years, treat foods contributed 19% of energy intake (231kcal) (**Tables 10 and 21**). Of the 19%E derived from treat foods, 23% came from 'biscuits' (54kcal), 15% from 'chocolate' (34kcal), 14% from 'ice-creams and desserts' (31kcal), 13% from 'savoury snacks' (28kcal), 11% from 'cakes and buns', 11% from 'sugar-sweetened soft drinks' (28kcal) and <5% from 'preserves, syrups and chocolate spreads', 'sweets', 'sugar' and 'cereal bars' (3-11 kcal) (**Figure 3**).

Figure 4. Contribution (%) of treat food groups to energy intake from all treat foods in 5-12-year-old children in the ROI (21%E)



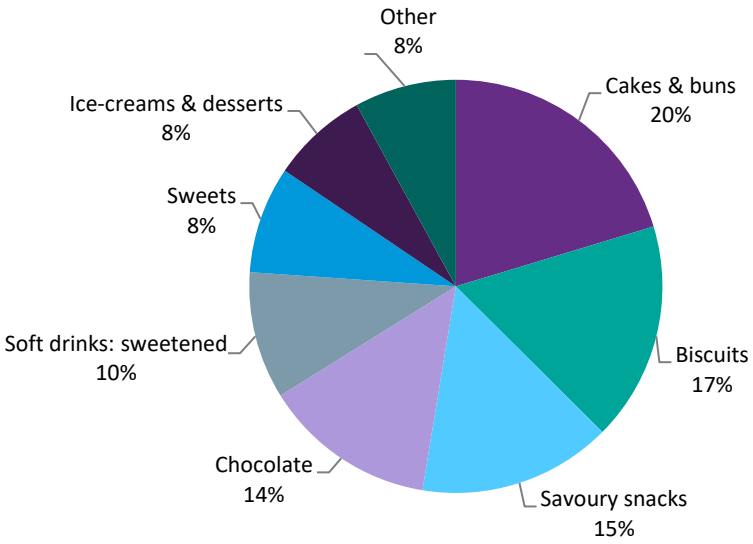
Among those aged 5-12 years, treat foods contributed 21% of energy intake (326kcal) (**Tables 10 and 21**). Of the 21%E derived from treat foods, 22% came from 'biscuits' (72kcal), 17% from 'cakes and buns' (57kcal), 14% from 'ice-creams and desserts' (46kcal), 13% from 'savoury snacks' (45kcal), 13% from 'chocolate' (43kcal) and <6% came from 'sweets', 'sugar-sweetened soft drinks', 'preserves, syrups and chocolate spreads', 'sugar' and 'cereal bars' (3-10kcal) (**Figure 4**). Those aged 9-12 years had a higher energy intake from both 'sugar-sweetened soft drinks' (1.5%) and 'no-added sugar soft drinks' (1.4%) compared to those aged 5-8 years (0.9%E and 0.8%E, respectively) (**Table 21**).

Figure 5. Contribution (%) of treat food groups to energy intake from all treat foods in 2-4-year-old children in NI (19%E)



In NI, among those aged 2-4 years, treat foods contributed 19% of energy (233kcal) (**Tables 11 and 22**). Of the 19%E derived from treat foods, 22% came from 'biscuits' (50kcal), 20% from 'cakes and buns' (46kcal), 16% from 'chocolate' (38kcal), 13% from 'savoury snacks' (30kcal) and <7%E from 'ice-creams and desserts', 'sweets', 'soft drinks', 'preserves, syrups and chocolate spreads' and 'cereal bars' (3-18kcal) (**Figure 5**).

Figure 6. Contribution (%) of treat food groups to energy intake from all treat foods in 5-12-year-old children in NI (25%E)



Among those aged 5-12 years, treat foods contributed 25% of energy (404kcal) (**Tables 11 and 22**). Of the 25%E derived from treat foods, 20% came from 'cakes and buns' (81kcal), 17% from 'biscuits' (67kcal), 15% from 'savoury snacks' (61kcal), 14% from 'chocolate' (55kcal), 10% from 'sugar-sweetened soft drinks' (42kcal) and <8% from 'sweets', 'ice-creams and desserts', 'preserves, syrups and chocolate spreads', 'sugar and sweeteners' and 'cereal bars' (2-34kcal) (**Figure 6**). Those aged 9-12 years had a higher energy intake from 'sugar-sweetened soft drinks' (3.1%E) compared to those aged 5-8 years (1.8%E) (**Table 22**).

Differences in the contribution of treat foods to energy intake

The contribution of treat foods to the mean daily intake of energy by age, sex, social class, parental education and weight status was examined for Ireland and NI and is presented in **Tables 10-31**.

Differences by sex

Overall, there were no differences in the contribution of all treat foods to energy intake in boys and girls at any age in both Ireland and NI (**Tables 23-26**).

In Ireland, among those aged 2-4 years, boys had a higher energy intake compared to girls from 'biscuits' (4.8%E vs 4.1%E), 'preserves, syrups and chocolate spreads' (0.6%E vs 0.5%E) and 'cakes and buns' (2.4%E vs 1.9%E) (**Table 23**). However, girls had a higher energy intake from 'chocolate' (3.1%E) and 'ice-creams and desserts' (2.8%E) compared to boys (2.5%E and 2.3%E, respectively). There were no differences in energy intake from treat foods (of any type) between boys and girls aged 5-12 years, 5-8 years or 9-12 years (**Tables 23 and 24**).

In NI, there were no differences in energy intake from treat foods (of any type) between boys and girls at any age (**Tables 25 and 26**).

Differences by social class

Overall, there were no differences in the contribution of all treat foods to energy intake by social class group for those aged 5-12 years in Ireland and for those aged 2-4 years and 5-12 years in NI (**Tables 27 and 28**). However, among those aged 2-4 years in Ireland, children of manual workers had a higher energy intake from all treat foods (22%) compared to all other groups (18%) (**Table 27**). While there were some differences in the contribution of treat foods (by food group) to energy intake between social class groups in Ireland, there was no clear pattern by social class gradient. The differences in the contribution of the most consumed treat foods to energy intake by social class grouping are presented below, with more information provided in (**Tables 27 and 28**).

In Ireland, among those aged 2-4 years, children of professional workers had a higher energy intake from 'biscuits' (4.9%E) compared to those of non-manual and semi-skilled/unskilled workers (3.7%E-4.2%E) (**Table 27**). The contribution of 'soft drinks' and 'sugar-sweetened soft drinks' to energy intake increased with decreasing social class status. Children of non-manual, skilled manual or semi-skilled/unskilled workers had a higher energy intake from

'savoury snacks' (2.5%E-2.9%E) compared to children of professional workers (1.9%E). Children of parents who are non-manual, skilled manual or semi-skilled/unskilled workers had a higher energy intake from 'chocolate' (2.8%E-3.3%E) compared to those of professional workers (2.3%E).

Among those aged 5-12 years, there was no difference in the contribution of 'biscuits', 'no added sugar soft drinks', 'savoury snacks' or 'chocolate' to energy intake by social class group (**Table 27**). Children of skilled manual workers had a higher energy intake from 'soft drinks' (2.3%E) and 'sugar-sweetened soft drinks' (2.1%E) compared to all other groups (0.8%E-1.6%E and 0.7%E-1.4%E, respectively).

In NI, there were no differences in the contribution of treat foods to energy intake by social class group at any age (**Table 28**).

Differences by parental education

Data regarding parental education level was available for Ireland surveys only. There was no difference in the contribution of all treat foods to energy intake by parental education group for 2-4-year-olds or 5-12-year-olds (**Table 29**). As with social class, there were some differences in the proportion of energy obtained from treat foods between parental education groups; however, there was no clear pattern by parental education gradient. The differences in the contribution of treat foods to energy intake by parental education group are presented below, with more information provided in **Table 29**.

Among those aged 2-4 years, children of parents with intermediate and tertiary education had a higher energy intake from 'biscuits' (4.5%E-5.2%E) compared to children of parents with secondary education (3.8%E) (**Table 29**). Children of parents with secondary education had a higher energy intake from 'soft drinks' (2.8%E) compared to children of parents with intermediate education (1.6%E). While no differences were noted in the contribution of 'sugar-sweetened soft drinks' to energy intake by parental education group, children of parents with secondary education had a higher energy intake from 'no-added sugar soft drinks' (0.4%E) compared to children of parents with intermediate or tertiary education (0.1%E-0.2%E). Children of parents with intermediate and secondary education had a higher energy intake from 'chocolate' (3.6%E-4.0%E) compared to children of parents with tertiary education (2.6%E).

Among those aged 5-12 years, there were fewer differences noted in the contribution of treat foods to energy intake by parental education group, with no differences noted for 'biscuits', 'soft drinks' (sugar-sweetened or no-added sugar), 'chocolate', 'savoury snacks' or 'ice-cream and desserts' between parental education groups (**Table 29**).

Differences by weight status

Overall, there were no differences in the contribution of all treat foods to energy intake between children classified as normal weight or overweight/obese for those aged 2-4 years in Ireland and for those aged 2-4 years and 5-12 years in NI (**Tables 30 and 31**). However, for those aged 5-12 years in Ireland, children classified as normal weight had a higher energy intake from all treat foods (22%E) compared to children classified as overweight/obese (18%E) (**Table 30**).

In Ireland, among those aged 2-4 years, children classified as overweight/obese had a higher energy intake from 'biscuits' (5.0%E) compared to those classified as normal weight (4.3%E) (**Table 30**). However, those classified as normal weight had a higher energy intake from 'savoury snacks' (2.4%E), 'chocolate spreads' (0.4%E), 'ice-creams and desserts' (2.7%E) and 'sugars and sweeteners' (0.2%E) compared to those classified as overweight/obese (2.1%E, 0.2%E, 2.1%E and 0.1%E, respectively).

Among those aged 5-12 years, there were no differences in the contribution of treat foods (of any type) to energy intake between children classified as normal weight compared to children classified as overweight/obese (**Table 30**).

In NI, there were no differences in the contribution of treat foods (of any type) to energy intake between children classified as normal weight compared to children classified as overweight/obese for any age group (**Table 31**).

Contribution of treat foods to nutrient intakes

The contribution of treat foods to the mean daily intake of nutrients is displayed in **Tables 32 and 33** for Ireland and **Tables 34 and 35** for NI. Because treat foods are recommended to be consumed less often and in small amounts as they are high in fat, sugar and salt, the contribution of treat foods to these nutrients of public health concern are discussed below[21-24].

Contribution of treat foods to saturated fat intake

Data from the NPNS and NCFS II in Ireland and the NDNS NI have previously shown that saturated fat intakes are above recommendations (<10% of energy intake[28]) among children aged 2-4 years (14-15%E) and 5-12 years (13-14%E)[29-31].

Figure 7. Contribution (%) of treat food groups to saturated fat intake from all treat foods in 2-4-year-old children in ROI (20%)

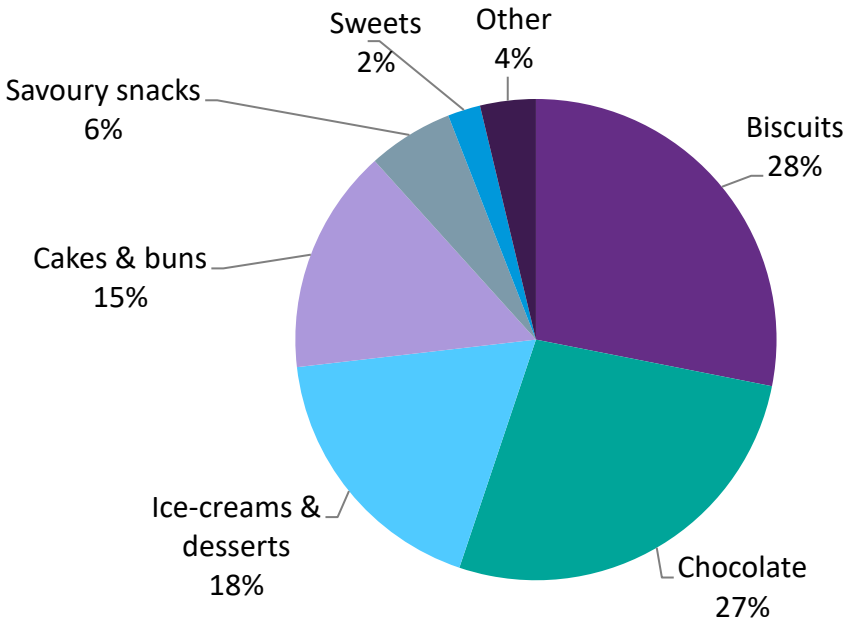
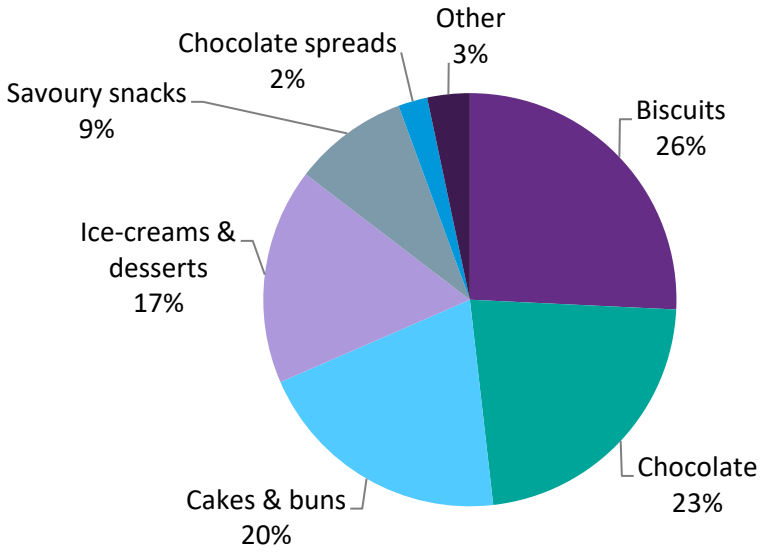


Figure 8. Contribution (%) of treat food groups to saturated fat intake from all treat foods in 5-12-year-old children in ROI (26%)



In Ireland, treat foods contributed 20% and 26% of saturated fat intake for 2-4-year-olds and 5-12-year-olds, respectively (**Tables 32 and 33**). For both 2-4-year-olds and 5-12-year-olds, 'biscuits', 'chocolate', 'ice-creams and desserts' and 'cakes and buns' were the key contributors to saturated fat intake from treat foods, accounting for 88% and 86% of saturated fat intake from treat foods, respectively (**Figures 7 and 8**).

Figure 9. Contribution (%) of treat food groups to saturated fat intake from all treat foods in 2-4-year-old children in NI (19%)

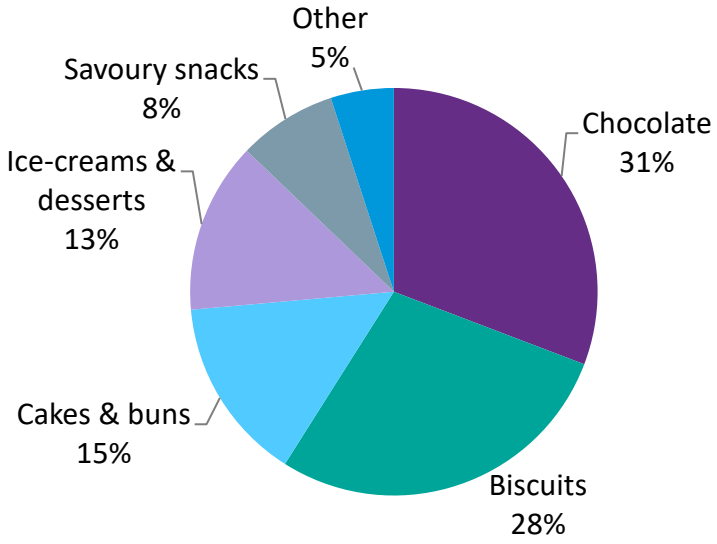
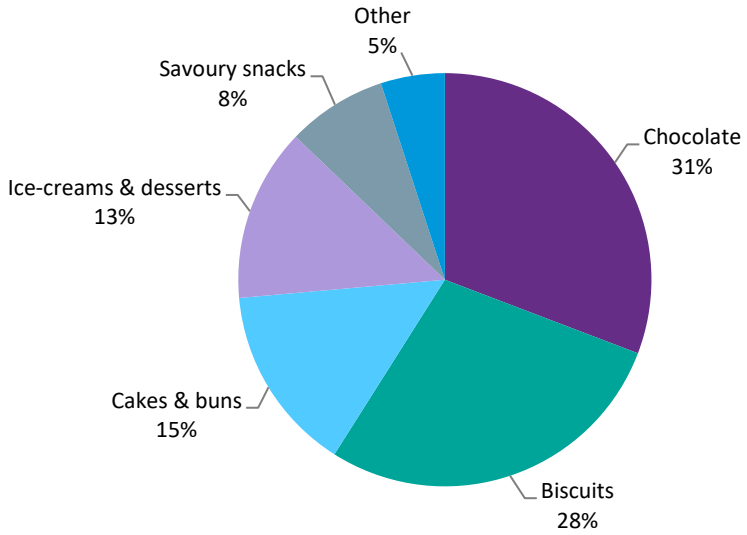


Figure 10. Contribution (%) of treat food groups to saturated fat intake from all treat foods in 5-12-year-old children in NI (26%)



In NI, treat foods contributed 19% and 26% of saturated fat intake for 2-4-year-olds and 5-12-year-olds, respectively (**Tables 34 and 35**). In similar findings to Ireland, 'chocolate', 'biscuits', 'cakes and buns' and 'ice-creams and desserts' were the key contributors to saturated fat intake from treat foods for 2-4-year-olds and 5-12-year-olds, accounting for 87% of saturated fat intake from treat foods for both age groups (**Figures 9 and 10**).

Contribution of treat foods to free sugars intake

Data from the NPNS and NCFS II in Ireland and the NDNS in NI have previously shown that free sugars intakes are above recommendations (<10% of energy intake[32 & 33]) among children aged 2-4 years (13%) and 5-12 years (10-14%)[29-31].

Figure 11. Contribution (%) of treat food groups to free sugar intake from all treat foods in 2-4-year-old children in ROI (52%)

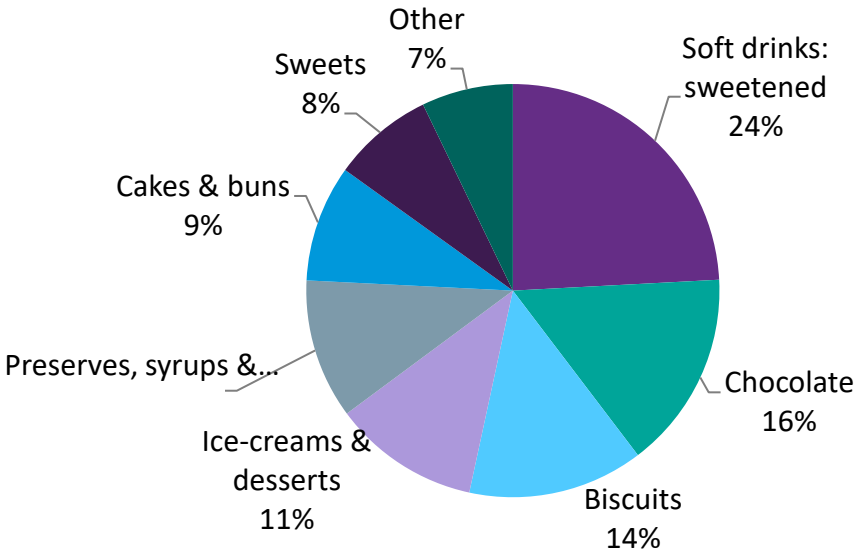
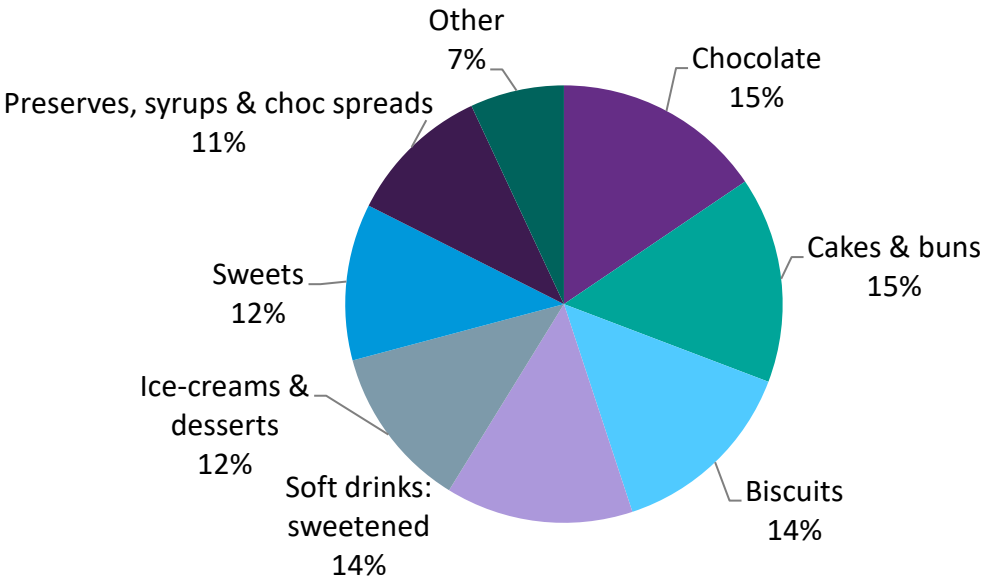


Figure 12. Contribution (%) of treat food groups to free sugar intake from all treat foods in 5-12-year-old children in ROI (61%)



In Ireland, treat foods contributed 52% and 61% of free sugars intake for 2-4-year-olds and 5-12-year-olds, respectively (**Tables 32 and 33**). Among those aged 2-4 years, 'sugar-sweetened soft drinks' accounted for 24% of free sugars intake from treat foods, 'chocolate' accounted for 16%, 'biscuits' accounted for 14% and 'ice-creams and desserts' accounted for 11%. Among those aged 5-12 years, 'chocolate' accounted for 15% of free sugars intake from treat foods, 'cakes and buns' accounted for 15%, 'biscuits' accounted for 14% and 'sugar-sweetened soft drinks' accounted for 14% (**Figures 11 and 12**).

Figure 13. Contribution (%) of treat food groups to free sugar intake from all treat foods in 2-4-year-old children in NI (56%)

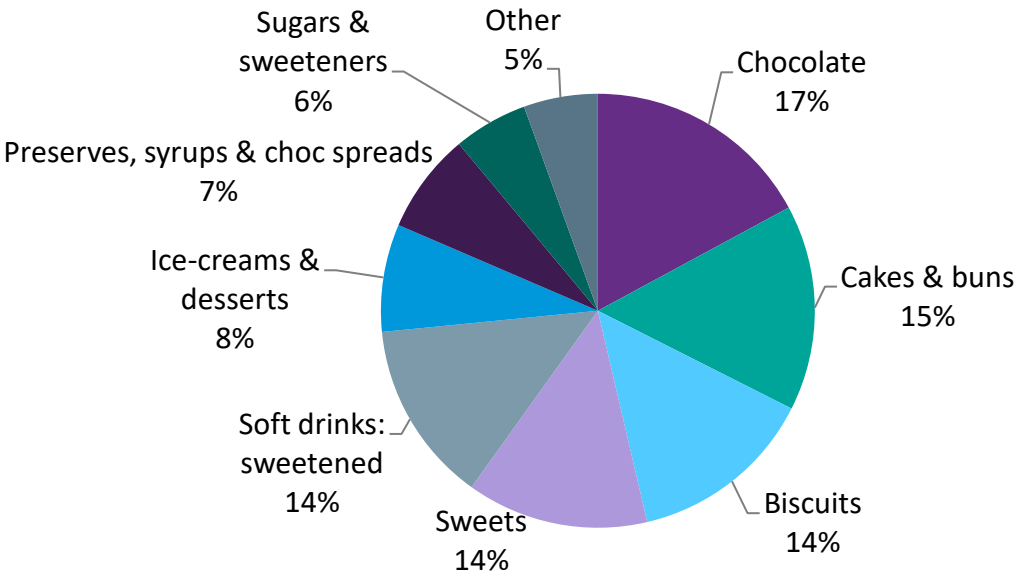
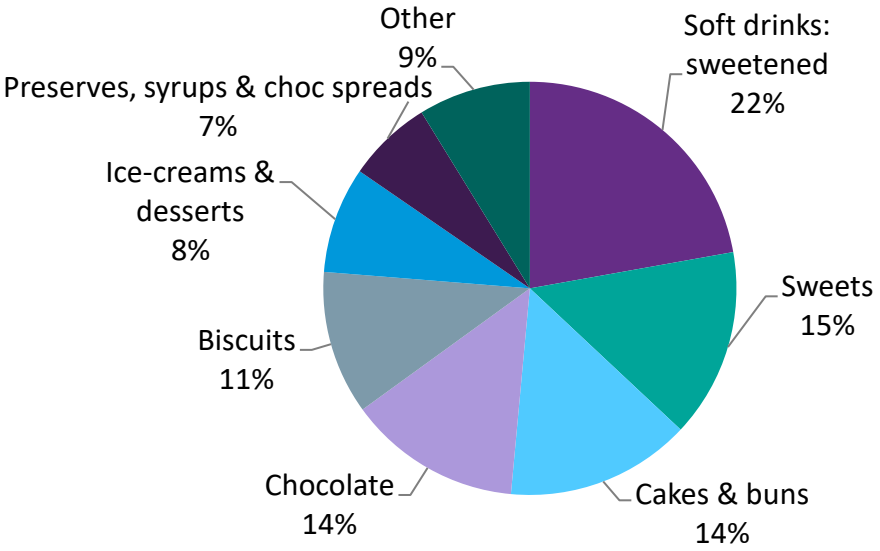


Figure 14. Contribution (%) of treat food groups to free sugar intake from all treat foods in 5-12-year-old children in NI (65%)



In NI, treat foods contributed 56% and 65% of free sugar intake for 2-4-year-olds and 5-12-year-olds, respectively (**Tables 34 and 35**). Among those aged 2-4 years, 'chocolate' accounted for 17% of free sugars intake from treat foods, 'cakes and buns' accounted for 15% and 'biscuits' and 'sugar-sweetened soft drinks' each accounted for 14%. Among those aged 5-12 years, 'sugar-sweetened soft drinks' accounted for 22% of free sugars intake from treat foods, 'sweets' accounted for 15%, and 'cakes and buns' and 'chocolate' each accounted for 14% (**Figures 13 and 14**).

Contribution of treat foods to salt intake

Data from the NPNS and NCFS II in Ireland have previously shown that salt intakes are above recommendations (age specific recommendations range from 2-6g/d for 2-12-year-olds[34]) among children aged 2-4 years (3.2g/d) and 5-12 years (5g/d)[30 & 31].

Figure 15. Contribution (%) of treat food groups to salt intake from all treat foods in 4-12-year-old children in ROI (12%)

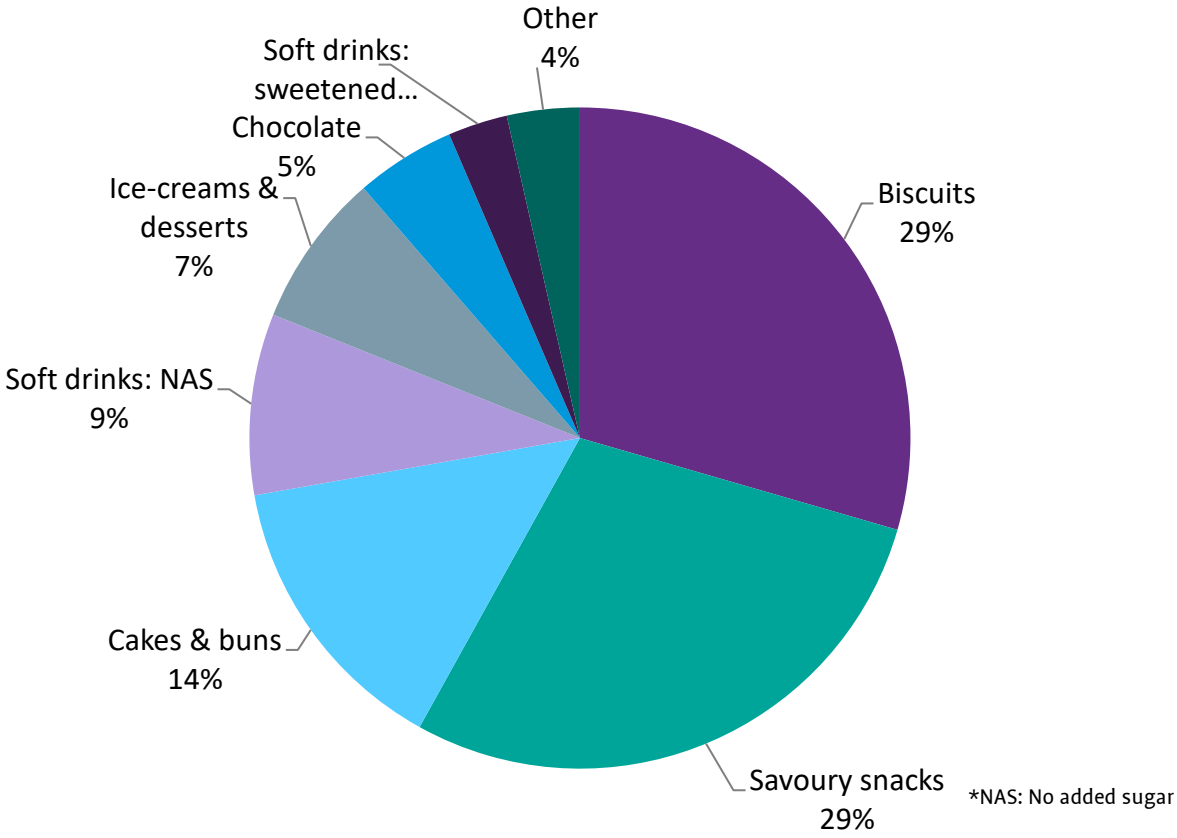
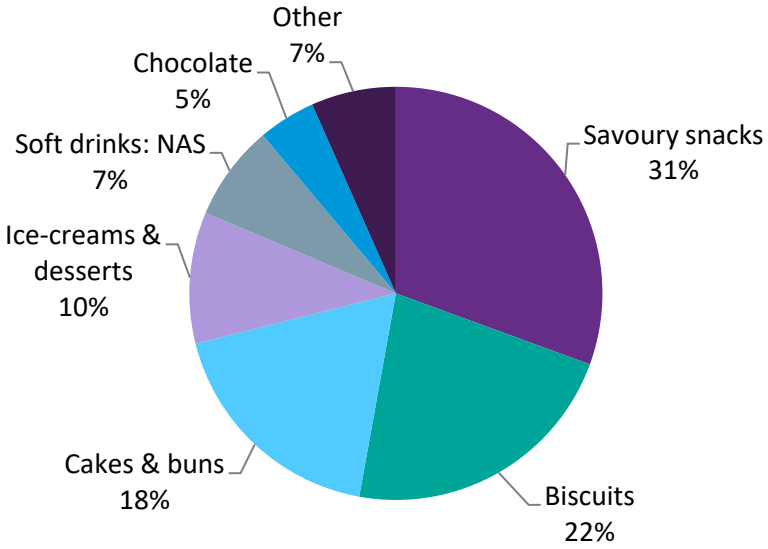


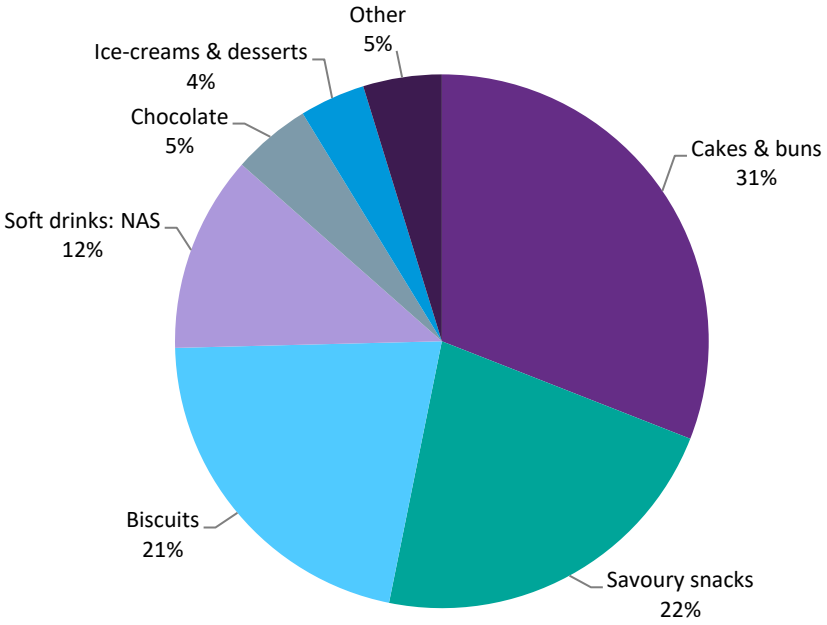
Figure 16. Contribution (%) of treat food groups to salt intake from all treat foods in 5-12-year-old children in ROI (14%)



*NAS: No added sugar

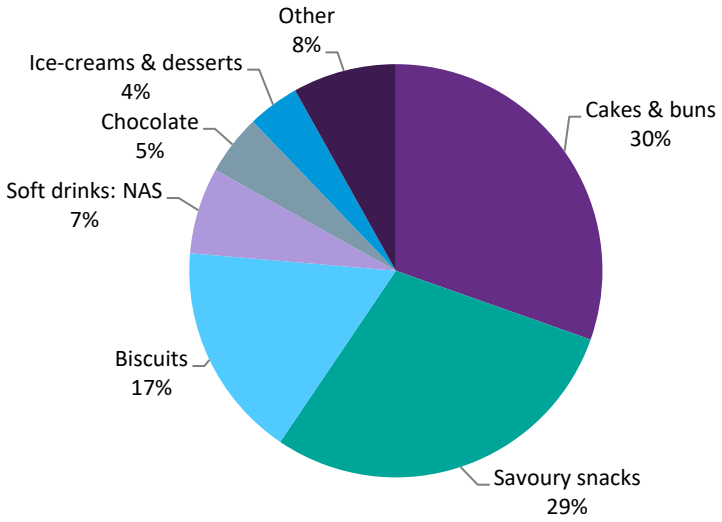
In Ireland, treat foods contributed 12% and 14% of overall salt intake (from food sources for 2-4-year-olds and 5-12-year-olds, respectively (**Tables 32 and 33**). For both 2–4-year-olds and 5-12-year-olds, the key contributors to salt intake from treat foods were 'biscuits', 'savoury snacks' and 'cakes and buns', which accounted for 72% and 71% of salt intake from treat foods, respectively (**Figures 15 and 16**).

Figure 17. Contribution (%) of treat food groups to salt intake from all treat foods in 2-4-year-old children in NI (13%)



*NAS: No added sugar

Figure 18. Contribution (%) of 'top-shelf' food groups to salt intake from all treat foods in 2-4-year-old children in NI (15%)



*NAS: No added sugar

In NI, treat foods contributed to 13% and 15% of overall salt intake (from food sources for 2-4-year-olds and 5-12-year-olds, respectively (**Tables 34 and 35**). In similar findings to Ireland, for

both 2-4-year-olds and 5-12-year-olds, 'cakes and buns', 'savoury snacks' and 'biscuits' were the key contributors to salt intake from treat foods, accounting for 74% and 76% of salt intake from treat foods, respectively (**Figures 17 and 18**).

Treat food consumption by meal type

Figure 19. Proportion (%) of children consuming treat foods at each meal in ROI, by age group

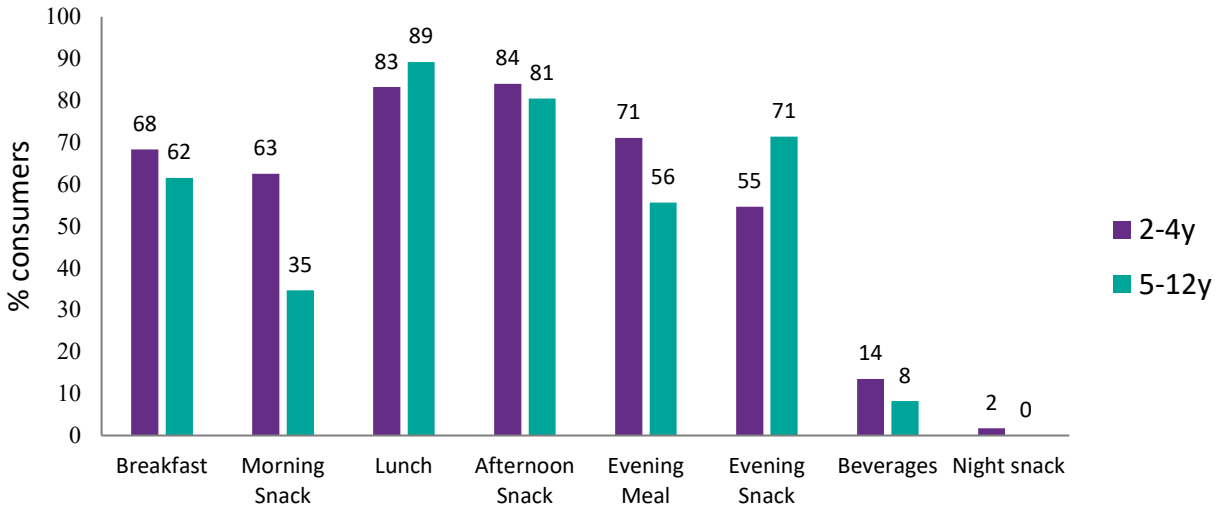
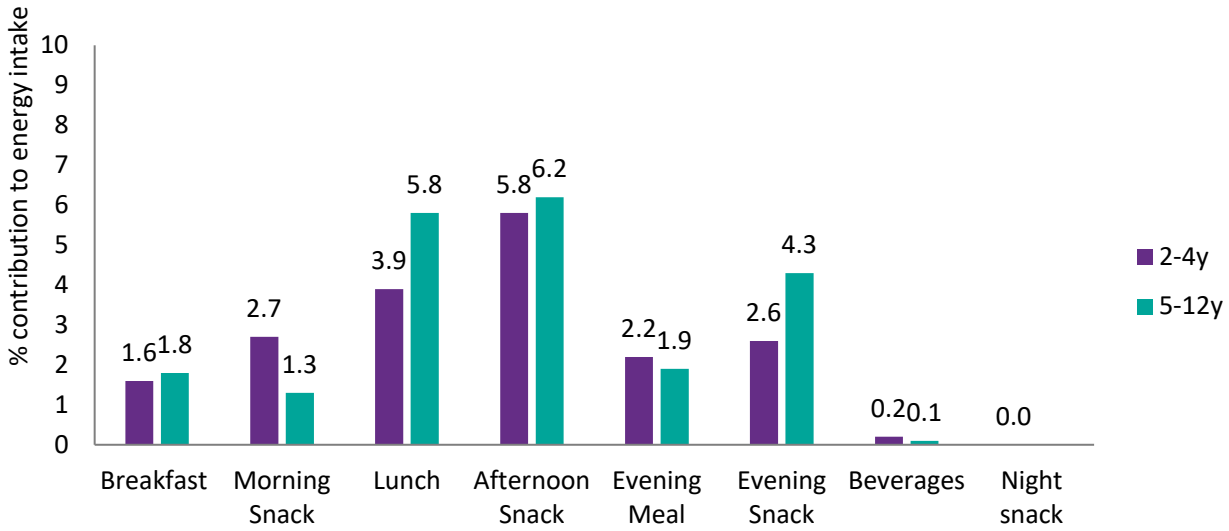


Figure 20. Contribution (%) of treat foods to energy intake in children in ROI, by meal



In Ireland, children aged 2-4 years consumed treat foods as part of most meal occasions, with over 80% of children consuming treat foods at lunch (83%) and at afternoon snacks (84%)

(**Figure 19**). For 2–4-year-olds, of the 19%E derived from treat foods (231kcal), 5.8% was consumed at afternoon snacks (70kcal), 3.9% at lunch (47kcal), 2.7% at morning snacks (33kcal), 2.6% at evening snacks (33kcal), 2.2% at evening meals (27kcal) and <2% at other eating occasions (breakfast, beverages and night snacks) (**Figure 20**). Those aged 5-12 years also consumed treat foods at most meal occasions, with 89% consuming treat foods at lunch, 81% at afternoon snacks and 71% at evening snacks (**Figure 19**). Of the 21%E derived from treat foods (326kcal), 6.2% of this was consumed at afternoon snacks (95kcal), 5.8% at lunch (87kcal), 4.3% at evening snack (66kcal) and <2% at other eating occasions (breakfast, morning snacks, evening meal and beverages) (**Figure 20**).

Figure 21. Proportion (%) of children consuming treat foods at each meal in NI, by age group

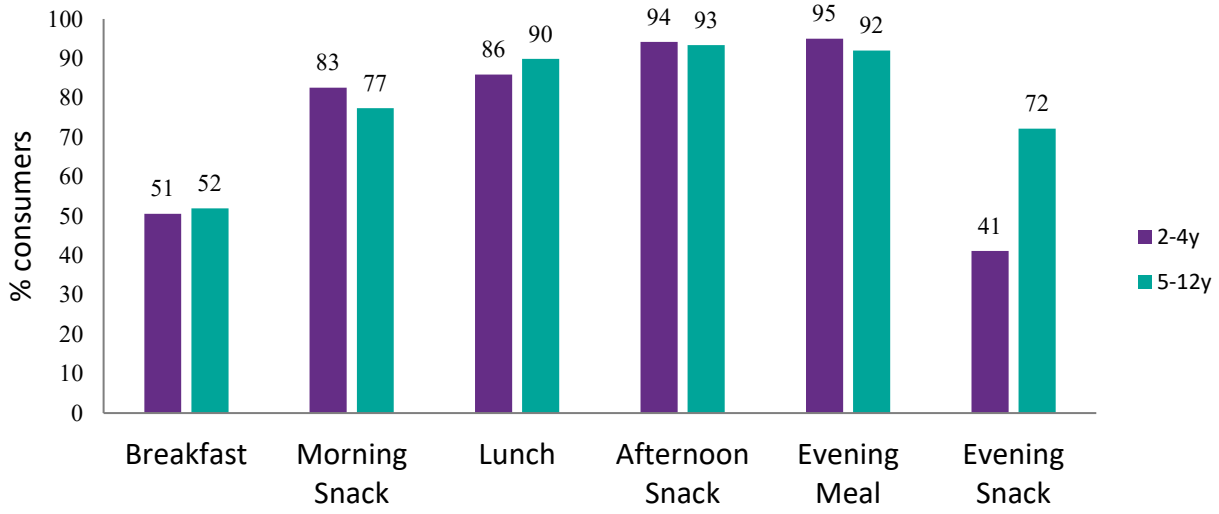
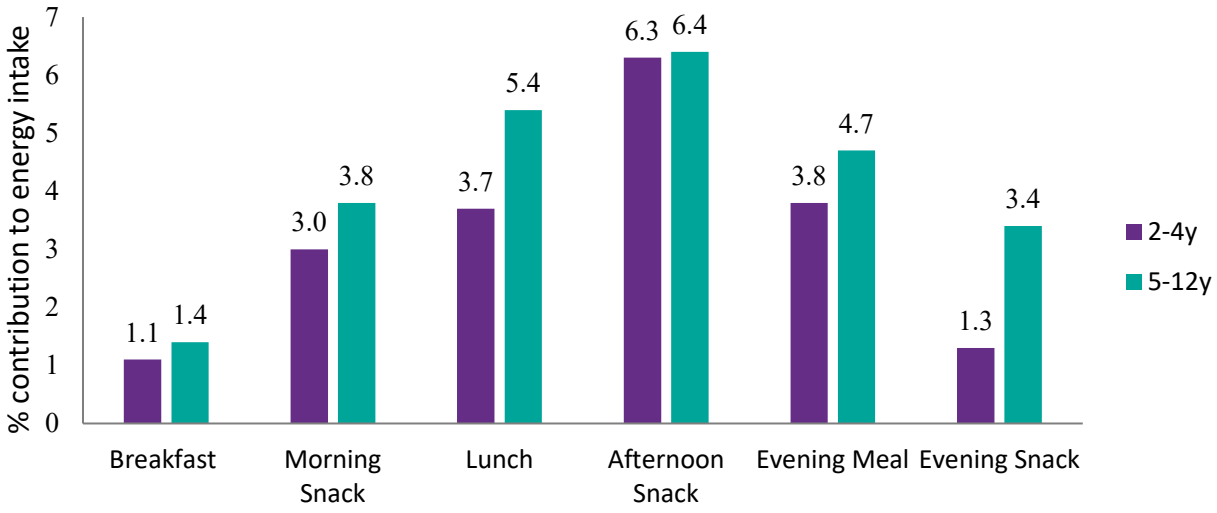


Figure 22. Contribution (%) of treat foods to energy intake in children in NI, by meal



In NI, children aged 2-4 years consumed treat foods as part of most meal occasions, with over 80% of children consuming treat foods at morning snacks (83%), lunch (86%), afternoon snacks (94%) and evening meals (95%) (**Figure 21**). Of the 19%E derived from treat foods (233kcal), 6.3% was contributed at afternoon snacks (76kcal), 3.8% at evening meals (46kcal), 3.7% at lunch (45kcal), 3.0% at morning snacks (36kcal), 1.3% at evening snacks (16kcal) and 1.1% at breakfast (14kcal) (**Figure 22**). Those aged 5-12 years also consumed treat foods at most meal occasions, with 93% consuming treat foods at lunch, 92% at evening meals and 90% at lunch (**Figure 21**). Of the 25%E derived from treat foods (404kcal), 6.4% was contributed at afternoon snacks (103kcal), 5.4% at lunch (85kcal), 4.7% at evening meals (76kcal), 3.8% at morning snacks (61kcal), 3.4% at evening snacks (56kcal) and 1.4% at breakfast (23kcal) (**Figure 22**).

Treat food consumption by day of week

Figure 23. Proportion (%) of children consuming treat foods in ROI, by day of the week

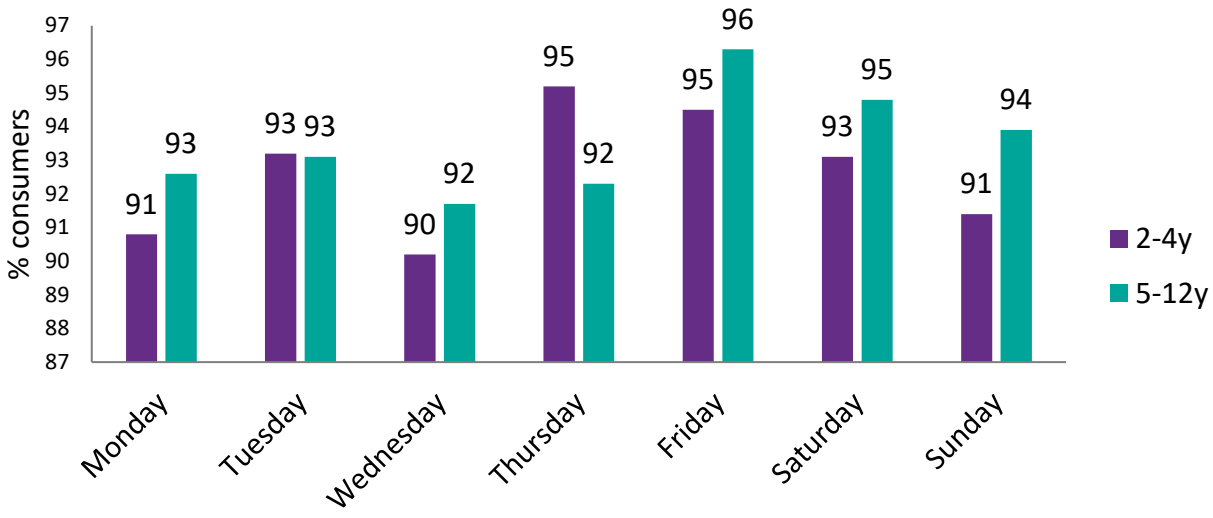
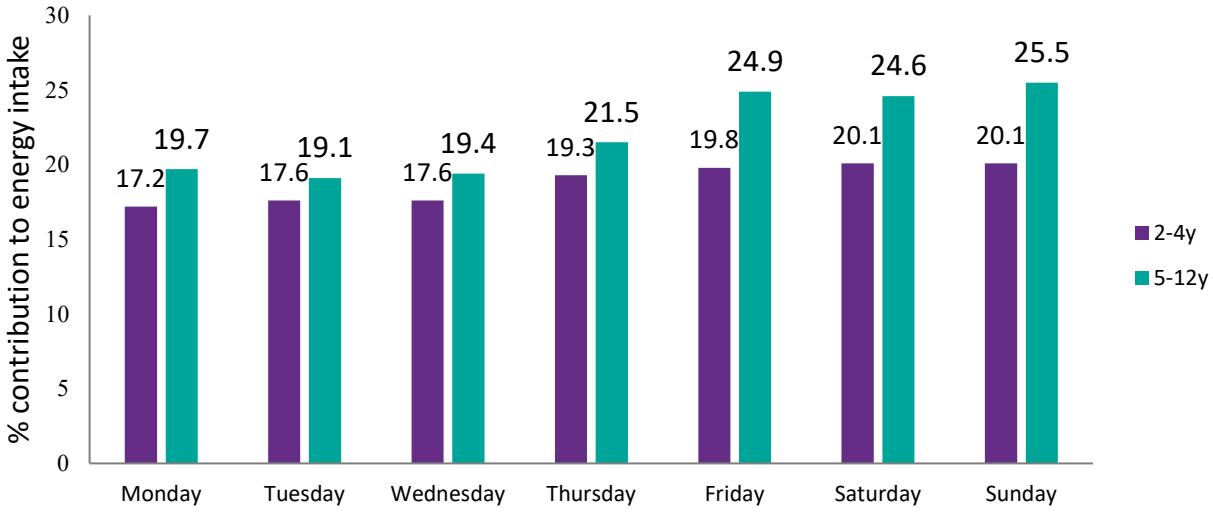


Figure 24. Contribution (%) of treat foods to energy intake in ROI, by day of the week



In Ireland, over 90% of children aged 2-4 years and 5-12 years consumed treat foods on each day of the week (**Figure 23**). Among those aged 2-4 years, treat foods contributed 17-18%E on

Monday-Wednesday, 19%E on Thursday and 20%E on Friday, Saturday and Sunday. Among those aged 5-12 years, treat foods contributed 19-20%E on Monday-Wednesday, 22%E on Thursday and 25-26%E on Friday, Saturday and Sunday (**Figure 24**). Data regarding school day/non-school day patterns of consumption are available for those aged 5-12 years in Ireland only, and these data have shown that 97% and 98% of children, respectively, consumed treat foods on non-school days and school days, with treat foods contributing 25% of energy intake on non-school days and 20% of energy intake on school days (**Tables 42-44**).

Figure 25. Proportion (%) of children consuming treat foods in NI, by day of the week

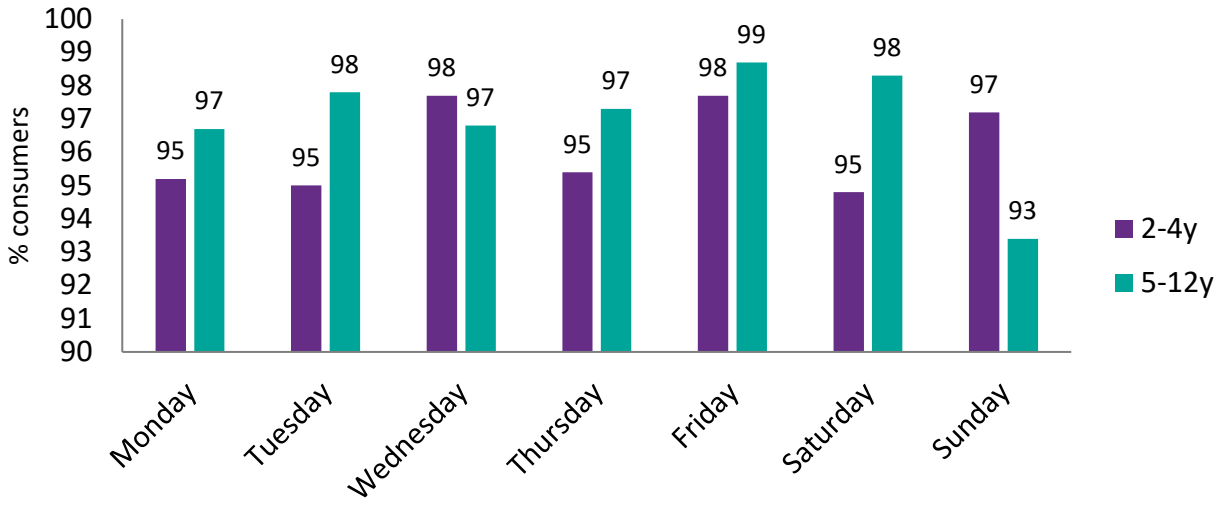
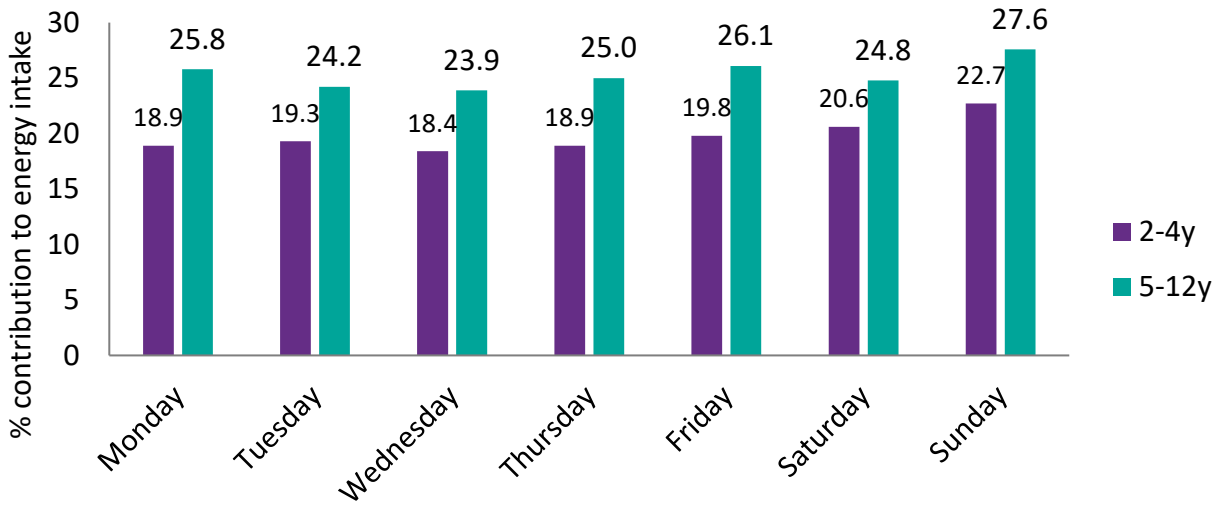


Figure 26. Contribution (%) of treat foods to energy intake in NI, by day of the week



In NI, over 90% of children aged 2-4 years and 5-12 years consumed treat foods on each day of the week (**Figure 25**). Among those aged 2-4y, treat foods contributed 18-19%E on Monday-Thursday and 20-23%E on Friday, Saturday and Sunday. Among those aged 5-12 years, treat foods contributed to 24-26%E on Monday-Thursday and 26-27%E on Friday, Saturday and Sunday (**Figure 26**).

Treat food consumption by eating location

Figure 27. Proportion (%) of 5-12-year-old children consuming treat foods in ROI, by eating location

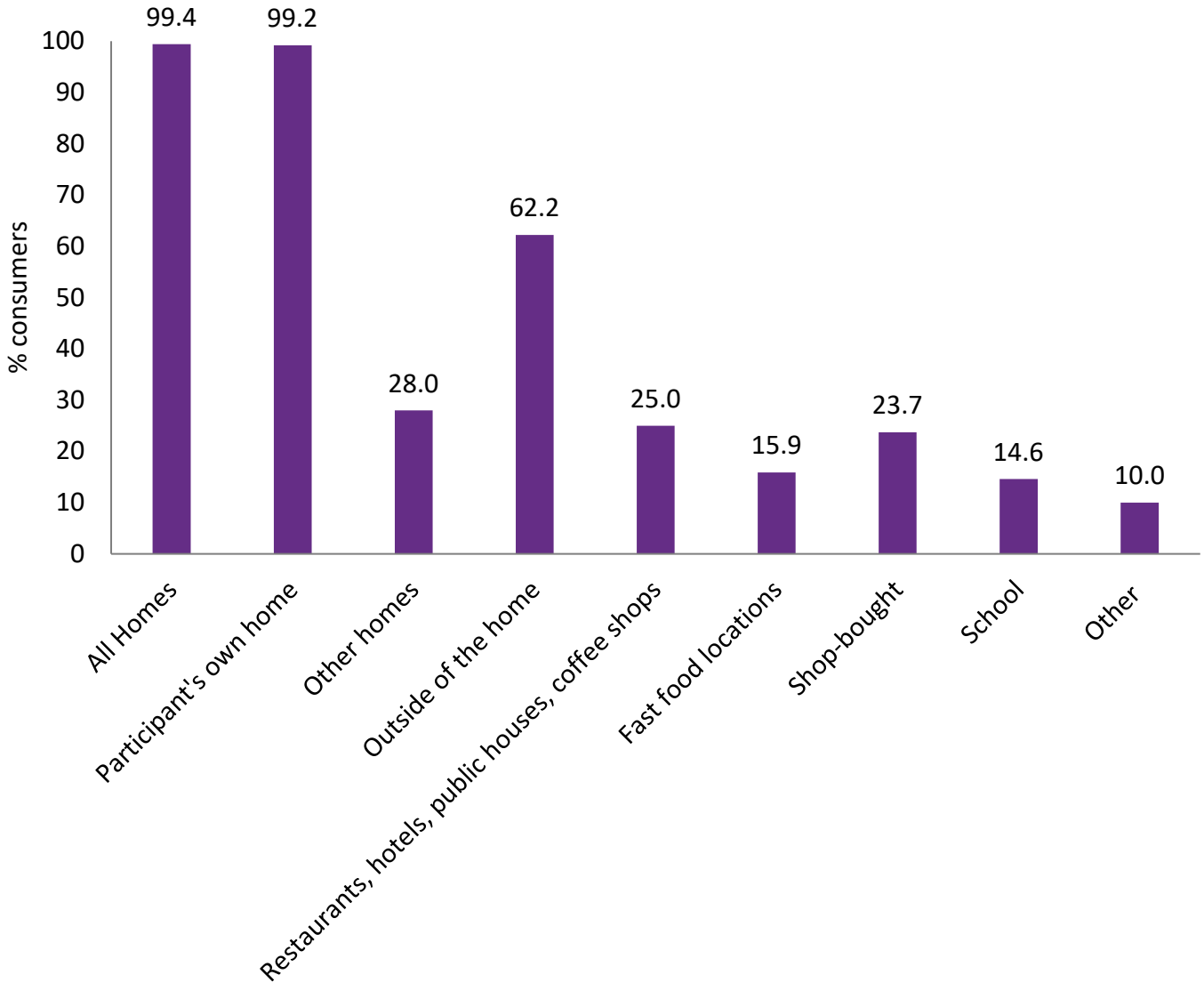
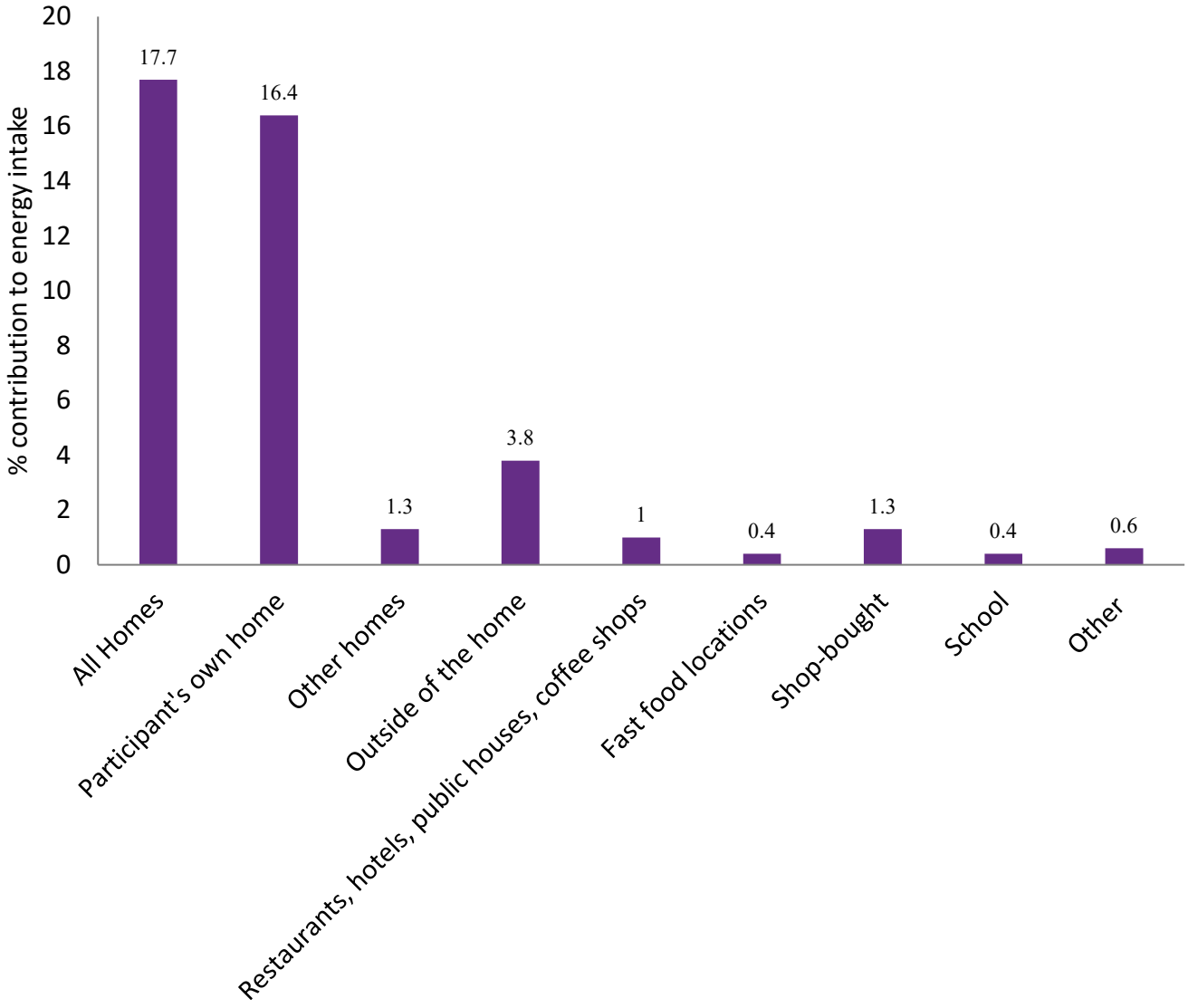


Figure 28. Contribution (%) of treat foods to energy intake in 5-12-year-old children in ROI, by eating location



In Ireland, data regarding eating locations were available for 5–12-year-olds only. Almost all children (99%) consumed treat foods at home (99% in their own homes and 28% in other people's homes), while 62% of children consumed treat foods outside the home (25% in restaurants, 24% shop-bought, 16% at fast food locations and 15% at school) (**Figure 27**).

Of the 21%E derived from treat foods in 5-12-year-olds, 17.7%E came from the home location (16.4% own home, 1.3% other people's homes) and 3.8%E came from outside the home (1-1.3% at restaurants and shop-bought, and 0.4% at fast food locations and school) (**Figure 28**).

Figure 29. Proportion (%) of children consuming treat foods in NI, by eating location

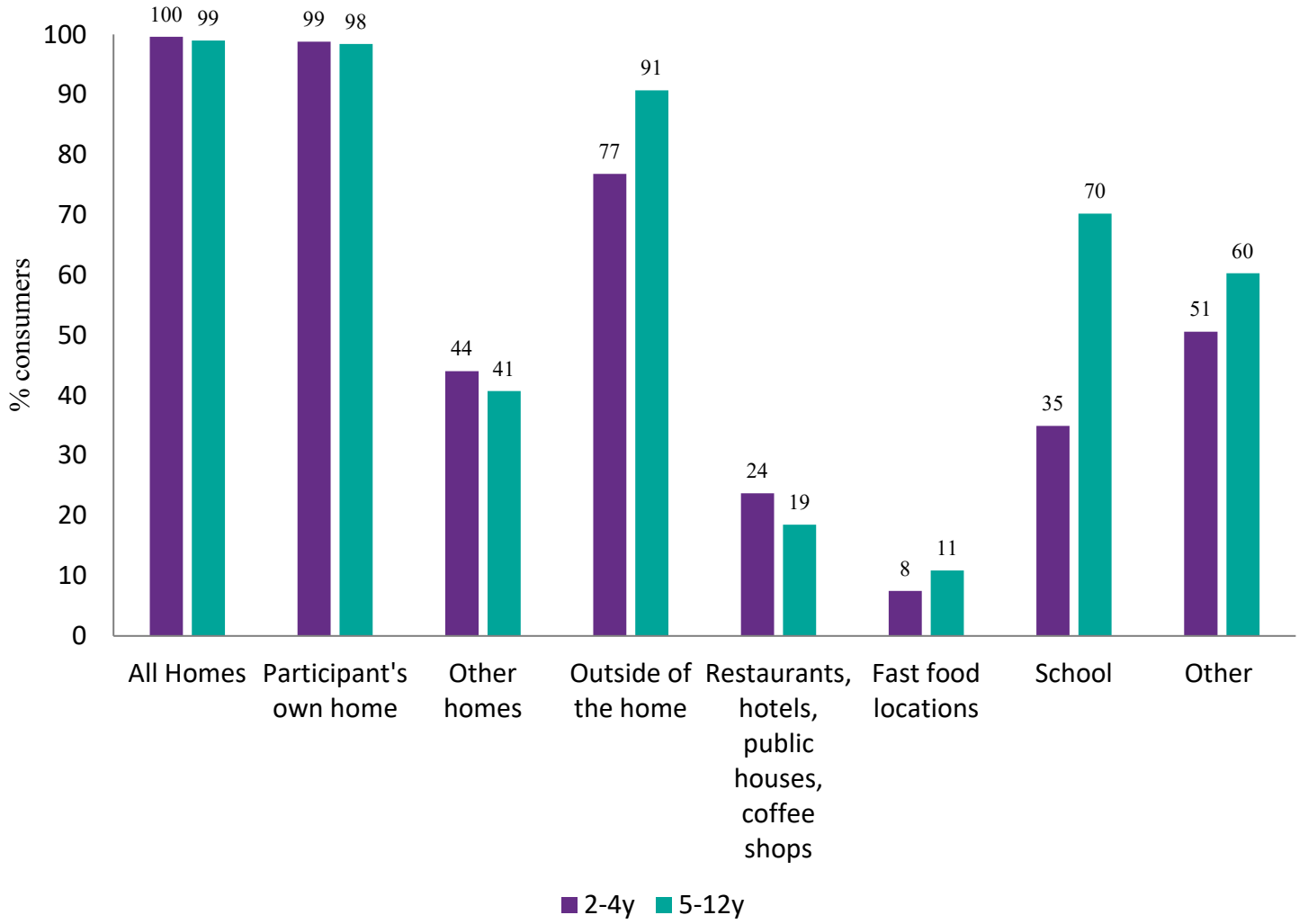
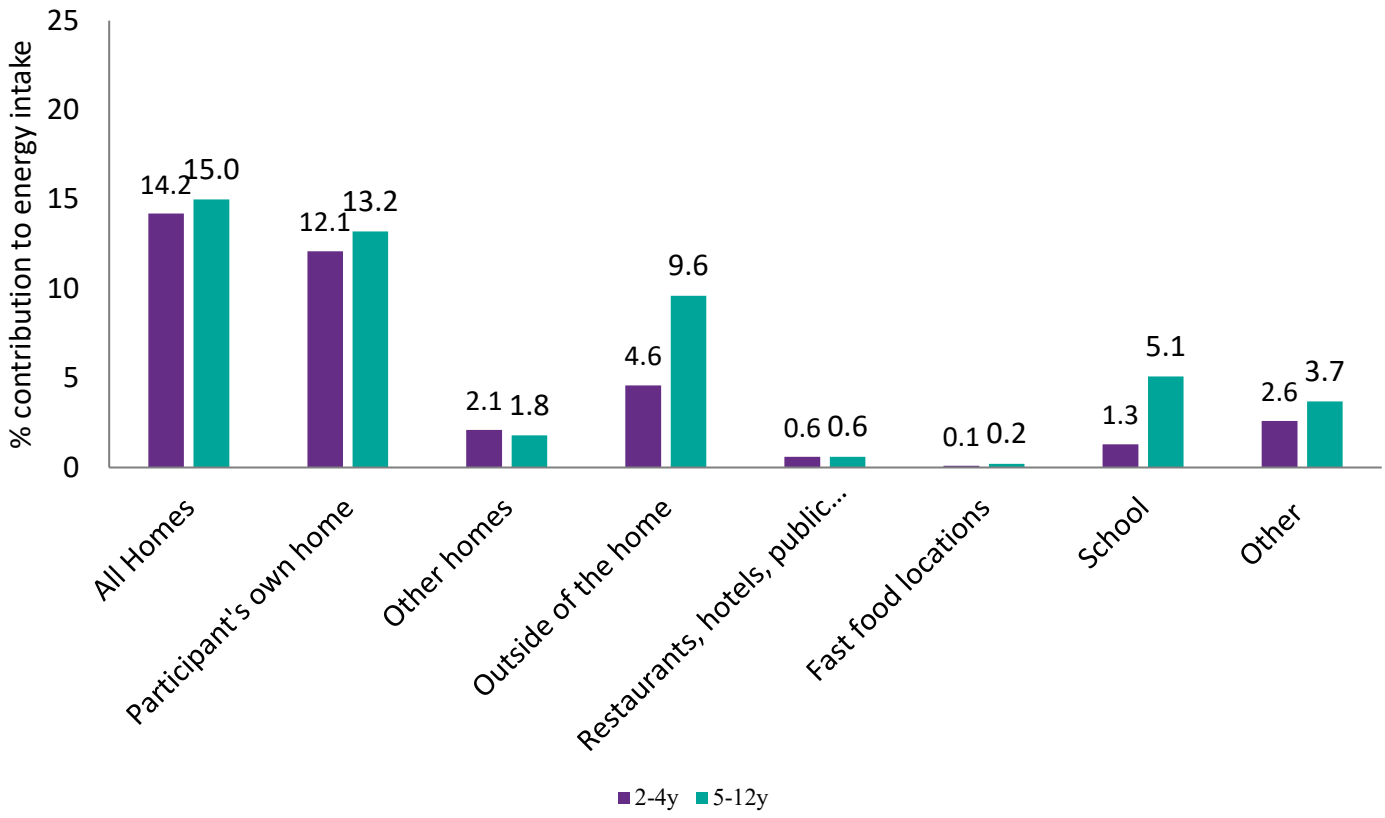


Figure 30. Contribution (%) of treat foods to energy intake in children in NI, by eating location



In NI, among those aged 2-4 years, all children consumed treat foods at home (99% in their own homes and 44% in other people's homes), while 77% of children consumed treat foods outside the home (24% in restaurants, 35% at school and 8% at fast food locations) (**Figure 29**).

Of the 19%E derived from treat foods in 2–4-year-olds, 14.2%E came from the home location (12.1% own home, 2.1% other people's homes) and 4.6%E came from outside the home (1.3% at school, 0.6% at restaurants and 0.1% at fast food locations) (**Figure 28**).

Among those aged 5-12 years, almost all children consumed treat foods at home (98% in their own homes and 41% in other people's homes), while 91% of children consumed treat foods outside the home (19% in restaurants, 70% at school and 11% at fast food locations) (**Figure 29**).

Of the 25%E derived from treat foods in 5-12-year-olds, 15.0%E came from the home location (13.2% own home, 1.8% other people's homes) and 9.6%E came from outside the home (3.7% at school, 0.6% at restaurants and 0.2% at fast food locations) (**Figure 28**).

Differences between low and high consumers of treat foods

Figure 31. Mean daily intake of energy (%E) from treat foods in low and high consumers of treat foods in ROI, by age group

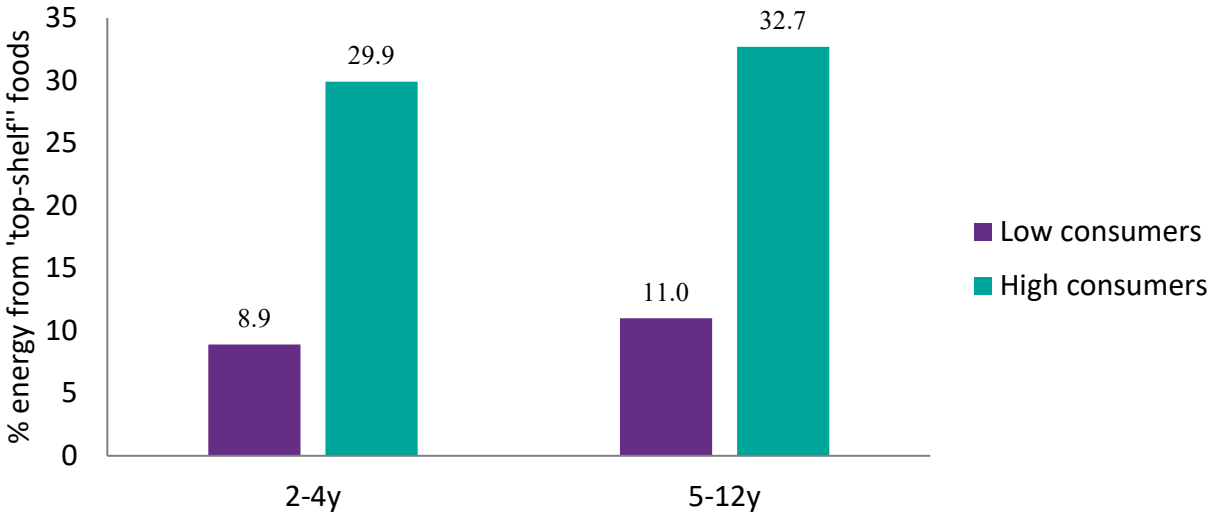


Figure 32. Mean daily intake of macronutrients from treat foods in low and high consumers of treat foods aged 2-4 years in ROI

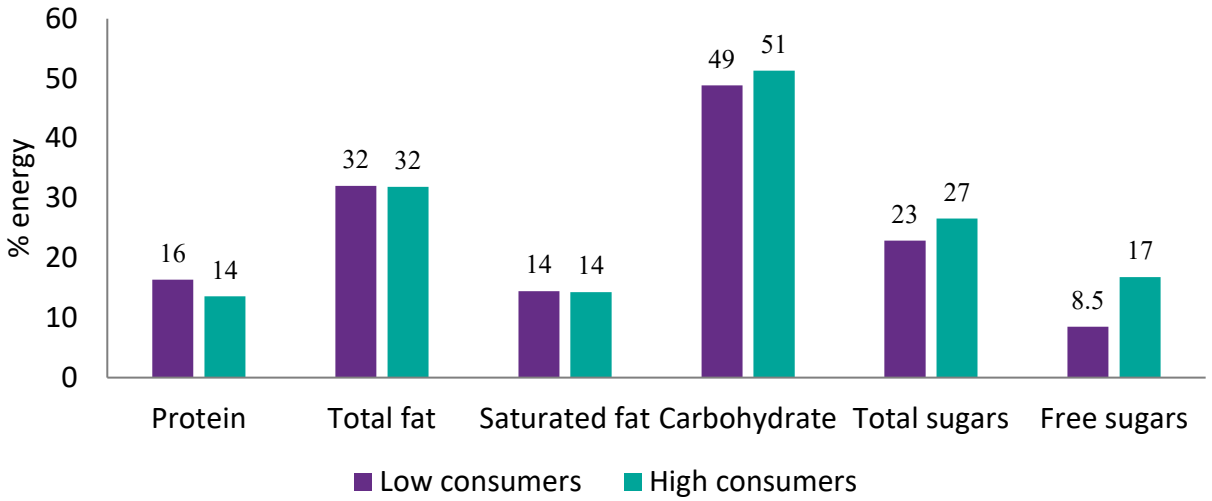
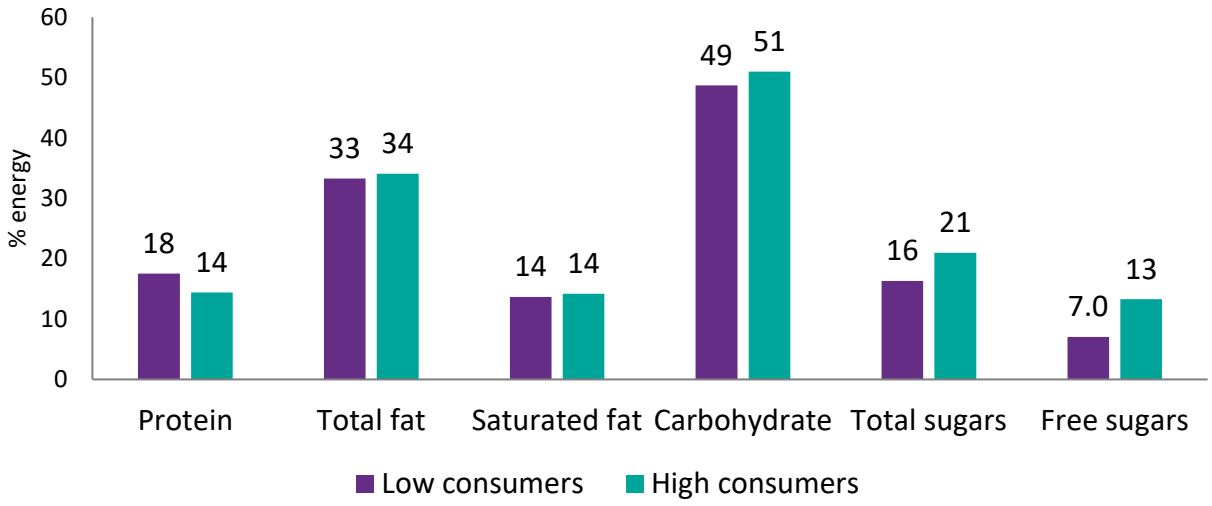


Figure 33. Mean daily intake of macronutrients from treat foods in low and high consumers of treat foods aged 5-12 years in ROI



In Ireland, among those aged 2-4 years there was a significant difference in energy intake from treat foods between low consumers of treat foods (9%E, 99kcal) compared to high consumers of treat foods (30%E, 364kcal) (**Figure 31**). There were no differences in the proportion of boys and girls or in those classified as normal weight or overweight/obese in the high and low treat foods consumer groups (**Table 54**). However, there were less children of professional, non-manual and semi-skilled/unskilled workers and more children of skilled manual workers in the high consumer group compared to the low consumer group. There were more children of parents with intermediate and secondary education and less children of parents with tertiary education in the high consumer group compared to the low consumer group.

Overall, for 2-4-year-olds, high consumers of treat foods had higher intakes of energy, carbohydrate (%E), total and free sugars (%E) and salt, and lower intakes of protein (%E) and dietary fibre (g) (**Figure 32**). With regard to micronutrients, high consumers of treat foods had lower intakes of vitamin A, vitamin D, riboflavin, vitamin B12, pantothenate, potassium, calcium, iron, magnesium, zinc, copper and phosphorous, and higher intakes of vitamin E (attributable to 'savoury snacks' and 'biscuits') and vitamin C (attributable to the fruit juice component of 'squashes and cordials' etc.) (**Table 55**).

Among those aged 5-12 years, there was a significant difference in energy intake from treat foods between low consumers of treat foods (11%E, 163kcal) compared to high consumers of treat foods (33%E, 508kcal) (**Figure 31**). There were no differences in the proportion of boys and girls, 5-8-year-olds and 9-12-year-olds, those classified as normal weight and overweight/obese, or those in different social class or parental education groups, between high and low treat foods consumer groups (**Table 56**). Overall, high consumers of treat foods had higher intakes of carbohydrate (%E) and total and free sugars (%E), and lower intakes of protein (%E) (**Figure 33**), while high consumers of treat foods had lower intakes of thiamine, niacin, vitamin B12, zinc and phosphorous (**Table 57**).

Figure 34. Mean daily intake of energy (%E) from treat foods in low and high consumers of treat foods in NI, by age group

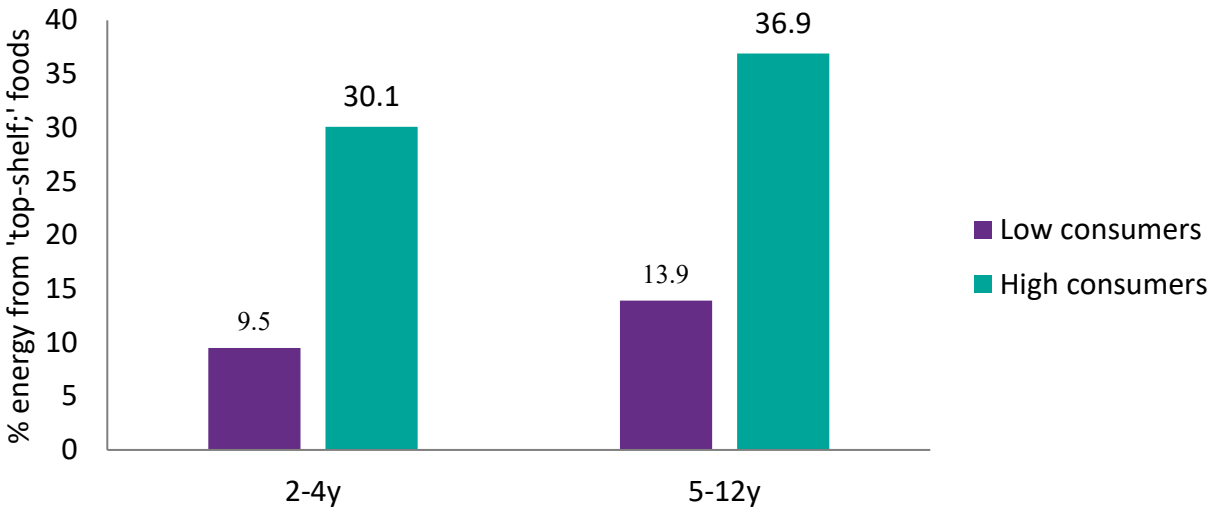


Figure 35. Mean daily intake of macronutrients from treat foods in low and high consumers of treat foods aged 2-4y in NI

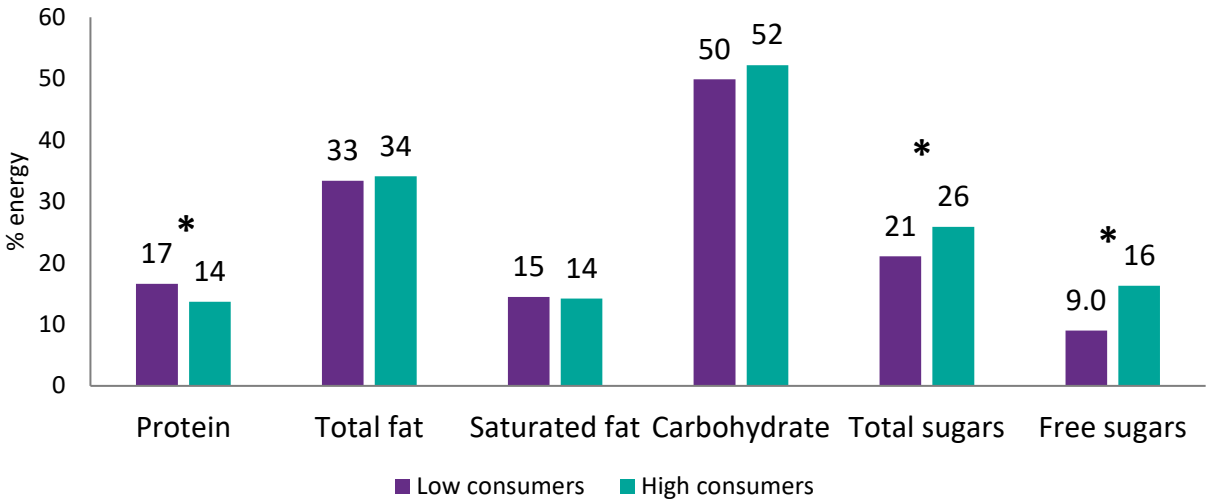
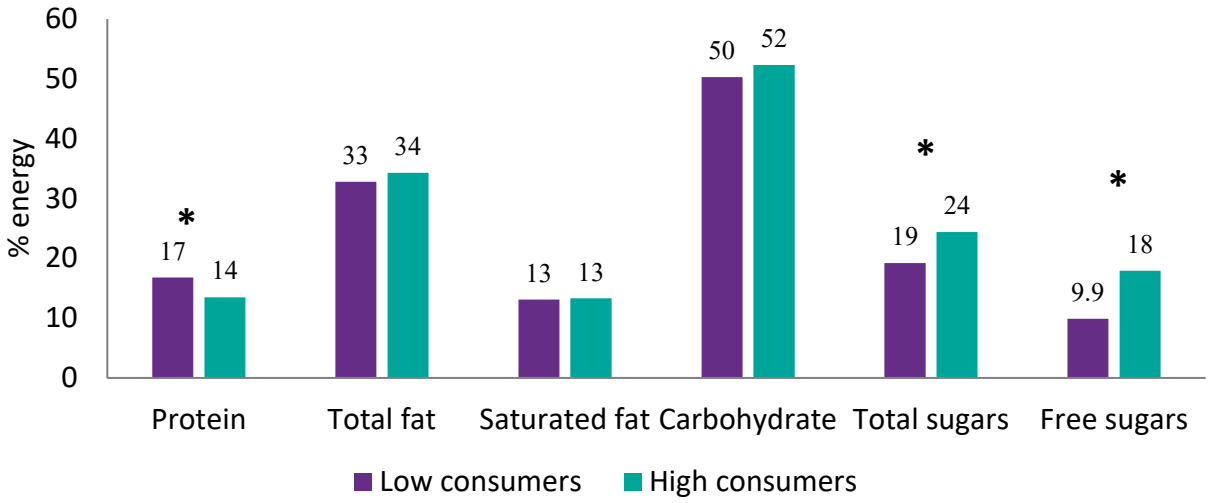


Figure 36. Mean daily intake of macronutrients from treat foods in low and high consumers of treat foods aged 5-12y in NI



In NI, among those aged 2-4 years there was a significant difference in energy intake from treat foods by low consumers of treat foods (9.5%E, 106kcal) compared to high consumers of treat foods (30%E, 372kcal) (**Figure 34**). There were no differences in the proportion of boys and girls, those classified as normal weight and overweight/obese, or those in different social

class or parental education groups, between high and low treat foods consumer groups (**Table 58**). Overall, high consumers of treat foods in this group had higher intakes of total and free sugars (%E) and lower intakes of protein (%E) (**Figure 35**). With regards to micronutrients, high consumers of treat foods had lower intakes of riboflavin, with no other differences noted between groups (**Table 59**).

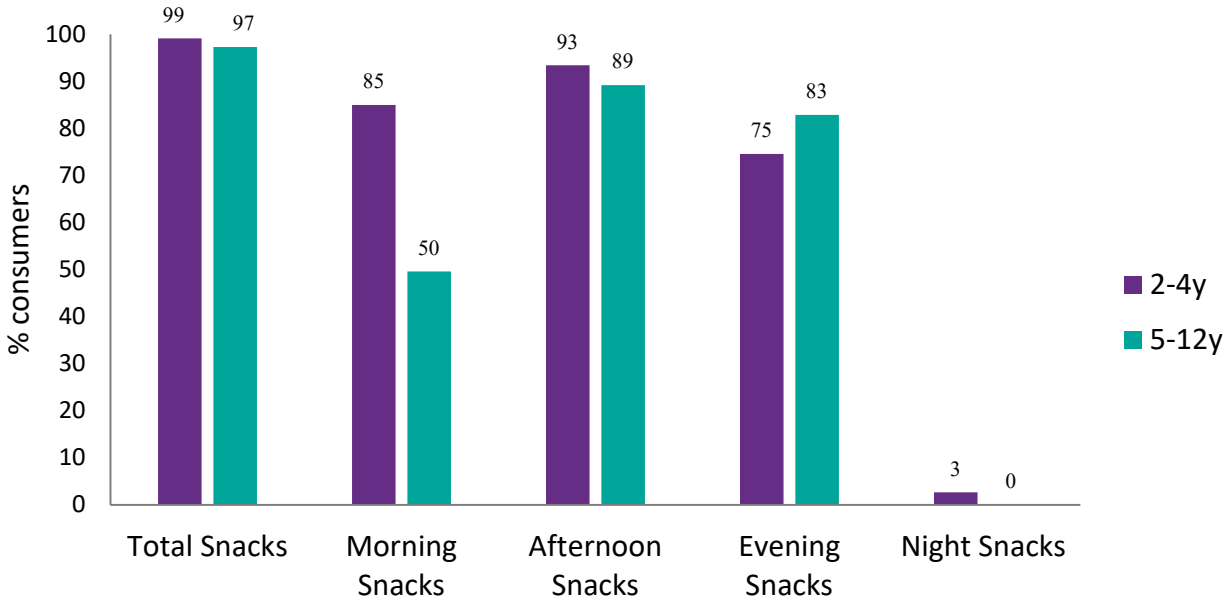
Among those aged 5-12 years there was a significant difference in energy intake from treat foods in the low consumers of treat foods (14%E, 205kcal) compared to high consumers of treat foods (37%E, 618kcal) (**Figure 34**). There were no differences in the proportion of boys and girls, those classified as normal weight and overweight/obese, or those in different social class or parental education groups, between high and low treat foods consumer groups (**Table 60**). Overall, high consumers of treat foods had higher intakes of energy (kcal), Monounsaturated fatty acids (MUFA) (%E), carbohydrate (%E) and total and free sugars (%E), and lower intakes of protein (%E) (**Figure 36**). With regards to micronutrients, high consumers of treat foods had lower intakes of riboflavin, total folate, calcium and zinc, and higher intakes of vitamin E (**Table 61**).

5 Results: Snacks

Patterns of consumption of snacks

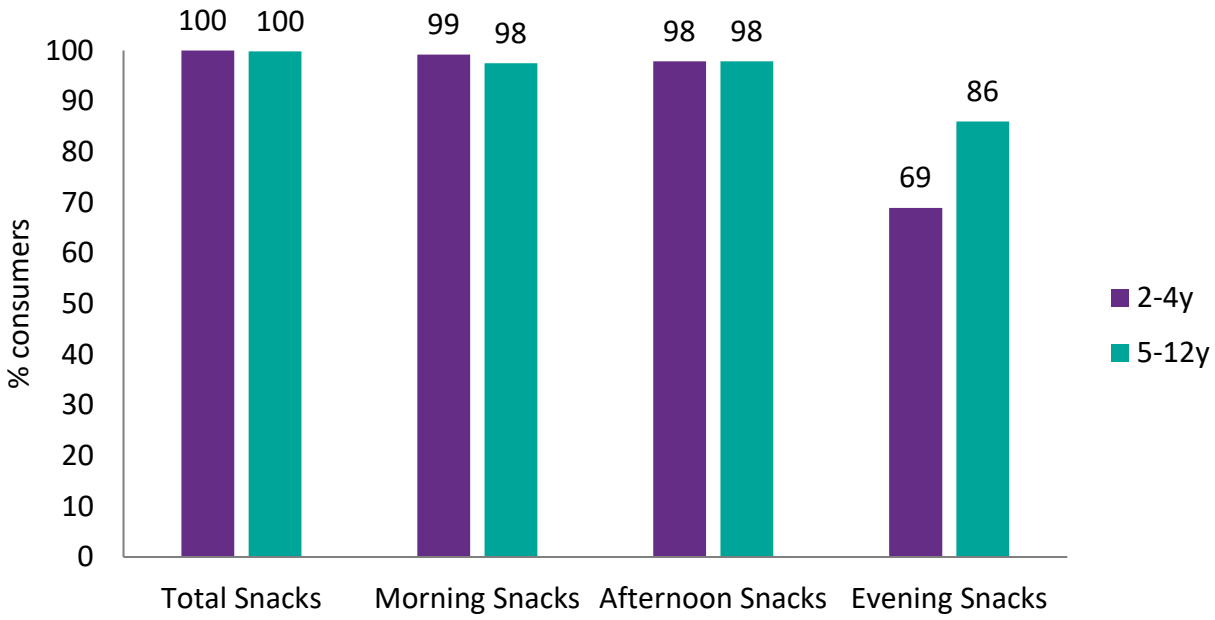
The Food-Based Dietary Guidelines (FBDG) for younger children aged 1-4 years in Ireland recommend that this population group should be offered 3 meals and 2-3 healthy snacks every day. Examples of recommended snacks include fruit, vegetables, yogurt, cereals etc.[22]. However, there are no quantitative guidelines for older children/general population regarding snacking in either Ireland or UK. This study found that almost all children (97-100%) aged 2-4 years and 5-12 years in both Ireland and NI consumed snacks, with varying proportions consuming morning, afternoon, evening or night snacks (**Figures 37-38**). The types of foods and beverages most commonly consumed as snacks were 'fruit', 'biscuits', 'chocolate', 'sweets', 'cakes and buns', 'savoury snacks' and 'water', 'milk' and 'soft drinks' for children aged 2-4 years and 5-12 years in both Ireland and NI. Further,2-4 year olds also commonly consumed 'yogurt and fromage frais', 'breads' and 'fruit juices' as snacks.

Figure 37. Proportion (%) of children consuming snacks in ROI



In Ireland, almost all children (97-99%) aged 2-4 years and 5-12 years consumed snacks, with no difference in the proportion of children consuming total snacks between those aged 5-8 years (96%) and 9-12 years (99%) (**Figure 37, Table 62**). Among those aged 2-4 years, 85% consumed morning snacks, 93% consumed afternoon snacks, 75% consumed evening snacks and 3% consumed night snacks. Among those aged 5-12 years, 50% consumed morning snacks, 89% consumed afternoon snacks and 83% consumed evening snacks (with no night snacks consumed among this age group).

Figure 38. Proportion (%) of children consuming snacks in NI



In NI, all children (100% for both 2-4-year-olds and 5-12-year-olds) consumed snacks, with no difference in the proportion of children consuming total snacks between those aged 5-8 years and 9-12 years (100% for both groups) (**Figure 38, Table 63**). Among those aged 2-4 years, 99% consumed morning snacks, 98% consumed afternoon snacks and 69% consumed evening snacks. Among those aged 5-12 years, 98% consumed morning snacks and afternoon snacks, and 86% consumed evening snacks.

Differences in patterns of consumption of snacks

Differences by sex

Almost all children in both Ireland and NI consumed snacks regardless of sex, and overall there were very few differences in the proportion of boys and girls consuming snacks of any type (**Tables 63 and 64**).

In Ireland, there were no differences in the proportion of boys and girls consuming total, morning, afternoon or evening snacks at any age (2-4y, 5-12y, 5-8y, 9-12y) (**Table 63**). However, among those aged 2-4 years, more girls (5%) consumed night snacks than boys (<1%).

In NI, there were no differences in the proportion of boys and girls consuming total, morning, afternoon or evening snacks at any age (2-4y, 5-12y, 5-8y or 9-12y) (**Table 64**).

Differences by social class

Most children (95-100%) in both Ireland and NI consumed snacks regardless of social class grouping and there were no differences in the proportion of children consuming total snacks by social class (**Tables 66 and 67**). While there were some differences in the proportion of children consuming snacks (by time of day) between social class groups in Ireland, there was no clear pattern by social class gradient.

In Ireland, among those aged 2-4 years, more children of professional and non-manual workers (89% for both groups) consumed morning snacks compared to children of skilled manual and semi-skilled/unskilled workers (77-82%) (**Table 66**). More children of professional workers consumed afternoon snacks (98%) compared to all other groups (91-92% across groups). More children of non-manual and skilled manual workers consumed evening snacks (79-81%) compared to children of professional workers (69%). More children of professional workers consumed night snacks (5%) compared to children of skilled manual workers (2%).

Among those aged 5-12 years, there were no differences in the proportion of children consuming morning, afternoon or evening snacks across social class groups (**Table 66**).

In NI, there were no differences in the proportion of children aged 2-4 years or 5-12 years consuming morning, afternoon or evening snacks across social class groups (**Table 67**).

Differences by parental education

Data regarding parental education level was available for Ireland surveys only and there was no difference in the proportion of children consuming total snacks by parental education level for 2-4-year-olds or 5-12-year-olds (**Table 68**). As with social class, there were some differences observed in the proportion of children consuming snacks (by time of day) between parental education groups; however, there was no clear pattern by parental education gradient.

Among those aged 2-4 years, more children of parents with secondary and tertiary education (85-89%) consumed morning snacks compared to children of parents with intermediate education (75%) (**Table 68**). More children of parents with an intermediate education consumed afternoon snacks (100%) compared to children of parents with tertiary education (93%). More children of parents with a tertiary education consumed evening snacks (77%) compared to children of parents with intermediate or secondary education (64-65%). There were no differences in the proportion of children consuming night snacks across parental education groups.

Among those aged 5-12 years, there were no differences in the proportion of children consuming morning, afternoon or evening snacks across parental education groups (**Table 68**).

Differences by weight status

Overall there were very few differences in the proportion of children classified as normal weight or overweight/obese consuming snacks of any type (**Tables 69 and 70**).

In Ireland, among those aged 2-4 years, there were no differences in the proportion of children consuming total, morning, afternoon or night snacks when compared by BMI classification (**Table 69**). However, more children classified as normal weight (77%) consumed evening snacks compared to those classified as overweight/obese (67%).

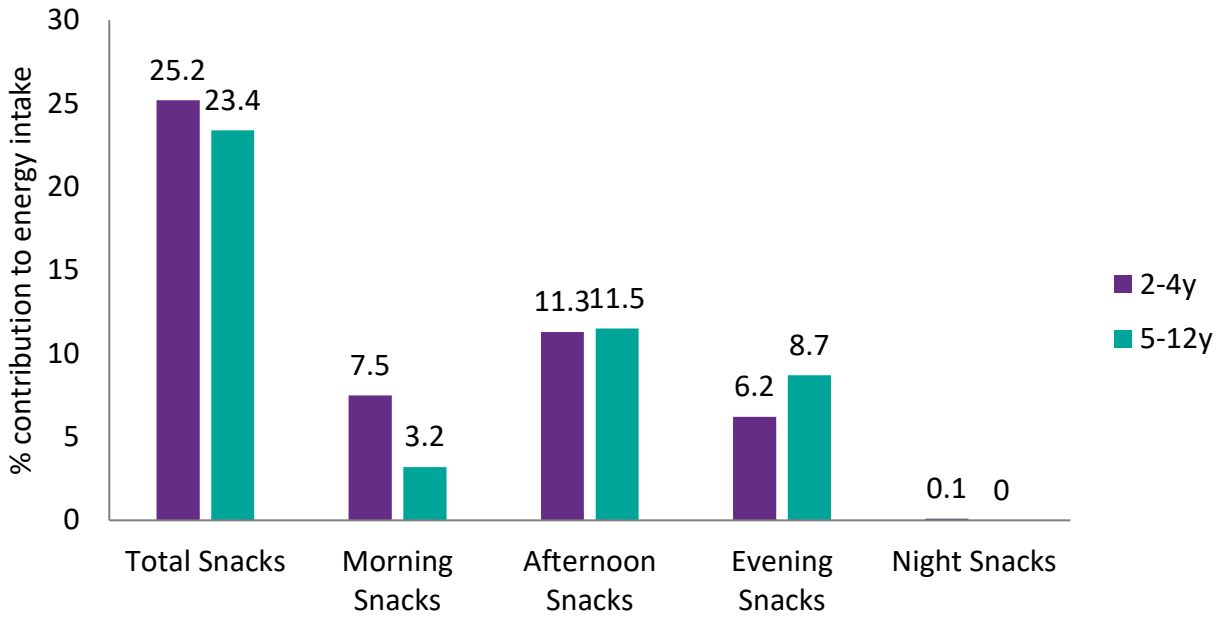
Among those aged 5-12 years, there were no differences in the proportion of children consuming total, morning, afternoon, evening or night snacks when compared by BMI classification (**Table 69**).

In NI, there were no differences in the proportion of children aged 2-4 years or 5-12 years consuming snacks by BMI classification (**Table 70**).

Contribution of snacks to energy intake

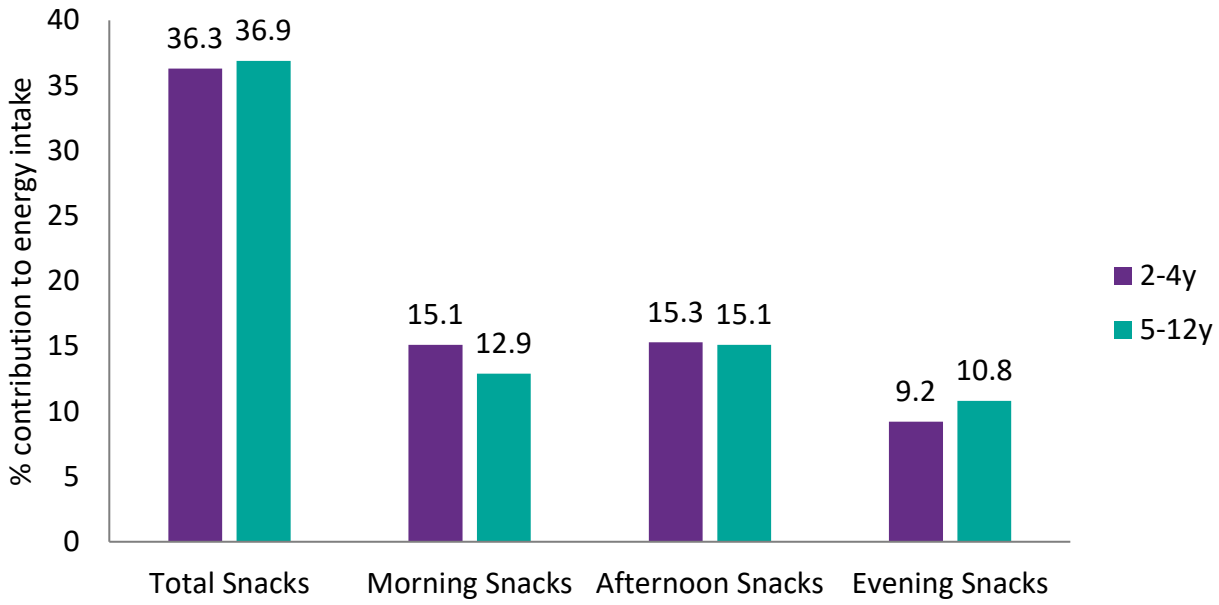
Overall, in Ireland, snacks contributed approximately one-quarter of the mean daily intake of energy for 2-4-year-olds (25%E) and 5-12-year-olds (23%E), while in NI, snacks contributed over one-third of the mean daily intake of energy (attributable to the differing methodology) for both 2-4-year-olds (36%E) and 5-12-year-olds (37%E).

Figure 39. Contribution (%) of snacks to energy intake in children in ROI, by age group



In Ireland, among those aged 2-4y years, snacks contributed 25% of energy intake (304kcal), of which 11% came from afternoon snacks (136kcal), 8% from morning snacks (90kcal), 6% from evening snacks (77kcal) and <1% from night snacks (2kcal) (**Figure 39, Table 71**). Among those aged 5-12 years, snacks contributed 23% of energy intake (360kcal), of which 12% came from afternoon snacks (176kcal), 9% from evening snacks (135kcal) and 3% from morning snacks (49kcal) (**Figure 39, Table 71**). There were no differences in the proportion of energy obtained from any snacks between those aged 5-8 years and 9-12 years (**Table 71**).

Figure 40. Contribution (%) of snacks to energy intake in children in NI, by age group



In NI, among those aged 2-4 years, snacks contributed 36% of energy intake (432kcal), of which 15% came from afternoon snacks (178kcal), 15% from morning snacks (176kcal) and 9% from evening snacks (77kcal) (**Figure 40, Table 71**). Among those aged 5-12 years, snacks contributed 37% of energy intake (587kcal), of which 15% came from afternoon snacks (237kcal), 13% from morning snacks (196kcal) and 9% from evening snacks (154kcal) (**Figure 40, Table 71**). There were no differences in the proportion of energy obtained from any snacks between those aged 5-8 years and 9-12 years (**Table 71**).

Differences in the contribution of snacks to energy intake

The contribution of snacks to the mean daily intake of energy by age, sex, social class, parental education and weight status was examined for Ireland and NI and is presented in **Tables 71-88**.

Differences by sex

Overall, there were no differences in the contribution of total snacks to energy intake in boys and girls for those aged 2-4 years or 5-12 years in both Ireland and NI (**Tables 82 and 83**).

In Ireland, among those aged 2-4 years, boys had a higher energy intake from morning snacks (7.9%E) compared to girls (7.2%E) and a lower energy intake from afternoon snacks (10.9 vs 11.8%E, respectively) and night snacks (0.0 vs 0.3%E, respectively) (**Table 82**). There were no differences in energy intake from snacks (of any type) between boys and girls aged 5-12 years, 5-8 years or 9-12 years (**Table 82**).

In NI, there were no differences in energy intake from snacks (of any type) between boys and girls at any age (**Table 83**).

Differences by social class

Overall, there were no differences in the contribution of total snacks to energy intake by social class group for those aged 5-12 years in Ireland and for those aged 2-4 years and 5-12 years in NI (**Tables 84 and 85**). However, among those aged 2-4 years in Ireland, children of professional, non-manual and skilled manual workers had a higher energy intake from total snacks (25-27%E) compared to children of semi-skilled/unskilled workers (22%) (**Table 84**). While there were some differences in the contribution of snacks (by time of day) to energy intake between social class groups in Ireland, there was no clear pattern by social class gradient.

In Ireland, among those aged 2-4 years, children of professional and non-manual workers had higher energy intakes from morning snacks (8%) compared to children of semi-skilled/unskilled workers (6.5%) (**Table 84**). Children of professional and skilled manual workers had higher energy intakes from afternoon snacks (12-13%) compared to children of non-manual (10.5%) and semi-skilled/unskilled workers (9%). Children of non-manual, skilled manual and semi-skilled/unskilled workers had higher energy intakes from evening snacks (6-7%) compared to children of professional workers (5%).

Among those aged 5-12 years, there were no differences in the proportion of energy obtained from afternoon or evening snacks between social class groups (**Table 84**). However, children of professional workers and non-manual workers had higher energy intakes from morning snacks (3.5%) compared to children of semi-skilled/unskilled workers (1.8%).

In NI, there were no differences in energy intake from snacks (of any type) between social class groups at any age (**Table 85**).

Differences by parental education

Data regarding parental education level was available for Ireland surveys only and there was no difference in the contribution of total snacks to energy intake by parental education group for 5-12-year-olds. However, for 2-4-year-olds, children of parents with intermediate education had a higher intake of energy from total snacks (32%) compared to children of parents with secondary and tertiary education (25% for both groups) (**Table 86**). As with social class, there were some differences in the proportion of energy obtained from snacks (by time of day) between parental education groups; however, there was no clear pattern by parental education gradient.

Among those aged 2-4 years, children of parents with intermediate and secondary education had a higher energy intake from morning snacks (9-10%) compared to children of parents with tertiary education (7%) (**Table 86**). Children of parents with intermediate education had a higher intake of energy from afternoon snacks (16%) compared to children of parents with secondary and tertiary education (11% for both groups). Children of parents with intermediate and tertiary education had a higher energy intake from evening snacks (6-7%) compared to children of parents with secondary education (5%). There were no differences in the proportion of energy obtained from night snacks between parental education groups.

Among those aged 5-12 years, there were no differences in the contribution of morning, afternoon or evening snacks to energy intake by parental education groups (**Table 86**).

Differences by weight status

Overall, there were no differences in the contribution of total snacks to energy intake by social class group for those aged 5-12 years in Ireland and for those aged 2-4 years and 5-12 years in NI (**Tables 87 and 88**). However, among those aged 2-4 years in Ireland, children

classified as normal weight had a higher energy intake from total snacks (26%E) compared to children classified as overweight/obese (**Table 87**).

In Ireland, among those aged 2-4 years, there were no differences in the contribution of morning, afternoon or night snacks to energy intake by BMI classification. However, children classified as normal weight had a higher energy intake from evening snacks (7%E) compared to children classified as overweight/obese (4%E) (**Table 87**).

Among those aged 5-12 years, there were no differences in the contribution of morning, afternoon or evening snacks to energy intake by BMI classification (**Table 87**).

In NI, there were no differences in the contribution of morning, afternoon or evening snacks to energy intake by BMI classification for either 2–4-year-olds or 5-12-year-olds (**Table 88**).

Contribution of snacks to nutrient intakes

The contribution of snacks to the mean daily intake of nutrients is displayed in **Tables 89 and 90** for ROI and **Tables 91 and 92** for NI.

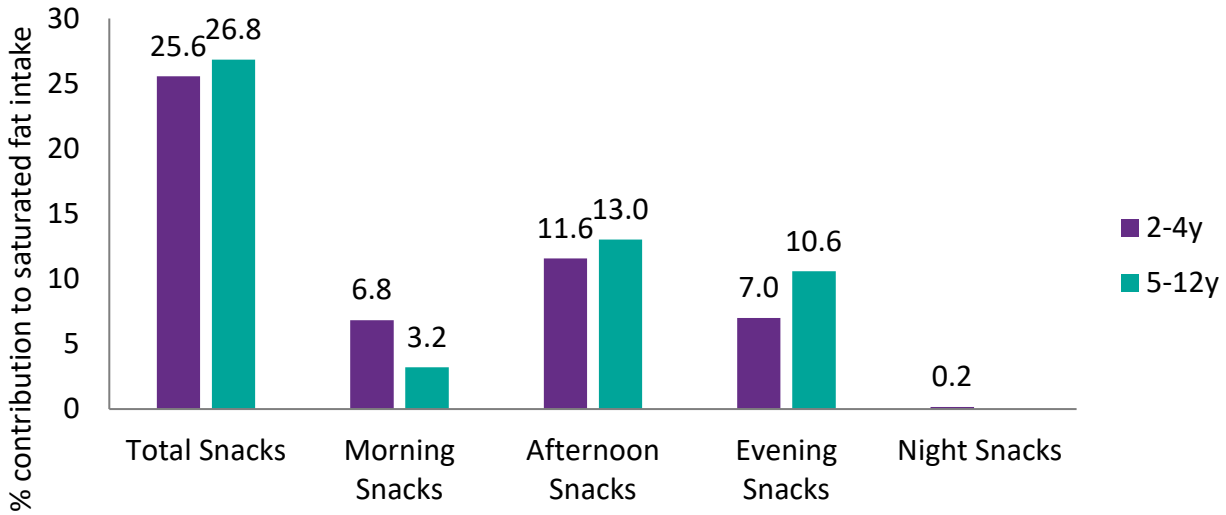
In Ireland, snacks contributed approximately one-quarter of energy intake for 2-4-year-olds (25%E) and 5-12-year-olds (23%E). Snacks also contributed to significant proportions of protein (16-17%), total fat (24-25%), saturated fat (26-27%), MUFA (24%), PUFA (21-24%), carbohydrate (25-29%), total sugars (34-37%), free sugars (38-40%), dietary fibre (20-26%) and salt (19%). Snacks also made important contributions to intakes of vitamin A (15-16%), vitamin D (14-18%), vitamin E (22-27%), thiamin (16-18%), riboflavin (18-19%), niacin (13-15%), vitamin B6 (15-18%), vitamin B12 (16%), pantothenate (16-18%), biotin (20%), DFE (16-17%), vitamin C (20-27%), potassium (19-24%), calcium (21-23%), iron (17-18%), magnesium (20-23%) and zinc (16-18%).

In NI, snacks contributed over one-third of energy intake for both 2-4-year-olds (36%) and 5-12-year-olds (37%E). Snacks also contributed to significant proportions of protein (31%), total fat (36-37%), saturated fat (38-39%), MUFA (35-36%), carbohydrate (38%), total sugars (46-47%), free sugars (45-46%), dietary fibre (32-33%) and salt (31-33%). Snacks also made important contributions to intakes of vitamin A (37-38%), vitamin D (45-46%), vitamin E (38%), thiamin (32-33%), riboflavin (38-40%), niacin (30%), vitamin B6 (35-36%), vitamin B12 (35-37%), pantothenate (36-37%), biotin (38-39%), total folate (34%), vitamin C (41-43%), potassium (34-35%), calcium (39%), iron (32-33%), magnesium (35%) and zinc (32%).

The contributions of snacks to intakes of saturated fat, free sugars and salt are discussed in more detail below.

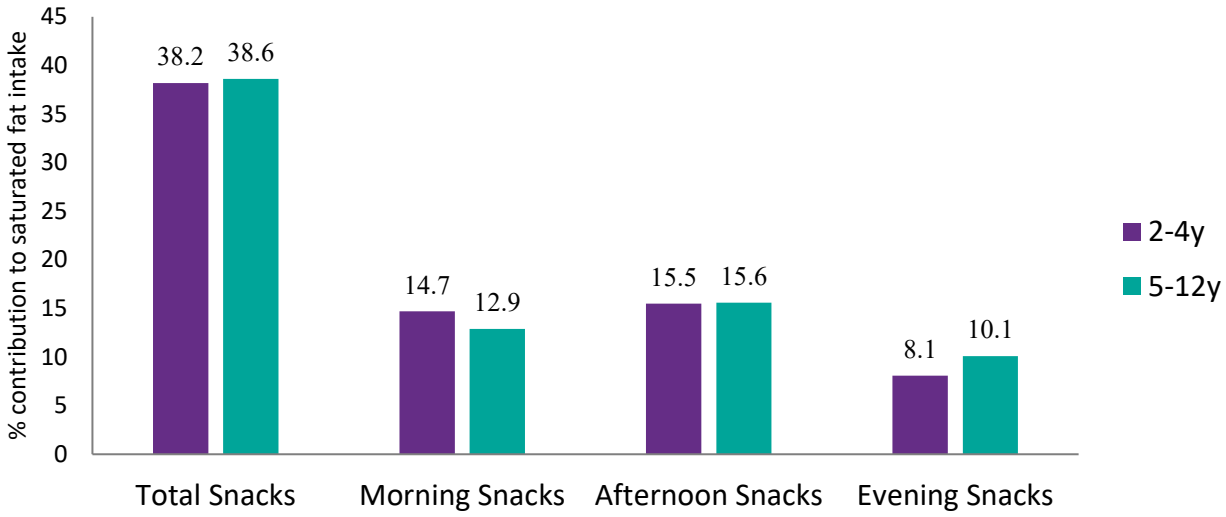
Contribution of snacks to saturated fat intake

Figure 41. Contribution (%) of snacks to saturated fat intake in children in ROI, by age group



In Ireland, for those aged 2-4 years, snacks contributed 26% of saturated fat intake, of which 12% came from afternoon snacks, 7% from both morning and evening snacks, and <1% from night snacks (**Figure 41**). For those aged 5-12 years, snacks contributed 27% of saturated fat intake, of which 13% came from afternoon snacks, 11% from evening snacks, and 3% from morning snacks (**Figure 41**).

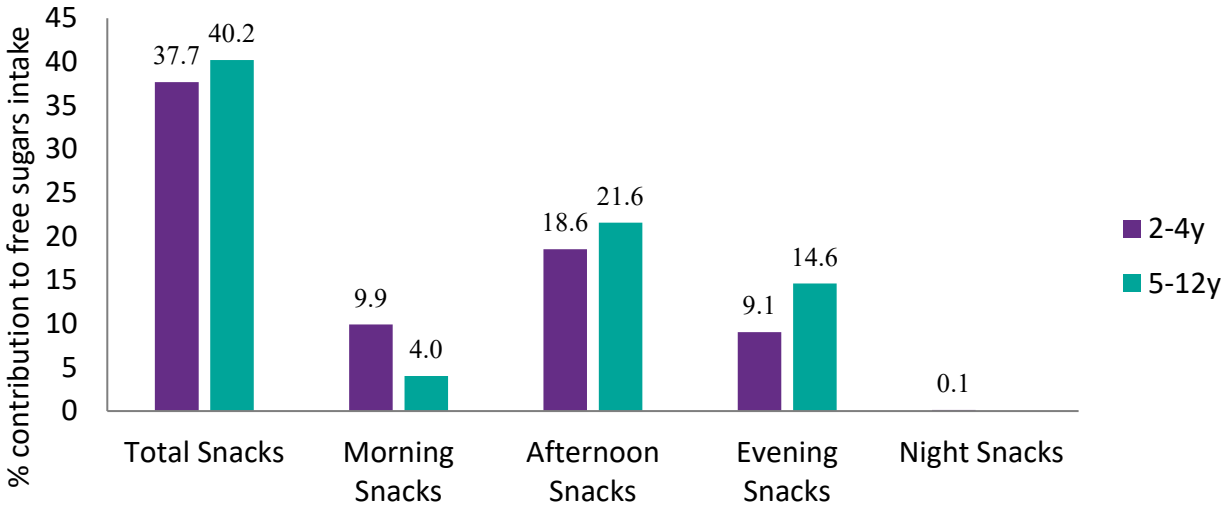
Figure 42. Contribution (%) of snacks to saturated fat intake in children in NI, by age group



In NI, for those aged 2-4 years, snacks contributed 38% of saturated fat intake, of which 16% came from afternoon snacks, 15% from morning snacks, and 8% from evening snacks (**Figure 42**). For those aged 5-12 years, snacks contributed 39% of saturated fat intake, of which 16% came from afternoon snacks, 13% from morning snacks, and 10% from evening snacks (**Figure 42**).

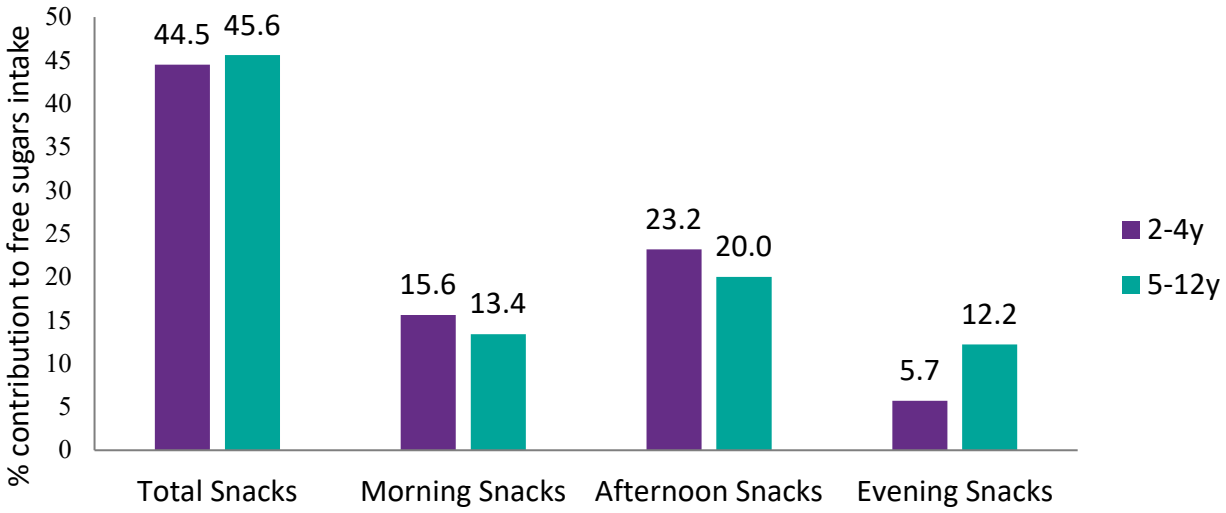
Contribution of snacks to free sugars intake

Figure 43. Contribution (%) of snacks to free sugars intake in children in ROI, by age group



In Ireland, for those aged 2-4 years, snacks contributed 38% of free sugars intake, of which 19% came from afternoon snacks, 10% from morning snacks, 9% from evening snacks, and <1% from night snacks (**Figure 43**). For those aged 5-12 years, snacks contributed 40% of free sugars intake, of which 22% came from afternoon snacks, 15% from evening snacks, and 4% from morning snacks (**Figure 43**).

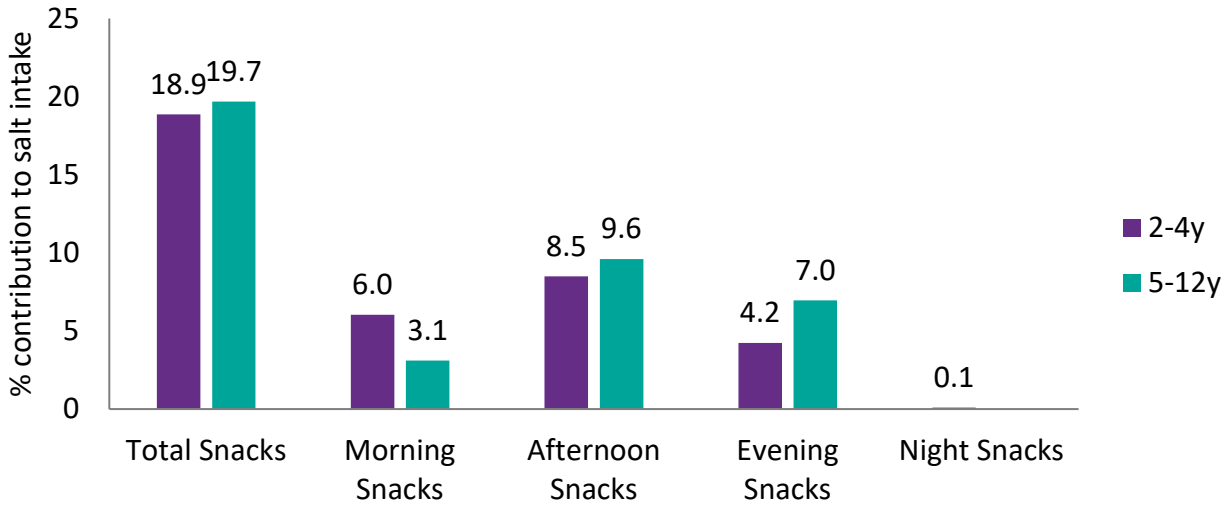
Figure 44. Contribution (%) of snacks to free sugars intake in children in NI, by age group



In NI, for those aged 2-4 years, snacks contributed 45% of free sugars intake, of which 23% came from afternoon snacks, 16% from morning snacks, and 6% from evening snacks (**Figure 44**). For those aged 5-12 years, snacks contributed 46% of free sugars intake, of which 20% came from afternoon snacks, 13% from morning snacks, and 12% from evening snacks (**Figure 44**).

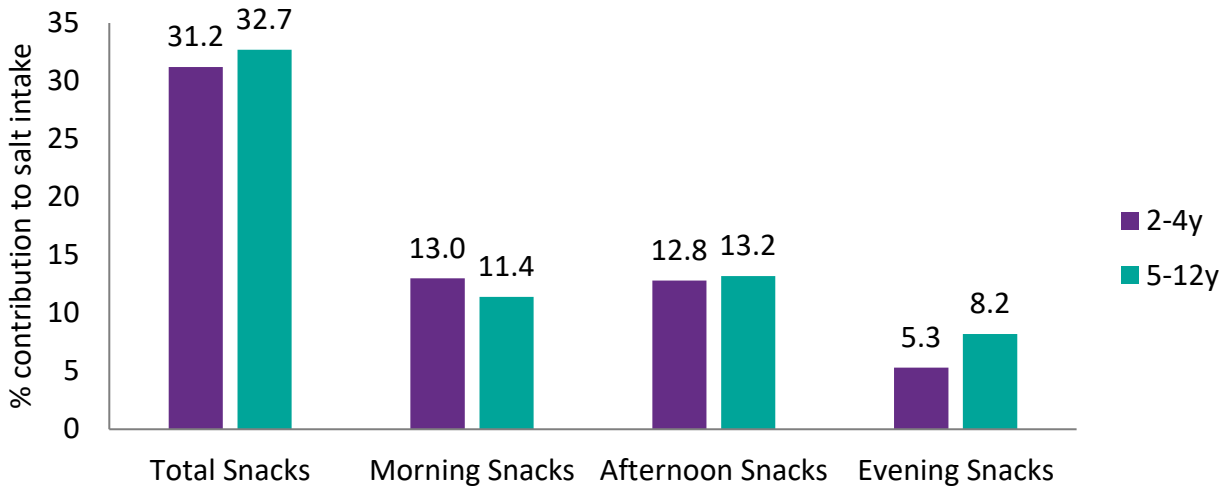
Contribution of snacks to salt intake

Figure 45. Contribution (%) of snacks to salt intake in children in ROI, by age group



In Ireland, snacks contributed 19% of salt intake for those aged 2-4 years, of which 9% came from afternoon snacks, 6% from morning snacks, 4% from evening snacks, and <1% from night snacks (**Figure 45**). For those aged 5-12 years, snacks contributed 20% of salt intake, of which 10% came from afternoon snacks, 7% from evening snacks, and 3% from morning snacks (**Figure 45**).

Figure 46. Contribution (%) of snacks to salt intake in children in NI, by age group



In NI, for those aged 2-4 years, snacks contributed 31% of salt intake, of which 13% came from both morning and afternoon snacks, and 5% from evening snacks (**Figure 46**). For those aged 5-12 years, snacks contributed 33% of salt intake, of which 13% came from afternoon snacks, 11% from morning snacks, and 8% from evening snacks (**Figure 46**).

Snack consumption by day of the week

Figure 47. Proportion (%) of children consuming snacks in ROI, by day of the week

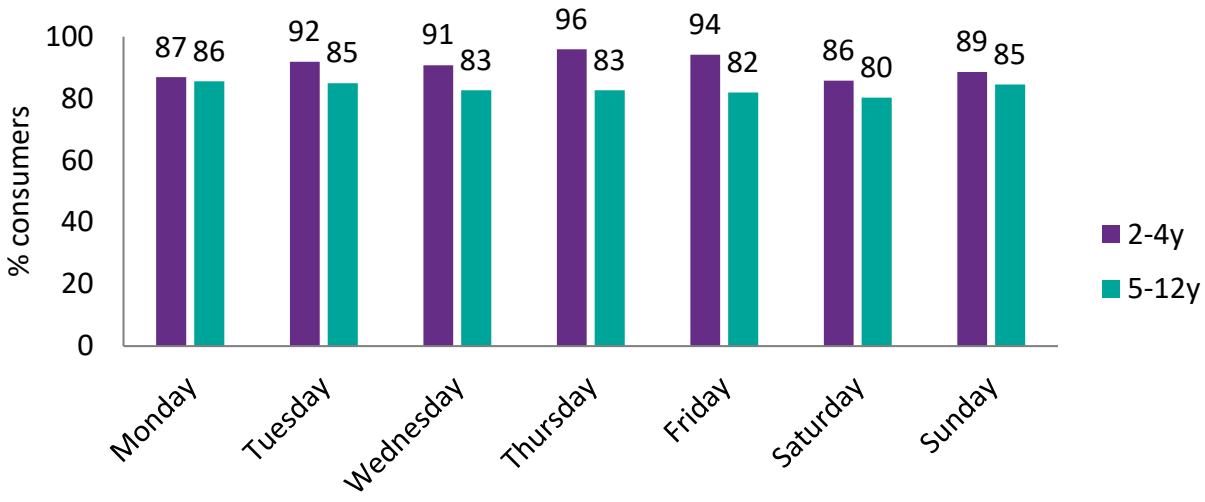
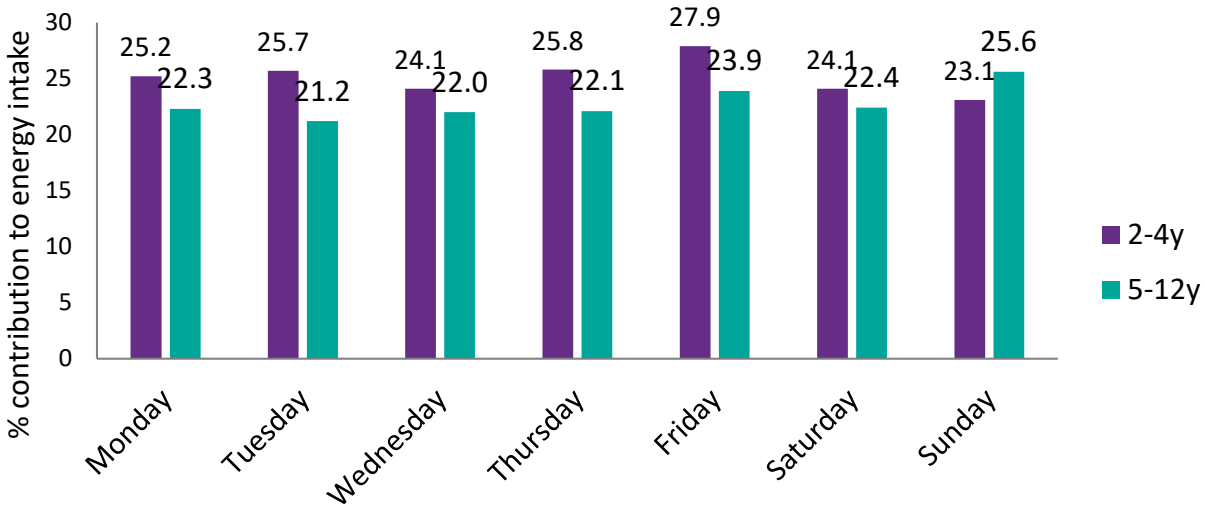


Figure 48. Contribution (%) of snacks to energy intake in ROI, by day of the week



In Ireland, over 80% of children aged 2-4 years and 5-12 years consumed snacks on each day of the week. Generally, a higher number of younger children (2-4 years) consumed snacks on

each day than older children (5-12 years) (**Figure 47**). Among those aged 2-4 years, snacks contributed 25-26%E on Monday-Thursday, 28%E on Friday, and 23-24%E on Saturday and Sunday. Among those aged 5-12 years, snacks contributed 21-22%E on Monday-Thursday, 24%E on Friday, 22%E on Saturday and 26%E on Sunday (**Figure 48**).

Data regarding school day/non-school day patterns of consumption are available for those aged 5-12 years in Ireland only. These data have shown that 96% of children consumed snacks on school days (contributing to 23%E), and 100% consumed snacks on non-school days (contributing to 28%E) (**Tables 93-95**).

Figure 49. Proportion (%) of children consuming snacks in NI, by day of the week

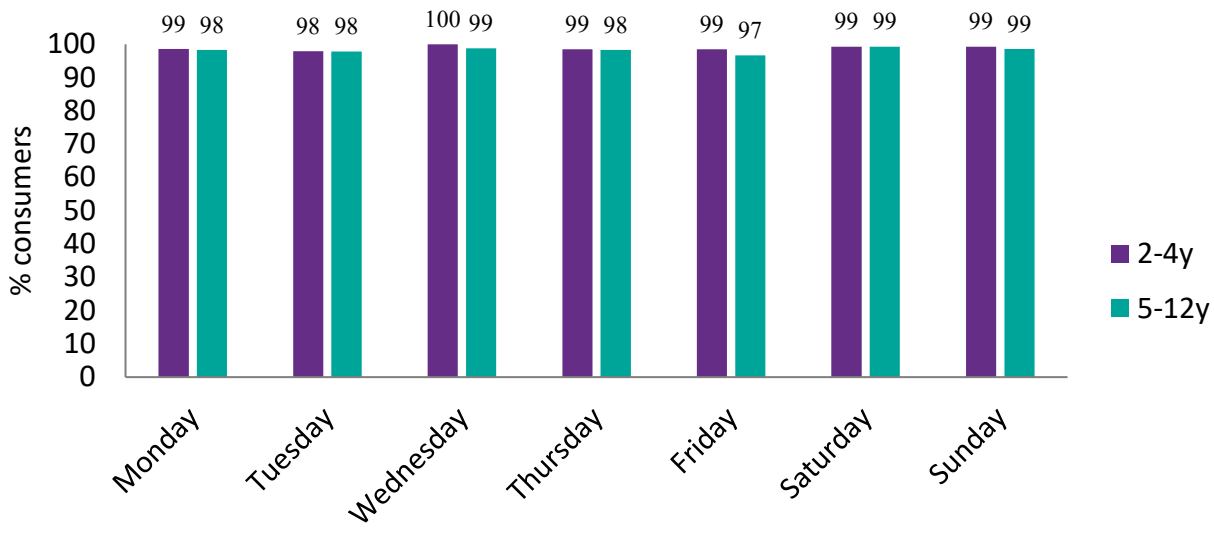
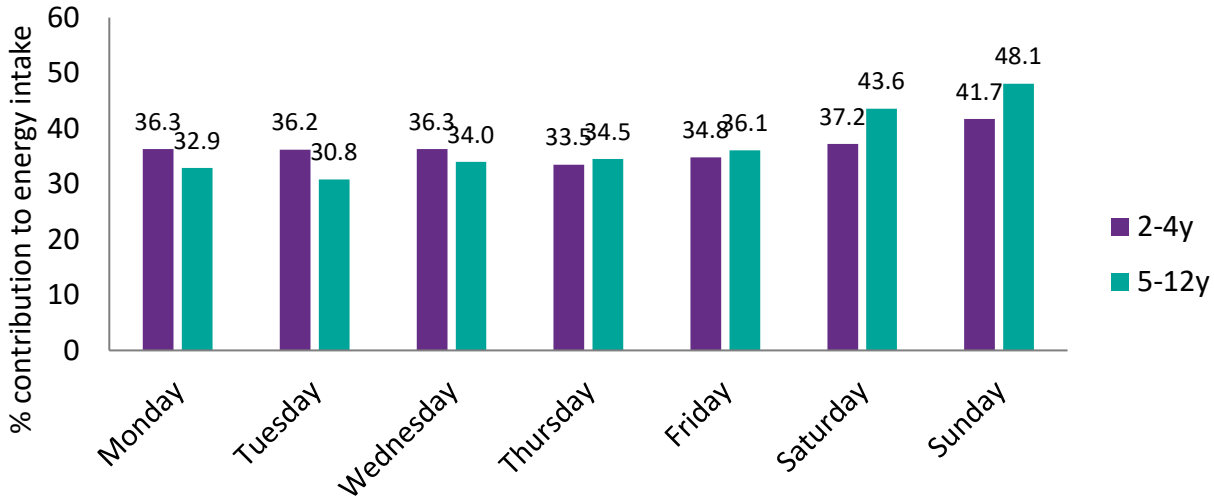


Figure 50. Contribution (%) of snacks to energy intake in NI, by day of the week



In NI, over 97% of children aged 2-4 years and 5-12 years consumed snacks on each day of the week (**Figure 49**). Among those aged 2-4 years, snacks contributed 35-36%E on Monday-Friday and 37-42%E on Saturday and Sunday. Among those aged 5-12 years, snacks contributed 31-36%E on Monday-Friday and 44-48%E on Saturday and Sunday (**Figure 50**).

Snack consumption by eating location

Figure 51. Proportion (%) of 5-12 year old children consuming snacks in ROI, by eating location

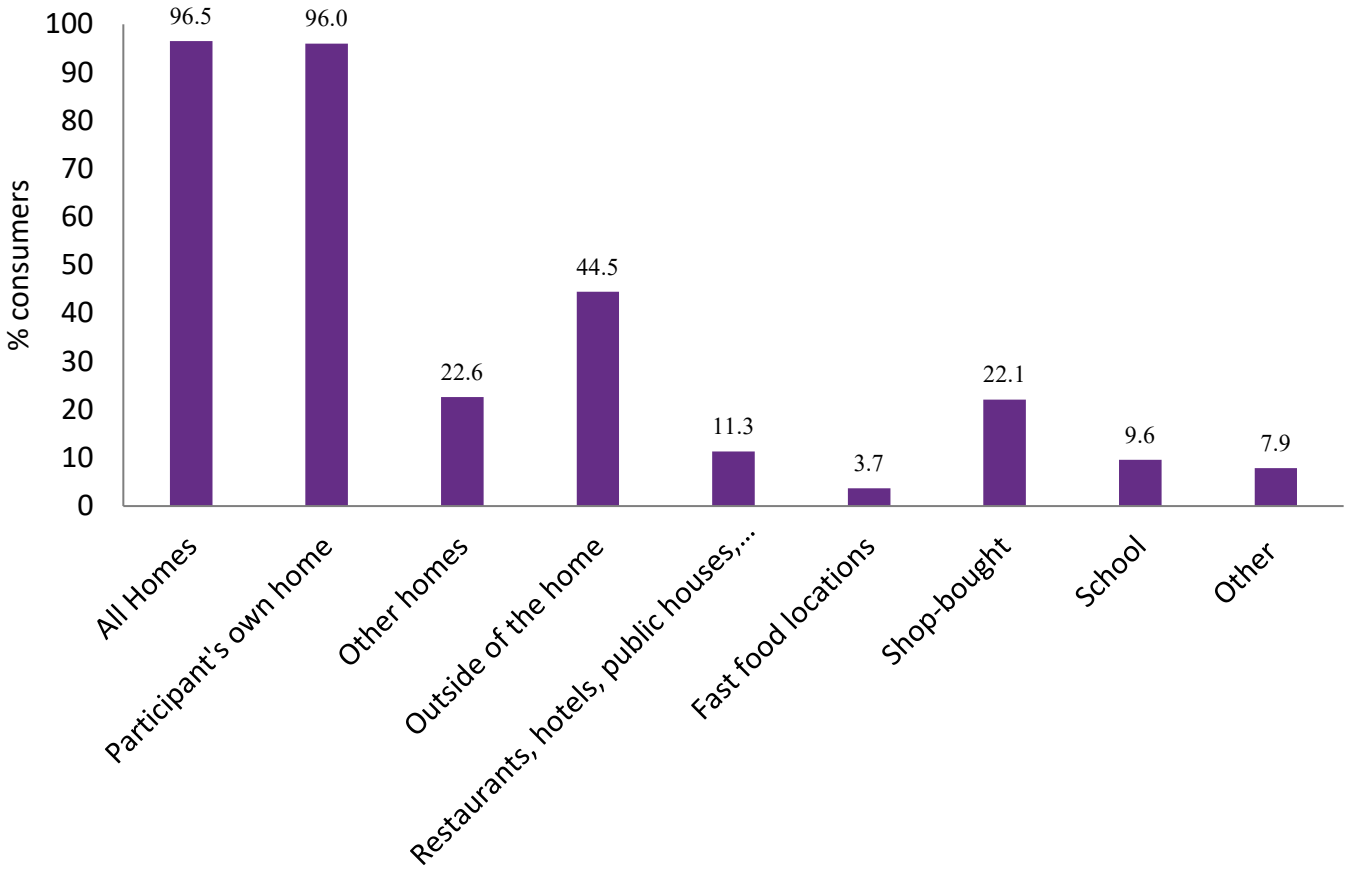
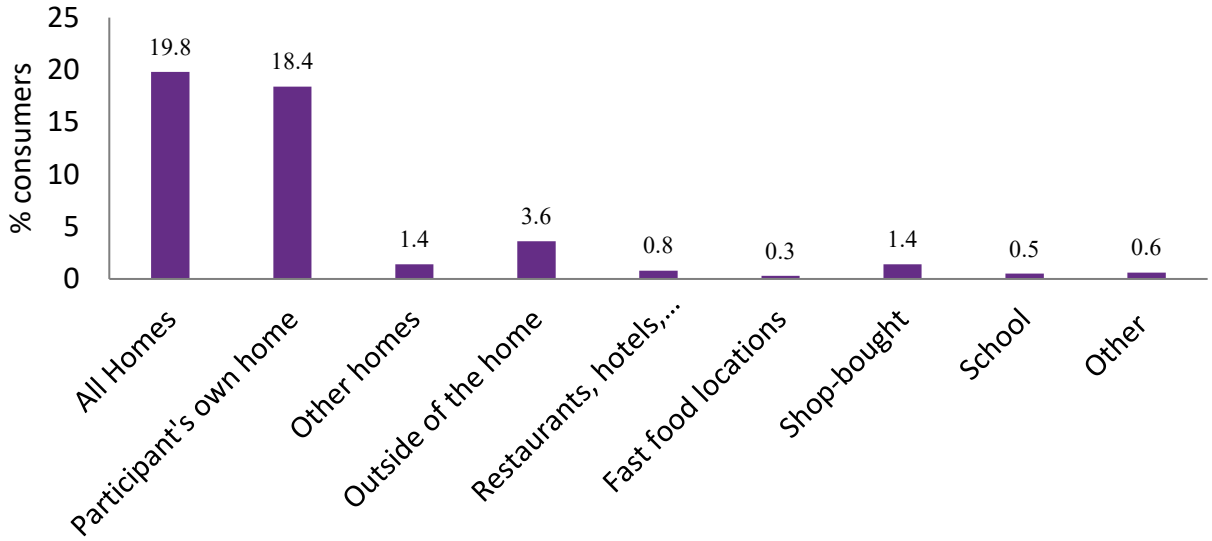


Figure 52. Contribution (%) of snacks to energy intake in 5-12 year old children in ROI, by eating location



In Ireland, data regarding eating location were available for 5-12-year-olds only. Almost all children (97%) consumed snacks at home (96% in their own homes and 23% in other people's homes) and 45% of children consumed snacks outside the home (22% shop-bought, 11% in restaurants, 10% at school and 4% at fast food locations) (**Figure 51**). Of the 23%E derived from snacks in 5-12-year-olds, 19.8% came from the home location (18.4% own home, 1.4% other people's homes) and 3.6% came from outside the home (1.4% shop-bought, 0.8% at restaurants, 0.5% at school and 0.3% fast food locations) (**Figure 52**).

Figure 53. Proportion (%) of children consuming snacks in NI, by eating location

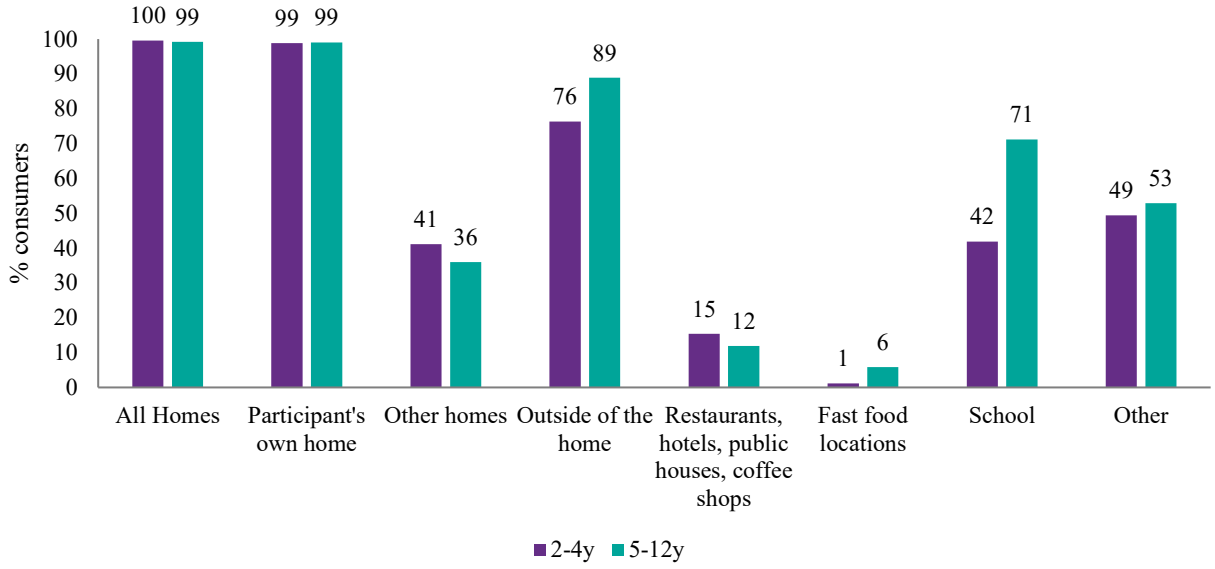
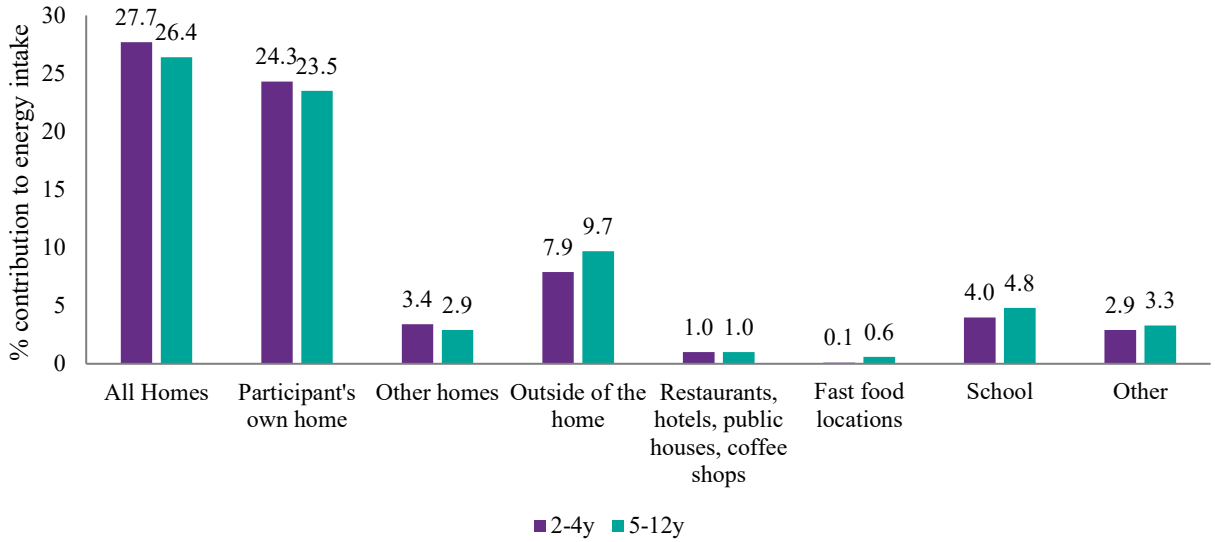


Figure 54. Contribution (%) of snacks to energy intake in children in NI, by eating location



In NI, among those aged 2-4 years, all children (100%) consumed snacks at home (99% in their own homes and 41% in other people's homes) and 76% of children consumed snacks

outside the home (42% at school, 15% in restaurants and 1% at fast food locations) (**Figure 53**). Of the 36%E derived from snacks in 2-4-year-olds, 27.7% came from the home location (24.3% own home, 3.4% other homes) and 7.9% came from outside the home (1.0% at restaurants, 0.1% at fast food locations and 4.0% at school) (**Figure 54**).

Among those aged 5-12 years, almost all children (99%) consumed snacks at home (99% in their own homes and 36% in other homes) and 89% of children consumed snacks outside the home (12% in restaurants, 6% at fast food locations and 71% at school) (**Figure 53**). Of the 36%E derived from snacks in 5-12-year-olds, 26.4% came from the home location (23.5% own home, 2.9% other people's homes) and 9.7% came from outside the home (4.8% at school, 1.0% at restaurants and 0.6% at fast food locations) (**Figure 54**).

Differences between low and high consumers of snacks

Figure 55. Mean daily intake of energy (%E) from snacks in low and high consumers of snacks in ROI, by age group

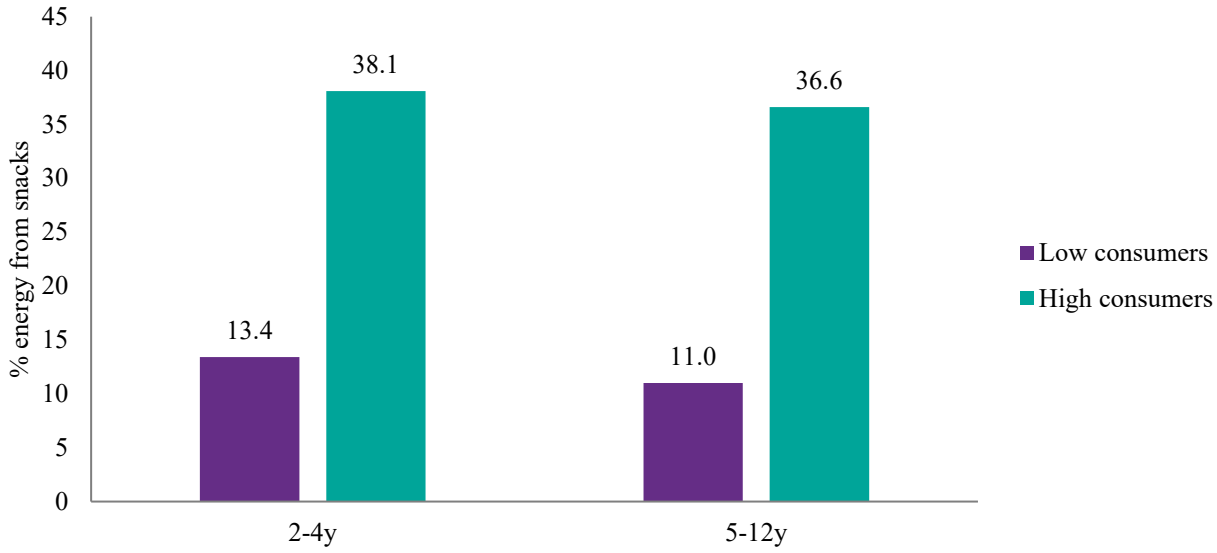


Figure 56. Mean daily intake of macronutrients from snacks in low and high consumers of snacks aged 2-4 years in ROI

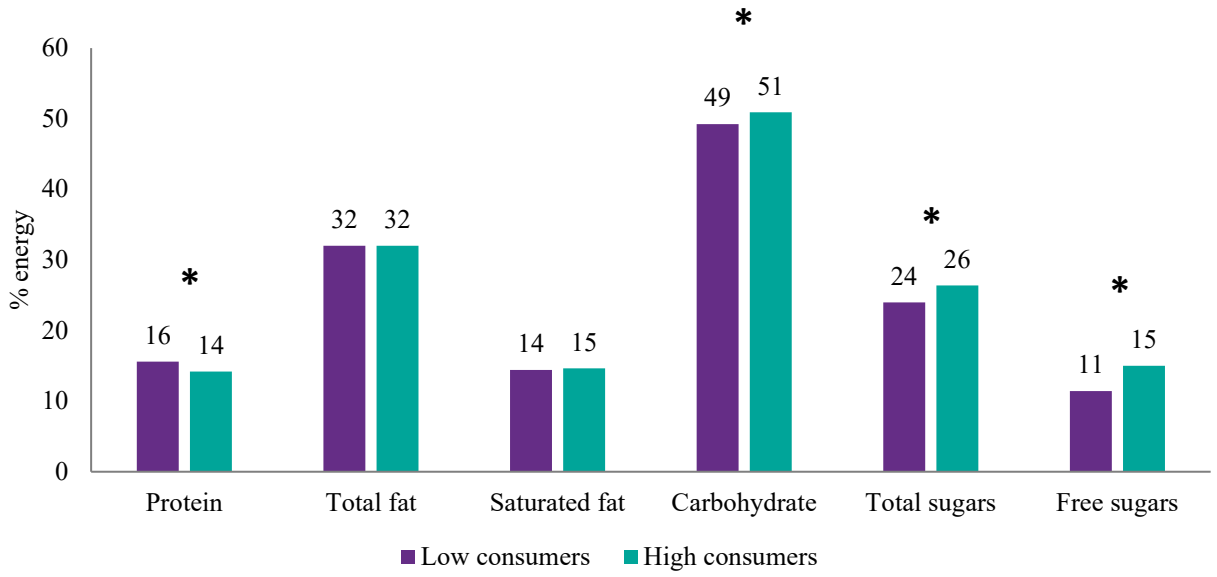
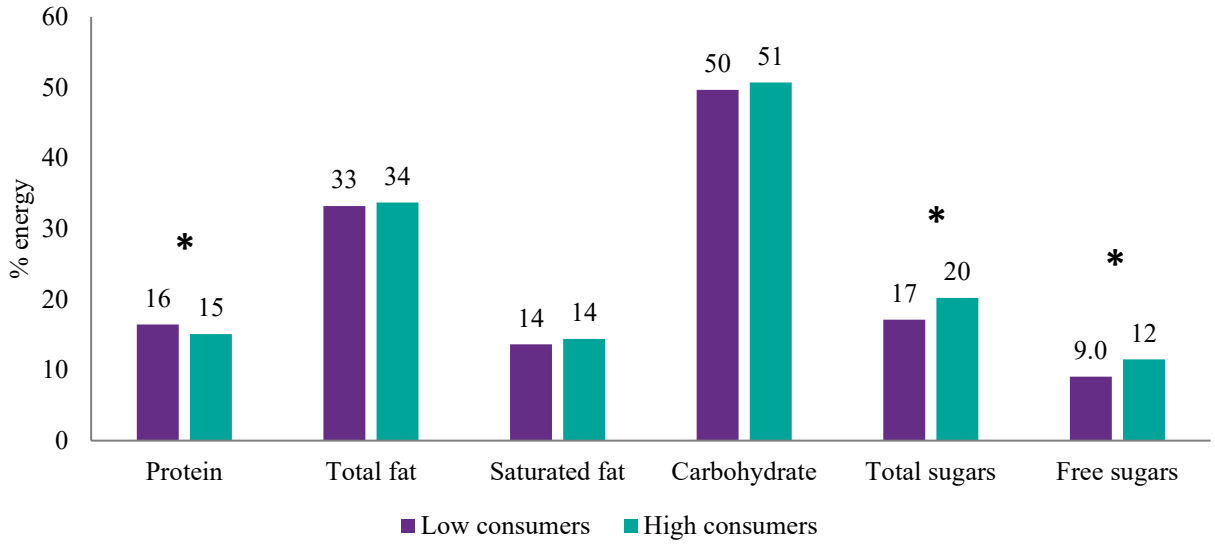


Figure 57. Mean daily intake of macronutrients from snacks in low and high consumers of snacks aged 5-12 years in ROI



In Ireland, among those aged 2-4 years there was a significant difference in energy intake from snacks between low consumers of snacks (13%E, 151kcal) compared to high consumers of snacks (38%E, 479kcal) (**Figure 55**). There were no differences in the proportion of boys and girls, those classified as normal weight and overweight/obese, or those in different social class or parental education groups, between high and low treat foods consumer groups (**Table 105**). Overall, among those aged 2-4 years, high consumers of snacks had higher intakes of energy, carbohydrate (%E), total sugars (%E), free sugars (%E), dietary fibre (g) and sodium (salt) (g), and lower intakes of protein (%E) (**Figure 56**). With regard to micronutrients, high consumers of snacks had higher intakes of vitamin E, vitamin B6, total folate, DFE, vitamin C, potassium, iron, magnesium and phosphorous, and lower intakes of vitamin A (**Table 106**).

Among those aged 5-12 years there was a significant difference in energy intake from snacks between low consumers of snacks (11%E, 156kcal) compared to high consumer of snacks (37%E, 577kcal) (**Figure 55**). There were no differences in the proportion of boys and girls, 5-8-year-olds and 9-12-year-olds, those classified as normal weight and overweight/obese, or those in different social class or parental education groups, between high and low treat foods consumer groups (**Table 107**). Overall, high consumers of snacks had higher intakes energy,

total sugars (%E) and free sugars (%E), and lower intakes of protein (%E) (**Figure 57**). High consumers of snacks had higher intakes of calcium but no other micronutrient (**Table 108**).

Figure 58. Mean daily intake of energy (%E) from snacks in low and high consumers of snacks in NI, by age group

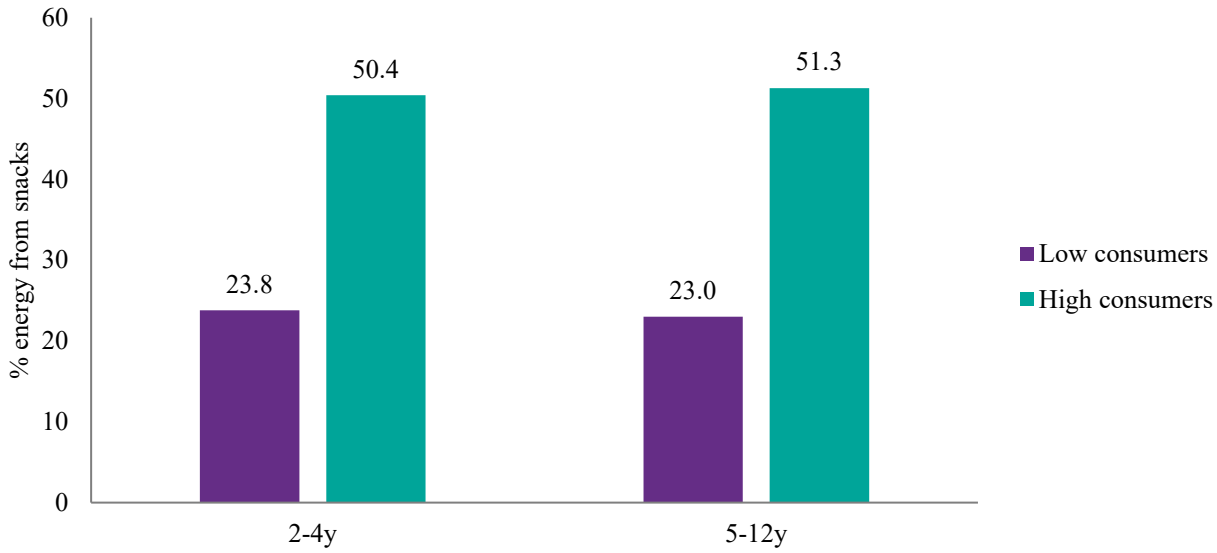


Figure 59. Mean daily intake of macronutrients from snacks in low and high consumers of snacks aged 2-4y in NI

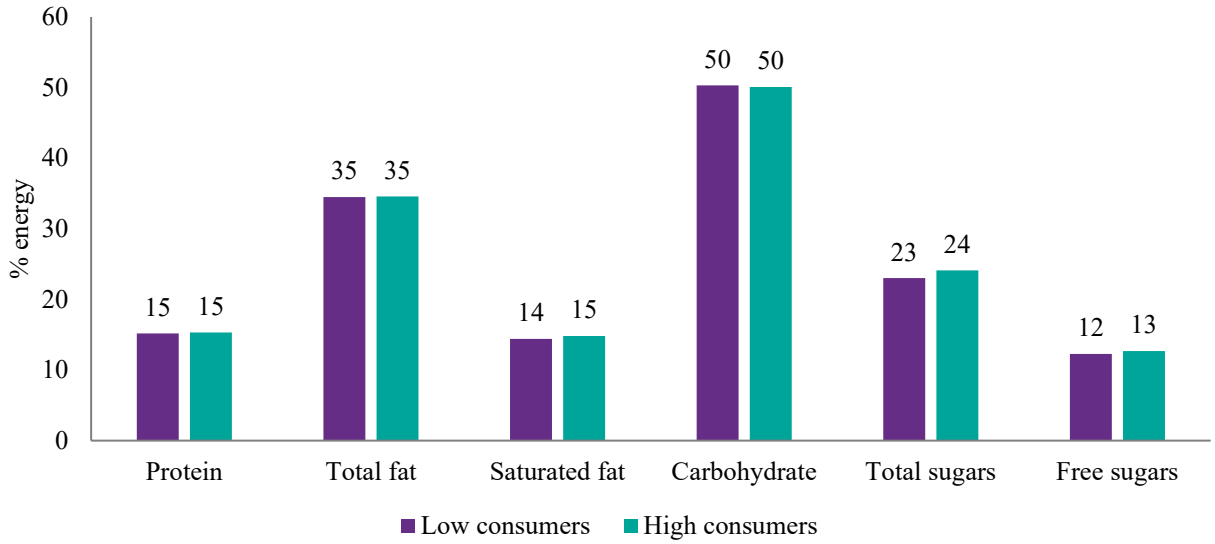
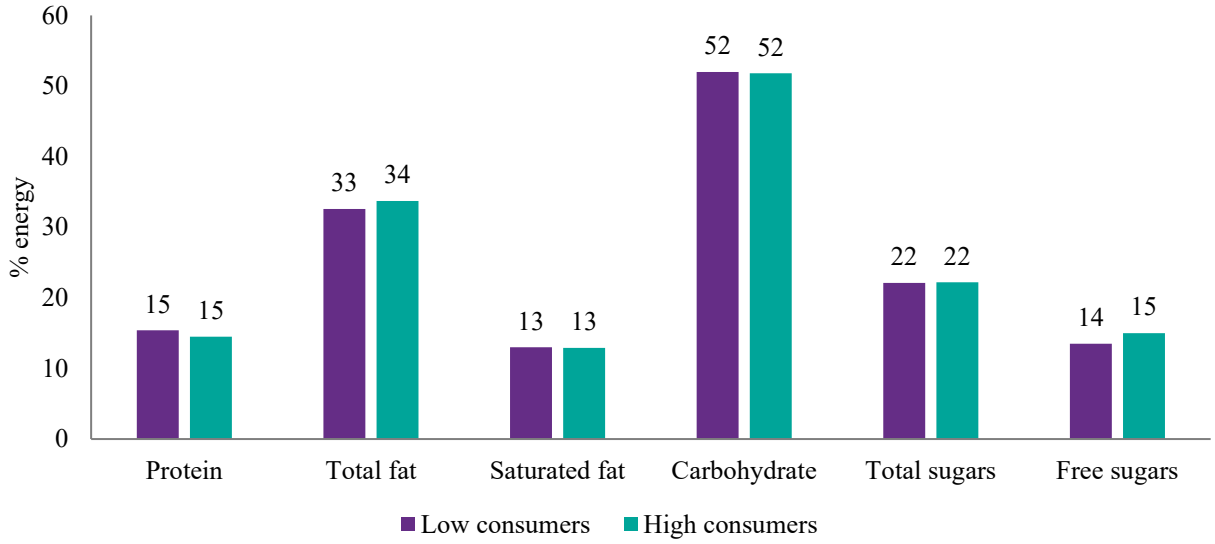


Figure 60. Mean daily intake of macronutrients from snacks in low and high consumers of snacks aged 5-12y in NI



In NI, among those aged 2-4 years there was a significant difference in energy intake from snacks between low consumers of snacks (24%E, 287kcal) compared to high consumers of snacks (50%E, 614kcal) (**Figure 58**). There were no differences in the proportion of boys and girls, those classified as normal weight and overweight/obese, or those in different social class groups, between high and low treat foods consumer groups (**Table 109**). There were no differences in energy or nutrient intakes between the low and high consumer group (**Figure 59, Table 110**).

Among those aged 5-12 years there was a significant difference in energy intake from snacks between low consumers of snacks (23%E, 348kcal) compared to high consumers of snacks (51%E, 846kcal) (**Figure 58**). There were no differences in the proportion of boys and girls, those classified as normal weight and overweight/obese, or those in different social class groups, between high and low treat foods consumer groups (**Table 111**). Overall, high consumers of snacks had higher intakes of energy, MUFA (%E) and vitamin E, and there were no differences between high and low consumer groups in the intake of any other nutrient examined (**Table 112**).

6 Conclusions

The overall outcome from this research is that both treat foods and snacks contribute significantly to the diets of children (2-12y) on the island of Ireland, regardless of sex, age group, social class, parental education or weight status. All children consumed treat foods, and practically all children consumed snacks outside their main meals. Treat foods contributed not only to snacking occasions, but also to main meals, whilst snacking occasions included nutrient-dense foods and beverages as well as those that would be defined as treat foods. Both treat foods and snacks are consumed on all days of the week, with slightly higher prevalence of both on Fridays-Sundays compared to weekdays.

The most popular treat foods consumed by children on the island of Ireland are 'biscuits' and 'soft drinks' followed by 'chocolate', 'savoury snacks', 'ice-creams and desserts' and 'cakes and buns'. The most popular types of foods and beverages consumed as snacks by children aged 2-4 years and 5-12 years in both Ireland and NI are 'fruit', 'biscuits', 'chocolate', 'sweets', 'cakes and buns', 'savoury snacks' and 'water', 'milk' and 'soft drinks', , while 2-4 year olds also commonly consumed 'yogurt and fromage frais', 'breads' and 'fruit juices' as snacks. The most popular time for snack consumption is in the afternoon, which is in line with children returning from school and before the main evening meal.

Treat foods are a key contributor to energy and fat intake in the diets of children on the island of Ireland, providing one fifth of energy intake in 2-4-year-olds and between one-quarter and one-fifth of energy intake in 5-12-year-olds. Furthermore, they contribute one fifth of saturated fat intake in 2-4-year-olds and over one-quarter of saturated fat intake in 5-12-year-olds. The following foods were the key contributors to energy and saturated fat intake: 'biscuits', 'cakes and buns', 'chocolate', 'ice-creams and desserts' and 'savoury snacks'.

Treat foods contributed to more than half of total daily free sugars intake in 5-12-year-olds (61-65%) and in 2–4-year-olds (52-56%). Whilst 'soft drinks' provided the greatest amount of free sugars from treat foods in 5–12-year-olds (10-16%), it should be noted that these data were collected before the sugar tax levy was implemented; the sugar tax levy has led to significant reformulation of 'sugar-sweetened soft drinks' in both Ireland and NI, and the

impact of this should be monitored. Other key contributors of free sugars are 'chocolate', 'cakes and buns', 'biscuits', 'sweets', 'ice-creams and desserts' and 'preserves, syrups and chocolate spreads'.

Treat foods contributed a relatively modest proportion of salt to the diets of children on the island of Ireland, with 12-15% of salt intake (from food sources) coming from treat foods including 'cakes and buns', 'savoury snacks' and 'biscuits'.

With regard to overall dietary quality, both high and low consumers of treat foods or snacks had similar overall intakes of total fat and saturated fat. However, high consumers of treat foods or snacks had higher free sugars intakes than low consumers of treat foods or snack foods.

In keeping with overall dietary intake in this cohort, treat foods and snacks are consumed mainly at home, with much smaller contributions coming from the out-of-home environment. A notable exception to this is in for children in NI, where snacking is very prevalent in the school environment. This is partially due to the definition of snacking occasions in the NDNS dataset and partially due to the provision of food at school in NI.

While some differences in consumption patterns for both treat foods and snacking emerged between demographic groups, for the most part there were no clear gradients that would prompt more focused dietary advice within different groups for pre-school or school-aged children.

This research also highlighted the fact that while there is considerable overlap between the consumption of treat foods and snacking occasions, the terms 'treat foods' and 'snacks' are not interchangeable, with many nutrient-dense foods being consumed as snacks and treat foods often being a component of main meals.

This research also further highlighted discrepancies in the literature definitions for both treat foods and snacks and the lack of standardisation in what is included in either/both definitions. For snacking in particular, different definitions of snacking at study design phase (participant-defined vs time-defined) make retrospective recoding challenging and at times subjective. This can lead to large differences in the contribution of snacking to energy and nutrient intakes, with time-defined snacking occasions overestimating dietary contributions compared to participant-defined snacking occasions. These challenges are noted throughout the literature.

In summary, all children aged 2-12 years on the island of Ireland consumed both treat and snack foods irrespective of gender, social class, parental education or body weight status. While nutrient-dense foods such as ‘milks’ and ‘fruit’ feature as snacks, treat foods are widely consumed both as snacks and with meals, with associated implications for energy and key nutrients such as fat, saturated fat and free sugars. Strategies and supports to provide more healthful snacks and reduce consumption of treat foods may be helpful.

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Appendix I: Tables of results

Table 1. Proportion (%) of consumers of treat foods in children aged 2-12 years in Ireland

	2–4-year-olds (*n* 374)	5–12-year-olds (*n* 600)	5-8 year olds (*n* 300)	9–12-year-olds (*n* 300)
All	100	100	100	100
Biscuits	76.3	80.0	83.6	76.7
Soft drinks†	75.4	68.3	67.8	68.7
Soft drinks: sweetened	53.8	40.1	31.5	47.9*
Soft drinks: NAS	49.8	48.9	55.0	43.3
Savoury snacks	57.5	64.0	62.1	65.7
Preserves, syrups & choc spreads	50.4	53.3	58.9	48.1
Preserves & syrups	43.3	39.6	44.4	35.2
Chocolate spreads	12.7	22.5	23.8	21.3
Chocolate	58.2	59.2	58.5	59.8
Cakes & buns	42.0	56.5	61.7	51.7
Ice-creams & desserts	57.4	58.0	59.7	56.4
Sweets	39.5	40.2	44.5	36.1
Cereal bars	11.8	17.9	16.4	19.3
Sugar & sweeteners	21.2	21.7	15.4	27.5*
Sugar	20.8	20.2	14.8	25.2
Sweeteners	0.3	1.5	0.5	2.4

† Carbonated beverages, fruit juice drinks, squashes & cordials

NAS: No added sugar

* indicates values are significantly different compared to 5-8 year olds within the rows ($p<0.001$)

Table 2. Proportion (%) of consumers of treat foods in children aged 2-12 years in NI

	2–4-year-olds (*n* 241)	**5–12-year-olds (*n* 486)**	**5-8 year olds (*n* 225)**	**9–12-year-olds (*n* 261)**
All	100	100	100	100
Biscuits	80.5	79.4	85.3	74.3
Soft drinks†	91.3	88.9	86.2	91.2
Soft drinks: sweetened	44.4	63.4	57.8	68.2
Soft drinks: NAS	78.8	67.3	68.4	66.3
Savoury snacks	63.5	76.3	77.8	75.1
Preserves, syrups & choc spreads	35.7	40.1	43.1	37.5
Chocolate	66.4	67.3	66.7	67.8
Cakes & buns	60.6	71.8	77.8	66.7
Ice-creams & desserts	45.2	51.0	53.8	48.7
Sweets	45.6	53.1	53.8	52.5
Cereal bars	6.6	10.7	11.1	10.3
Sugar & sweeteners	38.2	50.0	50.2	49.8

† Carbonated beverages, fruit juice drinks, squashes & cordials

NAS: No added sugar

* No significant differences noted between those aged 5-8y and 9-12y ($p<0.001$)

Table 3. Proportion (%) of consumers of treat foods in children aged 2-12 years in Ireland, by sex

	2–4-year-olds (*n* 374)		**5–12-year-olds (*n* 600)**		**5–8-year-olds (*n* 300)**		**9–12-year-olds (*n* 300)**	
	Boys (*n* 188)	**Girls (*n* 186)**	**Boys (*n* 300)**	**Girls (*n* 300)**	**Boys (*n* 149)**	**Girls (*n* 151)**	**Boys (*n* 151)**	**Girls (*n* 149)**
All	100	100	100	100	100	100	100	100
Biscuits	77.0	75.5	78.1	82.0	82.0	85.1	74.6	79.0
Soft drinks†	77.9	72.6*	73.6	62.7	74.5	61.2	72.8	64.1
Soft drinks: sweetened	57.0	50.2*	40.9	39.1	28.1	34.9	52.1	43.3
Soft drinks: NAS	50.6	48.8	52.8	44.9	61.4	48.6	45.2	41.2
Savoury snacks	60.7	53.9*	66.0	61.9	63.7	60.5	67.9	63.3
Preserves, syrups & choc spreads	51.7	48.9	54.5	52.1	62.9	55.0	47.1	49.2
Preserves & syrups	43.6	43.0	41.2	38.0	47.3	41.5	35.8	34.5
Chocolate spreads	13.1	12.2	23.8	21.2	27.3	20.4	20.8	21.9
Chocolate	55.0	61.9*	57.4	61.1	56.2	60.7	58.4	61.4
Cakes & buns	41.8	42.2	53.1	60.1	58.6	64.9	48.3	55.5
Ice-creams & desserts	52.5	62.9*	53.0	63.2	50.2	69.2*	55.5	57.3
Sweets	37.1	42.2	36.0	44.6	40.3	48.8	32.3	40.4
Cereal bars	11.6	12.0	14.4	21.6	14.5	18.3	14.4	24.8
Sugar & sweeteners	22.0	20.2	24.7	18.5	16.9	13.8	31.5	23.1
Sugar	21.7	19.9	23.3	16.9	15.9	13.8	29.8	20.0
Sweeteners	0.3	0.3	1.4	1.6	1.0	0.0	1.6	3.2

† Carbonated beverages, fruit juice drinks, squashes & cordials

NAS: No added sugar

* indicates values are significantly different compared to boys within the rows ($p<0.001$)

Table 4. Proportion (%) of consumers of treat foods in children aged 2-12 years in NI, by sex

	2–4-year-olds (*n* 241)		5–12-year-olds (*n* 486)		5–8-year-olds (*n* 225)		9–12-year-olds (*n* 261)	
	Boys (*n* 125)	Girls (*n* 116)	Boys (*n*257)	Girls (*n*229)	Boy (*n*118)	Girls (*n*107)	Boys (*n* 139)	Girls (*n* 122)
All	100	100	100	100	100	100	100	100
Biscuits	84.8	75.9	77.8	81.2	84.7	86.0	71.9	77.0
Soft drinks†	93.6	88.8	89.9	87.8	88.1	84.1	91.4	91.0
Soft drinks: sweetened	40.0	49.1	69.6	56.3	62.7	52.3	75.5	59.8
Soft drinks: NAS	82.4	75.0	67.7	66.8	68.6	68.2	66.9	65.6
Savoury snacks	64.0	62.9	74.3	78.6	77.1	78.5	71.9	78.7
Preserves, syrups & choc spreads	36.8	34.5	39.7	40.6	43.2	43.0	36.7	38.5
Chocolate	62.4	70.7	67.3	67.2	66.1	67.3	68.3	67.2
Cakes & buns	60.0	61.2	70.8	72.9	73.7	82.2	68.3	64.8
Ice-creams & desserts	48.0	42.2	50.2	52.0	52.5	55.1	48.2	49.2
Sweets	48.0	43.1	49.4	57.2	50.0	57.9	48.9	56.6
Cereal bars	5.6	7.8	9.7	11.8	10.2	12.1	9.4	11.5
Sugar & sweeteners	40.8	35.3	46.7	53.7	46.6	54.2	46.8	53.3

† Carbonated beverages, fruit juice drinks, squashes & cordials

NAS: No added sugar

* No significant differences noted between boys and girls at any age (p<0.001)

Table 5. Proportion (%) of consumers of treat foods in children aged 2-12 years in Ireland, by social class

	2–4-year-olds (*n* 374)				5–12-year-olds (*n* 600)			
	Professional, Managerial & Technical Workers	Non-Manual Workers	Skilled Manual Workers	Semi-Skilled/ Unskilled Workers (Including Students)	Professional, Managerial & Technical Workers	Non-Manual Workers	Skilled Manual Workers	Semi-Skilled/ Unskilled Workers (Including Students
All	100[a]	100[a]	100[a]	100[a]	100[a]	100[a]	100[a]	100[a]
Biscuits	85.3[a]	71.4[b]	83.1[a]	54.5[c]	82.0[a]	80.4[a]	79.6[a]	71.0[a]
Soft drinks†	68.3[a]	82.5[b]	81.5[b,c]	72.7[a]	63.4[a]	71.6[a]	77.8[a]	75.2[a]
Soft drinks: sweetened	45.4[a]	60.3[b]	55.4[b,c]	59.1[b,c]	32.5[a]	46.1[a,b]	57.4[b,c]	42.9[a,c]
Soft drinks: NAS	42.7[a]	60.3[b]	49.2[a,c]	50[a,c]	45.0[a]	50.0[a]	53.7[a]	60.1[a]
Savoury snacks	53.7[a]	63.5[b]	56.9[a,b,c]	59.1[a,c]	60.5[a]	67.6[a]	70.4[a]	63.6[a]
Preserves, syrups & choc spreads	56.9[a]	47.6[b]	56.9[a,c]	31.8[d]	58.3[a]	54.9[a]	44.4[a]	41.9[a]
Preserves & syrups	50.9[a]	38.1[b]	49.2[a,c]	27.3[d]	47.4[a]	40.2[a,b]	27.8[b]	20.5[b]
Chocolate spreads	11.5[a]	14.3[a,b]	15.4[a,b,c]	9.1[a,b]	21.4[a]	25.5[a]	18.5[a]	29.0[a]
Chocolate	56.9[a]	57.1[a,b]	52.3[a,b,c]	68.2[d]	60.2[a]	55.9[a]	63.0[a]	54.7[a]
Cakes & buns	48.6[a]	44.4[a,b]	41.5[b,c]	27.3[d]	58.8[a]	60.8[a]	44.4[a]	56.9[a]
Ice-creams & desserts	55.0[a]	55.6[a,b]	58.5[a,b,c]	63.6[c]	61.3[a]	64.7[a]	55.6[a,c]	36.6[c]
Sweets	41.3[a]	34.9[a,b]	41.5[a,b,c]	36.4[a,b,c]	42.0[a]	38.2[a]	38.9[a]	37.6[a]
Cereal bars	9.6[a]	7.9[a]	12.3[a,b]	18.2[b,d]	16.0[a]	27.5[a]	13.0[a]	16.1[a]
Sugar & sweeteners	14.2[a]	20.6[b]	23.1[b,c]	31.8[d]	14.7[a]	25.5[a,b]	31.5[b]	35.6[b]
Sugar	13.3[a]	20.6[b]	23.1[b,c]	31.8[d]	13.7[a]	23.5[a,b]	29.6[b]	33.4[b]
Sweeteners	0.9[a]	0.0[a]	0.0[a]	0.0[a]	1.1[a]	2.0[a]	1.9[a]	2.2[a]

† Carbonated beverages, fruit juice drinks, squashes & cordials

NAS: No added sugar

*Statistical differences between groups are indicated by different superscript letters

Table 6. Proportion (%) of consumers of treat foods in children aged 2-12 years in NI, by social class

	2–4-year-olds (*n* 241)			5–12-year-olds (*n* 486)		
	Higher Managerial, Administrative & Professional Occupations	Intermediate Occupations	Routine & Manual Occupations, and Other	Higher Managerial, Administrative & Professional Occupations	Intermediate Occupations	Routine & Manual Occupations, and Other
All	100	100	100	100	100	100
Biscuits	84.1	88.6	73.8	84.3	80.9	75.2
Soft drinks†	86.4	93.2	95.3	84.9	90.0	91.7
Soft drinks: sweetened	42.0	40.9	47.7	57.8	66.4	66.0
Soft drinks: NAS	77.3	79.5	80.4	65.7	69.1	68.0
Savoury snacks	61.4	63.6	65.4	71.7	76.4	80.1
Preserves, syrups & choc spreads	34.1	43.2	32.7	42.2	37.3	39.8
Chocolate	70.5	65.9	62.6	65.7	63.6	69.9
Cakes & buns	63.6	72.7	52.3	75.9	67.3	71.4
Ice-creams & desserts	54.5	52.3	33.6	51.8	56.4	46.6
Sweets	54.5	43.2	39.3	57.8	58.2	46.6
Cereal bars	9.1	6.8	4.7	11.4	9.1	11.2
Sugar & sweeteners	38.6	29.5	40.2	45.8	53.6	51.5

† Carbonated beverages, fruit juice drinks, squashes & cordials

NAS: No added sugar

* No significant differences noted between groups ($p<0.001$)

Table 7. Proportion (%) of consumers of treat foods in children aged 2-12 years in Ireland, by parental education

	2–4-year-olds (*n* 374)			5–12-year-olds (*n* 600)		
	Intermediate	Secondary	Tertiary	Intermediate	Secondary	Tertiary
All	100[a]	100[a]	100[a]	100[a]	100[a]	100[a]
Biscuits	87.5[a]	66.2[b]	77.0[c]	72.7[a]	78.5[a]	81.2[a]
Soft drinks†	54.5[a]	86.5[b]	75.1[c]	78.5[a]	78.6[a]	66.0[a]
Soft drinks: sweetened	30.5[a]	50.5[b]	55.8[b]	51.4[a,b]	60.9[a]	36.5[b]
Soft drinks: NAS	36.0[a]	66.7[b]	48.2[c]	55.5[a]	55.9[a]	47.5[a]
Savoury snacks	52.5[a]	64.2[a]	56.9[a]	60.3[a]	53.5[a]	65.2[a]
Preserves, syrups & choc spreads	83.0[a]	60.4[b]	46.8[c]	66.7[a]	47.7[a]	52.4[a]
Preserves & syrups	70.0[a]	59.0[a]	39.3[c]	25.8[a]	46.0[a]	40.6[a]
Chocolate spreads	23.0[a]	4.1[b]	13.3[c]	52.8[a]	11.5[b]	20.3[b]
Chocolate	73.5[a]	65.8[a,b]	56.2[b]	71.0[a]	67.3[a]	57.0[a]
Cakes & buns	22.5[a]	51.6[b]	41.9[c]	54.7[a]	48.2[a]	58.1[a]
Ice-creams & desserts	63.0[a]	57.0[a]	57.1[a]	45.1[a]	53.0[a]	60.0[a]
Sweets	56.0[a]	46.8[b]	37.4[c]	40.7[a]	35.9[a]	40.6[a]
Cereal bars	18.0[a]	20.7[a]	10.1[c]	13.0[a]	19.8[a]	17.8[a]
Sugar & sweeteners	3.0[a]	20.5[b]	22.4[b]	24.8[a,b]	38.8[a]	19.3[b]
Sugar	3.0[a]	19.1[b]	22.2[b]	21.7[a,b]	37.2[a]	17.9[b]
Sweeteners	0[a]	1.4[a]	0.2[a]	3.1[a]	1.7[a]	1.3[a]

† Carbonated beverages, fruit juice drinks, squashes & cordials

NAS: No added sugar

*Statistical differences between groups are indicated by different superscript letters

Table 8. Proportion (%) of consumers of treat foods in children aged 2-12 years in Ireland, by BMI classification

	2–4-year-olds (*n* 374)		5–12-year-olds (*n* 600)	
	Normal weight (*n* 287)	Overweight/obese (*n* 84)	Normal weight (*n* 512)	Overweight/obese (*n* 84)
All	100	100	100	100
Biscuits	76.5	75.0	81.4	72.7
Soft drinks†	75.0	76.5	67.9	71.2
Soft drinks: sweetened	53.7	53.5	38.6	47.7
Soft drinks: NAS	47.7	57.1*	49.6	46.4
Savoury snacks	56.8	59.8	65.0	58.1
Preserves, syrups & choc spreads	50.2	49.8	53.8	51.4
Preserves & syrups	42.5	46.1	41.5	30.0
Chocolate spreads	13.5	9.1*	22.1	24.7
Chocolate	58.3	58.8	61.3	47.6
Cakes & buns	42.0	41.8	59.8	38.7*
Ice-creams & desserts	59.4	50.8*	59.5	51.1
Sweets	39.9	37.8	41.7	32.7
Cereal bars	11.1	13.2	17.7	19.7
Sugar & sweeteners	22.8	16.5*	20.9	25.9
Sugar	22.6	15.8*	19.7	23.3
Sweeteners	0.2	0.7	1.3	2.7

† Carbonated beverages, fruit juice drinks, squashes & cordials

NAS: No added sugar

* indicates values are significantly different compared to those within normal weight category within the rows ($p<0.001$)

Table 9. Proportion (%) of consumers of treat foods in children aged 2-12 years in NI, by BMI classification

	2–4-year-olds (n 241)		5–12-year-olds (n 486)	
	Normal weight (*n* 114)	Overweight/obese (*n* 93)	Normal weight (*n* 292)	Overweight/obese (*n* 158)
All	100	100	100	100
Biscuits	78.9	80.6	80.1	78.5
Soft drinks†	93.9	89.2	88.7	90.5
Soft drinks: sweetened	48.2	39.8	62.0	69.6
Soft drinks: NAS	79.8	80.6	66.1	69.6
Savoury snacks	57.0	66.7	78.8	71.5
Preserves, syrups & choc spreads	34.2	37.6	42.1	34.8
Chocolate	67.5	62.4	69.5	63.9
Cakes & buns	60.5	59.1	72.6	73.4
Ice-creams & desserts	46.5	46.2	49.7	52.5
Sweets	52.6	37.6	57.9	46.8
Cereal bars	7.0	7.5	10.3	9.5
Sugar & sweeteners	30.7	43.0	54.5	43.0

† Carbonated beverages, fruit juice drinks, squashes & cordials

NAS: No added sugar

* No significant differences noted between groups (p<0.001)

Table 10. Mean daily intake of energy (kcal) from treat foods in children aged 2-12 years in Ireland

	2–4-year-olds (*n* 374)			5–12-year-olds (*n* 600)			5–8-year-olds (*n* 300)			9–12-year-olds (*n* 300)		
	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th
All	231 (134)	48	463	326 (180)	79	646	296 (164)	78	589	354 (190)*	83	680
Biscuits	53.9 (54.6)	0	165	71.9 (77.4)	0	211	64.9 (74.0)	0	185	78.3 (79.9)	0	242
Soft drinks†	27.8 (50.6)	0	112	19.6 (33.0)	0	85.4	13.1 (23.0)	0	62.6	25.5 (39.1)*	0	105
Soft drinks: sweetened	25.6 (50.5)	0	109	17.2 (32.3)	0	81.9	10.9 (22.4)	0	57.9	22.9 (38.4)*	0	105
Soft drinks: NAS	2.3 (4.5)	0	9.3	2.4 (6.4)	0	10.4	2.1 (4.0)	0	8.9	2.7 (8.0)	0	12.6
Savoury snacks	28.2 (34.2)	0	102	44.8 (55.4)	0	153	38.2 (49.9)	0	141	50.8 (59.5)	0	158
Preserves, syrups & choc spreads	10.9 (19.7)	0	52.8	14.3 (21.8)	0	61.1	13.9 (20.9)	0	57.6	14.6 (22.7)	0	61.8
Preserves & syrups	6.9 (13.7)	0	35.2	7.1 (13.2)	0	34.6	6.5 (10.8)	0	27.5	7.6 (15.0)	0	41.8
Chocolate spreads	3.9 (14.2)	0	26.2	7.2 (17.3)	0	44.6	7.4 (18.0)	0	43.7	7.0 (16.8)	0	47.9
Chocolate	33.6 (43.0)	0	125	43.4 (56.8)	0	151	33.6 (43.0)	0	120	52.5 (65.9)*	0	186
Cakes & buns	27.4 (45.8)	0	120	57.0 (77.8)	0	207	57.7 (77.2)	0	203	56.4 (78.5)	0	213
Ice-creams & desserts	31.2 (41.5)	0	117	46.0 (64.1)	0	180	46.7 (63.3)	0	178	45.4 (64.9)	0	194
Sweets	10.2 (17.3)	0	49.0	17.8 (34.4)	0	83.5	19.0 (31.5)	0	91.0	16.8 (36.9)	0	81.4
Cereal bars	5.0 (17.2)	0	41.4	9.0 (24.1)	0	58.3	7.5 (20.6)	0	52.6	10.4 (26.9)	0	69.3
Sugar & sweeteners	2.6 (7.1)	0	15.8	2.6 (7.7)	0	15.8	1.5 (5.1)	0	9.9	3.6 (9.4)*	0	19.7
Sugar	2.6 (7.1)	0	15.8	2.6 (7.7)	0	15.8	1.5 (5.0)	0	9.9	3.6 (9.4)*	0	19.7
Sweeteners	0.0 (0.0)	0	0	0.0 (0.5)	0	0	0.0 (0.6)	0	0	0.0 (0.3)	0	0

† Carbonated beverages, fruit juice drinks, squashes & cordials

NAS: No added sugar

* indicates values are significantly different compared to 5-8 year olds within the rows ($p<0.001$)

Table 11. Mean daily intake of energy (kcal) from treat foods in children aged 2-12 years in NI

	2-4 year olds (*n* 241)			5-12 year olds (*n* 486)			5-8 year olds (*n* 225)			9-12 year olds (*n* 261)		
	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th
All	233 (146)	50	495	404 (208)	110	773	369 (178)	118	672	433* (227)	99	794
Biscuits	49.9 (49.1)	0	495	67.1 (65.9)	0	188	71.4 (59.7)	0	180	63.5 (70.7)	0	207
Soft drinks†	17.7 (30.4)	0	79.3	44.2 (63.2)	0	173	30.2 (51.0)	0	137	56.3* (70.1)	0	192
Soft drinks: sweetened	14.3 (30.6)	0	76.0	41.8 (63.6)	0	170	27.7 (51.2)	0	134	53.9* (70.4)	0	188
Soft drinks: NAS	3.4 (4.3)	0	12.0	2.4 (3.2)	0	8.4	2.5 (3.2)	0	8.9	2.3 (3.2)	0	8.0
Savoury snacks	30.3 (35.6)	0	107	61.3 (63.8)	0	186	53.8 (53.1)	0	175	67.8 (71.2)	0	218
Preserves, syrups & choc spreads	10.1 (26)	0	55.0	16.1 (36.1)	0	84.7	15.9 (30.8)	0	76.9	16.2 (40.3)	0	89.8
Chocolate	38.3 (53.0)	0	130	55.0 (73.9)	0	197	43.2 (51.5)	0	153	65.2* (87.7)	0	222
Cakes & buns	46.0 (59.4)	0	165	81.4 (85.8)	0	246	86.7 (87.4)	0	261	76.7 (84.3)	0	246
Ice-creams & desserts	17.6 (27.2)	0	75.0	30.6 (46.2)	0	122	29.1 (46.1)	0	101	31.8 (46.3)	0	123
Sweets	16.1 (25.8)	0	72.3	34.0 (59.9)	0	165	27.1 (44.1)	0	111	40.1 (70.4)	0	185
Cereal bars	2.5 (11.5)	0	21.1	4.7 (16.8)	0	40.4	4.0 (13.4)	0	33.8	5.3 (19.3)	0	42.3
Sugar & sweeteners	4.4 (8.4)	0	24.5	8.8 (17.5)	0	41.8	7.4 (16.3)	0	35.1	10.1 (18.3)	0	53.7

† Carbonated beverages, fruit juice drinks, squashes & cordials

NAS: No added sugar

* indicates values are significantly different compared to 5-8 year olds within the rows ($p<0.001$)

Table 12. Mean daily intake of energy (kcal) from treat foods in children aged 2-12 years in Ireland, by sex

	2-4 year olds (*n* 374)						5-12 year olds (*n* 600)					
	Boys (n 188)			Girls (*n* 186)			Boys (*n* 300)			Girls (n 300)		
	Mean (SD)	P5	P95	Mean (SD)	P5	P95	Mean (SD)	P5	P95	Mean (SD)	P5	P95
All	241 (144)	50	511	219 (120.2)*	39	430	337 (193)	74	669	315 (166)	79	638
Biscuits	59.7 (57.0)	0	172	47.6 (51.0)*	0	151	75.9 (89.9)	0	232	67.6 (61.4)	0	195
Soft drinks†	30.0 (58.3)	0	112	25.4 (40.2)	0	106	22.5 (33.5)	0	99.1	16.4 (32.1)	0	75.2
Soft drinks: sweetened	27.8 (58.4)	0	109	23.1 (39.9)	0	106	19.4 (32.4)	0	93.6	14.8 (31.8)	0	72.7
Soft drinks: NAS	2.2 (4.7)	0	9.3	2.3 (4.3)	0	10.1	3.2 (7.2)	0	16.5	1.6 (4.2)	0	7.2
Savoury snacks	29.6 (32.1)	0	92.1	26.6 (36.3)	0	116	50.4 (61.4)	0	164	38.9 (47.8)	0	136
Preserves, syrups & choc spreads	11.7 (20.0)	0	65.3	9.9 (19.2)	0	49.1	16.9 (25.9)	0	69.5	11.5 (16.8)	0	47.1
Preserves & syrups	7.8 (15.6)	0	36.9	6.0 (11.2)*	0	32.7	8.1 (14.1)	0	40.5	6.0 (11.3)	0	28.7
Chocolate spreads	3.9 (13.4)	0	27.5	3.9 (15.1)	0	26.1	8.7 (20.7)	0	53.5	5.5 (12.8)	0	35.7
Chocolate	32.1 (43.1)	0	127	35.4 (42.8)	0	117	44.3 (57.3)	0	162	42.4 (56.4)	0	141
Cakes & buns	31.5 (51.8)	0	159	22.7 (37.5)*	0	95.7	54.6 (78.6)	0	214	59.5 (77.6)	0	207
Ice-creams & desserts	29.5 (43.2)	0	123	33.0 (39.4)	0	108	45.4 (67.4)	0	181	46.6 (59.9)	0	177
Sweets	10.1 (17.4)	0	48.5	10.3 (17.2)	0	49.0	16.7 (34.7)	0	87.1	19.0 (34.0)	0	82.1
Cereal bars	4.7 (17.7)	0	41.3	5.3 (16.7)	0	41.4	7.0 (22.0)	0	48.7	11.1 (25.9)	0	71.0
Sugar & sweeteners	2.5 (6.1)	0	15.8	2.7 (8.0)	0	14.8	3.2 (9.2)	0	16.5	2.0 (6.0)	0	15.3
Sugar	2.5 (6.1)	0	15.8	2.7 (8.0)	0	14.8	3.2 (9.2)	0	16.5	2.0 (6.0)	0	15.3
Sweeteners	0.0 (0.0)	0	0	0.0 (0.0)	0	0	0.0 (0.0)	0	0	0.0 (0.4)	0	0

† Carbonated beverages, fruit juice drinks, squashes & cordials

NAS: No added sugar

* indicates values are significantly different compared to boys within the rows ($p<0.001$)

Table 13. Mean daily intake of energy (kcal) from treat foods in children aged 2-12 years in Ireland, by sex

	5–8-year-olds (*n* 300)						9–12-year-olds (*n* 300)					
	Boys (*n* 149)			Girls (*n* 151)			Boys (*n* 151)			Girls (*n* 149)		
	Mean (SD)	P5	P95	Mean (SD)	P5	P95	Mean (SD)	P5	P95	Mean (SD)	P5	P95
All	296 (177)	65	573	296 (150)	79	628	373 (200)	82	733	334 (178)	79	661
Biscuits	68.1 (91.8)	0	210	61.7 (50.7)	0	162	82.8 (87.8)	0	262	73.4 (70.0)	0	207
Soft drinks†	14.6 (25.5)	0	70.8	11.6 (20.2)	0	49.9	29.5 (37.9)	0	120	21.1 (40.1)	0	84.4
Soft drinks: sweetened	11.8 (24.8)	0	66.7	10.1 (19.7)	0	49.1	25.9 (36.9)	0	118	19.5 (39.8)	0	84.4
Soft drinks: NAS	2.7 (4.8)	0	10.6	1.5 (2.9)	0	6.5	3.6 (9.8)	0	22.5	1.6 (5.2)	0	8.4
Savoury snacks	41.7 (51.8)	0	157	34.7 (47.8)	0	139	57.8 (67.8)	0	176.3	42.9 (47.6)	0	139
Preserves, syrups & choc spreads	17.5 (25.2)	0	68.8	10.3 (14.8)	0	40.5	16.4 (25.8)	0	70.3	12.7 (18.5)	0	57.4
Preserves & syrups	6.9 (10.9)	0	33.0	6.2 (10.6)	0	23.7	9.2 (17.2)	0	47.2	5.8 (12.0)	0	34.9
Chocolate spreads	10.6 (23.3)	0	61.4	4.1 (9.4)	0	27.5	7.1 (17.9)	0	52.2	6.9 (15.4)	0	44.5
Chocolate	32.3 (42.9)	0	120	34.9 (43.3)	0	112	54.9 (65.9)	0	187	49.8 (66.0)	0	189
Cakes & buns	52.3 (68.6)	0	182	63.0 (84.8)	0	261	56.6 (85.7)	0	285	56.1 (70.0)	0	191
Ice-creams & desserts	43.7 (69.4)	0	180	49.6 (56.7)	0	163	46.9 (66.7)	0	194	43.7 (62.9)	0	205
Sweets	17.7 (31.7)	0	93.9	20.3 (31.2)	0	91.2	15.9 (37.3)	0	82.9	17.8 (36.6)	0	79.8
Cereal bars	6.3 (19.6)	0	46.9	8.7 (21.6)	0	65.8	7.6 (24.3)	0	52.9	13.5 (29.3)	0	75.6
Sugar & sweeteners	1.8 (5.5)	0	14.4	1.2 (4.5)	0	7.9	4.4 (11.0)	0	28.2	2.7 (7.1)	0	18.7
Sugar	1.8 (5.5)	0	14.4	1.2 (4.5)	0	7.9	4.4 (11.0)	0	28.2	2.7 (7.1)	0	18.7
Sweeteners	0.1 (0.8)	0	0	0.0 (0.0)	0	0	0.0 (0.0)	0	0	0.1 (0.5)	0	0

† Carbonated beverages, fruit juice drinks, squashes & cordials

NAS: No added sugar

* indicates values are significantly different compared to boys within the rows ($p<0.001$)

Table 14. Mean daily intake of energy (kcal) from treat foods in children aged 2-12 years in NI, by sex

	2–4-year-olds (*n* 241)						5–12-year-olds (*n* 486)					
	Boys (n 125)			Girls (*n* 116)			Boys (*n* 257)			Girls (n 229)		
	Mean (SD)	P5	P95	Mean (SD)	P5	P95	Mean (SD)	P5	P95	Mean (SD)	P5	P95
All	249 (162)	62	508	216 (125)	41	482	417 (221)	112	782	390 (193)	103	764
Biscuits	54.6 (54.0)	0	166	44.8 (43.0)	0	133	70.1 (68.9)	0	202	63.9 (62.4)	0	174
Soft drinks†	19.5 (37.0)	0	83.0	15.7 (21.2)	0	53.4	54.0 (73.7)	0	201	33.2 (46.9)*	0	146
Soft drinks: sweetened	15.8 (37.2)	0	82.7	12.7 (21.3)	0	50.4	51.5 (74.1)	0	201	30.9 (46.9)*	0	142
Soft drinks: NAS	3.7 (4.5)	0	14.0	3.0 (4.0)	0	11.4	2.5 (3.1)	0	8.7	2.3 (3.3)	0	7.5
Savoury snacks	33.2 (39.8)	0	110	27.2 (30.5)	0	100	62.3 (63.6)	0	193	60.2 (64.2)	0	182
Preserves, syrups & choc spreads	11.1 (26.9)	0	67.8	9.0 (25.1)	0	46.7	15.6 (36.7)	0	86.2	16.7 (35.7)	0	86.9
Chocolate	38.6 (63.9)	0	172	38.0 (38.1)	0	122	59.5 (83.6)	0	210	49.9 (61.1)	0	170
Cakes & buns	49.0 (66.2)	0	195	42.8 (51.2)	0	158	76.6 (82.5)	0	243	86.7 (89.2)	0	269
Ice-creams & desserts	18.7 (28.3)	0	73.8	16.3 (26.0)	0	81.1	31.0 (48.0)	0	127	30.2 (44.1)	0	119
Sweets	17.0 (24.4)	0	71.3	15.1 (27.4)	0	76.4	34.2 (65.6)	0	165	34.0 (53.1)	0	166
Cereal bars	2.1 (9.3)	0	24.6	2.9 (13.5)	0	21.1	4.5 (16.6)	0	41.3	4.9 (17.1)	0	37.9
Sugar & sweeteners	4.6 (8.2)	0	23.7	4.1 (8.6)	0	27.9	8.8 (16.5)	0	42.2	8.9 (18.5)	0	41.9

† Carbonated beverages, fruit juice drinks, squashes & cordials

NAS: No added sugar

* indicates values are significantly different compared to boys within the rows ($p<0.001$)

Table 15. Mean daily intake of energy (kcal) from treat foods in children aged 2-12 years in NI, by sex

	5–8-year-olds (*n* 225)						9–12-year-olds (*n* 261)					
	Boys (*n* 118)			Girls (*n* 107)			Boys (*n* 139)			Girls (*n* 122)		
	Mean (SD)	P5	P95	Mean (SD)	P5	P95	Mean (SD)	P5	P95	Mean (SD)	P5	P95
All	363 (182)	114	677	377 (174)	119	658	463 (240)	109	907	400 (208)	98	774
Biscuits	73.4 (62.0)	0	200	69.2 (57.5)	0	165	67.4 (74.3)	0	211	59.2 (66.4)	0	185
Soft drinks†	37.4 (62.0)	0	155	22.3 (33.6)	0	114	68.1 (79.8)	0	239	42.8 (54.3)	0	175
Soft drinks: sweetened	34.8 (62.5)	0	154	19.9 (33.5)	0	111	65.7 (80.3)	0	239	40.6 (54.4)	0	170
Soft drinks: NAS	2.6 (3.2)	0	9.1	2.4 (3.2)	0	8.4	2.4 (3.0)	0	8.0	2.2 (3.3)	0	7.6
Savoury snacks	53.6 (52.4)	0	184	54.0 (54.3)	0	170	69.6 (71.1)	0	213	65.7 (71.5)	0	237
Preserves, syrups & choc spreads	14.8 (28.9)	0	69.3	17.3 (33.0)	0	81.4	16.3 (42.2)	0	87.9	16.1 (38.0)	0	91.8
Chocolate	44.0 (54.5)	0	184	42.2 (48.0)	0	140	72.7 (100.3)	0	259	56.7 (70.1)	0	204
Cakes & buns	75.1 (78.8)	0	225	99.5 (94.8)	0	300	77.8 (85.8)	0	244	75.4 (82.9)	0	251
Ice-creams & desserts	28.3 (46.7)	0	102	30.1 (45.7)	0	121	33.3 (49.1)	0	135	30.3 (42.9)	0	120
Sweets	24.5 (41.8)	0	107	30.0 (46.6)	0	123	42.5 (79.6)	0	191	37.5 (58.3)	0	179
Cereal bars	4.3 (15.5)	0	41.9	3.6 (10.8)	0	30.3	4.7 (17.5)	0	39.6	6.0 (21.2)	0	42.3
Sugar & sweeteners	7.1 (13.5)	0	37.1	7.8 (19.0)	0	29.0	10.3 (18.6)	0	54.2	10.0 (18.0)	0	53.4

† Carbonated beverages, fruit juice drinks, squashes & cordials

NAS: No added sugar

* No significant differences noted between boys and girls at any age (p<0.001)

Table 16. Mean daily intake of energy (kcal) from treat foods in children aged 2-12 years in Ireland, by social class

	2–4-year-olds (*n* 374)				5–12-year-olds (*n* 600)			
	Professional, Managerial & Technical Workers	Non-Manual Workers	Skilled Manual Workers	Semi-Skilled/ Unskilled Workers (Including Students)	Professional, Managerial & Technical Workers	Non-Manual Workers	Skilled Manual Workers	Semi-Skilled/ Unskilled Workers (Including Students)
All	212[a]	225[a]	260[b]	235[a,b]	315[a]	351[a]	371[a]	276[b]
Biscuits	57.8[a]	52.8[a]	57.3[a]	44.3[d]	71.5[a]	65.4[a]	90.8[a]	52.4[b]
Soft drinks†	16.4[a]	30.0[b]	44.0[c]	24.9[d]	12.9[a]	25.5[b]	35.1[b]	20.0[b]
Soft drinks: sweetened	14.5[a]	27.8[b]	41.0[c]	23.0[a]	11.2[a]	23.0b	32.0[b]	15.5[a]
Soft drinks: NAS	1.9[a]	2.2[b]	3.0[c]	1.9[d]	1.7[a]	2.6[a]	3.1[a]	4.4a
Savoury snacks	21.9[a]	31.3[b]	28.9[b,c]	36.7[d]	41.5[a]	44.0[a]	54.6[a]	48.7[a]
Preserves, syrups & choc spreads	10.9[a]	7.5[b]	13.7[a]	11.6[a]	14.3[a]	15.0[a]	11.9[a]	16.5[a]
Preserves & syrups	7.4[a]	5.0[b]	8.4[a]	6.8[a]	7.9[a]	6.9[a]	6.6[a]	4.8[a]
Chocolate spreads	3.5[a]	2.5[a]	5.3[a]	4.7[a]	6.4[a]	8.0[a]	5.3[a]	11.7[a]
Chocolate	26.9[a]	34.3[b]	37.0[b,c]	41.1[c]	41.5[a]	42.1[a]	50.7[a]	44.0[a]
Cakes & buns	34.6[a]	23.2[b]	24.5[b,c]	21.3[c]	61.4[a]	67.8[a]	41.9[a]	40.6[a]
Ice-creams & desserts	26.7[a]	32.3[a]	35.9[b,c]	32.8[a,c]	45.3[a,b]	56.6[a]	53.9[a,b]	23.1[a,b]
Sweets	11.1[a]	7.7[b]	9.8[a,b]	11.3[a]	16.2[a]	17.7[a]	21.4[a]	21.5[a]
Cereal bars	4.8[a]	2.7[a,b]	5.3[a]	6.9[a]	8.8[a]	14.8[a]	5.0[a]	5.3[a]
Sugar & sweeteners	1.2[a]	2.8[b]	3.4[b,c]	3.5[c]	1.7[a]	2.4[a]	5.3[a]	4.1[a]
Sugar	1.2[a]	2.8[b]	3.4[b,c]	3.5[c]	1.6[a]	2.4[a]	5.3[a]	4.1[a]
Sweeteners	0.0[a]	0.0[a]	0.0[a]	0.0[a]	0.1[a]	0.0[a]	0.0[a]	0.0[a]

† Carbonated beverages, fruit juice drinks, squashes & cordials

NAS: No added sugar

*Statistical differences between groups are indicated by different superscript letters

Table 17. Mean daily intake of energy (kcal) from treat foods in children aged 2-12 years in NI, by social class

	2–4-year-olds (*n* 241)			5–12-year-olds (*n* 486)		
	Higher Managerial, Administrative & Professional Occupations	Intermediate Occupations	Routine & Manual Occupations, and Other	Higher Managerial, Administrative & Professional Occupations	Intermediate Occupations	Routine & Manual Occupations, and Other
All	234 (133)	253	221	388	412	412
Biscuits	52.9	56.1	45.0	76.3	69.1	59.9
Soft drinks†	11.9	19.1	22.0	33.9	45.1	52.1
Soft drinks: sweetened	9.4	15.1	18.1	31.7	42.6	49.6
Soft drinks: NAS	2.5	4.1	3.9	2.1	2.3	2.5
Savoury snacks	28.4	33.0	31.0	52.8	60.2	68.8
Preserves, syrups & choc spreads	7.8	10.5	11.8	13.7	18.4	16.6
Chocolate	38.6	36.4	38.8	47.6	47.3	64.6
Cakes & buns	47.5	53.9	40.4	88.1	83.0	75.7
Ice-creams & desserts	22.7	23.5	10.6	30.0	36.0	27.7
Sweets	17.2	13.2	15.3	32.5	38.8	32.2
Cereal bars	3.2	2.3	2.0	5.7	3.5	4.6
Sugar & sweeteners	4.1	4.7	4.4	7.3	10.7	9.3

† Carbonated beverages, fruit juice drinks, squashes & cordials

NAS: No added sugar

* No significant differences noted between groups (p<0.001)

Table 18. Mean daily intake of energy (kcal) from treat foods in children aged 2-12 years in Ireland, by parental education

	2–4-year-olds (*n* 374)			5–12-year-olds (*n* 600)		
	Intermediate	Secondary	Tertiary	Intermediate	Secondary	Tertiary
All	268[a]	247[a,b]	226[b]	326[a]	338[a]	325[a]
Biscuits	63.6[a]	42.3[b]	55.0[a]	74.6[a]	84.6[a]	70.1[a]
Soft drinks†	15.8[a]	31.6[b]	28.1[b]	26.3[a]	28.0[a]	18.0[a]
Soft drinks: sweetened	14.2[a]	27.1[b]	26.1[b]	24.6[a]	23.5[a]	15.7[a]
Soft drinks: NAS	1.6[a]	4.5[b]	2.0[a,c]	1.6[a]	4.5[a]	2.3[a]
Savoury snacks	28.5[a]	36.3[a,b]	27.0[a]	43.6[a]	32.8[a]	46.1[a]
Preserves, syrups & choc spreads	25.9[a]	12.9[b]	9.6[c]	25.7[a]	12.7[a,b]	13.3[b]
Preserves & syrups	19.3[a]	12.3[b]	5.4[c]	5.2[a]	8.9[a]	7.1[a]
Chocolate spreads	6.6[a]	0.6[b]	4.2[a,b]	20.5[a]	3.8[b]	6.2[b]
Chocolate	48.6[a]	42.4[a]	31.4[b]	50.9[a]	54.4[a]	41.3[a]
Cakes & buns	15.6[a]	32.1[b]	27.4[b]	30.5[a]	51.0[a]	60.9[a]
Ice-creams & desserts	51.3[a]	22.8[b]	31.0[c]	41.9[a]	43.8[a]	47.0[a]
Sweets	9.8[a]	10.5[a,b]	10.1[b]	24.1[a]	18.7[a]	17.2[a]
Cereal bars	9.3[a]	11.4[a]	3.8[b]	5.5[a]	7.0[a]	9.5[a]
Sugar & sweeteners	0[a]	4.5[b]	2.5[b]	3.1[a]	5.5[a]	2.2[a]
Sugar	0[a]	4.5[b]	2.5[b]	3.1[a]	5.5[a]	2.2[a]
Sweeteners	0[a]	0[a]	0[a]	0[a]	0[a]	0[a]

† Carbonated beverages, fruit juice drinks, squashes & cordials

NAS: No added sugar

*Statistical differences between groups are indicated by different superscript letters

Table 19. Mean daily intake of energy (kcal) from treat foods in children aged 2-12 years in Ireland, by BMI classification

	2–4-year-olds (*n* 374)		5–12-year-olds (*n* 600)	
	Normal weight (*n* 287)	Overweight/obese (*n* 84)	Normal weight (*n* 512)	Overweight/obese (*n* 84)
All	235	214*	333	280
Biscuits	52.8	57.1	73.5	54.8
Soft drinks†	28.3	26.0	18.2	27.2
Soft drinks: sweetened	26.1	23.7	15.6	25.8
Soft drinks: NAS	2.2	2.3	2.6	1.4
Savoury snacks	29.7	23.5*	45.0	43.6
Preserves, syrups & choc spreads	10.9	10.6	14.1	15.2
Preserves & syrups	6.7	7.9	7.3	6.0
Chocolate spreads	4.2	2.7*	6.8	9.2
Chocolate	34.1	32.8	45.2	32.3
Cakes & buns	27.8	23.6	59.9	40.7
Ice-creams & desserts	33.2	23.9*	47.3	40.0
Sweets	10.4	9.0	18.7	13.8
Cereal bars	4.7	5.7	8.8	10.5
Sugar & sweeteners	2.9	1.5*	2.7	2.3
Sugar	2.9	1.5*	2.6	2.3
Sweeteners	0	0	0	0

† Carbonated beverages, fruit juice drinks, squashes & cordials
NAS: No added sugar

* indicates values are significantly different compared to those within normal weight category within the rows ($p<0.001$)

Table 20. Mean daily intake of energy (kcal) from treat foods in children aged 2-12 years in NI, by BMI classification

	2–4-year-olds (n 241)		5–12-year-olds (n 486)	
	Normal weight (*n* 114)	Overweight/obese (*n* 93)	Normal weight (*n* 292)	Overweight/obese (*n* 158)
All	212	249	417	391
Biscuits	43.4	55.5	69.4	62.7
Soft drinks†	19.2	13.0	46.3	44.9
Soft drinks: sweetened	15.6	9.7	44.0	42.3
Soft drinks: NAS	3.6	3.3	2.3	2.5
Savoury snacks	26.3	33.4	59.8	63.2
Preserves, syrups & choc spreads	10.2	9.6	17.3	14.9
Chocolate	37.1	42.0	55.9	52.3
Cakes & buns	34.9	56.4	84.8	80.6
Ice-creams & desserts	16.0	18.9	31.1	29.7
Sweets	18.6	11.7	38.4	29.8
Cereal bars	2.0	3.7	3.8	5.1
Sugar & sweeteners	4.0	4.7	9.7	8.3

† Carbonated beverages, fruit juice drinks, squashes & cordials
NAS: No added sugar
* No significant differences noted between groups (p<0.001)

Table 21. Contribution (%) of treat foods to energy intake in children aged 2-12 years in Ireland

	2–4-year-olds (*n* 374)			5–12-year-olds (*n* 600)			5–8-year-olds (*n* 300)			9–12-year-olds (*n* 300)		
	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th
All	19.1 (9.8)	5.2	36.0	21.4 (9.9)	6.1	38.1	21.2 (10.2)	5.9	38.5	21.6 (9.7)	6.1	38.0
Biscuits	4.5 (4.3)	0	12.3	4.8 (4.7)	0	14.1	4.7 (4.7)	0	13.9	4.8 (4.7)	0	14.5
Soft drinks†	2.3 (3.8)	0	9.1	1.3 (2.1)	0	5.7	0.9 (0.9)	0	4.5	1.5 (2.4)*	0	6.1
Soft drinks: sweetened	2.1 (3.7)	0	9.0	1.1 (2.1)	0	5.3	0.8 (0.8)	0	4.2	1.4 (2.4)*	0	6.0
Soft drinks: NAS	0.2 (0.4)	0	0.8	0.2 (0.4)	0	0.7	0.2 (0.2)	0	0.7	0.2 (0.5)	0	0.8
Savoury snacks	2.4 (2.8)	0	8.9	2.9 (3.4)	0	9.7	2.7 (2.7)	0	10.1	3.1 (3.4)	0	9.3
Preserves, syrups & choc spreads	0.9 (1.6)	0	4.1	1.0 (1.5)	0	3.9	1.0 (1.0)	0	4.6	0.9 (1.4)	0	3.6
Preserves & syrups	0.6 (1.1)	0	2.5	0.5 (0.8)	0	2.5	0.5 (0.5)	0	2.0	0.5 (0.9)	0	2.6
Chocolate spreads	0.3 (1.2)	0	2.6	0.5 (1.2)	0	3.0	0.6 (0.6)	0	3.4	0.5 (1.1)	0	2.8
Chocolate	2.8 (3.7)	0	10.3	2.8 (3.5)	0	9.6	2.4 (2.4)	0	8.2	3.2 (3.9)	0	11.2
Cakes & buns	2.2 (3.5)	0	9.7	3.7 (4.8)	0	12.9	4.1 (4.1)	0	13.9	3.4 (4.5)	0	12.6
Ice-creams & desserts	2.6 (3.4)	0	9.1	3.1 (4.2)	0	12.2	3.4 (3.4)	0	13.0	2.8 (3.8)	0	10.5
Sweets	0.8 (1.4)	0	4.0	1.2 (2.2)	0	5.7	1.4 (1.4)	0	6.4	1.0 (2.2)	0	5.1
Cereal bars	0.4 (1.4)	0	3.1	0.6 (1.7)	0	4.0	0.5 (0.5)	0	3.5	0.7 (2.0)	0	4.4
Sugar & sweeteners	0.2 (0.6)	0	1.3	0.2 (0.5)	0	1.1	0.1 (0.1)	0	0.7	0.2 (0.6)	0	1.3
Sugar	0.2 (0.6)	0	1.3	0.2 (0.5)	0	1.1	0.1 (0.1)	0	0.7	0.2 (0.6)	0	1.3
Sweeteners	0.0 (0.0)	0	0	0.0 (0.0)	0	0	0.0 (0.0)	0	0	0.0 (0.0)	0	0

† Carbonated beverages, fruit juice drinks, squashes & cordials

NAS: No added sugar

* indicates values are significantly different compared to 5-8 year olds within the rows ($p<0.001$)

Table 22. Contribution (%) of treat foods to energy intake in children aged 2-12 years in NI

	2–4-year-olds (*n* 241)			5–12-year-olds (*n* 486)			5–8-year-olds (*n* 225)			9–12-year-olds (*n* 261)		
	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th
All	19.3 (9.7)	5	35.3	25.0 (10.4)	9	42.0	24.4 (10.0)	10	41.0	25.5 (10.7)	8.3	43.1
Biscuits	4.2 (4.3)	0	11.5	4.3 (4.0)	0	11.6	4.8 (3.9)	0	13.1	3.8 (4.0)	0	11.2
Soft drinks†	1.5 (2.5)	0	5.8	2.6 (3.6)	0	10.2	1.9 (3.1)	0	8.4	3.3* (3.8)	0	12.3
Soft drinks: sweetened	1.2 (2.5)	0	5.7	2.5 (3.6)	0	10.2	1.8 (3.1)	0	11.1	3.1* (3.9)	0	11.7
Soft drinks: NAS	0.3 (0.4)	0	1.0	0.2 (0.2)	0	0.6	0.2 (0.2)	0	5.0	0.1 (0.2)	0	4.4
Savoury snacks	2.5 (2.7)	0	8.0	3.8 (3.8)	0	11.5	3.6 (3.6)	0	10.9	4.0 (3.9)	0	12.6
Preserves, syrups & choc spreads	0.8 (1.9)	0	4.5	1.0 (2.1)	0	4.9	1.0 (2.0)	0	16.9	0.9 (2.2)	0	13.6
Chocolate	3.1 (3.7)	0	10.4	3.4 (4.2)	0	11.7	2.9 (3.4)	0	7.0	3.8 (4.8)	0	7.3
Cakes & buns	3.8 (4.5)	0	12.7	5.1 (5.3)	0	15.7	5.7 (5.7)	0	7.6	4.6 (4.9)	0	11.4
Ice-creams & desserts	1.4 (2.2)	0	6.3	1.9 (2.8)	0	7.2	1.9 (2.8)	0	2.1	1.9 (2.7)	0	2.6
Sweets	1.3 (2.1)	0	5.8	2.1 (3.4)	0	9.5	1.7 (2.7)	0	2.2	2.4 (4.0)	0	2.8
Cereal bars	0.2 (0.8)	0	1.7	0.3 (1.1)	0	2.3	0.3 (0.9)	0	7.9	0.3 (1.3)	0	12.3
Sugar & sweeteners	0.4 (0.7)	0	2.0	0.5 (1.0)	0	2.5	0.5 (1.0)	0	0.6	0.6 (1.1)	0	0.5

† Carbonated beverages, fruit juice drinks, squashes & cordials

NAS: No added sugar

* indicates values are significantly different compared to 5-8 year olds within the rows ($p<0.001$)

Table 23. Contribution (%) of treat foods to energy intake in children aged 2-12 years in Ireland, by sex

	2–4-year-olds (*n* 374)						5–12-year-olds (*n* 600)					
	Boys (*n* 188)			Girls (*n* 186)			Boys (*n* 300)			Girls (*n* 300)		
	Mean (SD)	P5	P95	Mean (SD)	P5	P95	Mean (SD)	P5	P95	Mean (SD)	P5	P95
All	19.3 (10.1)	5.8	37.2	18.9 (9.4)	3.6	34.6	20.7 (9.8)	5.3	37.2	22.2 (10.0)	6.4	40.5
Biscuits	4.8 (4.4)	0	12.3	4.1 (4.2)*	0	13.5	4.8 (5.2)	0	14.6	4.8 (4.2)	0	13.1
Soft drinks†	2.4 (4.0)	0	9.0	2.3 (3.5)	0	9.8	1.4 (1.9)	0	5.9	1.1 (2.2)	0	5.1
Soft drinks: sweetened	2.2 (4.0)	0	8.7	2.1 (3.5)	0	9.4	1.2 (1.9)	0	5.7	1.0 (2.2)	0	4.7
Soft drinks: NAS	0.2 (0.4)	0	0.8	0.2 (0.4)	0	0.8	0.2 (0.5)	0	1.0	0.1 (0.3)	0	0.5
Savoury snacks	2.4 (2.6)	0	7.3	2.3 (3.1)	0	9.5	3.0 (3.5)	0	10.1	2.7 (3.4)	0	9.7
Preserves, syrups & choc spreads	0.9 (1.5)	0	5.1	0.9 (1.7)	0	3.8	1.1 (1.7)	0	4.9	0.8 (1.2)	0	3.2
Preserves & syrups	0.6 (1.2)	0	4.1	0.5 (0.9)*	0	2.3	0.5 (0.8)	0	2.5	0.4 (0.8)	0	2.5
Chocolate spreads	0.3 (0.9)	0	2.6	0.4 (1.4)	0	2.6	0.6 (1.4)	0	3.8	0.4 (0.9)	0	2.4
Chocolate	2.5 (3.5)	0	10.2	3.1 (3.9)*	0	11.4	2.6 (3.3)	0	9.2	3.0 (3.7)	0	11.1
Cakes & buns	2.4 (3.8)	0	11.7	1.9 (3.0)*	0	8.1	3.3 (4.5)	0	12.1	4.1 (5.2)	0	13.6
Ice-creams & desserts	2.3 (3.4)	0	9.0	2.8 (3.4)*	0	10.6	2.8 (4.0)	0	11.1	3.3 (4.3)	0	13.0
Sweets	0.8 (1.4)	0	4.0	0.8 (1.4)	0	3.7	1.1 (2.2)	0	5.6	1.3 (2.3)	0	5.9
Cereal bars	0.4 (1.5)	0	2.6	0.4 (1.4)	0	3.4	0.5 (1.7)	0	3.0	0.8 (1.8)	0	4.7
Sugar & sweeteners	0.2 (0.5)	0	1.2	0.2 (0.7)	0	1.4	0.2 (0.5)	0	1.2	0.1 (0.4)	0	1.0
Sugar	0.2 (0.5)	0	1.2	0.2 (0.7)	0	1.4	0.2 (0.5)	0	1.2	0.1 (0.4)	0	1.0
Sweeteners	0.0 (0.0)	0	0	0.0 (0.0)	0	0	0.0 (0.0)	0	0	0.0 (0.0)	0	0

† Carbonated beverages, fruit juice drinks, squashes & cordials

NAS: No added sugar

* indicates values are significantly different compared to boys within the rows ($p<0.001$)

Table 24. Contribution (%) of treat foods to energy intake in children aged 2-12 years in Ireland, by sex

	5–8-year-olds (*n* 300)						9–12-year-olds (*n* 300)					
	Boys (*n* 149)			Girls (*n* 151)			Boys (*n* 151)			Girls (*n* 149)		
	Mean (SD)	P5	P95	Mean (SD)	P5	P95	Mean (SD)	P5	P95	Mean (SD)	P5	P95
All	20.3 (10.3)	4.9	37.6	22.1 (10.0)	6.4	40.7	21.1 (9.4)	5.5	35.5	22.2 (10.1)	6.3	40.0
Biscuits	4.7 (5.5)	0.0	14.3	4.7 (3.9)	0.0	12.0	4.8 (4.9)	0.0	14.9	4.9 (4.4)	0.0	13.4
Soft drinks†	1.0 (1.8)	0.0	5.9	0.9 (1.5)	0.0	3.5	1.6 (2.1)	0.0	6.1	1.4 (2.7)	0.0	6.2
Soft drinks: sweetened	0.8 (1.7)	0.0	4.5	0.8 (1.5)	0.0	3.4	1.5 (2.0)	0.0	6.1	1.3 (2.7)	0.0	6.2
Soft drinks: NAS	0.2 (0.4)	0.0	0.8	0.1 (0.2)	0.0	0.6	0.2 (0.5)	0.0	1.1	0.1 (0.4)	0.0	0.5
Savoury snacks	2.8 (3.4)	0.0	10.2	2.5 (3.5)	0.0	9.9	3.2 (3.6)	0.0	9.3	2.9 (3.2)	0.0	9.7
Preserves, syrups & choc spreads	1.3 (1.8)	0.0	5.2	0.8 (1.1)	0.0	3.1	1.0 (1.5)	0.0	3.9	0.9 (1.2)	0.0	3.3
Preserves & syrups	0.5 (0.7)	0.0	2.1	0.5 (0.8)	0.0	2.5	0.5 (0.9)	0.0	2.7	0.4 (0.8)	0.0	2.5
Chocolate spreads	0.8 (1.7)	0.0	4.6	0.3 (0.7)	0.0	2.3	0.4 (1.2)	0.0	3.0	0.5 (1.0)	0.0	2.7
Chocolate	2.2 (2.8)	0.0	8.0	2.6 (3.1)	0.0	8.7	3.1 (3.6)	0.0	10.1	3.4 (4.2)	0.0	13.7
Cakes & buns	3.6 (4.6)	0.0	12.9	4.5 (5.7)	0.0	16.6	3.1 (4.4)	0.0	12.0	3.7 (4.5)	0.0	12.9
Ice-creams & desserts	2.9 (4.4)	0.0	12.1	3.8 (4.5)	0.0	13.5	2.7 (3.7)	0.0	9.6	2.9 (4.0)	0.0	12.4
Sweets	1.3 (2.2)	0.0	6.7	1.5 (2.3)	0.0	6.4	0.9 (2.1)	0.0	5.1	1.2 (2.3)	0.0	5.2
Cereal bars	0.4 (1.2)	0.0	3.2	0.7 (1.7)	0.0	4.7	0.5 (2.0)	0.0	2.9	0.9 (1.9)	0.0	4.8
Sugar & sweeteners	0.1 (0.3)	0.0	1.0	0.1 (0.3)	0.0	0.5	0.2 (0.6)	0.0	1.5	0.2 (0.5)	0.0	1.3
Sugar	0.1 (0.3)	0.0	1.0	0.1 (0.3)	0.0	0.5	0.2 (0.6)	0.0	1.5	0.2 (0.5)	0.0	1.3
Sweeteners	0.0 (0.1)	0.0	0.0	0.0 (0.0)	0.0	0.0	0.0 (0.0)	0.0	0.0	0.0 (0.0)	0.0	0.0

† Carbonated beverages, fruit juice drinks, squashes & cordials

NAS: No added sugar

* indicates values are significantly different compared to boys within the rows ($p<0.001$)

Table 25. Contribution (%) of treat foods to energy intake in children aged 2-12 years in NI, by sex

	2–4-year-olds (*n* 241)						5–12-year-olds (*n* 486)					
	Boys (*n* 125)			Girls (*n* 116)			Boys (*n* 257)			Girls (*n* 229)		
	Mean (SD)	P5	P95	Mean (SD)	P5	P95	Mean (SD)	P5	P95	Mean (SD)	P5	P95
All	19.5 (9.7)	6.3	34.6	19.0 (9.7)	4.2	36.2	24.8 (10.7)	8.5	41.8	25.3 (10.2)	9.0	42.3
Biscuits	4.4 (4.6)	0	11.4	3.9 (3.8)	0	12.7	4.3(4.1)	0	13.0	4.2 (3.9)	0	10.8
Soft drinks†	1.5 (2.9)	0	7.0	1.4 (1.9)	0	4.7	3.1 (4.0)	0	11.2	2.1 (3.0)	0	8.1
Soft drinks: sweetened	1.2 (2.9)	0	7.0	1.1 (1.9)	0	4.2	3.0 (4.1)	0	11.1	2.0 (3.0)	0	8.0
Soft drinks: NAS	0.3 (0.4)	0	1.0	0.3 (0.4)	0	1.0	0.2 (0.2)	0	0.6	0.2 (0.2)	0	0.6
Savoury snacks	2.5 (2.8)	0	8.9	2.4 (2.6)	0	7.1	3.7 (3.6)	0	11.2	4.0 (4.0)	0	11.9
Preserves, syrups & choc spreads	0.8 (1.9)	0	5.1	0.8 (2.0)	0	4.0	0.9 (2.1)	0	4.3	1.1 (2.1)	0	5.1
Chocolate	2.9 (4.1)	0	11.9	3.3 (3.2)	0	10.2	3.5 (4.5)	0	11.7	3.3 (3.9)	0	11.8
Cakes & buns	3.8 (4.7)	0	13.3	3.8 (4.4)	0	13.2	4.7 (4.9)	0	13.5	5.6 (5.6)	0	16.4
Ice-creams & desserts	1.5 (2.1)	0	6.0	1.4 (2.3)	0	6.5	1.9 (2.8)	0	7.3	1.9 (2.7)	0	7.1
Sweets	1.4 (1.9)	0	5.7	1.3 (2.4)	0	6.4	2.0 (3.5)	0	9.2	2.2 (3.4)	0	9.7
Cereal bars	0.2 (0.7)	0	1.7	0.2 (0.9)	0	1.9	0.3 (1.1)	0	2.5	0.3 (1.1)	0	2.3
Sugar & sweeteners	0.4 (0.6)	0	1.8	0.4 (0.8)	0	2.1	0.5 (1.0)	0	2.4	0.6 (1.1)	0	2.7

† Carbonated beverages, fruit juice drinks, squashes & cordials

NAS: No added sugar

* No significant differences noted between groups ($p<0.001$)

Table 26. Contribution (%) of treat foods to energy intake in children aged 2-12 years in NI, by sex

	5–8-year-olds (*n* 225)						9–12-year-olds (*n* 261)					
	Boys (*n* 118)			Girls (*n* 107)			Boys (*n* 139)			Girls (*n* 122)		
	Mean (SD)	P5	P95	Mean (SD)	P5	P95	Mean (SD)	P5	P95	Mean (SD)	P5	P95
All	23.8 (10.2)	9.8	40.7	25.0 (9.8)	9.3	41.5	25.6 (11.0)	5.8	43.6	25.5 (10.5)	8.4	43.0
Biscuits	4.9 (4.2)	0.0	13.6	4.7 (3.6)	0.0	10.4	3.8 (4.1)	0.0	11.0	3.8 (4.0)	0.0	11.3
Soft drinks†	2.4 (3.8)	0.0	10.4	1.4 (2.0)	0.0	6.7	3.7 (4.1)	0.0	12.7	2.8 (3.5)	0.0	12.2
Soft drinks: sweetened	2.2 (3.9)	0.0	10.3	1.2 (2.0)	0.0	6.4	3.6 (4.1)	0.0	12.5	2.7 (3.5)	0.0	12.1
Soft drinks: NAS	0.2 (0.2)	0.0	0.7	0.2 (0.2)	0.0	0.6	0.1 (0.2)	0.0	0.5	0.1 (0.2)	0.0	0.6
Savoury snacks	3.6 (3.4)	0.0	10.8	3.7 (3.8)	0.0	11.3	3.8 (3.7)	0.0	11.3	4.2 (4.1)	0.0	12.6
Preserves, syrups & choc spreads	1.0 (1.8)	0.0	4.8	1.1 (2.1)	0.0	5.1	0.9 (2.3)	0.0	4.0	1.0 (2.1)	0.0	6.5
Chocolate	3.0 (3.5)	0.0	11.0	2.8 (3.2)	0.0	10.6	3.9 (5.1)	0.0	12.6	3.6 (4.4)	0.0	13.1
Cakes & buns	4.9 (5.1)	0.0	13.6	6.5 (6.2)	0.0	19.5	4.4 (4.9)	0.0	13.6	4.7 (4.9)	0.0	14.3
Ice-creams & desserts	1.8(2.8)	0.0	7.2	2.0 (2.9)	0.0	7.8	1.9 (2.8)	0.0	7.6	1.9 (2.6)	0.0	7.3
Sweets	1.6 (2.5)	0.0	7.8	1.9 (2.8)	0.0	7.4	2.3 (4.1)	0.0	11.4	2.5 (3.8)	0.0	11.9
Cereal bars	0.3 (1.0)	0.0	2.5	0.2 (0.7)	0.0	2.0	0.3 (1.1)	0.0	2.6	0.4 (1.4)	0.0	2.6
Sugar & sweeteners	0.5 (0.8)	0.0	2.3	0.5 (1.2)	0.0	2.0	0.6 (1.1)	0.0	2.5	0.6 (1.0)	0.0	3.4

† Carbonated beverages, fruit juice drinks, squashes & cordials

NAS: No added sugar

* No significant differences noted between groups ($p<0.001$)

Table 27. Contribution (%) of treat foods to energy intake in children aged 2-12 years in Ireland, by social class

	2–4-year-olds (*n* 374)				5–12-year-olds (*n* 600)			
	Professional, Managerial & Technical Workers	Non-Manual Workers	Skilled Manual Workers	Semi Skilled/ Unskilled Workers (Including Students)	Professional, Managerial & Technical Workers	Non-Manual Workers	Skilled Manual Workers	Semi Skilled/ Unskilled Workers (Including Students)
All	17.9[a]	18.4[a]	22.0[c]	18.5[a]	21.1[a]	22.4[a]	23.4[a]	18.9[a]
Biscuits	4.9[a]	4.2[b]	4.7[a,b,c]	3.7[b]	4.8[a]	4.3[a]	5.7[a]	3.8[a]
Soft drinks†	1.4[a]	2.6[b]	3.6[c]	2.0[d]	0.8[a]	1.6[a]	2.3[b]	1.3[a]
Soft drinks: sweetened	1.2[a]	2.4[b]	3.4[c]	1.9[d]	0.7[a]	1.4[a]	2.1[b]	1.0[a]
Soft drinks: NAS	0.2[a]	0.2[a]	0.3[c]	0.2[a]	0.1[a]	0.2[a]	0.2[a]	0.3[a]
Savoury snacks	1.9[a]	2.5[b]	2.5[b]	2.9[b]	2.7[a]	2.8[a]	3.4[a]	3.3[a]
Preserves, syrups & choc spreads	0.9[a]	0.6[b]	1.1[a]	0.9[a]	1.0[a]	1.0[a]	0.8[a]	1.1[a]
Preserves & syrups	0.6[a]	0.4[b]	0.7[a]	0.6[a,b]	0.5[a]	0.4[a]	0.4[a]	0.3[a]
Chocolate spreads	0.3[a]	0.3[a]	0.5[a,b]	0.3[a]	0.5[a]	0.5[a]	0.4[a]	0.8[a]
Chocolate	2.3[a]	2.8[b]	3.3[b]	3.2[b]	2.7[a]	2.5[a]	3.2[a]	3.0[a]
Cakes & buns	2.8[a]	1.9[b]	2.0[b,c]	1.5[b]	4.0[a]	4.3[a]	2.6[a]	2.7[a]
Ice-creams & desserts	2.2[a]	2.7[b]	3.2[b,c]	2.5[a,b,c]	3.2[a]	3.5[a]	3.3[a,b]	1.6[b]
Sweets	0.9[a]	0.6[b]	0.8[a,b]	0.8[a,b]	1.1[a]	1.2[a]	1.4[a]	1.5[a]
Cereal bars	0.4[a]	0.2[b]	0.4[a]	0.7[a]	0.6[a]	1.1[a]	0.3[a]	0.4[a]
Sugar & sweeteners	0.1[a]	0.2[b]	0.3[b]	0.3[b]	0.1[a]	0.1[a]	0.3[a]	0.3[a]
Sugar	0.1[a]	0.2[b]	0.3[b]	0.3[b]	0.1[a]	0.1[a]	0.3[a]	0.3[a]
Sweeteners	0[a]	0[a]	0[a]	0[a]	0[a]	0[a]	0[a]	0[a]

† Carbonated beverages, fruit juice drinks, squashes & cordials

NAS: No added sugar

*Statistical differences between groups are indicated by different superscript letters

Table 28. Contribution (%) of treat foods to energy intake in children aged 2-12 years in NI, by social class

	2–4-year-olds (*n* 241)			5–12-year-olds (*n* 486)		
	Higher Managerial, Administrative & Professional Occupations	Intermediate Occupations	Routine & Manual Occupations, and Other	Higher Managerial, Administrative & Professional Occupations	Intermediate Occupations	Routine & Manual Occupations, and Other
All	19.4	20.1	18.7	23.8	26.2	25.3
Biscuits	4.4	4.6	3.9	4.7	4.4	3.9
Soft drinks†	1.0	1.6	1.8	2.0	2.9	3.1
Soft drinks: sweetened	0.8	1.2	1.5	1.8	2.7	2.9
Soft drinks: NAS	0.2	0.3	0.4	0.1	0.2	0.2
Savoury snacks	2.3	2.7	2.6	3.2	3.8	4.3
Preserves, syrups & choc spreads	0.6	0.8	0.9	0.8	1.1	1.0
Chocolate	3.2	2.8	3.2	2.9	3.1	3.8
Cakes & buns	3.9	4.2	3.4	5.5	5.3	4.7
Ice-creams & desserts	1.9	1.8	0.9	1.8	2.3	1.7
Sweets	1.4	1.0	1.3	2.0	2.5	1.9
Cereal bars	0.2	0.2	0.1	0.3	0.3	0.3
Sugar & sweeteners	0.3	0.4	0.4	0.4	0.6	0.6

† Carbonated beverages, fruit juice drinks, squashes & cordials

NAS: No added sugar

* No significant differences noted between groups ($p<0.001$)

Table 29. Contribution (%) of treat foods to energy intake in children aged 2-12 years in Ireland, by parental education

	2–4-year-olds (*n* 374)			5–12-year-olds (*n* 600)		
	Intermediate	Secondary	Tertiary	Intermediate	Secondary	Tertiary
All	22.5[a]	21.2[a]	18.6[c]	22.2[a]	20.8[a]	21.5[a]
Biscuits	5.2[a]	3.8[b]	4.5[a]	4.9[a]	5.0[a]	4.7[a]
Soft drinks†	1.6[a]	2.8[b]	2.3[a,b]	1.8[a]	1.8[a]	1.1[a]
Soft drinks: sweetened	1.5[a]	2.4[a]	2.1[a]	1.7[a]	1.5[a]	1.0[a]
Soft drinks: NAS	0.1[a]	0.4[b]	0.2[a]	0.1[a]	0.3[a]	0.1[a]
Savoury snacks	2.5[a]	3.1[a]	2.2[a]	2.9[a]	2.1[a]	2.9[a]
Preserves, syrups & choc spreads	2.1[a]	1.0[b]	0.8[b]	1.8[a]	0.7[a]	0.9[a]
Preserves & syrups	1.5[a]	1.0[b]	0.4[c]	0.3[a]	0.5[a]	0.5[a]
Chocolate spreads	0.5[a]	0[b]	0.4[a]	1.4[a]	0.2[b]	0.4[b]
Chocolate	4.0[a]	3.6[a]	2.6[b]	3.5[a]	3.2[a]	2.7[a]
Cakes & buns	1.3[a]	2.7[b]	2.2[b]	2.1[a]	3.1[a,b]	4.0[b]
Ice-creams & desserts	4.2[a]	2.0[b]	2.6[c]	2.9[a]	2.9[a]	3.1[a]
Sweets	0.9[a]	0.9[a]	0.8[a]	1.7[a]	1.1[a]	1.2[a]
Cereal bars	0.7[a]	0.9[a]	0.3[b]	0.4[a]	0.5[a]	0.7[a]
Sugar & sweeteners	0[a]	0.3[b]	0.2[b]	0.2[a]	0.3[a]	0.1[a]
Sugar	0[a]	0.3[b]	0.2[b]	0.2[a]	0.3[a]	0.1[a]
Sweeteners	0[a]	0[a]	0[a]	0[a]	0[a]	0[a]

† Carbonated beverages, fruit juice drinks, squashes & cordials

NAS: No added sugar

*Statistical differences between groups are indicated by different superscript letters

Table 30. Contribution (%) of treat foods to energy intake in children aged 2-12 years in Ireland, by BMI classification

	2–4-year-olds (*n* 374)		5–12-year-olds (*n* 600)	
	Normal weight (*n* 287)	Overweight/obese (*n* 84)	Normal weight (*n* 512)	Overweight/obese (*n* 84)
All	19.2	18.5	21.9	18.2*
Biscuits	4.3	5.0*	4.9	3.7
Soft drinks†	2.3	2.3	1.2	1.8
Soft drinks: sweetened	2.2	2.1	1.0	1.7
Soft drinks: NAS	0.2	0.2	0.2	0.1
Savoury snacks	2.4	2.1*	2.9	2.8
Preserves, syrups & choc spreads	0.9	0.9	1.0	1.0
Preserves & syrups	0.5	0.7	0.5	0.4
Chocolate spreads	0.4	0.2*	0.5	0.6
Chocolate	2.9	2.8	2.9	2.1
Cakes & buns	2.2	1.9	3.9	2.4
Ice-creams & desserts	2.7	2.1*	3.2	2.6
Sweets	0.8	0.8	1.3	0.9
Cereal bars	0.4	0.5	0.6	0.8
Sugar & sweeteners	0.2	0.1*	0.2	0.2
Sugar	0.2	0.1*	0.2	0.2
Sweeteners	0	0	0	0

† Carbonated beverages, fruit juice drinks, squashes & cordials

NAS: No added sugar

* indicates values are significantly different compared to those within normal weight category within the rows ($p<0.001$)

Table 31. Contribution (%) of treat foods to energy intake in children aged 2-12 years in NI, by BMI classification

	2–4-year-olds (n 241)		5–12-year-olds (n 486)	
	Normal weight (*n* 114)	Overweight/obese (*n* 93)	Normal weight (*n* 292)	Overweight/obese (*n* 158)
All	18.1	19.8	25.6	24.6
Biscuits	3.8	4.5	4.4	4.1
Soft drinks†	1.6	1.1	2.7	2.7
Soft drinks: sweetened	1.3	0.8	2.6	2.6
Soft drinks: NAS	0.3	0.3	0.1	0.2
Savoury snacks	2.2	2.6	3.7	4.0
Preserves, syrups & choc spreads	0.9	0.7	1.0	0.9
Chocolate	3.1	3.3	3.4	3.2
Cakes & buns	3.0	4.5	5.2	5.2
Ice-creams & desserts	1.4	1.5	1.9	1.9
Sweets	1.6	0.9	2.3	1.8
Cereal bars	0.2	0.3	0.2	0.3
Sugar & sweeteners	0.3	0.4	0.6	0.5

† Carbonated beverages, fruit juice drinks, squashes & cordials

NAS: No added sugar

* No significant differences noted between groups ($p<0.001$)

Table 32. Contribution (%) of treat foods to mean daily intakes of energy and selected nutrients in children aged 2-4 years in Ireland

	All	Biscuits	Soft drinks†	*Soft drinks: sweetened*	*Soft drinks: NAS*	Savoury snacks
	% Contribution					
Energy	19.1	4.5	2.3	2.1	0.2	2.4
Protein	7.0	2.0	0.2	0.1	0.1	0.9
Total fat	19.7	5.0	0.0	0.0	0.0	3.3
Saturated fat	20.2	5.7	0.0	0.0	0.0	1.2
MUFA	20.8	5.5	0.0	0.0	0.0	3.8
PUFA	21.2	4.2	0.0	0.0	0.0	9.6
Carbohydrates	22.5	5.2	4.1	3.9	0.2	2.0
Total sugars	28.8	3.6	7.6	7.2	0.4	0.2
Free sugars	52.0	7.1	13.5	12.6	0.9	0.1
Dietary fibre	10.2	3.0	0.4	0.2	0.2	3.5
Salt equivalents	11.6	3.4	1.4	0.3	1.0	3.3
Vitamins						
Vitamin A	5.4	0.4	1.6	1.6	0.0	0.3
Vitamin D	5.2	0.9	0.2	0.0	0.2	0.0
Vitamin E	21.3	5.9	2.4	2.1	0.4	6.8
Thiamin	7.6	2.2	1.1	1.1	0.0	1.1
Riboflavin	7.7	0.8	1.0	1.0	0.0	0.4
Niacin	7.5	1.6	1.8	1.3	0.5	0.9
Vitamin B6	7.3	1.0	2.6	1.9	0.7	1.5
Vitamin B12	4.9	0.0	1.1	1.1	0.0	0.0
Pantothenate	6.0	0.4	1.8	1.2	0.7	0.7
Biotin	7.3	0.7	1.8	1.8	0.0	0.6
Total folate	6.2	1.1	1.7	1.4	0.4	0.9
Dietary folate equivalents	6.0	0.9	1.8	1.5	0.3	0.7
Vitamin C	13.7	0.0	12.0	10.6	1.4	0.8
Minerals						
Potassium	8.4	1.2	1.7	1.3	0.3	1.8
Calcium	8.5	1.8	0.8	0.5	0.2	0.3
Iron	10.6	3.9	0.2	0.2	0.0	1.2
Magnesium	10.4	2.1	1.3	1.0	0.2	1.9
Zinc	6.6	1.6	0.0	0.0	0.0	1.1
Copper	11.1	3.3	0.1	0.1	0.0	1.1
Phosphorous	7.9	1.6	0.4	0.3	0.1	1.1

MUFA:Monounsaturated Fatty Acids

PUFA: Polyunsaturated Fatty Acids
† Carbonated beverages, fruit juice drinks, squashes & cordials
NAS: No added sugar

Table 32 continued. Contribution (%) of treat foods to mean daily intakes of energy and selected nutrients in children aged 2-4 years in Ireland

	Preserves, syrups & choc spreads	*Preserves & syrups*	*Chocolate spreads*	Chocolate	Cakes & buns
	% Contribution				
Energy	0.9	0.6	0.3	2.8	2.2
Protein	0.1	0.0	0.1	1.1	0.9
Total fat	0.5	0.0	0.5	4.2	3.1
Saturated fat	0.4	0.0	0.4	5.5	3.1
MUFA	0.9	0.0	0.9	4.3	3.4
PUFA	0.6	0.0	0.6	1.6	3.3
Carbohydrates	1.3	1.1	0.3	2.6	2.3
Total sugars	2.7	2.1	0.5	4.7	2.6
Free sugars	5.7	4.8	0.9	8.1	4.7
Dietary fibre	0.2	0.2	0.1	1.0	1.2
Salt equivalents	0.1	0.1	0.0	0.6	1.6
Vitamins					
Vitamin A	0.0	0.0	0.0	0.5	1.1
Vitamin D	0.0	0.0	0.0	0.2	1.6
Vitamin E	0.6	0.0	0.5	1.5	2.4
Thiamin	0.0	0.0	0.0	0.5	0.9
Riboflavin	0.1	0.0	0.0	2.2	0.6
Niacin	0.1	0.0	0.1	0.9	0.7
Vitamin B6	0.0	0.0	0.0	0.3	0.4
Vitamin B12	0.0	0.0	0.0	1.2	0.5
Pantothenate	0.0	0.0	0.0	1.1	0.4
Biotin	0.0	0.0	0.0	1.3	1.0
Total folate	0.0	0.0	0.0	0.4	0.8
Dietary folate equivalents	0.0	0.0	0.0	0.4	0.8
Vitamin C	0.3	0.3	0.0	0.0	0.1
Minerals					
Potassium	0.2	0.1	0.1	1.4	0.6
Calcium	0.2	0.1	0.1	1.9	0.9
Iron	0.3	0.1	0.2	1.4	1.4
Magnesium	0.3	0.1	0.3	2.0	0.9
Zinc	0.3	0.2	0.1	1.4	0.8
Copper	0.6	0.1	0.5	2.7	1.7
Phosphorous	0.2	0.0	0.1	1.7	1.1

MUFA:Monounsaturated Fatty Acids

PUFA: Polyunsaturated Fatty Acids

Table 32 continued. Contribution (%) of treat foods to mean daily intakes of energy and selected nutrients in children aged 2-4 years in Ireland

	Ice-creams & desserts	Sweets	Cereal bars	Sugar & sweeteners	*Sugar*	*Sweeteners*
	% Contribution					
Energy	2.6	0.8	0.4	0.2	0.2	0.0
Protein	1.3	0.3	0.2	0.0	0.0	0.0
Total fat	2.8	0.3	0.3	0.0	0.0	0.0
Saturated fat	3.6	0.4	0.4	0.0	0.0	0.0
MUFA	2.3	0.3	0.3	0.0	0.0	0.0
PUFA	1.5	0.1	0.3	0.0	0.0	0.0
Carbohydrates	2.4	1.5	0.6	0.4	0.4	0.0
Total sugars	3.6	2.2	0.5	0.9	0.9	0.0
Free sugars	6.0	4.1	0.9	1.9	1.9	0.0
Dietary fibre	0.5	0.0	0.3	0.0	0.0	0.0
Salt equivalents	0.9	0.1	0.2	0.0	0.0	0.0
Vitamins						
Vitamin A	1.5	0.0	0.0	0.0	0.0	0.0
Vitamin D	2.2	0.0	0.1	0.0	0.0	0.0
Vitamin E	1.5	0.0	0.2	0.0	0.0	0.0
Thiamin	0.9	0.0	0.8	0.0	0.0	0.0
Riboflavin	1.9	0.0	0.7	0.0	0.0	0.0
Niacin	0.9	0.0	0.6	0.0	0.0	0.0
Vitamin B6	0.6	0.0	0.8	0.0	0.0	0.0
Vitamin B12	2.0	0.0	0.2	0.0	0.0	0.0
Pantothenate	1.6	0.0	0.1	0.0	0.0	0.0
Biotin	1.9	0.0	0.0	0.0	0.0	0.0
Total folate	0.6	0.0	0.7	0.0	0.0	0.0
Dietary folate equivalents	0.6	0.0	0.9	0.0	0.0	0.0
Vitamin C	0.5	0.0	0.0	0.0	0.0	0.0
Minerals						
Potassium	1.3	0.0	0.2	0.0	0.0	0.0
Calcium	2.0	0.0	0.7	0.0	0.0	0.0
Iron	0.9	0.1	1.1	0.0	0.0	0.0
Magnesium	1.3	0.1	0.4	0.0	0.0	0.0
Zinc	1.0	0.0	0.3	0.0	0.0	0.0
Copper	1.1	0.1	0.3	0.1	0.1	0.0
Phosphorous	1.6	0.0	0.3	0.0	0.0	0.0

MUFA:Monounsaturated Fatty Acids

PUFA: Polyunsaturated Fatty Acids

Table 33. Contribution (%) of treat foods to mean daily intakes of energy and selected nutrients in children aged 5-12 years in Ireland

	All	Biscuits	Soft drinks†	*Soft drinks: sweetened*	*Soft drinks: NAS*	Savoury snacks
	% Contribution					
Energy	21.4	4.8	1.3	1.1	0.2	2.9
Protein	8.2	1.9	0.0	0.0	0.0	1.3
Total fat	24.1	5.7	0.0	0.0	0.0	4.1
Saturated fat	25.6	6.6	0.0	0.0	0.0	2.3
MUFA	24.1	5.2	0.0	0.0	0.0	5.7
PUFA	20.4	4.8	0.0	0.0	0.0	4.3
Carbohydrates	23.9	5.2	2.3	2.1	0.2	2.6
Total sugars	36.4	4.7	5.7	5.1	0.6	0.3
Free sugars	61.1	8.7	9.5	8.5	1.0	0.1
Dietary fibre	13.0	3.5	0.2	0.0	0.1	3.7
Salt equivalents	14.2	3.2	1.4	0.4	1.1	4.3
Vitamins						
Vitamin A	9.6	0.5	1.0	0.9	0.1	0.2
Vitamin D	5.5	0.2	0.3	0.0	0.3	0.0
Vitamin E	23.2	6.3	0.0	0.0	0.0	5.6
Thiamin	6.3	1.7	0.2	0.0	0.2	0.8
Riboflavin	9.2	0.7	0.0	0.0	0.0	0.8
Niacin	8.2	1.9	1.8	0.3	1.5	1.0
Vitamin B6	8.3	0.8	3.2	0.5	2.7	1.2
Vitamin B12	7.2	0.2	0.3	0.1	0.2	0.0
Pantothenate	7.9	2.0	0.5	0.3	0.3	0.8
Biotin	12.2	3.2	0.2	0.0	0.2	1.0
Total folate	6.9	1.3	0.6	0.2	0.3	1.5
Dietary folate equivalents	6.4	1.2	0.6	0.2	0.3	1.4
Vitamin C	5.1	0.0	2.6	1.6	1.1	0.8
Minerals						
Potassium	10.9	2.0	0.9	0.5	0.3	2.4
Calcium	10.5	2.3	0.6	0.4	0.2	0.4
Iron	12.6	3.7	0.1	0.1	0.0	1.2
Magnesium	13.7	3.6	1.0	0.7	0.3	1.7
Zinc	11.6	2.1	3.6	0.3	3.3	0.9
Copper	16.3	4.5	0.1	0.0	0.0	1.6
Phosphorous	10.9	2.6	0.7	0.4	0.3	0.9

MUFA:Monounsaturated Fatty Acids

PUFA: Polyunsaturated Fatty Acids

† Carbonated beverages, fruit juice drinks, squashes & cordials

NAS: No added sugar

Table 33. Contribution (%) of treat foods to mean daily intakes of energy and selected nutrients in children aged 5-12 years in Ireland

	All	Biscuits	Soft drinks†	*Soft drinks: sweetened*	*Soft drinks: NAS*	Savoury snacks
	% Contribution					
Energy	21.4	4.8	1.3	1.1	0.2	2.9
Protein	8.2	1.9	0.0	0.0	0.0	1.3
Total fat	24.1	5.7	0.0	0.0	0.0	4.1
Saturated fat	25.6	6.6	0.0	0.0	0.0	2.3
MUFA	24.1	5.2	0.0	0.0	0.0	5.7
PUFA	20.4	4.8	0.0	0.0	0.0	4.3
Carbohydrates	23.9	5.2	2.3	2.1	0.2	2.6
Total sugars	36.4	4.7	5.7	5.1	0.6	0.3
Free sugars	61.1	8.7	9.5	8.5	1.0	0.1
Dietary fibre	13.0	3.5	0.2	0.0	0.1	3.7
Salt equivalents	14.2	3.2	1.4	0.4	1.1	4.3
Vitamins						
Vitamin A	9.6	0.5	1.0	0.9	0.1	0.2
Vitamin D	5.5	0.2	0.3	0.0	0.3	0.0
Vitamin E	23.2	6.3	0.0	0.0	0.0	5.6
Thiamin	6.3	1.7	0.2	0.0	0.2	0.8
Riboflavin	9.2	0.7	0.0	0.0	0.0	0.8
Niacin	8.2	1.9	1.8	0.3	1.5	1.0
Vitamin B6	8.3	0.8	3.2	0.5	2.7	1.2
Vitamin B12	7.2	0.2	0.3	0.1	0.2	0.0
Pantothenate	7.9	2.0	0.5	0.3	0.3	0.8
Biotin	12.2	3.2	0.2	0.0	0.2	1.0
Total folate	6.9	1.3	0.6	0.2	0.3	1.5
Dietary folate equivalents	6.4	1.2	0.6	0.2	0.3	1.4
Vitamin C	5.1	0.0	2.6	1.6	1.1	0.8
Minerals						
Potassium	10.9	2.0	0.9	0.5	0.3	2.4
Calcium	10.5	2.3	0.6	0.4	0.2	0.4
Iron	12.6	3.7	0.1	0.1	0.0	1.2
Magnesium	13.7	3.6	1.0	0.7	0.3	1.7
Zinc	11.6	2.1	3.6	0.3	3.3	0.9
Copper	16.3	4.5	0.1	0.0	0.0	1.6
Phosphorous	10.9	2.6	0.7	0.4	0.3	0.9

MUFA:Monounsaturated Fatty Acids

PUFA: Polyunsaturated Fatty Acids

† Carbonated beverages, fruit juice drinks, squashes & cordials

NAS: No added sugar

Table 33 continued. Contribution (%) of treat foods to mean daily intakes of energy and selected nutrients in children aged 5-12 years in Ireland

	Ice-creams & desserts	Sweets	Cereal bars	Sugar & sweeteners	*Sugar*	*Sweeteners*
	% Contribution					
Energy	3.1	1.2	0.6	0.2	0.2	0.0
Protein	1.6	0.4	0.3	0.0	0.0	0.0
Total fat	3.8	0.2	0.6	0.0	0.0	0.0
Saturated fat	4.3	0.3	0.6	0.0	0.0	0.0
MUFA	2.9	0.1	0.6	0.0	0.0	0.0
PUFA	4.1	0.1	0.6	0.0	0.0	0.0
Carbohydrates	3.1	2.1	0.7	0.3	0.3	0.0
Total sugars	5.2	4.0	0.9	0.9	0.9	0.0
Free sugars	7.4	7.1	1.5	1.6	1.6	0.0
Dietary fibre	1.3	0.1	0.8	0.0	0.0	0.0
Salt equivalents	1.5	0.2	0.3	0.0	0.0	0.0
Vitamins						
Vitamin A	3.3	0.1	0.0	0.0	0.0	0.0
Vitamin D	2.2	0.0	0.8	0.0	0.0	0.0
Vitamin E	4.4	0.2	0.9	0.0	0.0	0.0
Thiamin	1.1	0.1	0.5	0.0	0.0	0.0
Riboflavin	3.1	0.0	0.4	0.0	0.0	0.0
Niacin	1.0	0.0	0.4	0.0	0.0	0.0
Vitamin B6	0.9	0.0	0.5	0.0	0.0	0.0
Vitamin B12	2.7	0.0	0.2	0.0	0.0	0.0
Pantothenate	2.0	0.0	0.3	0.0	0.0	0.0
Biotin	2.9	0.0	0.5	0.0	0.0	0.0
Total folate	1.0	0.0	0.6	0.0	0.0	0.0
Dietary folate equivalents	0.9	0.0	0.8	0.0	0.0	0.0
Vitamin C	0.7	0.3	0.1	0.0	0.0	0.0
Minerals						
Potassium	1.9	0.1	0.3	0.0	0.0	0.0
Calcium	2.6	0.1	0.6	0.0	0.0	0.0
Iron	1.7	0.2	0.8	0.0	0.0	0.0
Magnesium	1.8	0.1	0.8	0.0	0.0	0.0
Zinc	1.5	0.0	0.5	0.0	0.0	0.0
Copper	1.9	0.2	0.8	0.1	0.1	0.0
Phosphorous	2.0	0.0	0.5	0.0	0.0	0.0

MUFA:Monounsaturated Fatty Acids
PUFA: Polyunsaturated Fatty Acids

Table 34. Contribution (%) of treat foods to mean daily intakes of energy and selected nutrients in children aged 2-4 years in NI

	All	Biscuits	Soft drinks†	*Soft drinks: sweetened*	*Soft drinks: NAS*
	% Contribution				
Energy	19.3	4.2	1.5	1.2	0.3
Protein	7.2	1.7	0.2	0.0	0.2
Total fat	19.3	4.5	0.0	0.0	0.0
Saturated fat	19.2	5.4	0.0	0.0	0.0
MUFA	21.9	4.5	0.0	0.0	0.0
Carbohydrates	23.2	4.9	2.8	2.3	0.5
Total sugars	32.3	4.3	5.7	4.5	1.3
Free sugars	56.0	7.8	10.2	7.6	2.6
Dietary fibre	10.4	3.2	0.1	0.1	0.0
Salt equivalents	12.6	2.7	1.7	0.2	1.5
Vitamins					
Vitamin A	11.0	0.7	4.0	1.5	2.5
Vitamin D	9.0	1.1	0.1	0.0	0.1
Vitamin E	20.2	4.6	0.5	0.3	0.1
Thiamin	7.7	1.8	0.9	0.1	0.7
Riboflavin	7.6	0.8	0.1	0.1	0.0
Niacin	8.5	1.8	1.9	0.4	1.4
Vitamin B6	7.8	0.9	2.6	0.7	1.9
Vitamin B12	4.4	0.3	0.1	0.0	0.1
Pantothenate	11.1	1.4	4.3	0.5	3.8
Biotin	10.5	2.3	0.2	0.2	0.0
Total folate	7.2	1.2	1.6	0.5	1.1
Vitamin C	24.9	0.1	21.3	6.4	14.9
Minerals					
Potassium	10.6	1.4	2.4	0.7	1.7
Calcium	9.2	1.8	1.3	0.5	0.8
Iron	12.5	4.3	0.2	0.1	0.1
Magnesium	12.3	2.4	2.0	0.7	1.3
Zinc	7.3	1.9	0.3	0.2	0.0
Copper	14.8	4.2	0.2	0.1	0.1
Phosphorous	9.8	1.7	0.7	0.2	0.5

MUFA:Monounsaturated Fatty Acids

† Carbonated beverages, fruit juice drinks, squashes & cordials

NAS: No added sugar

Table 34 continued. Contribution (%) of treat foods to mean daily intakes of energy and selected nutrients in children aged 2-4 years in NI

	Savoury snacks	Preserves, syrups & choc spreads	Chocolate	Cakes & buns
	% Contribution			
Energy	2.5	0.8	3.1	3.8
Protein	0.9	0.1	1.1	2.0
Total fat	4.0	0.7	4.4	3.5
Saturated fat	1.5	0.5	5.9	2.8
MUFA	7.0	0.8	4.1	4.0
Carbohydrates	2.1	1.1	2.9	4.6
Total sugars	0.3	2.2	5.8	4.8
Free sugars	0.2	4.2	9.6	8.6
Dietary fibre	1.9	0.5	1.3	2.7
Salt equivalents	2.8	0.1	0.6	3.9
Vitamins				
Vitamin A	0.4	0.0	0.8	3.2
Vitamin D	0.0	0.0	0.4	5.1
Vitamin E	6.9	0.8	1.8	4.0
Thiamin	1.0	0.1	0.7	2.0
Riboflavin	0.7	0.1	2.6	1.4
Niacin	1.3	0.1	0.9	1.8
Vitamin B6	1.9	0.1	0.7	1.3
Vitamin B12	0.0	0.1	1.7	0.8
Pantothenate	1.1	0.1	1.2	1.4
Biotin	2.3	0.4	1.7	2.3
Total folate	1.5	0.1	0.5	1.4
Vitamin C	1.0	0.4	0.0	0.1
Minerals				
Potassium	2.2	0.3	1.6	1.7
Calcium	0.4	0.2	2.1	1.9
Iron	1.2	0.5	2.0	2.9
Magnesium	2.0	0.5	2.3	2.0
Zinc	1.0	0.3	1.5	1.6
Copper	1.9	0.9	3.2	3.2
Phosphorous	1.0	0.2	1.7	3.3

MUFA:Monounsaturated Fatty Acids

Table 34 continued. Contribution (%) of treat foods to mean daily intakes of energy and selected nutrients in children aged 2-4 years in NI

	Ice-creams & desserts	Sweets	Cereal bars	Sugar & sweeteners
	% Contribution			
Energy	1.4	1.3	0.2	0.4
Protein	0.7	0.3	0.1	0.0
Total fat	1.7	0.3	0.2	0.0
Saturated fat	2.6	0.3	0.2	0.0
MUFA	1.1	0.3	0.1	0.0
Carbohydrates	1.5	2.3	0.2	0.7
Total sugars	2.9	4.3	0.2	1.6
Free sugars	4.5	7.6	0.3	3.1
Dietary fibre	0.3	0.3	0.2	0.0
Salt equivalents	0.5	0.2	0.1	0.0
Vitamins				
Vitamin A	1.5	0.3	0.1	0.0
Vitamin D	2.1	0.0	0.2	0.0
Vitamin E	1.0	0.4	0.2	0.0
Thiamin	0.8	0.1	0.3	0.0
Riboflavin	1.6	0.1	0.3	0.0
Niacin	0.4	0.0	0.2	0.0
Vitamin B6	0.1	0.0	0.4	0.0
Vitamin B12	1.2	0.0	0.1	0.0
Pantothenate	1.5	0.0	0.1	0.0
Biotin	1.2	0.1	0.2	0.0
Total folate	0.5	0.1	0.3	0.0
Vitamin C	0.1	1.9	0.0	0.0
Minerals				
Potassium	0.8	0.1	0.1	0.0
Calcium	1.2	0.1	0.3	0.0
Iron	0.4	0.2	0.6	0.0
Magnesium	0.8	0.2	0.2	0.0
Zinc	0.5	0.0	0.1	0.0
Copper	0.5	0.3	0.2	0.2
Phosphorous	0.9	0.1	0.1	0.0

MUFA:Monounsaturated Fatty Acids

Table 35. Contribution (%) of treat foods to mean daily intakes of energy and selected nutrients in children aged 5-12 years in NI

	All	Biscuits	Soft drinks†	*Soft drinks: sweetened*	*Soft drinks: NAS*
	% Contribution				
Energy	25.0	4.3	2.7	2.5	0.2
Protein	8.6	1.6	0.1	0.1	0.1
Total fat	25.6	4.9	0.0	0.0	0.0
Saturated fat	26.3	6.2	0.0	0.0	0.0
MUFA	28.0	4.7	0.0	0.0	0.0
Carbohydrates	29.3	4.7	4.9	4.7	0.3
Total sugars	45.0	4.8	10.8	10.2	0.6
Free sugars	64.7	7.3	15.5	14.4	1.1
Dietary fibre	13.8	3.0	0.1	0.1	0.0
Salt equivalents	14.9	2.5	1.5	0.5	1.0
Vitamins					
Vitamin A	14.1	0.6	4.6	2.4	2.1
Vitamin D	10.1	0.4	0.1	0.0	0.1
Vitamin E	25.8	4.6	0.6	0.6	0.0
Thiamin	8.8	1.8	0.5	0.2	0.3
Riboflavin	11.3	1.2	0.2	0.2	0.0
Niacin	9.2	1.7	1.5	1.0	0.5
Vitamin B6	9.6	1.1	2.4	1.7	0.7
Vitamin B12	7.0	0.4	0.6	0.4	0.1
Pantothenate	12.7	1.5	3.2	1.5	1.7
Biotin	14.9	2.7	1.0	1.0	0.0
Total folate	9.1	1.5	1.3	0.7	0.6
Vitamin C	24.6	0.1	20.4	10.1	10.3
Minerals					
Potassium	13.3	1.5	1.8	0.8	0.9
Calcium	12.9	2.0	1.7	1.0	0.7
Iron	15.1	3.8	0.2	0.2	0.0
Magnesium	16.6	2.7	2.3	1.5	0.8
Zinc	9.5	2.0	0.2	0.1	0.0
Copper	18.3	4.2	0.2	0.1	0.0
Phosphorous	13.9	2.0	1.8	0.9	0.9

MUFA:Monounsaturated Fatty Acids

† Carbonated beverages, fruit juice drinks, squashes & cordials

NAS: No added sugar

Table 35 continued. Contribution (%) of treat foods to mean daily intakes of energy and selected nutrients in children aged 5-12 years in NI

	Savoury snacks	Preserves, syrups & choc spreads	Chocolate	Cakes & buns
	% Contribution			
Energy	3.8	1.0	3.4	5.1
Protein	1.4	0.2	1.2	2.4
Total fat	6.0	1.0	4.8	5.5
Saturated fat	2.4	0.8	6.9	5.3
MUFA	9.3	1.3	4.3	5.7
Carbohydrates	3.2	1.2	3.1	5.7
Total sugars	0.4	2.6	6.5	6.5
Free sugars	0.2	4.3	8.8	9.4
Dietary fibre	3.3	0.6	1.6	3.5
Salt equivalents	4.3	0.1	0.7	4.5
Vitamins				
Vitamin A	0.5	0.0	1.1	4.3
Vitamin D	0.0	0.0	0.5	6.0
Vitamin E	10.0	1.3	2.0	5.2
Thiamin	1.7	0.1	0.8	2.3
Riboflavin	1.3	0.2	3.2	2.0
Niacin	1.8	0.1	0.9	2.1
Vitamin B6	3.1	0.1	0.6	1.4
Vitamin B12	0.0	0.2	2.2	1.4
Pantothenate	1.9	0.1	1.5	2.0
Biotin	2.5	0.8	2.4	3.4
Total folate	2.5	0.1	0.6	1.9
Vitamin C	1.9	0.2	0.0	0.1
Minerals				
Potassium	4.1	0.4	1.8	2.3
Calcium	0.8	0.3	2.6	2.9
Iron	1.9	0.7	2.3	4.4
Magnesium	3.4	0.7	2.7	2.9
Zinc	1.8	0.4	1.6	2.3
Copper	2.8	1.2	3.4	4.8
Phosphorous	1.7	0.3	2.0	4.4

MUFA:Monounsaturated Fatty Acids

Table 35 continued. Contribution (%) of treat foods to mean daily intakes of energy and selected nutrients in children aged 5-12 years in NI

	Ice-creams & desserts	Sweets	Cereal bars	Sugar & sweeteners
	% Contribution			
Energy	1.9	2.1	0.3	0.5
Protein	0.9	0.6	0.1	0.0
Total fat	2.4	0.7	0.2	0.0
Saturated fat	3.8	0.5	0.3	0.0
MUFA	1.6	0.8	0.2	0.0
Carbohydrates	1.9	3.3	0.4	1.0
Total sugars	3.9	6.6	0.5	2.4
Free sugars	5.4	9.6	0.6	3.8
Dietary fibre	0.4	0.9	0.4	0.0
Salt equivalents	0.6	0.5	0.1	0.0
Vitamins				
Vitamin A	2.5	0.4	0.0	0.0
Vitamin D	3.1	0.0	0.1	0.0
Vitamin E	1.1	0.7	0.2	0.0
Thiamin	1.0	0.1	0.6	0.0
Riboflavin	2.4	0.1	0.6	0.0
Niacin	0.6	0.0	0.4	0.0
Vitamin B6	0.2	0.1	0.6	0.0
Vitamin B12	2.0	0.0	0.2	0.0
Pantothenate	2.1	0.0	0.1	0.0
Biotin	1.6	0.1	0.3	0.0
Total folate	0.6	0.1	0.6	0.0
Vitamin C	0.3	1.5	0.0	0.0
Minerals				
Potassium	1.1	0.2	0.2	0.0
Calcium	1.9	0.2	0.5	0.0
Iron	0.6	0.3	0.9	0.1
Magnesium	1.1	0.5	0.3	0.0
Zinc	0.8	0.2	0.2	0.1
Copper	0.7	0.4	0.3	0.3
Phosphorous	1.3	0.2	0.2	0.0

MUFA:Monounsaturated Fatty Acids

Table 36. Proportion (%) of consumers of treat foods in children aged 2-12 years in Ireland, by meal

	2–4-year-olds (*n* 374)	5–12-year-olds (*n* 600)	5–8-year-olds (*n* 300)	9–12-year-olds (*n* 300)
Breakfast	68.3	61.5	63.5	59.7
Morning Snack	62.5	34.7	39.7	30.1
Lunch	83.2	89.2	88.8	89.6
Afternoon Snack	84.0	80.5	83.5	77.8
Evening Meal	71.1	55.6	59.1	52.3
Evening Snack	54.6	71.4	65.8	76.6
Night snack	1.7	-	-	-
Beverages	13.5	8.2	10.0	6.7

Table 37. Mean daily intake of energy (kcal) from treat foods in children aged 2-12 years in Ireland, by meal

	2–4-year-olds (*n* 374)			5–12-year-olds (*n* 600)			5–8-year-olds (*n* 300)			9–12-year-olds (*n* 300)		
	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th
Breakfast	18.7 (27.1)	0.0	82.1	27.9 (51.3)	0.0	124	25.2 (46.5)	0.0	119	30.4 (55.4)	0.0	129
Morning Snack	32.6 (41.9)	0.0	113	19.5 (39.7)	0.0	113	19.4 (35.4)	0.0	107	19.6 (43.3)	0.0	115
Lunch	46.5 (46.0)	0.0	138	87.0 (85.0)	0.0	266	74.7 (69.1)	0.0	214	98.4 (96.2)	0.0	298
Afternoon Snack	70.0 (65.0)	0.0	201	95.2 (94.3)	0.0	276	96.9 (92.9)	0.0	269	93.7 (95.8)	0.0	280
Evening Meal	27.0 (34.2)	0.0	101	29.3 (54.5)	0.0	133	28.2 (46.8)	0.0	147	30.3 (60.7)	0.0	133
Evening Snack	33.2 (47.9)	0.0	127	66.2 (74.9)	0.0	204	50.8 (62.2)	0.0	184	80.3 (82.6)	0.0	240
Night snack	0.7 (7.3)	0.0	0.0	-	-	-	-	-	-	-	-	-
Beverages	2.2 (12.3)	0.0	15.5	1.3 (8.0)	0.0	2.0	0.9 (4.8)	0.0	2.5	1.7 (10.1)	0.0	1.3

Table 38. Contribution (%) of treat foods to energy intake in children aged 2-12 years in Ireland, by meal

	2–4-year-olds (*n* 374)			5–12-year-olds (*n* 600)			5–8-year-olds (*n* 300)			9–12-year-olds (*n* 300)		
	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th
Breakfast	1.6 (2.3)	0.0	6.5	1.8 (3.3)	0.0	9.4	1.8 (3.3)	0.0	10.2	1.9 (3.3)	0.0	8.9
Morning Snack	2.7 (3.4)	0.0	9.7	1.3 (2.5)	0.0	7.0	1.4 (2.5)	0.0	7.6	1.2 (2.5)	0.0	6.3
Lunch	3.9 (3.8)	0.0	11.7	5.8 (5.4)	0.0	16.1	5.4 (4.8)	0.0	15.5	6.1 (5.8)	0.0	16.8
Afternoon Snack	5.8 (5.2)	0.0	16.7	6.2 (5.8)	0.0	17.3	6.8 (5.9)	0.0	17.5	5.7 (5.6)	0.0	17.2
Evening Meal	2.2 (2.9)	0.0	7.8	1.9 (3.2)	0.0	9.1	2.1 (3.3)	0.0	9.6	1.8 (3.1)	0.0	8.2
Evening Snack	2.6 (3.5)	0.0	9.8	4.3 (4.6)	0.0	12.8	3.6 (4.2)	0.0	12.3	4.9 (4.9)	0.0	13.7
Night snack	0.0 (0.5)	0.0	0.0	-	-	-	-	-	-	-		
Beverages	0.2 (1.0)	0.0	1.3	0.1 (0.5)	0.0	0.1	0.1 (0.4)	0.0	0.2	0.1 (0.6)	0.0	0.1

Table 39. Proportion (%) of consumers of treat foods in children aged 2-12 years in NI, by meal

	2–4-year-olds (*n* 241)	5–12-year-olds (*n* 486)	5–8-year-olds (*n* 225)	9–12-year-olds (*n* 261)
Breakfast	50.6	51.9	59.6	45.2
Morning Snack	82.6	77.4	78.2	76.6
Lunch	85.9	89.9	91.1	88.9
Afternoon Snack	94.2	93.4	93.8	93.1
Evening Meal	95.0	92.0	94.2	90.0
Evening Snack	41.1	72.2	60.0	82.8

Table 40. Mean daily intake of energy (kcal) from treat foods in children aged 2-12 years in NI, by meal

	2-4 year olds (*n* 241)			5-12 year olds (*n* 486)			5-8 year olds (*n* 225)			9-12 year olds (*n* 261)		
	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th
Breakfast	14.0 (27.9)	0.0	72.6	22.7 (44.3)	0.0	114	26.3 (47.5)	0.0	122.8	19.5 (41.1)	0.0	98.4
Morning Snack	35.9 (43.0)	0.0	131	61.1 (66.1)	0.0	196	55.2 (57.9)	0.0	166	66.2 (72.2)	0.0	220
Lunch	44.6 (48.2)	0.0	141	84.7 (72.9)	0.0	232	78.9 (62.2)	0.0	195	89.8 (80.8)	0.0	261
Afternoon Snack	76.1 (57.6)	0.0	196	102.7 (84.3)	0.0	274	97.8 (80.0)	0.0	240	107.0 (87.8)	0.0	283
Evening Meal	46.2 (49.8)	0.0	136	76.2 (76.4)	0.0	237	75.0 (69.1)	0.0	226	77.2 (82.3)	0.0	256
Evening Snack	16.3 (33.6)	0.0	97.6	56.1 (72.1)	0.0	205	36.0 (50.8)	0.0	150	73.5 (82.5)	0.0	229

Table 41. Contribution (%) of treat foods to energy intake in children aged 2-12 years in NI, by meal

	2-4 year olds (*n* 241)			5-12 year olds (*n* 486)			5-8 year olds (*n* 225)			9-12 year olds (*n* 261)		
	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th
Breakfast	1.1 (2.1)	0.0	6.2	1.4 (2.9)	0.0	7.1	1.7 (3.2)	0.0	8.2	1.2 (2.6)	0.0	5.8
Morning Snack	3.0 (3.5)	0.0	10.9	3.8 (4.0)	0.0	12.1	3.7 (3.8)	0.0	11.2	3.9 (4.2)	0.0	12.5
Lunch	3.7 (3.8)	0.0	11.7	5.4 (4.5)	0.0	14.2	5.3 (4.3)	0.0	12.8	5.4 (4.6)	0.0	14.6
Afternoon Snack	6.3 (4.4)	0.0	14.7	6.4 (4.8)	0.0	15.0	6.3 (4.7)	0.0	14.8	6.4 (4.9)	0.0	15.2
Evening Meal	3.8 (3.7)	0.0	11.2	4.7 (4.4)	0.0	13.6	4.9 (4.4)	0.0	14.3	4.4 (4.4)	0.0	13.6
Evening Snack	1.3 (2.7)	0.0	8.5	3.4 (4.1)	0.0	11.4	2.4 (3.3)	0.0	9.3	4.3 (4.5)	0.0	12.7

Table 42. Proportion (%) of consumers of treat foods in children aged 2-12 years in Ireland, by day of week

	2-4 year olds (*n* 374)	5-12 year olds (*n* 600)	5-8 year olds (*n* 300)	9-12 year olds (*n* 300)
Monday	90.8	92.6	93.5	91.7
Tuesday	93.2	93.1	93.4	92.8
Wednesday	90.2	91.7	92.0	91.4
Thursday	95.2	92.3	94.3	90.5
Friday	94.5	96.3	97.4	95.3
Saturday	93.1	94.8	95.7	94.0
Sunday	91.4	93.9	96.0	92.0
School days	N/A	98.3	98.8	97.9
Non school days	N/A	97.2	98.7	95.7

Table 43. Mean daily intake of energy (kcal) from treat foods in children aged 2-12 years in Ireland, by day of week

	2-4 year olds (*n* 374)			5-12 year olds (*n* 600)			5-8 year olds (*n* 300)			9-12 year olds (*n* 300)		
	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th
Monday	195 (143)	0.0	446	284 (215)	22.4	745	244 (168)	16.7	581	323 (246)	23.6	854
Tuesday	206 (180)	0.0	573	280 (234)	18.1	665	238 (183)	17.7	645	323 (271)	17.9	744
Wednesday	221 (161)	0.0	506	302 (243)	17.0	802	274 (208)	14.4	660	330 (272)	39.2	892
Thursday	243 (207)	0.8	700	334 (259)	16.1	801	314 (264)	11.8	877	353 (253)	18.4	818
Friday	249 (205)	0.0	715	402 (296)	48.3	973	364 (297)	27.1	972	435 (293)	71.6	1072
Saturday	255 (212)	0.0	678	405 (347)	23.0	1138	363 (300)	14.6	967	442 (381)	41.6	1185
Sunday	238 (189)	0.0	578	390 (274)	56.4	909	354 (250)	46.0	880	423 (291)	65.9	945
School days	N/A	N/A	N/A	304 (200)	46.4	660	2756 (186)	42.5	592	331 (209)	56.6	666
Non school days	N/A	N/A	N/A	387 (272)	59.1	877	352 (240)	35.2	857	420 (296)	94.0	898

Table 44. Contribution (%) of treat foods to energy intake in children aged 2-12 years in Ireland, by day of week

	2-4 year olds (*n* 374)			**5-12 year olds (*n* 600)**			**5-8 year olds (*n* 300)**			**9-12 year olds (*n* 300)**		
	Mean (SD)	**5th**	**95th**	**Mean (SD)**	**5th**	**95th**	**Mean (SD)**	**5th**	**95th**	**Mean (SD)**	**5th**	**95th**
Monday	17.2 (12.5)	0.0	38.4	19.7 (13.9)	1.5	45.0	18.7 (12.0)	1.2	42.7	20.7 (15.5)	1.7	52.0
Tuesday	17.6 (15.0)	0.0	49.3	19.1 (12.9)	1.9	45.7	18.4 (12.6)	2.0	40.8	19.7 (13.2)	1.6	46.8
Wednesday	17.6 (11.9)	0.0	39.7	19.4 (12.5)	1.4	44.9	19.4 (12.6)	1.1	45.0	19.5 (12.5)	1.9	45.0
Thursday	19.3 (14.0)	0.1	47.7	21.5 (14.4)	1.0	47.5	21.4 (15.5)	1.1	53.5	21.6 (13.3)	0.9	44.7
Friday	19.8 (13.5)	0.0	44.7	24.9 (14.9)	3.4	52.6	24.1 (16.5)	2.2	54.3	25.6 (13.4)	7.7	49.8
Saturday	20.1 (13.7)	0.0	44.5	24.6 (15.8)	2.2	52.8	24.0 (15.6)	1.3	52.3	25.1 (15.9)	2.5	56.5
Sunday	20.1 (14.8)	0.0	48.2	25.5 (15.0)	3.9	54.6	25.8 (15.9)	3.7	59.8	25.2 (14.2)	3.9	52.3
School days	N/A	N/A	N/A	19.8 (11.0)	4.1	39.0	19.5 (11.6)	3.1	40.5	20.2 (10.4)	4.7	38.9
Non school days	N/A	N/A	N/A	25.0 (14.1)	4.5	51.3	25.3 (15.0)	2.6	56.3	24.8 (13.3)	6.2	48.9

Table 45. Proportion (%) of consumers of treat foods in children aged 2-12 years in NI, by day of week

	2-4 year olds (*n* 241)	5-12 year olds (*n* 486)	5-8 year olds (*n* 225)	9-12 year olds (*n* 261)
Monday	95.2	96.7	99.2	94.1
Tuesday	95.0	97.8	97.7	97.8
Wednesday	97.7	96.8	98.3	95.6
Thursday	95.4	97.3	96.1	98.3
Friday	97.7	98.7	97.8	99.4
Saturday	94.8	98.3	98.5	98.1
Sunday	97.2	93.4	96.3	90.7

Table 46. Mean daily intake of energy (kcal) from treat foods in children aged 2-12 years in NI, by day of week

	2-4 year olds (*n* 241)			5-12 year olds (*n* 486)			5-8 year olds (*n* 225)			9-12 year olds (*n* 261)		
	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th
Monday	221 (168)	34.7	492	408 (262)	68.9	881	387 (264)	70.9	872	431 (259)	34.2	911
Tuesday	242 (192)	8.9	685	390 (274)	46.5	972	345 (193)	49.3	698	416 (330)	21.3	1071
Wednesday	223 (164)	8.3	574	376 (249)	50.2	953	345 (228)	59.8	780	403 (264)	41.8	985
Thursday	232 (223)	6.2	555	410 (275)	77.3	935	361 (243)	50.3	799	445 (292)	85.6	1013
Friday	252 (186)	9.4	642	444 (305)	60.3	1062	392 (255)	23.7	876	486 (334)	83.4	1222
Saturday	254 (198)	7.5	616	416 (314)	9.9	996	398 (299)	27.6	990	398 (299)	27.6	990
Sunday	273 (197)	5.3	621	467 (339)	40.5	1029	415 (253)	74.5	897	518 (400)	21.8	1249

Table 47. Contribution (%) of treat foods to energy intake in children aged 2-12 years in NI, by day of week

	2-4 year olds (*n* 241)			5-12 year olds (*n* 486)			5-8 year olds (*n* 225)			9-12 year olds (*n* 261)		
	Mean (SD)	**5th**	**95th**	**Mean (SD)**	**5th**	**95th**	**Mean (SD)**	**5th**	**95th**	**Mean (SD)**	**5th**	**95th**
Monday	18.9 (11.9)	2.4	39.4	25.8 (14.5)	4.5	47.9	25.2 (14.3)	5.3	48.0	25.2 (14.3)	5.3	48.0
Tuesday	19.3 (12.7)	0.7	46.5	24.2 (15.0)	3.5	49.9	22.8 (11.6)	4.2	45.3	25.5 (17.6)	1.8	60.0
Wednesday	18.4 (11.8)	1.0	41.3	23.9 (13.9)	4.1	49.5	24.1 (14.2)	3.9	51.4	23.7 (13.8)	4.1	48.9
Thursday	18.9 (12.9)	0.7	41.8	25.0 (13.5)	5.5	50.4	24.0 (13.3)	4.7	49.6	25.8 (13.7)	6.2	52.4
Friday	19.8 (12.2)	1.0	42.8	26.1 (14.9)	5.1	53.7	24.7 (13.9)	1.7	51.0	27.1 (15.6)	5.9	58.2
Saturday	20.6 (13.5)	0.8	43.8	24.8 (14.8)	0.7	51.5	24.8 (14.7)	2.3	53.9	24.8 (15.0)	0.5	50.3
Sunday	22.7 (14.7)	0.6	51.3	27.6 (15.7)	3.3	55.5	26.3 (13.7)	5.8	47.7	28.8 (17.4)	2.2	61.4

Table 48. Proportion (%) of consumers of treat foods in children aged 5-12 years in Ireland, by eating location

	5-12 year olds	(*n* 600)	5-8 year olds	(*n* 300)	9-12 year olds	(*n* 300)
All Homes	**99.4**		**100**		**98.8**	
Participant's own home	*99.2*		*99.7*		*98.8*	
Other homes	*28.0*		*35.5*		*21.0*	
Outside of the home	**62.2**		**63.6**		**61.9**	
Restaurants/hotels/public houses/coffee shops	*25.0*		*27.7*		*22.4*	
Fast food	*15.9*		*13.6*		*17.9*	
Shop-bought	*23.7*		*21.8*		*25.4*	
School	*14.6*		*16.2*		*13.1*	
Other	*10.0*		*12.0*		*8.1*	

Table 49. Mean daily intake of energy (kcal) from treat foods in children aged 5-12 years in Ireland, by eating location

	5-12 year olds (*n* 600)			**5-8 year olds (*n* 300)**			**9-12 year olds (*n* 300)**		
	Mean (SD)	**5th**	**95th**	**Mean (SD)**	**5th**	**95th**	**Mean (SD)**	**5th**	**95th**
All Homes	**269 (168)**	**52.6**	**587**	**245 (158)**	**53.5**	**529.0**	**291 (174)**	**49.8**	**598**
Participant's own home	*250 (165)*	*43.0*	*578*	*218 (148)*	*37.7*	*495.0*	*278 (174)*	*46.2*	*594*
Other homes	*19.1 (44.3)*	*0.0*	*119*	*26.2 (51.7)*	*0.0*	*136*	*12.5 (35.0)*	*0.0*	*76.0*
Outside of the home	**57.7 (79.4)**	**0.0**	**216**	**51.4 (73.3)**	**0.0**	**211**	**63.4 (84.3)**	**0.0**	**225**
Restaurants/hotels/public houses/coffee shops	*15.4 (37.7)*	*0.0*	*100*	*14.8 (37.3)*	*0.0*	*93.9*	*16.0 (38.1)*	*0.0*	*109*
Fast food	*6.7 (23.7)*	*0.0*	*46*	*5.0 (16.9)*	*0.0*	*39.3*	*8.3 (28.6)*	*0.0*	*49.4*
Shop-bought	*19.7 (50.3)*	*0.0*	*118*	*17.4 (49.6)*	*0.0*	*117*	*21.8 (51.0)*	*0.0*	*131*
School	*6.9 (24.3)*	*0.0*	*42*	*5.1 (15.2)*	*0.0*	*39.8*	*8.5 (30.3)*	*0.0*	*62.6*
Other	*9.0 (35.5)*	*0.0*	*77*	*9.1 (30.9)*	*0.0*	*78.5*	*8.9 (39.2)*	*0.0*	*74.4*

Table 50. Contribution (%) of treat foods to energy intake in children aged 5-12 years in Ireland, by eating location

	5-12 year olds (*n* 600)			**5-8 year olds (*n* 300)**			**9-12 year olds (*n* 300)**		
	Mean (SD)	**5th**	**95th**	**Mean (SD)**	**5th**	**95th**	**Mean (SD)**	**5th**	**95th**
All Homes	**17.7 (9.6)**	**3.9**	**34.9**	**17.6 (10.0)**	**4.0**	**35.6**	**17.7 (9.1)**	**3.5**	**34.9**
Participant's own home	*16.4 (9.3)*	*2.9*	*33.3*	*15.8 (9.5)*	*2.5*	*33.3*	*16.9 (9.1)*	*3.1*	*34.5*
Other homes	*1.3 (2.9)*	*0.0*	*8.2*	*1.8 (3.4)*	*0.0*	*9.3*	*0.8 (2.1)*	*0.0*	*5.8*
Outside of the home	**3.8 (5.0)**	**0.0**	**14.5**	**3.6 (4.9)**	**0.0**	**14.6**	**3.9 (5.2)**	**0.0**	**14.2**
Restaurants/hotels/public houses/coffee shops	*1.0 (2.4)*	*0.0*	*6.8*	*1.1 (2.6)*	*0.0*	*7.7*	*0.9 (2.2)*	*0.0*	*6.2*
Fast food	*0.4 (1.5)*	*0.0*	*3.0*	*0.4 (1.2)*	*0.0*	*3.3*	*0.5 (1.7)*	*0.0*	*2.8*
Shop-bought	*1.3 (3.3)*	*0.0*	*7.5*	*1.2 (3.2)*	*0.0*	*8.0*	*1.4 (3.3)*	*0.0*	*7.4*
School	*0.4 (1.5)*	*0.0*	*2.9*	*0.4 (1.2)*	*0.0*	*2.8*	*0.5 (1.8)*	*0.0*	*3.9*
Other	*0.6 (2.2)*	*0.0*	*5.5*	*0.7 (2.2)*	*0.0*	*5.8*	*0.5 (2.3)*	*0.0*	*4.5*

Table 51. Proportion (%) of consumers of treat foods in children aged 2-12 years in NI, by eating location

	2-4 year olds (*n* 241)	5-12 year olds (*n* 486)	5-8 year olds (*n* 225)	9-12 year olds (*n* 261)
All Homes	**99.6**	**99.0**	**98.7**	**99.2**
Participant's own home	*98.8*	*98.4*	*98.2*	*98.5*
Other homes	*44.0*	*40.7*	*47.1*	*35.2*
Outside of the home	**76.8**	**90.7**	**90.7**	**90.8**
Restaurants/hotels/public houses/coffee shops	*23.7*	*18.5*	*18.7*	*18.4*
Fast food	*7.5*	*10.9*	*8.4*	*13.0*
School	*34.9*	*70.2*	*73.3*	*67.4*
Other	*50.6*	*60.3*	*59.1*	*61.3*
Unspecified location	**14.5**	**11.9**	**10.7**	**13.0**

Table 52. Mean daily intake of energy (kcal) from treat foods in children aged 2-12 years in NI, by eating location

	5–12-year-olds (*n* 241)			5–12-year-olds (*n* 486)			5–8-year-olds (*n* 225)			9–12-year-olds (*n* 261)		
	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th
All Homes	**172 (128)**	**27.9**	**376.4**	**242 (166)**	**29.5**	**536.5**	**233 (147)**	**31.1**	**495.9**	**250 (181)**	**28.3**	**646.9**
Participant's own home	*147 (121)*	*15.1*	*362.2*	*213.0 (157.5)*	*14*	*486.3*	*203.8 (139.1)*	*16.2*	*453.1*	*221.0 (171.7)*	*13.4*	*641.6*
Other homes	*24.6 (42.8)*	*0*	*121.2*	*29.2 (57.0)*	*0*	*149.1*	*29.4 (46.6)*	*0*	*139.5*	*29.0 (64.7)*	*0*	*158.7*
Outside of the home	**56.4 (63.3)**	**0**	**182.2**	**156 (131)**	**0**	**410.5**	**131 (106)**	**0**	**366.7**	**176 (147)**	**0**	**483.5**
Restaurants/hotels/ public houses/coffee shops	*7.5 (19.5)*	*0*	*42.4*	*10.7 (35.2)*	*0*	*74.1*	*9.7 (33.6)*	*0*	*68.8*	*11.6 (36.7)*	*0*	*87.3*
Fast food	*1.1 (5.8)*	*0*	*2.0*	*3.0 (12.6)*	*0*	*23.1*	*1.2 (6.0)*	*0*	*7.7*	*4.5 (16.1)*	*0*	*30.8*
School	*16.5 (32.3)*	*0*	*88.4*	*81.8 (94.6)*	*0*	*259.8*	*71.8 (78.1)*	*0*	*218.7*	*90.3 (106.2)*	*0*	*300.4*
Other	*31.3 (47.8)*	*0*	*130.7*	*60.1 (88.8)*	*0*	*234.1*	*48.6 (72.7)*	*0*	*183.8*	*69.9 (99.8)*	*0*	*258.2*
Unspecified location	*5.2 (16.6)*	*0*	*42.6*	*5.8 (23.2)*	*0*	*37.5*	*4.6 (22.5)*	*0*	*27.4*	*6.9 (23.9)*	*0*	*54.4*

Table 53. Contribution (%) of treat foods to energy intake in children aged 2-12 years in NI, by eating location

	5–12-year-olds (*n* 241)			5–12-year-olds (*n* 486)			5–8-year-olds (*n* 225)			9–12-year-olds (*n* 261)		
	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th
All Homes	**14.2 (8.8)**	**2.5**	**29.8**	**15.0 (9.0)**	**2**	**31.3**	**15.4 (8.7)**	**2.7**	**31**	**14.7 (9.3)**	**1.8**	**32.2**
Participant's own home	*12.1 (8.2)*	*1.1*	*27.5*	*13.2 (8.7)*	*1.2*	*29.2*	*13.4 (8.3)*	*1.1*	*28.6*	*13.0 (9.0)*	*1.1*	*31.5*
Other homes	*2.1 (3.6)*	*0*	*10.2*	*1.8 (3.3)*	*0*	*9.6*	*1.9 (3.0)*	*0*	*9.0*	*1.7 (3.5)*	*0*	*10.8*
Outside of the home	**4.6 (5.1)**	**0**	**14.9**	**9.6 (7.5)**	**0**	**24.1**	**8.7 (6.6)**	**0**	**22.5**	**10.4 (8.1)**	**0**	**26.9**
Restaurants/hotels/ public houses/coffee shops	*0.6 (1.7)*	*0*	*3.7*	*0.6 (2.0)*	*0*	*4.2*	*0.6 (2.0)*	*0*	*4.3*	*0.7 (2.1)*	*0*	*4.2*
Fast food	*0.1 (0.5)*	*0*	*0.1*	*0.2 (0.7)*	*0*	*1.4*	*0.1 (0.4)*	*0*	*0.6*	*0.3 (0.9)*	*0*	*2.2*
School	*1.3 (2.5)*	*0*	*6.7*	*5.1 (5.8)*	*0*	*16.1*	*4.8 (5.3)*	*0*	*16.4*	*5.4 (6.2)*	*0*	*16*
Other	*2.6 (4.0)*	*0*	*11.1*	*3.7 (5.1)*	*0*	*14.4*	*3.1 (4.5)*	*0*	*11.3*	*4.1 (5.5)*	*0*	*15.8*
Unspecified location	*0.4 (1.4)*	*0*	*3.7*	*0.4 (1.5)*	*0*	*2.5*	*0.3 (1.6)*	*0*	*1.9*	*0.4 (1.4)*	*0*	*3.2*

Table 54. Characteristics of low, medium and high consumers (%E from treat foods) in children aged 2-4 years in Ireland

	Low consumers (*n* 124)	Medium consumers (*n* 125)	High consumers (*n* 125)	P-value
MDI of energy from treat foods (kcal), Mean (P5-P95)	98.7 (26.0-174.1)[a]	219 (141-334)[b]	364 (251-554)[c]	<0.001
Contribution (%) of treat foods to energy intake, Mean (P5-P95)	8.9 (2.5-13.3)[a]	17.8 (14.2-21.6)[b]	29.9 (22.5-44.6)[c]	<0.001
Sex				
Boys (%)	51.9	52.0	54.1	
Girls (%)	48.1	48.0	45.9	0.448
Weight Status				
Normal weight (%)	79.2	74.3	76.6	
Overweight/obese (%)	20.8	25.7	23.4	0.017
Social Class				
Professional, Managerial & Technical Workers (%)	38.6	36.5	31.4	
Non-Manual Workers (%)	23.9	21.7	21.0	
Skilled Manual Workers (%)	17.5	26.8	29.1	
Semi Skilled/ Unskilled Workers (Including Students) (%)	20.0	15.0	18.5	<0.001
Parental Education				
Intermediate (%)	5.0	4.7	6.2	
Secondary (%)	11.8	9.0	14.4	
Tertiary (%)	83.2	86.3	79.4	<0.001

*Statistical differences between groups are indicated by different superscript letters

Table 55. Mean daily intakes of nutrients in low, medium and high consumers (%E from treat foods) in children aged 2-4 years in Ireland

	Low consumers (*n* 124)	Medium Consumers (*n* 125)	High consumers (*n* 125)
Macronutrients			
Energy (kcal)	1094	1231	1224*
Protein (g)	44.6	46.1	41.6*
Protein (%E)	16.4	15.0	13.6*
Total fat (g)	39.4	45.4	43.4*
Total fat (%E)	32.1	32.8	31.9
Saturated fat (g)	17.9	20.7	19.5*
Saturated fat (%E)	14.5	14.9	14.3
Monounsaturated fat (g)	5.3	5.9	6.1*
Monounsaturated fat (%E)	10.7	11.1	10.9
Polyounsaturated fat (g)	13.1	15.4	14.8*
Polyounsaturated fat (%E)	4.4	4.3	4.5
Carbohydrate (g)	142	161	168*
Carbohydrate (%E)	48.9	49.3	51.3*
Total sugars (g)	66.1	80.9	86.9*
Total sugars (%E)	22.9	25.0	26.6*
Free sugars (g)	24.8	40.6	54.7*
Free sugars (%E)	8.5	12.5	16.8*
Dietary fibre (g)	12.4	12.1	11.5*
Vitamins			
Vitamin A (µg)	710	678	601*
Vitamin D (µg)	3.5	3.6	3.0*
Vitamin E (µg)	5.2	5.9	7.1*
Thiamin (mg)	1.1	1.1	1.1
Riboflavin (mg)	1.6	1.6	1.4*
Niacin (mg)	21.2	21.0	20.7
Vitamin B6 (µg)	1.5	1.5	1.5
Vitamin B12 (µg)	4.4	4.1	3.6*
Pantothenate (mg)	4.6	4.5	4.2*
Biotin (µg)	23.6	22.9	23.7
Total folate (µg)	185	184	182
Dietary folate equivalents (µg)	229	226	228
Vitamin C (mg)	77.5	85.1	99.5*
Minerals			
Sodium (mg)	1255	1312	1320*

Potassium (mg)	1779	1848	1661*
Calcium (mg)	797	788	688*
Iron (mg)	7.6	7.9	6.9*
Magnesium (mg)	160	162	149*
Zinc (mg)	5.4	5.6	5.0*
Copper (mg)	0.7	0.7	0.6*
Phosphorous (mg)	868	876	781*

* indicates values are significantly different compared to low consumers within the rows ($p<0.001$)

Table 56. Characteristics of low, medium and high consumers (%E from treat foods) in children aged 5-12 years in Ireland

	Low consumers (*n* 200)	Medium consumers (*n* 200)	High consumers(*n* 200)	P-value
MDI of energy from treat foods (kcal), Mean (P5-P95)	163 (47.7-305)[a]	306 (178-472)[b]	508 (315-760)[c]	<0.001
Contribution (%) of treat foods to energy intake, Mean (P5-P95)	11.0 (3.8-16.1)[a]	20.6 (16.9-24.7)[b]	32.7 (25.6-44.3)[c]	<0.001
Sex				
Boys (%)	56.0	49.9	48.2	
Girls (%)	44.0	50.1	51.8	0.267
Age Group				
5-8 year olds (%)	49.6	46.8	47.5	
9-12 year olds (%)	50.4	53.2	52.5	0.868
Weight Status				
Normal weight (%)	78.4	84.1	90.5	
Overweight/obese (%)	21.6	15.9	9.5	0.004
Social Class				
Professional, Managerial & Technical Workers (%)	55.0	57.0	47.7	
Non-Manual Workers (%)	19.6	15.6	25.3	
Skilled Manual Workers (%)	8.1	17.3	18.5	
Semi Skilled/ Unskilled Workers (Including Students) (%)	17.2	10.1	8.4	0.001
Parental Education				
Intermediate (%)	8.1	7.4	9.4	
Secondary (%)	11.7	10.0	16.2	
Tertiary (%)	80.2	82.6	83.8	0.548

*Statistical differences between groups are indicated by different superscript letters

Table 57. Mean daily intakes of nutrients in low, medium and high consumers (%E from treat foods) in children aged 5-12 years in Ireland

	Low consumers (*n* 200)	Medium Consumers (*n* 200)	High consumers (*n* 200)
Macronutrients			
Energy (kcal)	1471	1480	1554
Protein (g)	64.3	58.3	55.8*
Protein (%E)	17.6	15.7	14.4*
Total fat (g)	55.2	54.9	59.2
Total fat (%E)	33.3	33.3	34.1
Saturated fat (g)	22.7	23.0	24.7
Saturated fat (%E)	13.7	14.0	14.2
Monounsaturated fat (g)	23.0	22.5	24.5
Monounsaturated fat (%E)	13.8	13.6	14.1
Polyounsaturated fat (g)	9.3	9.2	9.7
Polyounsaturated fat (%E)	5.6	5.6	5.6
Carbohydrate (g)	189	199	211*
Carbohydrate (%E)	48.7	50.5	51.0*
Total sugars (g)	63.6	74.6	87.0*
Total sugars (%E)	16.3	19.0	21.1*
Free sugars (g)	27.5	40.4	55.0*
Free sugars (%E)	7.0	10.2	13.3*
Dietary fibre (g)	15.2	14.3	14.4
Vitamins			
Vitamin A (µg)	658	665	609
Vitamin D (µg)	4.2	4.2	5.0
Vitamin E (µg)	6.6	7.0	7.1
Thiamin (mg)	1.5	1.5	1.3*
Riboflavin (mg)	1.7	1.6	1.5
Niacin (mg)	31.4	28.4	27.4*
Vitamin B6 (µg)	1.6	1.5	1.5
Vitamin B12 (µg)	5.0	4.6	4.3*
Pantothenate (mg)	5.7	5.4	5.2
Biotin (µg)	25.9	24.9	23.0
Total folate (µg)	218	205	196
Dietary folate equivalents (µg)	262	247	236
Vitamin C (mg)	66.8	92.5	69.1
Minerals			
Sodium (mg)	1759	1684	1660
Potassium (mg)	2082	1997	1932
Calcium (mg)	816	796	759
Iron (mg)	9.3	8.8	8.9
Magnesium (mg)	197	190	186

Zinc (mg)	7.8	7.0	6.8*
Copper (mg)	0.7	0.7	0.7
Phosphorous (mg)	1064	992	949*

* indicates values are significantly different compared to low consumers within the rows ($p<0.001$)

Table 58. Characteristics of low, medium and high consumers (%E from treat foods) in children aged 2-4 years in NI

	Low consumers (*n* 80)	Medium consumers (*n* 81)	High consumers (*n* 80)	P-value
MDI of energy from treat foods (kcal), Mean (P5-P95)	106 (37.9-196.5)[a]	221 (148-336)[b]	372 (218-649)[c]	<0.001
Contribution (%) of treat foods to energy intake, Mean (P5-P95)	9.5 (2.7-14.3)[a]	18.3 (15.0-21.9)[b]	30.1 (23.4-49.1)[c]	<0.001
Sex				
Boys (%)	52.5	50.6	52.5	
Girls (%)	47.5	49.4	47.5	0.963
Weight Status				
Normal weight (%)	65.3	50.7	48.5	
Overweight/obese (%)	34.7	49.3	51.5	0.095
Social Class				
Higher Managerial, Administrative & Professional Occupations (%)	33.8	36.3	40.5	
Intermediate Occupations (%)	15.0	21.3	19.0	
Routine & Manual Occupations, and Other (%)	51.2	42.5	40.5	0.638

*Statistical differences between groups are indicated by different superscript letters

Table 59. Mean daily intakes of nutrients in low, medium and high consumers (%E from treat foods) in children aged 2-4 years in NI

	Low consumers (*n* 80)	Medium consumers (*n* 81)	High consumers (*n* 80)
Macronutrients			
Energy (kcal)	1114	1207	1226
Protein (g)	46.1	48.5	42.0
Protein (%E)	16.6	16.1	13.7*
Total fat (g)	41.5	47.2	46.6
Total fat (%E)	33.4	34.9	34.1
Saturated fat (g)	18.1	19.9	19.4
Saturated fat (%E)	14.5	14.7	14.2
Monounsaturated fat (g)	13.8	16.2	16.5*
Monounsaturated fat (%E)	11.2	12.0	12.0
Cisn6FA (g)	4.8	5.6	5.7
Cisn6FA (%)	3.9	4.2	4.2
Cisn3FA (g)	0.9	1.1	1.0
Cisn3FA (%)	0.7	0.8	0.7
Carbohydrate (g)	149	157	170
Carbohydrate (%E)	49.9	48.9	52.2*
Total sugars (g)	63.2	73.7	84.7*
Total sugars (%E)	21.1	22.9	25.9*
Free sugars (g)	26.9	37.3	53.4*
Free sugars (%E)	9.0	11.5	16.3*
Dietary fibre (g)	11.1	10.6	10.4
Vitamins			
Vitamin A (µg)	517	526	422
Vitamin D (µg)	2.0	2.1	1.9
Vitamin E (µg)	4.9	5.7	5.7
Thiamin (mg)	1.0	1.1	1.0
Riboflavin (mg)	1.5	1.5	1.2*
Niacin (mg)	20.6	21.3	18.9
Vitamin B6 (µg)	1.3	1.4	1.2
Vitamin B12 (µg)	4.0	4.5	3.2
Pantothenate (mg)	4.8	5.0	4.1
Biotin (µg)	20.4	24.2	18.3
Total folate (µg)	157	163	135
Vitamin C (mg)	56.7	68.0	72.2
Minerals			
Sodium (mg)	1388	1454	1335
Potassium (mg)	1823	1914	1719
Calcium (mg)	804	819	678
Iron (mg)	6.7	6.4	6.1
Magnesium (mg)	155	161	148
Zinc (mg)	5.4	5.4	4.7

Copper (mg)	0.5	0.6	0.6
Phosphorous (mg)	869	939	810

* indicates values are significantly different compared to low consumers within the rows ($p<0.001$)

Table 60. Characteristics of low, medium and high consumers (%E from treat foods) in children aged 5-12 years in NI

	Low consumers (*n* 162)	Medium consumers (*n* 162)	High consumers (*n* 162)	P-value
MDI of energy from treat foods (kcal), Mean (P5-P95)	205 (48-357)[a]	389 (233-564)[b]	618 (413-930)[c]	<0.001
Contribution (%) of treat foods to energy intake, Mean (P5-P95)	13.9 (4.4-19.2)[a]	24.3 (20.1-28.9)[b]	36.8 (30.0-47.0)[c]	<0.001
Sex				
Boys (%)	56.8	49.4	52.5	
Girls (%)	43.2	50.6	47.5	0.407
Weight Status				
Normal weight (%)	62.4	67.6	64.7	
Overweight/obese (%)	37.6	32.4	35.3	0.649
Social Class				
Higher Managerial, Administrative & Professional Occupations (%)	38.8	36.6	28.0	
Intermediate Occupations (%)	19.4	21.7	27.3	
Routine & Manual Occupations, and Other (%)	41.9	41.6	44.7	0.228

*Statistical differences between groups are indicated by different superscript letters

Table 61. Mean daily intakes of nutrients in low, medium and high consumers (%E from treat foods) in children aged 5-12 years in NI

	Low consumers (*n* 162)	Medium consumers (*n* 162)	High consumers (*n* 162)
Macronutrients			
Energy (kcal)	1452	1601	1671*
Protein (g)	60.9	59.1	56.1
Protein (%E)	16.8	14.8	13.5*
Total fat (g)	53.2	59.0	63.7*
Total fat (%E)	32.8	33.1	34.3
Saturated fat (g)	21.3	23.2	24.7*
Saturated fat (%E)	13.1	13.0	13.3
Monounsaturated fat (g)	18.9	21.5	23.6*
Monounsaturated fat (%E)	11.7	12.0	12.7*
Cisn6FA (g)	6.9	7.7	8.4*
Cisn6FA (%)	4.3	4.3	4.6
Cisn3FA (g)	1.3	1.5	1.6*
Cisn3FA (%)	0.8	0.8	0.8
Carbohydrate (g)	195	222	233*
Carbohydrate (%E)	50.3	52.1	52.3*
Total sugars (g)	74.6	97.0	110*
Total sugars (%E)	19.2	22.7	24.4*
Free sugars (g)	38.4	63.2	80.8*
Free sugars (%E)	9.9	14.7	17.9*
Dietary fibre (g)	14.5	14.4	13.5
Vitamins			
Vitamin A (µg)	557	570	508
Vitamin D (µg)	2.3	2.3	2.0
Vitamin E (µg)	6.9	7.7	8.1*
Thiamin (mg)	1.4	1.4	1.3
Riboflavin (mg)	1.6	1.5	1.4*
Niacin (mg)	28.2	28.3	26.8
Vitamin B6 (µg)	1.7	1.7	1.6
Vitamin B12 (µg)	4.5	4.0	3.6*
Pantothenate (mg)	5.7	5.3	5.1
Biotin (µg)	25.2	22.8	22.0
Total folate (µg)	205	188	168*
Vitamin C (mg)	71.8	80.6	77.9
Minerals			
Sodium (mg)	1798	1922	1886
Potassium (mg)	2204	2265	2126
Calcium (mg)	875	826	747*
Iron (mg)	8.9	8.8	8.1
Magnesium (mg)	195	195	186
Zinc (mg)	6.9	6.5	6.1*

Copper (mg)	0.8	0.8	0.8
Phosphorous (mg)	1075	1048	993

* indicates values are significantly different compared to low consumers within the rows ($p<0.001$)

Table 62. Proportion (%) of consumers of snacks in children aged 2-12 years in Ireland

	2–4-year-olds (*n* 374)	5–12-year-olds (*n* 600)	5–8-year-olds (*n* 300)	9–12-year-olds (*n* 300)
Total Snacks	99.1	97.3	98.8	95.8
Morning Snacks	85.0	49.6	56.2	43.5
Afternoon Snacks	93.4	89.2	91.5	87.0
Evening Snacks	74.6	82.9	82.2	83.5
Night Snacks	2.7	-	-	-

* No significant differences noted between those aged 5-8y and 9-12y ($p<0.001$)

Table 63. Proportion (%) of consumers of snacks in children aged 2-12 years in NI

	2–4-year-olds (*n* 241)	5–12-year-olds (*n* 486)	5–8-year-olds (*n* 225)	9–12-year-olds (*n* 261)
Total Snacks	100.0	99.8	99.6	100.0
Morning Snacks	99.2	97.5	99.6	95.8
Afternoon Snacks	97.9	97.9	97.8	98.1
Evening Snacks	68.9	86.0	76.9	93.9*

* indicates values are significantly different compared to 5-8 year olds within the rows ($p<0.001$)

	2–4-year-olds (*n* 374)		5–12-year-olds (*n* 600)		5–8-year-olds (*n* 300)		9–12-year-olds (*n* 300)	
	Boys (*n* 188)	Girls (*n* 186)	Boys (*n* 300)	Girls (*n* 300)	Boys (*n* 149)	Girls (*n* 151)	Boys (*n* 151)	Girls (*n* 149)
Total Snacks	99.3	98.9	98.6	95.9	100.0	97.7	97.4	94.1
Morning Snacks	85.4	84.5	44.4	55.0	48.4	64.0	41.0	46.2
Afternoon Snacks	93.0	93.8	90.2	88.0	92.9	90.1	87.9	86.0
Evening Snacks	73.2	76.2	84.0	81.7	84.2	80.3	83.8	83.1
Night Snacks	0.6	4.9*	-	-	-	-	-	-

	2–4-year-olds (*n* 241)		5–12-year-olds (*n* 486)		5–8-year-olds (*n* 225)		9–12-year-olds (*n* 261)	
	Boys (*n* 125)	Girls (*n* 116)	Boys (*n* 257)	Girls (*n* 229)	Boys (*n* 118)	Girls (*n* 107)	Boys (*n* 139)	Girls (*n* 122)
Total Snacks	100	100	100	99.6	100	99.1	100	100
Morning Snacks	98.4	100	97.3	97.8	100	99.1	95.0	96.7
Afternoon Snacks	99.2	96.6	98.1	97.8	98.3	97.2	97.8	98.4
Evening Snacks	72.8	64.7	87.2	84.7	77.1	76.6	95.7	91.8

Table 66. Proportion (%) of consumers of snacks in children aged 2-12 years in Ireland, by social class

	2–4-year-olds (*n* 374)				5–12-year-olds (*n* 600)			
	Professional, Managerial & Technical Workers	Non-Manual Workers	Skilled Manual Workers	Semi-Skilled/ Unskilled Workers (Including Students)	Professional, Managerial & Technical Workers	Non-Manual Workers	Skilled Manual Workers	Semi-Skilled/ Unskilled Workers (Including Students)
Total Snacks	99.5[a]	98.4[a]	98.5[a]	100[a]	98.5[a]	95.1[a]	96.3[a]	96.8[a]
Morning Snacks	89.0[a]	88.9[a]	81.5[b]	77.3[b]	53.4[a]	49.0[a]	44.4[a]	39.9[a]
Afternoon Snacks	97.7[a]	90.5[b]	92.3[b]	90.9[b]	92.1[a]	86.3[a]	88.9[a]	80.7[a]
Evening Snacks	69.3[a]	81.0[b]	78.5[b]	72.7[a,b]	82.1[a]	81.4[a]	88.9[a]	81.7[a]
Night Snacks	4.6[a]	3.2[a,b]	1.5[b,c]	0[c]	-	-	-	-

*Statistical differences between groups are indicated by different superscript letters

Table 67. Proportion (%) of consumers of snacks in children aged 2-12 years in NI, by social class

	2–4-year-olds (*n* 241)			5–12-year-olds (*n* 486)		
	Higher Managerial, Administrative & Professional Occupations	Intermediate Occupations	Routine & Manual Occupations, and Other	Higher Managerial, Administrative & Professional Occupations	Intermediate Occupations	Routine & Manual Occupations, and Other
Total Snacks	100	100	100	100.0	99.1	100
Morning Snacks	100	97.7	99.1	97.6	96.4	98.1
Afternoon Snacks	98.9	100	96.3	99.4	98.2	96.6
Evening Snacks	65.9	72.7	69.2	82.5	88.2	87.9

* No significant differences noted between groups ($p<0.001$)

Table 68. Proportion (%) of consumers of snacks in children aged 2-12 years in Ireland, by parental education

	2–4-year-olds (*n* 374)			5–12-year-olds (*n* 600)		
	Intermediate	Secondary	Tertiary	Intermediate	Secondary	Tertiary
Total Snacks	100[a]	100[a]	98.9[a]	90.2[a]	96.2[a]	98.1[a]
Morning Snacks	75.0[a]	89.2[b]	85.1[b]	35.0[a]	46.2[a]	51.7[a]
Afternoon Snacks	100[a]	95.5[a,b]	92.7[b]	84.7[a]	87.0[a]	90.1[a]
Evening Snacks	65.0[a]	64.2[a]	76.7[b]	82.0[a]	76.3[a]	83.9[a]
Night Snacks	3.0[a]	4.1[a]	2.4[a]	-	-	-

*Statistical differences between groups are indicated by different superscript letters

Table 69. Proportion (%) of consumers of snacks in children aged 2-12 years in Ireland, by BMI classification

	2–4-year-olds (*n* 374)		5–12-year-olds (*n* 600)	
	Normal weight (*n* 287)	Overweight/obese (n 84)	Normal weight (*n* 512)	Overweight/obese (n 84)
Total Snacks	98.8	100.0	98.0	93.4
Morning Snacks	85.1	84.1	52.1	37.0
Afternoon Snacks	93.3	93.5	90.3	83.1
Evening Snacks	76.8	66.6*	84.3	75.5
Night Snacks	2.8	2.3	-	-

* indicates values are significantly different compared to normal weight children within the rows ($p<0.001$)

Table 70. Proportion (%) of consumers of snacks in children aged 2-12 years in NI, by BMI classification

	2–4-year-olds (n 241)		5–12-year-olds (n 486)	
	Normal weight (*n* 114)	Overweight/obese (n 93)	Normal weight (*n* 292)	Overweight/obese (n 158)
Total Snacks	100	100	100	100
Morning Snacks	99.1	98.9	97.9	96.8
Afternoon Snacks	99.1	95.7	98.6	97.5
Evening Snacks	61.4	77.4	85.6	85.4

* No significant differences noted between groups (p<0.001)

Table 71. Mean daily intake of energy (kcal) from snacks in children aged 2-12 years in Ireland

	2–4-year-olds (*n* 374)			5–12-year-olds (*n* 600)			5–8-year-olds (*n* 300)			9–12-year-olds (*n* 300)		
	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th
Total Snacks	304 (1656)	52.0	638	360 (211)	62.2	753	338 (191)	70.3	694	380 (227)	37.1	856
Morning Snacks	90.0 (72.9)	0.0	228	48.5 (69.8)	0.0	192	51.4 (66.4)	0.0	180	45.8 (72.8)	0.0	215
Afternoon Snacks	136 (98.6)	0.0	339	176 (138)	0.0	411	174 (132)	0.0	413	178 (143)	0.0	411
Evening Snacks	77.2 (87.7)	0.0	234	135 (126)	0.0	372	112 (1089)	0.0	309	156* (137)	0.0	407
Night Snacks	1.8 (14.3)	0.0	0.0	-	-	-	-	-	-	-	-	-

* indicates values are significantly different compared to 5-8 year olds within the rows (p<0.001)

Table 72. Mean daily intake of energy (kcal) from snacks in children aged 2-12 years in NI

	2–4-year-olds (*n* 241)			5–12-year-olds (*n* 486)			5–8-year-olds (*n* 225)			9–12-year-olds (*n* 261)		
	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th
Total Snacks	432 (187)	194	780	587 (269)	212	1091	518 (229)	181	984	648 (287) *	229	1165
Morning Snacks	176 (86.9)	43.3	328	196 (115)	32.4	404.9	186 (107)	38.2	358	204 (121)	19.3	420
Afternoon Snacks	178 (97.3)	39.0	342	237 (149)	34.1	532.8	226 (136)	29.7	525	247 (160)	35.6	536
Evening Snacks	77 (92.1)	0	252	154 (133)	0	401.9	106 (100)	0	309	196 (145) *	0	443

* indicates values are significantly different compared to 5-8 year olds within the rows ($p<0.001$)

Table 73. Mean daily intake of energy (kcal) from snacks in children aged 2-12 years in Ireland, by sex

	2–4-year-olds (*n* 374)					
	Boys (n 188)			Girls (*n* 186)		
	Mean (SD)	P5	P95	Mean (SD)	P5	P95
Total Snacks	315 (179)	44.6	664	292* (148)	65.6	577
Morning Snacks	95.9 (77.9)	0.0	243	83.3* (66.3)	0.0	207
Afternoon Snacks	136 (103)	0.0	359	135 (93.5)	0.0	316
Evening Snacks	83.2 (102)	0.0	312	70.6* (68.6)	0.0	200
Night Snacks	0.3 (3.7)	0.0	0.0	3.4* (20.3)	0.0	0.4

* indicates values are significantly different compared to boys within the rows (p<0.001)

	5–12-year-olds (*n* 600)					
	Boys (*n* 300)			Girls (n 300)		
	Mean (SD)	P5	P95	Mean (SD)	P5	P95
Total Snacks	383 (229)	69.6	861	335 (187)	32.4	656
Morning Snacks	49.6 (77.0)	0.0	230	47.4 (61.4)	0.0	169
Afternoon Snacks	187 (144)	0.0	424	165 (130)	0.0	396
Evening Snacks	146 (139)	0.0	397	123 (110)	0.0	344
Night Snacks	-	-	-	-	-	-

* indicates values are significantly different compared to boys within the rows (p<0.001)

	5–8-year-olds (*n* 300)					
	Boys (*n* 149)			Girls (*n* 151)		
	Mean (SD)	P5	P95	Mean (SD)	P5	P95
Total Snacks	357 (208)	73.9	733	320 (170)	66.0	651
Morning Snacks	50.4 (73.8)	0.0	205	52.4 (58.4)	0.0	168
Afternoon Snacks	190 (139)	0.0	424	159 (122)	0.0	406
Evening Snacks	116 (119)	0.0	323	109 (97.8)	0.0	281
Night Snacks	-	-	-	-	-	-

* indicates values are significantly different compared to boys within the rows (p<0.001)

	9–12-year-olds (*n* 300)					
	Boys (*n* 151)			Girls (*n* 149)		
	Mean (SD)	P5	P95	Mean (SD)	P5	P95
Total Snacks	406 (245)	62.2	917	350 (202)	0.0	753
Morning Snacks	48.9 (80.0)	0.0	253	42.4 (64.0)	0.0	192
Afternoon Snacks	184 (148)	0.0	453	170 (138)	0.0	387
Evening Snacks	173 (150)	0.0	468	137 (119)	0.0	372
Night Snacks	-	-	-	-	-	-

* indicates values are significantly different compared to boys within the rows (p<0.001)

Table 74. Mean daily intake of energy (kcal) from snacks in children aged 2-12 years in NI, by sex

	2–4-year-olds (*n* 241)					
	Boys (n 125)			Girls (*n* 116)		
	Mean (SD)	P5	P95	Mean (SD)	P5	P95
Total Snacks	461 (206)	218	813	401 (159)	167	695
Morning Snacks	185 (98)	46.5	343	167 (72.2)	42.7	288
Afternoon Snacks	191 (98)	45.7	356	164 (94.9)	23.6	337
Evening Snacks	84 (103)	0	264	69.8 (77.8)	0	230

* No significant differences noted between boys and girls (p<0.001)

	5–12-year-olds (*n* 600)					
	Boys (*n* 300)			Girls (n 300)		
	Mean (SD)	P5	P95	Mean (SD)	P5	P95
Total Snacks	616 (284)	200	1120	557 (249)	213	1064
Morning Snacks	197 (122)	29.6	422	195 (107)	38.9	388
Afternoon Snacks	245 (155)	27.3	538	229 (142)	39.8	499
Evening Snacks	174 (146)	0	435	133 (116)*	0	379

* indicates values are significantly different compared to boys within the rows (p<0.001)

	5-8 year olds (*n* 300)					
	Boys (*n* 149)			Girls (*n* 151)		
	Mean (SD)	P5	P95	Mean (SD)	P5	P95
Total Snacks	505 (219)	158	863	533 (239)	212	1052
Morning Snacks	176 (103)	33.4	332.996	195 (110)	39.8	387
Afternoon Snacks	218 (134)	21.9	443	235 (140)	51.7	552
Evening Snacks	110 (101)	0	321	101 (98.3)	0	303

* No significant differences noted between boys and girls (p<0.001)

	9-12 year olds (*n* 300)					
	Boys (*n* 151)			Girls (*n* 149)		
	Mean (SD)	P5	P95	Mean (SD)	P5	P95
Total Snacks	710 (299)	253	1323	578 (256)*	212	1107
Morning Snacks	215 (133)	0	457	193 (106)	28.9	388
Afternoon Snacks	267 (169)	41.2	567	223 (146)	33.8	443
Evening Snacks	228 (156)	0.5	518	160 (123)*	0	403

* indicates values are significantly different compared to boys within the rows (p<0.001)

Table 75. Mean daily intake of energy (kcal) from snacks in children aged 2-12 years in Ireland, by social class

	2–4-year-olds (*n* 374)				5–12-year-olds (*n* 600)			
	Professional, Managerial & Technical Workers	Non-Manual Workers	Skilled Manual Workers	Semi-Skilled/ Unskilled Workers (Including Students)	Professional, Managerial & Technical Workers	Non-Manual Workers	Skilled Manual Workers	Semi-Skilled/ Unskilled Workers (Including Students)
Total Snacks	298[a]	313[a]	314[a]	283[a]	356[a]	365[a]	402[a]	309[a]
Morning Snacks	91.6[a,b]	102[a]	85.6[b,c]	75.5[c]	51.2[a]	56.5[a]	48.4[a]	25.0[a]
Afternoon Snacks	148[a]	126[b,c]	141[a,b]	113[c]	172[a]	170[a]	195[a]	173[a]
Evening Snacks	56.5[a]	80.4[b]	87.2[b]	94.7[b]	133[a]	138[a]	159[a]	112[a]
Night Snacks	2.3[a,b]	4.2[a]	0.1[b]	0[b]	-	-	-	-

*Statistical differences between groups are indicated by different superscript letters

Table 76. Mean daily intake of energy (kcal) from snacks in children aged 2-12 years in NI, by social class

	2-4 year olds (*n* 241)			5-12 year olds (*n* 486)		
	Higher Managerial, Administrative & Professional Occupations	Intermediate Occupations	Routine & Manual Occupations, and Other	Higher Managerial, Administrative & Professional Occupations	Intermediate Occupations	Routine & Manual Occupations, and Other
Total Snacks	420	429	444	579	549	618
Morning Snacks	171	182	179	187	184	211
Afternoon Snacks	177	180	177	238	222	246
Evening Snacks	71.7	67.0	87.1	154	143	162

* No significant differences noted between groups (p<0.001)

Table 77. Mean daily intake of energy (kcal) from snacks in children aged 2-12 years in Ireland, by parental education

	2-4 year olds (*n* 374)			5-12 year olds (*n* 600)		
	Intermediate	Secondary	Tertiary	Intermediate	Secondary	Tertiary
Total Snacks	372[a]	289[b]	302[b]	345[a]	359[a]	362[a]
Morning Snacks	95.8[a,b]	110[a]	86.7[b]	46.6[a]	41.1[a]	49.9[a]
Afternoon Snacks	186[a]	122[b]	134[b]	169[a]	179[a]	176[a]
Evening Snacks	89.2[a]	56.1[b]	79.5[a]	132[a]	138[a]	136[a]
Night Snacks	1.1[a]	0.9[a]	1.9[a]	-	-	-

*Statistical differences between groups are indicated by different superscript letters

Table 78. Mean daily intake of energy (kcal) from snacks in children aged 2-12 years in Ireland, by BMI classification

	2–4-year-olds (*n* 374)		5–12-year-olds (*n* 600)	
	Normal weight (*n* 287)	Overweight/obese (n 84)	Normal weight (*n* 512)	Overweight/obese (n 84)
Total Snacks	317	260*	368	317
Morning Snacks	89.9	88.7	50.5	38.1
Afternoon Snacks	141	119*	180	153
Evening Snacks	84.6	51.3*	137	126
Night Snacks	2.0	0.9	-	-

* indicates values are significantly different compared to those within normal weight category within the rows (p<0.001)

Table 79. Mean daily intake of energy (kcal) from snacks in children aged 2-12 years in NI, by BMI classification

	2–4-year-olds (n 241)		5–12-year-olds (n 486)	
	Normal weight (*n* 114)	Overweight/obese (n 93)	Normal weight (*n* 292)	Overweight/obese (n 158)
Total Snacks	414	452	595	567
Morning Snacks	175	184	198	186
Afternoon Snacks	169	182	239	232
Evening Snacks	70.4	86.1	158	148

* No significant differences noted between groups (p<0.001)

Table 80. Contribution (%) of snacks to energy intake in children aged 2-12 years in Ireland

	2-4 year olds (*n* 374)			5-12 year olds (*n* 600)			5-8 year olds (*n* 300)			9-12 year olds (*n* 300)		
	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th
Total Snacks	25.2 (11.4)	5.3	45.1	23.4 (11.6)	4.5	42.9	24.0 (11.4)	5.7	44.0	22.9 (11.7)	2.7	42.9
Morning Snacks	7.5 (5.9)	0.0	18.0	3.2 (4.4)	0.0	12.3	3.6 (4.5)	0.0	12.3	2.8 (4.3)	0.0	12.0
Afternoon Snacks	11.3 (7.6)	0.0	25.6	11.5 (8.3)	0.0	26.5	12.4 (8.4)	0.0	26.7	10.8 (8.1)	0.0	25.7
Evening Snacks	6.2 (6.4)	0.0	17.6	8.7 (7.3)	0.0	21.5	8.0 (7.1)	0.0	20.3	9.3 (7.5)	0.0	23.8
Night Snacks	0.1 (1.0)	0.0	0.0	-	-	-	-	-	-	-	-	-

*No differences were noted in intakes between age groups (p<0.001)

Table 81. Contribution (%) of snacks to energy intake in children aged 2-12 years in NI

	2-4 year olds (*n* 241)			5-12 year olds (*n* 486)			5-8 year olds (*n* 225)			9-12 year olds (*n* 261)		
	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th
Total Snacks	36.3 (12.2)	16.9	57.4	36.8 (13.1)	15.9	60.6	34.4 (12.4)	13.8	55	38.9* (13.4)	18.0	63.9
Morning Snacks	15.0 (6.7)	4.2	28.0	12.5 (6.9)	2.2	24.6	12.5 (6.5)	2.7	23.9	12.6 (7.2)	1.3	24.7
Afternoon Snacks	14.9 (7.4)	3.7	28.2	14.9 (8.4)	2.6	30.6	14.9 (8.3)	2.9	31.4	14.7 (8.4)	2.4	30.4
Evening Snacks	6.3 (7.1)	0	18.9	9.4 (7.4)	0	22.8	6.9 (6.3)	0	18.3	11.5* (7.7)	0	25.1

* indicates values are significantly different compared to 5-8 year olds within the rows (p<0.001)

Table 82. Contribution (%) of snacks to energy intake in children aged 2-12 years in Ireland, by sex

	2–4-year-olds (*n* 374)					
	Boys (n 188)			Girls (*n* 186)		
	Mean (SD)	P5	P95	Mean (SD)	P5	P95
Total Snacks	25.2 (11.7)	4.0	45.1	25.3 (11.0)	7.2	44.1
Morning Snacks	7.9 (6.3)	0.0	20.5	7.2 (5.3) *	0.0	16.6
Afternoon Snacks	10.9 (7.3)	0.0	23.0	11.8 (7.9) *	0.0	26.5
Evening Snacks	6.3 (7.0)	0.0	21.4	6.0 (5.6)	0.0	15.8
Night Snacks	0.0 (0.4)	0.0	0.0	0.3 (1.4) *	0.0	0.0

* indicates values are significantly different compared to boys within the rows (p<0.001)

	5–12-year-olds (*n* 600)					
	Boys (*n* 300)			Girls (n 300)		
	Mean (SD)	P5	P95	Mean (SD)	P5	P95
Total Snacks	23.2 (11.5)	5.9	44.1	23.7 (11.7)	2.7	42.3
Morning Snacks	3.0 (4.6)	0.0	13.5	3.4 (4.3)	0.0	12.0
Afternoon Snacks	11.5 (8.1)	0.0	27.0	11.6 (8.4)	0.0	26.4
Evening Snacks	8.7 (7.3)	0.0	21.5	8.7 (7.4)	0.0	23.0
Night Snacks	-	-	-	-	-	-

*no significant differences were noted between sexes

	5–8-year-olds (*n* 300)					
	Boys (*n* 149)			Girls (*n* 151)		
	Mean (SD)	P5	P95	Mean (SD)	P5	P95
Total Snacks	24.0 (11.5)	6.7	46.2	24.0 (11.4)	5.3	41.9
Morning Snacks	3.3 (4.7)	0.0	13.9	3.9 (4.2)	0.0	12.2
Afternoon Snacks	12.9 (8.2)	0.0	27.1	11.9 (8.5)	0.0	26.4
Evening Snacks	7.8 (7.2)	0.0	21.4	8.2 (7.0)	0.0	19.8
Night Snacks	-	-	-	-	-	-

*no significant differences were noted between sexes

	9-12 year olds (*n* 300)					
	Boys (*n* 151)			Girls (*n* 149)		
	Mean (SD)	P5	P95	Mean (SD)	P5	P95
Total Snacks	22.5 (11.5)	5.1	42.9	23.5 (12.0)	0.0	43.7
Morning Snacks	2.7 (4.4)	0.0	13.5	2.9 (4.3)	0.0	12.0
Afternoon Snacks	10.3 (7.8)	0.0	25.7	11.4 (8.4)	0.0	27.1
Evening Snacks	9.5 (7.4)	0.0	22.9	9.2 (7.7)	0.0	25.1
Night Snacks	-	-	-	-	-	-

*no significant differences were noted between sexes

Table 83. Contribution (%) of snacks to energy intake in children aged 2-12 years in NI, by sex

	2–4-year-olds (*n* 241)					
	Boys (n 125)			Girls (*n* 116)		
	Mean (SD)	P5	P95	Mean (SD)	P5	P95
Total Snacks	36.7 (12.4)	17.6	59.4	36.0 (11.9)	16.2	55.7
Morning Snacks	14.7 (6.9)	3.8	26.2	15.2 (6.5)	4.3	28.6
Afternoon Snacks	15.3 (6.8)	4.3	27.5	14.6 (8.1)	2.9	29.3
Evening Snacks	6.7 (7.5)	0	21.8	6.1 (6.5)	0	18.8

*no significant differences were noted between sexes

	5–12-year-olds (*n* 6486)					
	Boys (*n* 257)			Girls (n 229)		
	Mean (SD)	P5	P95	Mean (SD)	P5	P95
Total Snacks	37.0 (13.2)	14.7	61.2	36.6 (13.0)	17.2	60.0
Morning Snacks	12.1 (6.9)	1.8	24.8	13.0 (6.7)	2.6	24.3
Afternoon Snacks	14.8 (8.6)	2.4	30.8	14.9 (8.0)	2.9	30.1
Evening Snacks	10.1 (7.7)	0	23.7	8.6 (7.0)*	0	21.4

* indicates values are significantly different compared to boys within the rows ($p<0.001$)

	5–8-year-olds (*n* 225)					
	Boys (*n* 118)			Girls (*n* 107)		
	Mean (SD)	P5	P95	Mean (SD)	P5	P95
Total Snacks	33.3 (11.9)	12.0	50.2	35.6 (12.8)	16.8	58.0
Morning Snacks	11.7 (6.1)	2.5	22.8	13.3 (6.9)	2.8	25.3
Afternoon Snacks	14.3 (8.3)	1.5	31.0	15.7 (8.2)	3.4	31.7
Evening Snacks	7.2 (6.7)	0	20.5	6.6 (5.7)	0	17.6

*no significant differences were noted between sexes

	9-12 year olds (*n* 261)					
	Boys (*n* 139)			Girls (*n* 122)		
	Mean (SD)	P5	P95	Mean (SD)	P5	P95
Total Snacks	40.1 (13.5)	18.4	64.2	37.5 (13.1)	16.8	63.1
Morning Snacks	12.5 (7.6)	0	26.6	12.7 (6.6)	2.0	24.2
Afternoon Snacks	15.1 (8.9)	2.4	30.7	14.3 (7.9)	2.0	27.5
Evening Snacks	12.5 (7.7)	0.0	27.7	10.4 (7.5)*	0	23.9

*no significant differences were noted between sexes

Table 84. Contribution (%) of snacks to energy intake in children aged 2-12 years in Ireland, by social class

	2–4-year-olds (*n* 374)				5–12-year-olds (*n* 600)			
	Professional, Managerial & Technical Workers	Non-Manual Workers	Skilled Manual Workers	Semi-Skilled/ Unskilled Workers (Including Students)	Professional, Managerial & Technical Workers	Non-Manual Workers	Skilled Manual Workers	Semi-Skilled/ Unskilled Workers (Including Students)
Total Snacks	25.4[a]	25.1[a]	26.6[a]	22.3[b]	23.5[a]	23[a]	25.5[a]	21.2[a]
Morning Snacks	8.0[a]	8.0[a,b]	7.0[b,c]	6.5[c]	3.5[a]	3.5[a]	3.0[a,b]	1.8[b]
Afternoon Snacks	12.5[a]	10.5[b]	12.1[a]	8.9[c]	11.3[a]	10.9[a]	12.6[a]	11.6[a]
Evening Snacks	4.7[a]	6.3[b]	7.4[b]	6.9[b]	8.7[a]	8.7[a]	9.9[a]	7.7[a]
Night Snacks	0.2[a]	0.3[a]	0[b]	0[b]	-	-	-	-

*Statistical differences between groups are indicated by different superscript letters

Table 85. Contribution (%) of snacks to energy intake in children aged 2-12 years in NI, by social class

	2–4-year-olds (*n* 241)			5–12-year-olds (*n* 486)		
	Higher Managerial, Administrative & Professional Occupations	Intermediate Occupations	Routine & Manual Occupations, and Other	Higher Managerial, Administrative & Professional Occupations	Intermediate Occupations	Routine & Manual Occupations, and Other
Total Snacks	34.9	35.1	37.9	35.7	35.5	38.5
Morning Snacks	14.6	14.7	15.5	11.9	12.1	13.4
Afternoon Snacks	14.6	14.7	15.2	14.7	14.3	15.3
Evening Snacks	5.8	5.7	7.3	9.1	9.1	9.8

* No significant differences noted between groups ($p<0.001$)

Table 86. Contribution (%) of snacks to energy intake in children aged 2-12 years in Ireland, by parental education

	2–4-year-olds (*n* 374)			5–12-year-olds (*n* 600)		
	Intermediate	Secondary	Tertiary	Intermediate	Secondary	Tertiary
Total Snacks	31.7[a]	25.4[b]	24.8[b]	23.8[a]	21.3[a]	23.7[a]
Morning Snacks	8.7[a]	9.6[a]	7.2[b]	3.1[a]	2.6[a]	3.3[a]
Afternoon Snacks	15.7[a]	11.0[b]	11.1[b]	11.4[a]	10.6[a]	11.6[a]
Evening Snacks	7.2[a]	4.8[b]	6.3[a]	9.3[a]	8.1[a]	8.8[a]
Night Snacks	0.1[a]	0.1[a]	0.1[a]	-	-	-

*Statistical differences between groups are indicated by different superscript letters

Table 87. Contribution (%) of snacks to energy intake in children aged 2-12 years in Ireland, by BMI classification

	2–4-year-olds (*n* 374)		5–12-year-olds (*n* 600)	
	Normal weight (*n* 287)	Overweight/obese (n 84)	Normal weight (*n* 287)	Overweight/obese (n 84)
Total Snacks	25.9	23.0*	24.0	20.2
Morning Snacks	7.4	7.9	3.3	2.4
Afternoon Snacks	11.6	10.7	11.8	9.9
Evening Snacks	6.7	4.3*	8.9	7.9
Night Snacks	0.2	0.1	-	-

* indicates values are significantly different compared to those within normal weight category within the rows ($p<0.001$)

Table 88. Contribution (%) of snacks to energy intake in children aged 2-12 years in NI, by BMI classification

	2–4-year-olds (n 241)		5–12-year-olds (n 486)	
	Normal weight (*n* 114)	Overweight/obese (n 93)	Normal weight (*n* 292)	Overweight/obese (n 158)
Total Snacks	35.7	36.6	36.9	36.0
Morning Snacks	15.2	15.1	12.5	12.3
Afternoon Snacks	14.6	14.6	15.0	14.7
Evening Snacks	5.9	6.9	9.5	9.1

* No significant differences noted between groups ($p<0.001$)

Table 89. Contribution (%) of snacks to mean daily intakes of energy and selected nutrients in children aged 2-4 years in Ireland

	All snacks	Morning snacks	Afternoon snacks	Evening snacks	Night Snacks
	% Contribution				
Energy	25.2	7.5	11.3	6.2	0.1
Protein	17.2	5.2	7.0	4.8	0.1
Total fat	24.2	6.5	11.2	6.5	0.2
Saturated fat	25.6	6.8	11.6	7.0	0.2
Monounsaturated fat	23.6	6.2	11.0	6.2	0.1
Polyunsaturated fat	23.9	6.3	11.7	5.8	0.1
Carbohydrates	28.7	9.1	13.0	6.5	0.1
Total sugars	36.9	11.4	16.9	8.5	0.1
Free sugars	37.7	9.9	18.6	9.1	0.1
Dietary fibre	25.5	8.7	11.6	5.1	0.1
Salt equivalents	18.9	6.0	8.5	4.2	0.1
Vitamins					
Vitamin A	14.9	4.6	6.0	4.1	0.1
Vitamin D	17.7	4.9	7.1	5.7	0.0
Vitamin E	27.1	8.1	12.2	6.7	0.1
Thiamin	17.7	5.6	7.6	4.5	0.1
Riboflavin	18.8	5.0	7.3	6.4	0.1
Niacin	15.0	4.7	6.3	3.9	0.1
Vitamin B6	17.9	6.0	7.7	4.2	0.1
Vitamin B12	15.8	4.3	5.3	6.0	0.1
Pantothenate	18.4	5.3	7.2	5.7	0.1
Biotin	20.0	5.8	8.0	6.0	0.1
Total folate	18.4	6.0	7.6	4.8	0.1
Dietary folate equivalents	17.4	5.6	7.1	4.7	0.1
Vitamin C	27.4	9.3	12.1	5.9	0.1
Minerals					
Potassium	23.6	7.5	10.3	5.8	0.1
Calcium	22.7	6.7	8.8	7.1	0.1
Iron	17.6	5.7	7.4	4.3	0.1
Magnesium	23.2	7.3	9.9	5.8	0.1
Zinc	17.5	5.2	6.9	5.2	0.1
Copper	28.5	10.1	12.7	5.6	0.1
Phosphorous	20.0	5.9	8.1	5.9	0.1

Table 90. Contribution (%) of snacks to mean daily intakes of energy and selected nutrients in children aged 5-12 years in Ireland

	All snacks	Morning snacks	Afternoon snacks	Evening snacks
	% Contribution			
Energy	23.4	3.2	11.5	8.7
Protein	15.6	2.3	7.3	6.0
Total fat	24.8	3.1	12.2	9.5
Saturated fat	26.8	3.2	13.0	10.6
Monounsaturated fat	24.3	3.0	12.0	9.3
Polyunsaturated fat	21.0	3.0	10.5	7.5
Carbohydrates	25.0	3.5	12.5	9.0
Total sugars	34.6	4.8	17.3	12.4
Free sugars	40.2	4.0	21.6	14.6
Dietary fibre	20.1	3.3	9.5	7.4
Salt equivalents	19.7	3.1	9.6	7.0
Vitamins				
Vitamin A	16.2	2.5	7.3	6.3
Vitamin D	14.2	2.4	5.8	6.0
Vitamin E	22.0	2.7	10.7	8.6
Thiamin	15.5	2.6	7.1	5.8
Riboflavin	18.4	2.3	7.9	8.2
Niacin	13.2	2.1	6.0	5.1
Vitamin B6	14.8	2.5	6.6	5.7
Vitamin B12	15.9	1.9	6.7	7.3
Pantothenate	16.4	2.3	7.1	7.0
Biotin	20.5	3.1	9.2	8.2
Total folate	16.2	2.5	6.9	6.8
Dietary folate equivalents	15.5	2.3	6.4	6.7
Vitamin C	19.5	4.1	8.8	6.6
Minerals				
Potassium	19.1	2.9	8.9	7.4
Calcium	21.3	3.1	9.5	8.7
Iron	16.9	2.4	7.8	6.7
Magnesium	19.6	2.9	9.1	7.5
Zinc	15.8	2.4	7.1	6.3
Copper	21.8	3.4	10.5	7.9
Phosphorous	18.3	2.8	8.3	7.2

Table 91. Contribution (%) of snacks to mean daily intakes of energy and selected nutrients in children aged 2-4 years in NI

	All snacks	Morning snacks	Afternoon snacks	Evening snacks
	% Contribution			
Energy	36.3	15.0	14.9	6.4
Protein	30.9	12.6	12.0	6.3
Total fat	36.0	13.9	15.3	6.8
Saturated fat	38.2	14.7	15.5	8.1
Monounsaturated fat	35.1	12.9	16.2	6.0
Carbohydrates	38.3	16.5	15.6	6.1
Total sugars	46.1	19.2	19.5	7.3
Free sugars	44.5	15.6	23.2	5.7
Dietary fibre	32.2	14.8	13.4	4.0
Salt equivalents	31.2	13.0	12.8	5.3
Vitamins				
Vitamin A	37.5	18.4	12.2	7.0
Vitamin D	45.5	28.4	12.5	4.6
Vitamin E	37.9	17.0	15.7	5.2
Thiamin	32.3	15.6	11.3	5.5
Riboflavin	38.1	17.7	10.5	10.0
Niacin	30.1	12.9	11.7	5.5
Vitamin B6	35.6	16.9	11.9	6.8
Vitamin B12	35.1	15.9	9.7	9.5
Pantothenate	36.9	16.4	12.1	8.4
Biotin	38.8	18.3	12.1	8.4
Total folate	34.1	17.0	10.5	6.6
Vitamin C	43.4	20.9	16.9	5.6
Minerals				
Potassium	34.8	14.4	13.9	6.5
Calcium	38.8	17.3	11.6	9.8
Iron	32.3	15.9	11.1	5.4
Magnesium	35.0	15.1	13.3	6.5
Zinc	31.6	13.2	11.7	6.8
Copper	33.8	14.4	14.9	4.4
Phosphorous	34.3	14.5	12.0	7.8

Table 92. Contribution (%) of snacks to mean daily intakes of energy and selected nutrients in children aged 5-12 years in NI

	All snacks	Morning snacks	Afternoon snacks	Evening snacks
	% Contribution			
Energy	36.8	12.5	14.9	9.4
Protein	30.7	10.3	12.5	7.9
Total fat	36.9	12.0	15.5	9.3
Saturated fat	38.6	12.9	15.6	10.1
Monounsaturated fat	36.4	11.4	16.0	9.0
Carbohydrates	38.4	13.5	15.1	9.9
Total sugars	46.7	16.7	18.0	12.0
Free sugars	45.6	13.4	20.0	12.2
Dietary fibre	33.1	11.6	13.5	8.0
Salt equivalents	32.7	11.4	13.2	8.2
Vitamins				
Vitamin A	36.7	14.1	14.0	8.6
Vitamin D	44.5	26.6	9.4	8.5
Vitamin E	37.7	13.3	15.5	8.9
Thiamin	32.8	13.8	10.8	8.1
Riboflavin	39.7	17.9	10.4	11.4
Niacin	30.1	10.4	12.1	7.6
Vitamin B6	35.3	14.8	11.6	8.9
Vitamin B12	36.5	15.1	10.7	10.6
Pantothenate	35.5	13.8	11.9	9.8
Biotin	38.3	16.1	11.8	10.3
Total folate	34.3	15.0	10.5	8.8
Vitamin C	41.2	18.2	14.8	8.2
Minerals				
Potassium	33.9	11.9	13.3	8.7
Calcium	38.6	15.8	11.7	11.2
Iron	33.4	13.3	11.2	8.9
Magnesium	35.2	12.4	13.5	9.3
Zinc	32.0	11.1	12.5	8.4
Copper	34.0	11.3	13.8	8.9
Phosphorous	34.6	12.5	12.6	9.5

Table 93. Proportion (%) of consumers of snacks in children aged 2-12 years in Ireland, by day of week

	2–4-year-olds (*n* 374)	5–12-year-olds (*n* 600)	5–8-year-olds (*n* 300)	9–12-year-olds (*n* 300)
Monday	86.9	85.6	85.6	85.7
Tuesday	91.9	85.0	86.6	83.4
Wednesday	90.8	82.7	84.5	80.8
Thursday	95.9	82.7	86.8	78.9
Friday	94.2	82.0	83.9	80.2
Saturday	85.8	80.3	86.2	75.1
Sunday	88.6	84.6	85.0	84.2
School days	N/A	96.0	98.6	99.4
Non-school days	N/A	99.7	93.7	100.0

Table 94. Mean daily intake of energy (kcal) from snacks in children aged 2-12 years in Ireland, by day of week

	2–4-year-olds (*n* 374)			5–12-year-olds (*n* 600)			5–8-year-olds (*n* 300)			9–12-year-olds (*n* 300)		
	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th
Monday	292 (211)	0.0	707	340 (285)	0.0	985	288 (259)	0.0	757	388 (301)	0.0	1015
Tuesday	302 (226)	0.0	708	314 (263)	0.0	856	294 (247)	0.0	844	334 (277)	0.0	862
Wednesday	293 (205)	0.0	671	350 (332)	0.0	950	304 (244)	0.0	774	397 (396)	0.0	1143
Thursday	322 (219)	31.9	737	348 (303)	0.0	922	340 (280)	0.0	905	354 (323)	0.0	946
Friday	354 (274)	0.0	943	383 (331)	0.0	1046	371 (289)	0.0	881	393 (364)	0.0	1151
Saturday	299 (256)	0.0	836	360 (333)	0.0	962	365 (320)	0.0	908	356 (345)	0.0	1002
Sunday	276 (219)	0.0	718	396 (360)	0.0	1074	381 (334)	0.0	993	410 (382)	0.0	1137
School days	N/A	N/A	N/A	359 (242)	29.1	794	332 (206)	59.3	769	383 (268)	0.0	880
Non-school days	N/A	N/A	N/A	429 (285)	74.4	972	403 (261)	66.1	956	454 (305)	95.2	1037

Table 95. Contribution (%) of snacks to energy intake in children aged 2-12 years in Ireland, by day of week

	2–4-year-olds (*n* 374)			5–12-year-olds (*n* 600)			5–8-year-olds (*n* 300)			9–12-year-olds (*n* 300)		
	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th
Monday	25.2 (16.9)	0.0	56.5	22.3 (16.2)	0.0	52.4	21.1 (16.8)	0.0	58.5	23.4 (15.6)	0.0	49.7
Tuesday	25.7 (16.8)	0.0	56.4	21.2 (15.7)	0.0	50.9	21.6 (15.6)	0.0	53.5	20.8 (15.9)	0.0	51.2
Wednesday	24.1 (15.1)	0.0	51.6	22.0 (16.8)	0.0	52.6	21.6 (15.9)	0.0	52.4	22.4 (17.7)	0.0	55.4
Thursday	25.8 (15.1)	3.1	53.5	22.1 (17.2)	0.0	50.8	22.9 (16.2)	0.0	50.6	21.4 (18.1)	0.0	51.1
Friday	27.9 (17.9)	0.0	59.2	23.9 (17.5)	0.0	53.4	25.2 (17.1)	0.0	51.9	22.7 (17.8)	0.0	56.5
Saturday	24.1 (17.5)	0.0	57.7	22.4 (17.80	0.0	53.7	24.2 (17.4)	0.0	51.9	20.8 (18.0)	0.0	56.6
Sunday	23.1 (16.5)	0.0	52.3	25.6 (19.7)	0.0	61.1	27.7 (21.3)	0.0	69.4	23.7 (18.0)	0.0	58.4
School days	N/A	N/A	N/A	23.1 (12.8)	2.4	46.9	23.3 (12.2)	4.7	46.0	22.9 (13.4)	0.0	47.9
Non-school days	N/A	N/A	N/A	27.7 (15.1)	5.8	54.4	28.9 (15.8)	5.4	58.5	26.5 (14.3)	6.3	53.3

Table 96. Proportion (%) of consumers of snacks in children aged 2-12 years in NI, by day of week

	2–4-year-olds (*n* 241)	5–12-year-olds (*n* 486)	5–8-year-olds (*n* 225)	9–12-year-olds (*n* 261)
Monday	98.6	98.3	99.2	97.5
Tuesday	97.9	97.8	97.7	97.8
Wednesday	100	98.8	98.3	99.3
Thursday	98.5	98.3	97.7	98.8
Friday	98.5	96.7	97.8	95.8
Saturday	99.3	99.3	99.2	99.4
Sunday	99.3	98.6	99.3	98.0

Table 97. Mean daily intake of energy (kcal) from snacks in children aged 2-12 years in NI, by day of week

	2–4-year-olds (*n* 241)			5–12-year-olds (*n* 486)			5–8-year-olds (*n* 225)			9–12-year-olds (*n* 261)		
	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th
Monday	416 (246)	137	852	528 (360)	117	1141	478 (298)	105	1057	581 (411)	118	1283
Tuesday	443 (263)	141	941	481 (325)	95.5	1144	420 (233)	97.9	849	539 (384)	92.2	1351
Wednesday	438 (258)	110	926	540 (346)	101	1183	455 (265)	53.5	992	612 (388)	110	1429
Thursday	397 (251)	89.3	830	551 (350)	112	1257	461 (305)	105	1236	616 (366)	118	1292
Friday	433 (241)	94.6	895	600 (356)	143	1236	519 (281)	131	1086	667 (396)	149	1340
Saturday	448 (294)	62.6	1006	696 (418)	121	1413	632 (380)	111	1340	750 (442	118	1507
Sunday	484 (300)	96.5	1093	762 (444)	187	1562	693 (358)	211	1413	825 (502)	157	1753

Table 98. Contribution (%) of snacks to energy intake in children aged 2-12 years in NI, by day of week

	2–4-year-olds (*n* 241)			5–12-year-olds (*n* 486)			5–8-year-olds (*n* 225)			9–12-year-olds (*n* 261)		
	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th
Monday	36.3 (18.5)	10.5	71.3	32.9 (17.4)	9.4	65.3	30.9 (15.5)	9.9	59.9	35.0 (19.0)	8.6	72.4
Tuesday	36.2 (16.8)	12.7	69.3	30.8 (17.4)	7.4	66.3	28.2 (14.2)	7.6	54.0	33.4 (19.6)	6.8	73.6
Wednesday	36.3 (17.6)	11.5	67.9	34.0 (17.2)	8.0	65.8	31.9 (17.0)	5.3	65.7	35.8 (17.3)	9.9	70.3
Thursday	33.5 (16.7)	9.3	64.6	34.5 (19.1)	8.5	74.8	31.1 (17.4)	9.0	64.7	37.0 (19.9)	7.8	78.8
Friday	34.8 (15.6)	10.3	62.4	36.1 (18.2)	12.1	68.5	34.2 (16.8)	12.4	66.8	37.6 (19.2)	11.9	70.1
Saturday	37.2 (19.3)	5.1	73.2	43.6 (22.1)	10.1	82.4	40.8 (20.9)	7.9	78.8	45.9 (22.9)	9.5	86.2
Sunday	41.7 (21.6)	11.3	80.9	48.1 (21.2)	14.8	81.8	46.1 (20.0)	14.8	77.9	49.9 (22.1)	14.9	84.5

Table 99. Proportion (%) of consumers of snacks in children aged 5-12 years in Ireland, by eating location

	5–12-year-olds (n 600)	5–8-year-olds (n 300)	9–12-year-olds (n 300)
All Homes	**96.5**	**98.1**	**95.1**
Participant's own home	96.0	97.5	94.6
Other homes	22.6	30.5	15.3
Outside of the home	**44.5**	**45.9**	**43.2**
Restaurants/hotels/public houses/coffee shops	11.3	13.0	9.6
Fast food	3.7	3.3	4.1
Shop-bought	22.1	20.0	24.0
School	9.6	8.6	10.6
Other	7.9	8.4	7.3

Table 100. Mean daily intake of energy (kcal) from snacks in children aged 5-12 years in Ireland, by eating location

	5–12-year-olds (n 600)			5–8-year-olds (n 300)			9–12-year-olds (n 300)		
	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th
All Homes	**304 (194)**	**28.0**	**658**	**288 (178)**	**56.0**	**646**	**319 (207)**	**2.6**	**734**
Participant's own home	282 (191)	21.1	614	255 (168)	32.8	589	307 (207)	0.0	734
Other homes	21.6 (51.2)	0.0	144	32.2 (63.0)	0.0	187	11.9 (34.5)	0.0	89.9
Outside of the home	**55.8 (88.3)**	**0.0**	**239**	**50.5 (82.6)**	**0.0**	**224**	**60.8 (93.0)**	**0.0**	**253**
Restaurants/hotels/public houses/coffee shops	12.2 (41.2)	0.0	107	12.9 (39.0)	0.0	111	11.6 (43.1)	0.0	100
Fast food	5.5 (31.9)	0.0	0.0	4.7 (28.7)	0.0	0.0	6.2 (34.5)	0.0	0.0
Shop-bought	21.6 (58.6)	0.0	133	19.7 (61.4)	0.0	118	23.5 (56.0)	0.0	143
School	7.9 (32.0)	0.0	65.3	5.0 (21.4)	0.0	49.8	10.6 (39.3)	0.0	80.6
Other	8.6 (36.8)	0.0	71.7	8.2 (33.4)	0.0	70.5	8.9 (39.7)	0.0	82.1

Table 101. Contribution (%) of snacks to energy intake in children aged 5-12 years in Ireland, by eating location

	5–12-year-olds (n 600)			5–8-year-olds (n 300)			9–12-year-olds (n 300)		
	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th
All Homes	**19.8 (10.9)**	**2.1**	**40.3**	**20.4 (11.0)**	**4.3**	**42.3**	**19.3 (10.8)**	**0.2**	**39.8**
Participant's own home	18.4 (10.8)	1.4	39.4	18.2 (10.7)	2.8	38.5	18.5 (10.8)	0.0	39.6
Other homes	1.4 (3.3)	0.0	9.6	2.2 (4.1)	0.0	12.0	0.8 (2.1)	0.0	5.9
Outside of the home	**3.6 (5.5)**	**0.0**	**14.5**	**3.6 (5.5)**	**0.0**	**14.6**	**3.7 (5.6)**	**0.0**	**14.5**
Restaurants/hotels/public houses/coffee shops	0.8 (2.6)	0.0	7.6	1.0 (2.8)	0.0	8.5	0.7 (2.4)	0.0	5.5
Fast food	0.3 (2.0)	0.0	0.0	0.3 (1.9)	0.0	0.0	0.4 (2.1)	0.0	0.0
Shop-bought	1.4 (3.7)	0.0	7.9	1.3 (3.8)	0.0	8.0	1.5 (3.6)	0.0	7.7
School	0.5 (2.0)	0.0	4.4	0.4 (1.6)	0.0	3.0	0.6 (2.2)	0.0	5.3
Other	0.6 (2.3)	0.0	5.1	0.6 (2.3)	0.0	5.3	0.5 (2.3)	0.0	5.0

Table 102. Proportion (%) of consumers of snacks in children aged 2-12 years in NI, by eating location

	2–4-year-olds (n 241)	5–12-year-olds (n 486)	5–8-year-olds (n 225)	9–12-year-olds (n 261)
All Homes	**99.6**	**99.2**	**98.7**	**99.6**
Participant's own home	98.8	99.0	98.7	99.2
Other homes	41.1	36.0	38.2	34.1
Outside of the home	**76.3**	**88.9**	**89.8**	**88.1**
Restaurants/hotels/public houses/coffee shops	15.4	11.9	10.7	13.0
Fast food	1.2	5.8	3.6	7.7
School	41.9	71.2	76.9	66.3
Other	49.4	52.9	51.1	54.4
Unspecified location	**14.5**	**10.7**	**8.0**	**13.0**

Table 103. Mean daily intake of energy (kcal) from snacks in children aged 2-12 years in NI, by eating location

	5–12-year-olds (n 241)			5–12-year-olds (n 486)			5–8-year-olds (n 225)			9–12-year-olds (n 261)		
	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th
All Homes	**326 (192)**	**79.3**	**675.4**	**424 (260)**	**84.7**	**945.8**	**372 (231)**	**77.2**	**839.5**	**468 (276)**	**96.3**	**1018**
Participant's own home	287 (189)	41.2	610.8	376 (248)	62.7	845	330 (217)	45	793.3	417 (267)	66.4	928.3
Other homes	39.4 (67.8)	0	182.4	47.2 (94.4)	0	249.9	42.7 (77.9)	0	197.1	51.1 (107)	0	284.6
Outside of the home	**96.7 (100)**	**0**	**289.3**	**153.6 (13)**	**0**	**439.4**	**137 (116)**	**0**	**366.9**	**168 (152)**	**0**	**479**
Restaurants/hotels/ public houses/coffee shops	10.9 (31.6)	0	94.1	15.5 (52.9)	0	117.2	12.6 (42.9)	0	116.6	18.0 (60.2)	0	119.6
Fast food	1.4 (12.9)	0	0	9.4 (40.5)	0	107.9	4.6 (24.3)	0	0	13.6 (50.1)	0	140.7
School	49.3 (80.7)	0	227.8	74.6 (86.4)	0	242.4	72.7 (81.5)	0	219.9	76.3 (90.5)	0	282.5
Other	35.1 (56.1)	0	152.3	54.1 (84.2)	0	225	47.0 (70.9)	0	208.3	60.2 (93.8)	0	240.1
Unspecified location	**9.2 (31.8)**	**0**	**71.8**	**10.6 (45.6)**	**0**	**67.5**	**8.9 (44.2)**	**0**	**48.8**	**12.2 (46.9)**	**0**	**114.2**

Table 104. Contribution (%) of snacks to energy intake in children aged 2-12 years in NI, by eating location

	5–12-year-olds (n 241)			5–12-year-olds (n 486)			5–8-year-olds (n 225)			9–12-year-olds (n 261)		
	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th	Mean (SD)	5th	95th
All Homes	**27.7 (14.1)**	**7.8**	**52.7**	**26.4 (13.8)**	**6.2**	**52.7**	**24.6 (13.3)**	**5**	**48.4**	**28.0 (14.1)**	**6.4**	**53.9**
Participant's own home	24.3 (14.2)	3.7	50.7	23.5 (13.6)	4.3	49.5	21.8 (12.8)	3.6	46.4	24.9 (14.2)	4.6	52.4
Other homes	3.4 (6.0)	0	16.5	2.9 (5.5)	0	15.7	2.8 (4.9)	0	13.3	3.0 (6.0)	0	17.6
Outside of the home	**7.9 (7.9)**	**0**	**23.5**	**9.7 (8.2)**	**0**	**24.5**	**9.1 (7.4)**	**0**	**23.2**	**10.1 (8.8)**	**0**	**29.8**
Restaurants/hotels/ public houses/coffee shops	1.0 (2.7)	0	8.3	1.0 (3.1)	0	7.9	0.8 (2.7)	0	8.2	1.1 (3.4)	0	7.9
Fast food	0.1 (1.0)	0	0	0.6 (2.6)	0	6.5	0.4 (2.0)	0	0	0.8 (3.0)	0	10.6
School	4.0 (6.4)	0	16.00	4.8 (5.4)	0	16.0	4.9 (5.3)	0	15.1	4.7 (5.5)	0	16.7
Other	2.9 (4.6)	0	12.5	3.3 (5.0)	0	14.1	3.0 (4.4)	0	14	3.6 (5.4)	0	14.6
Unspecified location	**0.8 (2.5)**	**0**	**6.1**	**0.7 (3.2)**	**0**	**4.5**	**0.7 (3.3)**	**0**	**3.4**	**0.8 (3.1)**	**0**	**6.0**

Table 105. Characteristics of low, medium and high consumers (%E from snacks) in children aged 2-4 years in Ireland

	Low consumers (*n* 124)	Medium Consumers (*n* 125)	High consumers (*n* 125)	P-value
MDI of energy from snacks (kcal), Mean (P5-P95)	151 (33.1-263) [a]	295 (206-418) [b]	479 (292-696) [c]	<0.001
Contribution of (%) snacks to energy intake, Mean (P5-P95)	13.4 (3.0-19.7) [a]	25.0 (20.6-29.4) [b]	38.1 (31.1-51.8) [c]	<0.001
Sex				
Boys (%)	52.3	55.3	50.5	0.054
Girls (%)	47.7	44.7	49.5	
Weight Status				
Normal weight (%)	72.2	78.3	80.0	<0.001
Overweight/obese (%)	27.8	21.7	20.0	
Social Class				
Professional, Managerial & Technical Workers (%)	32.2	38.3	36.0	
Non-Manual Workers (%)	21.6	20.7	24.2	
Skilled Manual Workers (%)	21.2	25.9	27.2	
Semi Skilled/ Unskilled Workers (Including Students) (%)	25.0	15.1	12.7	<0.001
Parental Education				
Intermediate (%)	1.9	5.9	8.5	<0.001
Secondary (%)	11.0	13.0	11.5	
Tertiary (%)	87.1	81.1	80.0	

Table 106. Mean daily intakes of nutrients in low, medium and high consumers (%E from snacks) in children aged 2-4 years in Ireland

	Low consumers (*n* 124)	Medium consumer (*n* 125)	High consumers (*n* 125)
Macronutrients			
Energy (kcal)	1121	1181	1256*
Protein (g)	43.4	44.5	44.3
Protein (%E)	15.6	15.1	14.2*
Total fat (g)	40.6	43.1	44.8*
Total fat (%E)	32.0	32.8	32.0
Saturated fat (g)	18.2	19.4	20.5*
Saturated fat (%E)	14.4	14.7	14.6
Monounsaturated fat (g)	5.5	6.0	6.0*
Monounsaturated fat (%E)	4.3	4.7	4.3
Polyounsaturated fat (g)	13.8	14.5	15.0*
Polyounsaturated fat (%E)	10.9	11.0	10.7
Carbohydrate (g)	146	156	170*
Carbohydrate (%E)	49.3	49.5	50.9*
Total sugars (g)	71.2	75.9	88.0*
Total sugars (%E)	24.0	24.3	26.4*
Free sugars (g)	34.6	36.8	50.1*
Free sugars (%E)	11.4	11.7	15.0*
Dietary fibre (g)	11.6	11.8	12.6*
Vitamins			
Vitamin A (µg)	703	668	612*
Vitamin D (µg)	3.3	3.5	3.3
Vitamin E (µg)	5.4	6.7	6.3*
Thiamin (mg)	1.1	1.1	1.1
Riboflavin (mg)	1.5	1.6	1.5
Niacin (mg)	20.7	20.8	21.5
Vitamin B6 (µg)	1.4	1.5	1.5*
Vitamin B12 (µg)	4.0	4.1	3.9
Pantothenate (mg)	4.4	4.5	4.5
Biotin (µg)	24.9	22.6	22.7
Total folate (µg)	176	185	190*
Dietary folate equivalents (µg)	220	229	236*
Vitamin C (mg)	83.8	87.8	91.6*
Minerals			
Sodium (mg)	1271	1285	1335*
Potassium (mg)	1724	1756	1804*
Calcium (mg)	735	783	752
Iron (mg)	7.3	7.3	7.8*
Magnesium (mg)	152	158	162*

Zinc (mg)	5.4	5.2	5.3
Copper (mg)	0.7	0.7	0.7
Phosphorous (mg)	822	843	857*

* indicates values are significantly different compared to low consumers within the rows ($p<0.001$)

Table 107. Characteristics of low, medium and high consumers (%E from snacks) in children aged 5-12 years in Ireland

	Low consumers (*n* 200)	Medium Consumers (*n* 200)	High consumers (*n* 200)	P-value
MDI of energy from snacks (kcal), Mean (P5-P95)	156 (0.0-290) [a]	349 (211-543) [b]	577 (340-921) [c]	<0.001
% Contribution of snacks to energy intake, Mean (P5-P95)	11.0 (0.0-17.9) [a]	22.9 (18.6-27.5) [b]	36.6 (29.2-48.6) [c]	<0.001
Sex				
Boys (%)	55.1	49.7	49.2	
Girls (%)	44.9	50.3	50.8	0.414
Age Group				
5–8-year-olds (%)	46.2	48.3	49.5	
9–12-year-olds (%)	53.8	51.7	50.5	0.781
Weight Status				
Normal weight (%)	77.9	85.2	90.0	
Overweight/obese (%)	22.1	14.8	10.0	0.004
Social Class				
Professional, Managerial & Technical Workers (%)	51.7	55.4	52.6	
Non-Manual Workers (%)	19.9	20.4	20.4	
Skilled Manual Workers (%)	13.6	10.7	19.7	
Semi-Skilled/ Unskilled Workers (Including Students) (%)	14.7	13.5	7.4	0.083
Parental Education				
Intermediate (%)	11.1	4.7	9.0	
Secondary (%)	10.6	11.1	6.7	
Tertiary (%)	78.3	84.2	84.2	0.078

Table 108. Mean daily intakes of nutrients in low, medium and high consumers (%E from snacks) in children aged 5-12 years in Ireland

	Low consumers (*n* 200)	Medium Consumers (*n* 200)	High consumer (*n* 200)
Macronutrients			
Energy (kcal)	1413	1516	1578*
Protein (g)	57.9	61.0	59.6
Protein (%E)	16.5	16.1	15.1*
Total fat (g)	52.6	57.2	59.5*
Total fat (%E)	33.2	33.7	33.7
Saturated fat (g)	21.6	23.5	25.3*
Saturated fat (%E)	13.6	13.9	14.4
Monounsaturated fat (g)	21.9	23.8	24.4*
Monounsaturated fat (%E)	13.8	14.0	13.8
Polyounsaturated fat (g)	8.9	9.7	9.6
Polyounsaturated fat (%E)	5.6	5.7	5.4
Carbohydrate (g)	187	200	212*
Carbohydrate (%E)	49.7	49.7	50.7
Total sugars (g)	64.9	76.6	83.9*
Total sugars (%E)	17.1	19.1	20.2*
Free sugars (g)	34.5	40.7	47.9*
Free sugars (%E)	9.0	10.0	11.5*
Dietary fibre (g)	14.2	14.6	15.2
Vitamins			
Vitamin A (µg)	634	621	677
Vitamin D (µg)	3.9	4.8	4.7
Vitamin E (µg)	6.5	6.8	7.3
Thiamin (mg)	1.4	1.4	1.4
Riboflavin (mg)	1.5	1.6	1.6
Niacin (mg)	28.9	29.7	28.5
Vitamin B6 (µg)	1.5	1.6	1.5
Vitamin B12 (µg)	4.5	4.9	4.6
Pantothenate (mg)	5.2	5.5	5.4
Biotin (µg)	23.8	24.9	25.1
Total folate (µg)	205	208	206
Dietary folate equivalents (µg)	250	248	247
Vitamin C (mg)	71.5	76.3	80.4
Minerals			
Sodium (mg)	1674	1715	1715
Potassium (mg)	1907	2062	2043
Calcium (mg)	729	812	829*
Iron (mg)	9.0	8.9	9.1

Magnesium (mg)	181	193	199
Zinc (mg)	7.1	7.3	7.2
Copper (mg)	956	1021	1029
Phosphorous (mg)	0.7	0.7	0.8

* indicates values are significantly different compared to low consumers within the rows ($p<0.001$)

Table 109. Characteristics of low, medium and high consumers (%E from snacks) in children aged 2-4 years in NI

	Low consumers (*n* 80)	Medium Consumers (*n* 81)	High consumer (*n* 80)	P-value
MDI of energy from snacks (kcal), Mean (P5-P95)	287 (116-447) [a]	396 (235-562) [b]	614 (400-996) [c]	<0.001
Contribution of (%) snacks to energy intake, Mean (P5-P95)	23.8 (11.5-29.8) [a]	34.9 (30.2-40.5) [b]	50.4 (42.1-64.0) [c]	<0.001
Sex				
Boys (%)	56.3	44.4	55.0	
Girls (%)	43.8	55.6	45.0	0.257
Weight Status				
Normal weight (%)	63.9	46.4	54.5	
Overweight/obese (%)	36.1	53.6	45.5	0.112
Social Class				
Higher Managerial, Administrative & Professional Occupations (%)	36.3	45.0	29.1	
Intermediate Occupations (%)	20.0	20.0	15.2	
Routine & Manual Occupations, and Other (%)	43.8	35.0	55.7	0.124

*Statistical differences between groups are indicated by different superscript letters

Table 110. Mean daily intakes of nutrients in low, medium and high consumers (%E from snacks) in children aged 2-4 years in NI

	Low consumers (*n* 80)	Medium consumers (*n* 81)	High consumers (*n* 80)
Macronutrients			
Energy (kcal)	1190	1138	1220
Protein (g)	45.1	45.3	46.1
Protein (%E)	15.2	16.0	15.3
Total fat (g)	45.8	42.4	47.1
Total fat (%E)	34.5	33.3	34.6
Saturated fat (g)	19.3	18.1	20.1
Saturated fat (%E)	14.4	14.2	14.8
Monounsaturated fat (g)	15.8	14.4	16.2
Monounsaturated fat (%E)	12.0	11.3	11.8
Cisn6FA (g)	5.5	5.0	5.6
Cisn6FA (%)	4.2	3.9	4.1
Cisn3FA (g)	1.0	0.9	1.0
Cisn3FA (%)	0.8	0.7	0.7
Carbohydrate (g)	159	153	163
Carbohydrate (%E)	50.3	50.7	50.1
Total sugars (g)	73.7	69.3	78.8
Total sugars (%E)	23.0	22.8	24.1
Free sugars (g)	39.8	35.9	41.9
Free sugars (%E)	12.3	11.7	12.7
Dietary fibre (g)	11.0	10.6	10.6
Vitamins			
Vitamin A (µg)	502	471	491
Vitamin D (µg)	2.1	1.8	2.1
Vitamin E (µg)	5.5	5.1	5.6
Thiamin (mg)	1.1	1.0	1.0
Riboflavin (mg)	1.3	1.4	1.5
Niacin (mg)	19.7	20.3	20.8
Vitamin B6 (µg)	1.2	1.3	1.4
Vitamin B12 (µg)	3.6	3.8	4.2
Pantothenate (mg)	4.5	4.6	4.9
Biotin (µg)	20.1	20.2	22.6
Total folate (µg)	145	152	158
Vitamin C (mg)	68.1	63.5	65.4
Minerals			
Sodium (mg)	1429	1331	1418
Potassium (mg)	1779	1771	1907
Calcium (mg)	738	743	821
Iron (mg)	6.3	6.4	6.5
Magnesium (mg)	153	152	160
Zinc (mg)	5.2	5.1	5.3

Copper (mg)	0.6	0.5	0.6
Phosphorous (mg)	852	850	917

* No significant differences noted between groups ($p<0.001$)

Table 111. Characteristics of low, medium and high consumers (%E from snacks) in children aged 5-12 years in NI

	Low consumers (*n* 162)	Medium consumers (*n* 162)	High consumers (*n* 162)	P-value
MDI of energy from snacks (kcal), Mean (P5-P95)	348 (133-539)[a]	569 (358-805)[b]	846 (508-1329)[c]	<0.001
Contribution of (%) snacks to energy intake, Mean (P5-P95)	23.0 (10.6-30.9)[a]	36.0 (31.9-40.8)[b]	51.3 (42.3-67.9)[c]	<0.001
Sex				
Boys (%)	52.5	53.7	52.5	0.968
Girls (%)	47.5	46.3	47.5	
Weight Status				
Normal weight (%)	64.1	67.8	62.8	
Overweight/obese (%)	35.9	32.2	37.2	0.642
Social Class				
Higher Managerial, Administrative & Professional Occupations (%)	38.1	37.3	28.0	
Intermediate Occupations (%)	24.4	24.8	19.3	
Routine & Manual Occupations, and Other (%)	37.5	37.9	52.8	0.040

*Statistical differences between groups are indicated by different superscript letters

Table 112. Mean daily intakes of nutrients in low, medium and high consumers (%E from snacks) in children aged 5-12 years in NI

	Low consumers (*n* 162)	Medium consumers (*n* 162)	High consumers (*n* 162)
Macronutrients			
Energy (kcal)	1500	1576	1648*
Protein (g)	57.6	59.3	59.2
Protein (%E)	15.4	15.1	14.5
Total fat (g)	54.5	59.2	62.2*
Total fat (%E)	32.6	33.8	33.7
Saturated fat (g)	21.9	23.5	23.9
Saturated fat (%E)	13.0	13.4	12.9
Monounsaturated fat (g)	19.4	21.5	23.1*
Monounsaturated fat (%E)	11.6	12.3	12.5*
Cisn6FA (g)	7.0	7.6	8.3*
Cisn6FA (%)	4.3	4.4	4.6
Cisn3FA (g)	1.3	1.4	1.5*
Cisn3FA (%)	0.8	0.8	0.8
Carbohydrate (g)	208	215	227
Carbohydrate (%E)	52.0	51.0	51.8
Total sugars (g)	89.2	93.9	98.2
Total sugars (%E)	22.1	22.0	22.2
Free sugars (g)	55.1	60.4	66.9
Free sugars (%E)	13.5	14.0	15.0
Dietary fibre (g)	14.1	14.3	14.0
Vitamins			
Vitamin A (µg)	529	566	539
Vitamin D (µg)	2.1	2.2	2.4
Vitamin E (µg)	7.0	7.4	8.3*
Thiamin (mg)	1.4	1.4	1.4
Riboflavin (mg)	1.5	1.5	1.5
Niacin (mg)	27.1	28.1	28.1
Vitamin B6 (µg)	1.7	1.7	1.6
Vitamin B12 (µg)	4.2	4.1	3.9
Pantothenate (mg)	5.3	5.4	5.2
Biotin (µg)	23.7	23.0	23.2
Total folate (µg)	192	185	184
Vitamin C (mg)	80.2	75.2	74.9
Minerals			
Sodium (mg)	1771	1865	1970
Potassium (mg)	2153	2218	2225
Calcium (mg)	823	819	807
Iron (mg)	8.5	8.7	8.6

Magnesium (mg)	188	193	196
Zinc (mg)	6.4	6.5	6.5
Copper (mg)	0.7	0.8	0.8
Phosphorous (mg)	1015	1049	1052

* indicates values are significantly different compared to low consumers within the rows ($p<0.001$)

Appendix II: Literature review - patterns of snacking and the position of snacks and treat foods in children's diets

Abstract

Background: Childhood obesity is associated with serious co-morbidities that can continue into adulthood. Food behaviours and consumption habits can have a significant impact upon diet quality and overall health and obesity status. One potential risk factor for childhood obesity is the consumption of unhealthy, energy-dense foods. However, the patterns of snacking and consumption of treat foods may mediate the impact of snacking upon dietary quality. This review aims to examine recent evidence on snacking in children aged 2-12 years of age, to determine the patterns and position in children's diets of snacking and treat foods.

Methods: A rapid review of literature was conducted, in which electronic databases (MEDLINE, Web of Science) were searched for relevant articles published from March 2011 to March 2021. Articles were included which provided insight into either: i) the position of snacking within children's diets (e.g., energy and nutrient contribution), or ii) the patterns of snacking and treat foods in children (e.g., the location, timing, source) in children aged 2-12 years of age. A quality assessment of the studies was conducted and data was synthesized according to data source (i.e., nationally representative, or other data sources).

Results: A total of 19 articles were included, most of which (n=12) reported data from nationally representative sources. All studies were considered moderate or high quality. The proportion of children consuming snacks ranged from 92.9% to 99.3%, and the average number of snacks consumed daily was three. Most snacks were consumed in the afternoon (75.2-84.0%) and at home (46.5-67.3%). Snacks most frequently consumed were 'fruits and vegetables', 'baked desserts', 'sweets, candy and confectionary', and 'dairy products'. Snacks contributed 231-565kcal daily, approximately a third of daily carbohydrate intake, a quarter of fat intake, and a fifth of protein intake. Snacks also provided approximately one third of vitamin C intake, one quarter of vitamin E, potassium and magnesium intake, and a fifth of calcium, folic acid, vitamins D and B12, iron and sodium.

Conclusion: This review provides insight into patterns and the position of snacking within children's diets. Snacking plays a significant role in the diets of children aged 2-12 years of age and multiple snacking occasions occur throughout a child's day. Further research is required

into the role of snacking in children's diets, particularly the specific foods which play a role in micronutrient intake, and clear guidance for snacking intake in children is needed.

Introduction

Childhood obesity is considered a global public health challenge. It is associated with serious co-morbidities that can continue into adulthood, including cardiovascular dysfunction and type 2 diabetes [1,2]. Worldwide, in 2016 340 million children and adolescents aged 5-19 years were considered overweight or obese [3]. Food behaviours and consumption habits can have a significant impact upon diet quality, composition, and overall health and obesity status [4,5].

One potential risk factor for childhood obesity is the consumption of unhealthy, energy-dense foods, such as snack and treat foods, during childhood and adolescence [6,7]. While there is no clear, standardised definition for 'snack foods', the term often refers to food and beverages consumed between meals, and which could be associated with unhealthy or healthy food [6]. Whereas the term 'treat foods' more often refers to foods high in fat, sugar and salt, consumed either at meal times or between meals [8]. In the literature, there is no consistent definition used for a "snack", and definitions vary from one study to the next, which has implications for outcomes, interpretation of results, and application of findings [6,9–11].

The role of snacking in children's diets is of increasing global concern, with global trends suggesting there has been a significant increase in snacking behaviours over the last number of decades [12–16]. There is evidence to suggest that regular overconsumption of unhealthy snack and treat foods in children has the potential to increase the risk of childhood obesity, and that limiting consumption of high-fat energy-dense snacks may be associated with a reduction in childhood obesity [17,18]. However, the picture for snacking in general is a little less clear, with some evidence pointing to potential benefits in an increased eating frequency throughout the day. While some studies have demonstrated an association between eating frequency and snack frequency with increased energy intake and higher risks of overweight and abdominal obesity in children [19,20], others have found higher eating frequencies associated with lower weight status in children and adolescents [4,21,22].

Thus it is apparent from the existing evidence that snacking significantly influences children's diets. However, it is also clear that the specific patterns of snacking and the position of snacking within children's diets may mediate the impact of snacking occasions upon general health and dietary quality in children [23]. Whether the effects of snacking occasions and increase in eating frequency are harmful or protective rely on the patterns (what snacks, when, where, and how many) and the positioning of snack consumption (contribution of snacks to overall energy and nutrient intake) in the diet of the child. Whilst a number of individual studies have

investigated the role of snacking and snack foods within the diet of children, there is little evidence in the form of reviews which have compiled the evidence.

Therefore, this review aims to examine recent evidence on snacking in children aged 2-12 years of age in order to determine the patterns and the positioning of snacking and snack foods in children's diets.

Methods

This rapid review of literature was conducted according to the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) guidelines, following the principles of knowledge synthesis, statement of objectives, selection criteria and synthesis of results [24,25].

Search methods

A search of electronic databases (MEDLINE, Web of Science) was conducted to capture original articles published in the last ten years (March 2011 to March 2021) that addressed the position and patterns of snacking and snack foods within children's diets. The following key words were used: 'child' or 'young', 'snack', 'diet' or 'eat' or 'intake' or 'habit' or 'food' or 'behaviour' or 'health' or 'association' or 'relationship' or 'pattern' or 'proportion' or 'frequency' or 'contribution'.

Study selection

Articles were selected for inclusion in the review if they provided insight into either: i) the position of snacking and snack foods within children's diets (e.g., energy and nutrient intake from snacking and snack foods); or, ii) the patterns of snacking and snack foods in children (e.g., the location, timing, source of snacking and snack foods). Due to the wide range of definitions for snacking and snack foods, articles were not filtered by one chosen definition but, rather, the varying definitions were extracted at the data extraction stage.

Original articles conducting primary or secondary data analysis which contained empirical evidence on snacking in children aged 2-12 years in countries with a 'very high' Human Development Index (HDI) (where 'very high' isdefined as a HDI value higher than 0.8) were included [26,27]. Where articles had a sample which included the target population of 2-12-year-old children, but also ages beyond or below this, these articles were included provided the age groups of interest were stratified (e.g., 6-11-years-old and 12-18-years-old), or where the mean age of the population fell within the age range (i.e. mean age between 2 and 12 years). Articles which were cross-sectional, cohort or case control studies were included. Review articles,

interventional studies, qualitative studies and articles not published in English were excluded from the review. As the aim of the review was to gain a broad understanding of the general position and patterns of snacking and snack foods within children's diets, studies conducted in clinical populations were also excluded.

Titles and abstracts were screened by one author in consultation with all authors. Where there were cases in doubt, a second author advised on the outcome. Articles deemed potentially relevant were then screened according to the full text of the article, and eligible articles were included in the review. Outcomes of interest included quantitative evidence of snacking position and patterns in children aged 2-12 years.

Data extraction and quality assessment

Data extraction was undertaken using a template developed by authors. Variables extracted included study setting and design, data source, definition of snack or snacking, population size and characteristics, as well as the outcomes related to snacking. Snacking outcomes included frequency, timing and the location of snacking, as well as common snack foods, and energy and nutrient intake from snacks. Where possible, where outcomes differed in units (for example, energy intake presented as kcal vs kJ), these figures were converted to allow direct comparison of outcomes.

Appraisal of the included articles was undertaken using the Quality Assessment Tool for Quantitative Studies developed by the Effective Public Health Practice Project [28,29]. Articles were scored as 'weak', 'moderate', or 'strong' within each sub-component of the tool (selection bias, study design, confounders, blinding, data collection methods, withdrawals and dropouts). These components were combined to provide an overall rating of 'weak', 'moderate', or 'strong' for each article.

Data synthesis

Where appropriate, if outcomes for the same variable differed in units across studies (for example, energy intake presented as kcal vs kJ), these figures were converted to allow direct comparison of outcomes. Regarding foods or food groups most frequently consumed as snacks, due to the variation (and sometimes large number) of foods and food groups reported, the top three most frequently consumed were selected from each study and recategorised into seven encompassing groups for the purposes of comparison. These categories included: 1) Fruits and vegetables; 2) Dairy products; 3) Sweets, candy and confectionary; 4) Baked desserts and snacks (such as brownies, cookies, biscuits, pies, cakes); 5) Cereal bars and granola; 6) Potato chips; and 7) Sandwiches.

Articles were first grouped according to the data source and whether it was nationally representative. Due to the heterogeneity of study designs and outcomes, a quantitative synthesis was deemed inappropriate. Data from the included articles have, therefore, been descriptively summarised and narratively synthesised [28].

Results

A total of 19 original articles met the inclusion criteria and are thus included in the present review. Study characteristics can be found in Table 1.

Study characteristics and quality

Country

Almost half (9/19) of the included studies reported data collected from within the United States [20,30–37]. A further three studies reported data collected from within Canada [38–40], and two from within Australia [37,41]. One study included data from both the United States and Australia [37]. The remaining studies were conducted in the United Kingdom [42], Spain [43], The Netherlands [44], Finland [45] and New Zealand [46].

Data source and population size

Almost two thirds (12/19, 63.2%) of the included studies reported cross-sectional data from nationally representative data sources [20,30–33,37,39–41,43,44,47]. For example, the National Health and Nutrition Examination Survey (NHANES) in the United States[30] , and the National Diet and Nutrition Survey (NDNS) in the United Kingdom[47]. The remaining studies (7/19) reported data from non-representative sources [34–36,38,45,46,48], for example, cross-sectional analysis of baseline data from an intervention study [45].

Population characteristics

Age

Among studies that provided a mean age for participants (7/19) [34,38,40,44–47], the mean age ranged from 2.4 to 12.6 years, with the majority of these studies (6/7) presenting a mean age which fell in the 7-12 years age range [34,44–47]. Among the studies which did not provide a mean age for participants, two thirds (8/12) captured a population in the 2-6 years age range, and a third (4/12) of studies captured a population which spanned the ages of 2 through to 12 years of age.

Sex

A small number of studies (3/19) did not provide breakdown of sex. The remaining studies which did provide breakdown of sex had a reasonably equal representation of males and females. One of the smaller, non-representative (n=52) studies had a split of 56% female.

Snack definition

The definition of a snack varied across studies. Just over half of the studies (11/19) used a researcher-defined description of a snack, meaning the definition of snack was conferred onto the participant's reported intake 30,34,37–39,41,43–47. For example, by food group (e.g., "salty snack") 30, timing (e.g., "foods consumed between meals") 37, or energy intake (e.g., foods contributing less than 15% total energy intake but greater than 210kJ) 47. One study, conducted in Spain, had a culturally specific definition for snacking, "merienda", which was described in the study as a "defined eating occasion as mid-afternoon snack (between lunch and dinner)" 43. A further eight studies used participant-defined descriptions of a snack, meaning, at the data collection stage, participants were asked to categorise their foods according to whether they were main meals (e.g., breakfast, lunch, dinner) or snacks 20,31–33,35,36,40,48.

Quality assessment

Quality ratings for each of the studies can be found in Appendix 1. All studies with nationally representative data source (12/19) [20,31–33,37,39–44,49] were rated overall high quality. In addition, two studies within the non-representative data sources (2/7) [35,45] were considered high quality overall. The remaining studies with non-representative data sources (5/7) [34,36,38,46,48] were rated moderate quality; most were rated weak with regard to selection bias (small, non-representative populations).

Patterns of snacking in children

Findings regarding the patterns and positioning of snacking can be found in Table 2 and Table 3.

Proportion of children consuming snacks

Across studies which provided a percentage of children consuming at least one snack a day (12/19) [20,30–33,37–40,43,46,48], the percentage of ranged from 92.9% to 99.3%. In addition, some studies looked at the proportion of children consuming specific snacks or snacks at a specific time of day. From these studies, the mean percentage of children consuming after-school snacks was 63% [39]; for mid-afternoon snack consumption, this ranged from 78.3% to 84.4% [43]; salty snacks ranged from 57.5% to 59.4% [30]; and sweet snacks ranged from 71.2% to 73.9% [30].

Frequency of snacking

Among studies which measured the number of snacks consumed per day, the pooled mean number was 3. These figures ranged from 1.6 snacks a day [42] to 8.2 snacks a day [46]. The lowest figure of 1.6 was observed in a representative study, with a mean participant age of 7.1 years, using 24-hour recall [42]. The high figure of 8.2 snacks a day was observed in a non-representative study, with a mean participant age of 12.6 years, which utilised wearable cameras and captured snacks consumed at home and in school [46]. Other studies (3/19) presented a percentage of children consuming numbers of snacks [31,32,40]. These studies found that children consuming one snack a day ranged from 18% to 24%; for two snacks a day, the percentage ranged from 29% to 64%; three snacks a day ranged from 26% to 31%; and four or more snacks a day ranged from 15% to 19%.

Timing of snacking

With regards time of day, all studies reported the afternoon period being the most common period of snack consumption among children. Among the studies which reported the percentage of children consuming snacks according to different times in the day [31–33,38,41,44,46]: 48.3-77.6% of children consumed a morning snack; 75.2-84% of children consumed an afternoon snack; and 50.3-72% of children consumed a snack in the evening period. Two studies reported timing of snack consumption with regards the percentage of overall snacks which were consumed at different times [44,46]. These studies showed that 23-29.7% of snacks were consumed in the morning, 45.3-55.9% were consumed in the afternoon, and 14-23% were consumed in the evening. One study [44] also reported that snack consumption was similar on weekdays and weekends, with 52.6% of total snacks consumed on a weekday and 47.4% on a weekend (based on cases with one recall day during the week and one during the weekend).

Location of snacking

A small number of studies looked at the location of snacking (5/19) [20,30,44,46,48]. Among the studies which presented the percentage of snacking occasions or events according to location (3/5) [20,44,46], 47.5-67.3% of snacks were consumed home, 17.1-31.7% were consumed at school, and 21.9-33.6% were consumed in other locations (such as travelling, sports centre, public spaces, etc.). Three studies presented the location of snacking according to calories/energy intake consumed from snacks in different locations [20,30,48]. One study [30] found that more calories were consumed in snacks consumed at home as opposed to snacks consumed outside the home (approximate mean difference of 47 kcal, significant regarding sweet snacks) and another study [48] found that most energy intake from snacks was consumed at home (approx. 46%). However,

another study [20] reported that away-from-home snacks provided approximately an additional 50 calories per day compared to snacks consumed at home.

Foods or food groups frequently consumed as snacks

Twelve studies (12/19) [20,31,32,36–39,41,43,44,46,48] provided an indication of foods or food groups most frequently consumed as snacks. As detailed in the methods section, where studies provided frequency tables of foods consumed as snacks, the top three items were selected. From the studies, seven categories of food groups were identified. Among the twelve studies, an equal number (8/12 studies) identified 'fruit and vegetables' and 'baked desserts (including brownies, cookies, biscuits, pies, cakes)' as the most frequently consumed snacks. Sweets, candy and confectionary, and dairy products were identified as frequently consumed snacks by around half of the studies (6/12 and 5/12, respectively). Additionally, a small number of studies also identified cereal bars and granola (2/12), potato chips (1/12) and sandwiches (1/12) as frequently consumed snacks.

Position of snacking within children's diet

Energy intake from snacks

Approximately two thirds of the studies (13/19) [30–39,42,44,48] provided an indication of the daily average calorie intake from snacks. These studies showed that children aged 2-12 years consumed a range of 231-565kcal from snacks daily. The lowest figure was in a representative study which looked specifically at the consumption of after-school snacks[39]. The highest figure reported was from a study which analysed multiple representative datasets from different countries, and which reported an average of 565kcal consumed in snacks daily in Australia [37]. Additionally, a number of studies (12/19) [20,30–33,35–40,45,48] provided data on energy intake from snacks in terms of percentage of total energy intake. Contribution of snacks to total energy intake ranged from 12.9% to 41.8%. The former, again, was from the study reported only on after-school snacks [39], and the latter was a relatively smaller study (n=424) conducted in a non-representative population [45].

Macronutrient intake from snacks

Nine studies overall provided some insight into macronutrient intake from snacks [32,33,35,37,38,40,42,45,48]. The reporting of this varied in outcomes across studies, as did the specific macronutrients included in the analysis, with some studies reporting nutrient intake in more detail. Five studies measured nutrient intake with regards to percentage intake of nutrients derived from snacks as opposed to other eating occasions, such as meals. These studies showed that snacks provided a range of 28-32.8% intake of carbohydrates (32-41.7% total sugar, 35.7%

added sugars), 23-26.8% intake of total fats (23.9-28.6% Saturated Fatty Acids (SFA), 26.2% Monounsaturated Fatty Acids (MUFA), 27.3% Polyunsaturated Fatty Acids ((PUFA)), and 17.5-20% intake of protein.

A further four studies measured nutrient intake with regard to the compositional breakdown of a snack, either in terms of: i) energy composition, with each nutrient presented as a percentage of energy; ii) energy composition, with each nutrient presented according to kcal contribution; or, iii) contribution of nutrients in grams (g). According to one study, snacks comprised an average of 73.8g of carbohydrates (44.0g total sugar), 14.8g of total fats (6.1g SFA, 0.3g TFA), and 12.4g of protein. According to another study analysing two datasets, snacks comprised 162-203kcal total sugar, 99-103kcal added sugars, 73-146kcal total fats, 36-55kcal SFA, and 38-51kcal protein. Fibre was reported in two studies, where snacks comprised 3.1-6.3g of fibre [37,38]. The average breakdown of snacks according to macronutrient makeup, according to two studies, ranged between 54.2-62.3% carbohydrate (31.6% total sugar, 20.2% sucrose, 12.3% fibre), 28.4-35.3% total fats (12.4-15.5% SFA, 8.9-11.2% MUFA, 4.3-4.8% PUFA), and 10.5-11.1% protein.

Micronutrient intake from snacks

Only six studies reported micronutrient intake from snacks [32,33,37,38,40,48]. Similarly to macronutrient intake, these studies varied in how intake was reported and the number of nutrients analysed (e.g., two studies (Jensen, Hutchinson) reported only sodium intake). Two studies reported the average composition of snacks (with regards mg/µg intake). These studies report an average intake of 28.7mg vitamin C, 235.5mg calcium, 1.0 µg vitamin, 2.1mg vitamin E, 2.4mg iron, 593.0mg potassium, 1.6mg zinc and 390-466.5mg sodium.

The remaining four reported percentages of nutrient intake derived from snacks, as opposed to other eating occasions. Snacks contributed between 26.6% and 32.8% of vitamin C intake, 18.8-19.8% of folic acid intake, 17.3-19.1% of vitamin B12 intake, 21.1-23% of calcium intake, 17.3-21% of vitamin D intake, 24.6% of vitamin E intake, 18.4-21.6% of iron intake, 22.9-26.6% of potassium intake, 19.5% of zinc intake, 18.4-19.2% of sodium intake, 19.8% of thiamin intake, 22.8% of riboflavin intake, 17.8% of niacin intake, 21.7% of vitamin B6 intake, 24.4% of magnesium intake and 20-21.3% of vitamin A intake.

Discussion

The aim of this review was to examine recent evidence on snacking in children aged 2-12 years, in order to determine the patterns and positioning of snacking and snack foods in children's diets. The resulting evidence from 19 studies of moderate (n=7) or high (n=12) quality suggests that snacking plays a substantial role in the daily dietary intake of children aged 2-12 years, with

92.9% to 99.3% of children consuming at least one snack a day, and the average three snacks consumed throughout the day. More snacks, on average, are consumed in the home, and in the afternoon period. The most common snacks consumed by children, as reported by the studies, included: 'fruits and vegetables'; 'baked desserts'; 'sweets, candy and confectionery'; and 'dairy products'. Snacks contributed 231-565kcal daily, and approximately a third of daily carbohydrate intake, a quarter of total fat intake, and just under a fifth of protein intake. In addition, snacks provided approximately one third of vitamin C intake, one quarter of vitamin E, potassium and magnesium intake, and a fifth of calcium, folic acid, vitamins D and B12, iron and sodium.

Snack consumption among children is generally very high, with an average 92.9% to 99.3% of children consuming at least one snack a day. The pooled average number of snacks per day across the studies was three snacks. It is difficult to contextualise this within recommended snacking-specific guidelines given the number of different countries captured in this review, and given that countries and organisations differ in their recommendations [4,50]. However, in a recent review of global snacking recommendations, most countries' (n=47) guidelines (which included quantitative recommendations) recommended an intake of two to three snacks per day [50]. This suggests that the average number of snacks consumed across the studies is well within recommended levels. However, a number of studies in the review also recorded children who consumed four or more snacks each day [32,40], and one study reported that participants consumed an average of 8.2 snacks in a 10-hour period [46]. The latter study was comparatively small (n=158); however, data was collected using wearable cameras that captured images of food consumed. This could potentially suggest discrepancies between the reporting of snacks using food frequency questionnaires and dietary recall, and the objective number of snacks consumed in children.

Reflecting previously described existing trends in the literature [6,50], the definitions used for "snack" varied across the studies. Just over half of the studies used a 'researcher-defined' description of a snack, meaning researchers inferred, by food group, timing or energy intake, the consumption of a snack as reported by participants. As prior studies have suggested [9,11,42], this inconsistency in defining the term had implications for comparisons of study design, data collection and outcome variability across studies in the present review. The definition of snack, and the study design chosen in each study to investigate it, had implications for all outcomes of interest in this review. For example, when comparing the 'foods or food groups most frequently consumed as snacks', one must consider the definition and study design of each study. One study which investigated only energy-dense snack foods [44] found the most frequently consumed snacks to be cookies, sweets and potato chips,whereas a study which investigated

snacks as a whole (including conventionally "healthier" snacks) [48] found the most frequently consumed snacks to be fruits and vegetables, grain-based desserts and dairy foods.

Another influence upon the chosen definition of snack is that of cultural differences within and between countries. This is demonstrated by one study [43] which used a culturally-specific definition of a "merienda", which was defined in the study as a "defined eating occasion as mid-afternoon snack (between lunch and dinner)". Under this definition, sandwiches were identified in the study as being a commonly consumed snack [43], with no other studies identifying sandwiches as a frequently consumed snack. This reflects the potential for cultural differences to impact the definition of snacking what children consume as snacks [4,51–53].

Differences in snacking culture across countries can also be observed when looking at intake from snacks. Snacks provided 231-565kcal daily, and snacks contributed between 12.9% to 41.8% of total daily energy intake. The majority of global guidelines and recommendations which have provided guidance on suggested energy intake from snacks have done so per snacking occasion (i.e., 5-15% of daily energy intake), rather than overall intake. Thus it is hard to state whether these findings fall within a recommended range [50]. However, it is worth highlighting the article which reported the highest caloric intake from snacks. This was a study which found that Australian children consumed, on average, 565kcal from snacks [37]. This is much higher when compared to other studies with nationally representative data, for example, one in The Netherlands with an older child population, which reported a mean of 375kcal from snacks [44]. This finding potentially offers more evidence that culture plays an important role in determining the snacking patterns and positioning of snacks within children's diets, from one country to another, and indeed within countries [4,51–53]. In addition, ethnicity was explored by a number of studies in the review, which found that ethnicity played a significant factor in consumption of calorically-dense snack foods [34], and in snacking location [20].

With regard to the location of snacking, the small number of studies which reported location all identified that a higher percentage of snacking occasions were consumed at home. However, two studies found that at-home snacks provided more energy [48,49], and one study reported that away-from-home snacks provided more energy [20]. One factor that may be influencing this disagreement is that of age, with the former studies reporting higher energy snacks consumed at home by children aged 2-11 and 4-6 years, respectively, and the latter study reporting higher energy snacks consumed away from home by pre-school aged children (24-47.9 months). Another factor is that of the role that parents and caregivers in children's eating behaviours, something that is not within the remit of this review, but is an important factor recognised in previous snacking literature [54,55].

The studies in the present review highlighted that snacks are most commonly consumed in the afternoon compared to any other time of day. The majority of snack consumption taking place in the afternoon may be considered a positive finding from the review, as there is evidence to suggest that afternoon snacks may play an important role in the control of appetite and eating behaviours, with a number of studies highlighting the positive effects of afternoon snacks, and particularly nutrient-dense snacks, which include satiety, appetite control and diet quality [4,56]. The high consumption of afternoon snacks is a trend identified in populations beyond those included in this review, for example, in countries that do not have a "very high HDI" [57] and young adults [58].

Snacks contributed, on average, a third of carbohydrate intake, a quarter of total fats and a fifth of protein. There exists very little guidance on the acceptable or advisable nutrient intake for snacks in children; however, Denmark is one country which advises that snacks in adults should contribute no more than 30% total fat and no more than 10% saturated fat energy [50,59]. This may suggest that the average contribution of snacks to saturated fat intake (26.5%) is higher than acceptable levels in children, but this is perhaps unsurprising due to the popularity of dairy products and treat foods as snacks. It is difficult to comment on micronutrient intake from snacking due to the limited number of studies which reported these findings. However, it is clear from the small number of studies which did report micronutrient intake that snacking has the potential to contribute substantially to nutrient intake (e.g., contributing a third of overall vitamin C intake). There is a need for further investigation of larger, representative datasets which could provide greater insight into the micronutrient breakdown of snacks consumed by children.

Limitations

As is the case with existing research, the lack of consistency in defining snacks poses difficulties in comparing findings. The heterogeneity of the studies (i.e., variation in definition, outcomes, and quality of the studies) mean that the pooled averages and summations, particularly regarding nutrient intake, suggest a need for caution in the interpretation of results. In addition, a number of studies (7/19) were conducted among a non-representative, and in some cases small (e.g., n=52 (Hutchinson)), populations. Heterogeneity continues as a pattern in the review when considering the different datasets and data sources, using, in some cases, different data collection methods. As a result, food or food groups most frequently consumed may differ or overlap according to variations in defined food categories. For example, one study (Rebuli *et al*, 2020) recorded "dairy products" as a frequently consumed snack, and another study (Deming *et al*, 2017) recorded "cow's milk" as a frequently consumed snack. In this case, the food

reported in one study may be included under a broad categorization into a food group recorded in another study. Finally, only studies conducted within countries with “very high HDI” were collated for this review, which limits the application of findings.

Conclusions

This review provides insight into patterns and the position of snacking within children’s diets. The studies captured in the review ranged in their definitions of snacks; however, it is clear that snacking plays a significant role in the diets of children aged 2-12 years of age. Multiple snacking occasions occur throughout a child’s day. Snacks are most commonly consumed in the home, in the afternoon, and account for approximately one quarter of energy intake in children. Cultural differences may play a role in determining the patterns of snacking and the positioning of snacking within children’s diets. Snacks contribute around a third of vitamin C intake, but are potentially high in saturated fats, providing over a quarter of all saturated fat intake. Further research is required into consistent definitions for snacking and the role of snacking in children’s diets, particularly the specific foods which play a role in micronutrient intake, and for clear guidance for snacking intake in children.

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Table 1. Characteristics of included studies

Reference	Country	Study design	Sample size (of eligible population*)	Data source	Snacking definition	Age *other age groups included in study	Sex *of full sample
Nationally representative data sources							
Gilbert et al. 2012	Canada	Cross-sectional survey analysis	2495	Canadian Community Health Survey, cycle 2.2 (2004)	Researcher defined: After school (AS) snack intake; i.e., foods consumed Monday to Friday 3-6pm, excluding lunch and dinner	*4-8 years	F: 49% M: 51%
Bleich and Wolfson, 2015	United States of America	Cross-sectional survey analysis	11,142	National Health and Nutrition Examination Survey (NHANES)	Researcher defined: Defined by food group - salty snacks (76 items) and sugary snacks (696)	*4879 aged 2-5, 6266 aged 6-11	In both age groups: F: 49% M: 51%
Gevers et al. 2016	The Netherlands	Cross-sectional survey analysis	860	Dutch National Food Consumption Survey 2007-2010	Researcher defined: Defined using both eating occasion (during/between meals, self-designated by participants), and using a food classification - type of eating occasion taken into account to determine if foods usually consumed as a meal (e.g., pizza) would be counted as snacks	Mean age 9.42 (SD 1.75), range 7-12	F: 49.7% M: 50.3%
Wang et al. 2016	United States of America	Cross-sectional survey analysis	1917	NHANES	Participant defined: Snacking occasions categorised into morn/aft/eve	*Aged 4-8: n=1917	F: 47.4% M: 52.6%
Murakami and	United Kingdom	Cross-sectional survey analysis	808	NDNS	Researcher defined: Time-defined/between	4-10, mean 7.1 (SD 1.9)	F: 46.8% M: 53.2%

Livingstone, 2016					meals (9-12/2-5/8-6) and contribution to EI (<15% but >210kJ)		
Deming et al. 2017	United States of America	Cross-sectional study analysis	1461	Feeding Infants and Toddlers Study (FITS) 2008	Participant defined	*n=1461 (in 24-47.9month age range)	Not reported
Julian et al. 2017	Spain	Cross-sectional analysis	2851	Kantar World Panel survey of 4,000 households	Researcher defined: Merienda - defined eating occasion as mid-afternoon snack (between lunch and dinner)	03-Dec	F: 49.6% M: 50.4%
Jacquier et al. 2018	United States of America	Cross-sectional survey analysis	1461	US Feeding Infants and Toddlers Study (FITS) 2008.	Participant defined: Foods/beverages consumed between meals, caregivers were asked to define the type of eating occasion (e.g. breakfast, lunch, dinner or snack)	n=1461 (in 24-47.9month age range)	Not reported in total but 43.9-46.4% female (in 'at home' and 'away from home' groups) F: 43.9-46.4%
Wang et al. 2018	Australia and United States of America	Cross-sectional survey analysis across 4 national surveys	1646	NHANES (USA) and NNPAS (Aus)	Researcher defined: Foods/beverages consumed between meals (breakfast, brunch[aus], lunch, dinner, supper[USA])	*n=1646 aged 4-8 in Aus and USA	F: 48% M: 52%
Shriver et al. 2018	United States of America	Cross-sectional survey analysis	3,429	NHANES	Participant defined (parent)	02-May	Not reported
Vatanparast et al. 2019	Canada	Cross-sectional survey analysis	2–5 years *n* = 1,181,823	Canadian Community	Participant defined (by parent or parent/child)	*2–5 years *n* = 1,181,823 6–12 years n =	*50.3% male

			6–12 years n = 2,407,637	Health Survey (CCHS)		2,407,637 // mean age of 2-18: 9.6 (0.1)	
Rebuli et al. 2020	Australia	Cross-sectional survey analysis	1711	Australian National Nutrition and Physical Activity Survey 2011-2012	Researcher defined: Foods consumed between meals	3.8% aged 2-3; 6.5% aged 4-8; 3.8% aged 9-11	F: 50% M: 50% 2-3: M:49.1% F:50.9% 4-8: M:50.3% F:50.7% 9-11: M:50% F:50%
Other data sources							
Branscum and Sharma, 2011	United States of America	Cross-sectional study	166	Original data collection - children recruited in schools	Researcher defined: Foods consumed between meals	Mean age 10.4 (SD=0.74)	F: 59% M: 41%
Eloranta et al. 2011	Finland	Cross-sectional analysis of baseline data in intervention study	424	Baseline data of Physical Activity and Nutrition in Children (PANIC) Study	Researcher defined: Foods/beverages consumed between meals	Mean (SD) age 7.6 (0.4)	F: 49.8% M: 50.2%
Hutchinson et al. 2018	Canada	Cross-sectional study (baseline data from pilot)	52	Pilot cohort study baseline data	Researcher defined: Foods/beverages (excl. water) consumed between meals	*Mean age 3.4+- (18months-5yrs)	*F: 56% M: 44%
Jensen et al. 2019	Chile	Cross-sectional survey analysis	958	Food Environment Chilean Cohort (FECHIC)	Participant defined (counted 'once' as a meal)	4-6 yrs	Not reported

Xue et al. 2019	United States of America	Cross-sectional analysis of data from first wave of an ongoing prospective study	417	Data from first wave of ongoing prospective study (Newborn Epigenetic STudy (NEST))	Participant defined (parent)	2-6 yrs n=417	*53.9% male
Loth et al. 2020	United States of America	Cross-sectional data analysis (from phase I of an observational study)	150	Data from phase I of observational study	Participant defined	06-Jul	F: 47.5% M: 52.5%
Gage et al. 2021	New Zealand	Cross-sectional observational study	168	Original data collection - children recruited in schools	Researcher defined: Foods/beverages (excl. water) consumed between meals (main meals 6-10/12-3/5-8), but "snacking episodes" also included smaller eating episodes within these times	*Mean age 12.6 (13 year olds also incl. but only made up 15.8%)	*F: 52.5% M: 47.5%

Table 2. Snacking patterns reported in the included studies

	Snacking patterns				
Reference	Percent (%) consumers	Number of snacks/day	Time of snacking	Snacking location	Most common snacks
Nationally representative data sources					
Gilbert et al. 2012	63% consumed After School (AS) snacks	/	/	/	Fruits (raw, cooked, frozen and canned) (11.6%); water, tea and coffee (11.5%), other beverages (9.9%) [excl. water]. Cookies, biscuits and cereal bars (9.1%)
Bleich and Wolfson, 2015	**Aged 2-5:** 57.5% salty snack consumers, 71.2% sweet snack consumers **Aged 6-11:** 59.4% salty snack consumers, 73.9% sweet snack consumers	/	/	Approx. avg 47 kcal more consumed at home (significant for sweet snacks)	/
Gevers et al. 2016	/	Mean number of Energy Dense Snack Food (EDSF) events was 3.3/day	•23.0% EDSF events were in the morning, 45.3% in afternoon, 23.0% in evening • 52.6% EDSF events on weekend days, 47.4% on weekdays	49.3% EDSF events were at home, 17.1% at school, 15.2% at a friend's home, 18.4% other (street, sports centre, travelling etc.)	Cookies (30.9%), sweets (21.2%), potato chips (8.5%)
Wang et al. 2016	96.6% consumed at least 1 snack	24.0% consumed 1 snack; 46.6% consumed 2;	Afternoon 79.7%; evening 67.2%; morning 48.3%	/	Morning: water (30.4% consuming), snacks and sweets (18.2%), beverages (9.8%)

		26.0% consumed 3			Afternoon: snacks and sweets (56.7%), beverages (28.1%), water (24.8%) Evening: snacks and sweets (38.3%), water (18.9%), milk and dairy (18.8%)
Murakami and Livingstone, 2016	/	Mean 1.58	/	/	/
Deming et al. 2017	• **24-35.9-month-olds:** 95.2% • **36-47.9-month-olds:** 93.7%	• **24-35.9-month-olds:** 21% had 1, 38% had 2, 31% had 3, 16% had 4+ • **36-47.9-month-olds:** 22% had 1, 29% has 2, 28% had 3, 15% had 4+	• **24-35.9-month-olds:** 59.8% morning, 76.4% afternoon, 50.3% evening • **36-47.9-month-olds:** 57.2% morning, 75.2% afternoon, 60.6% evening	/	• **24-35.9-month-olds:** Top 3 - fruits (46.3%), cow's milk (38.4%), cookies/cakes/pies (36.8%) • **36-47.9-month-olds:** Top 3 - fruits (42.9%), cow's milk (40.7%), cookies/cakes/pies (33.1%)
Julian et al. 2017	84.4% Children aged 3-6 and 78.3% aged 7-12 were mid-afternoon snack (merienda) consumers	44/50% consumed 1 food item, 46.5/43.9% consumed 2 food items, 9.5/6% consumed 3 or more	/	/	• Regular younger consumers: fruit (62%); sandwich (59%); biscuits (55%) • Regular older consumers: sandwich (64%); fruit (50%); biscuits (50%)
Jacquier et al. 2018	Snacks consumed by 95.5% of children	/	/	More consumed at home (67.3%) than away (32.7%)	Sweets were the most popular choice of snack both at home (60%) and away from home (83%)
Wang et al. 2018	**AUS:** 99.3% **USA:** 97.9%	/	/	/	**AUS:** Water (82.8%); fruits (69.7%), cookies and

					brownies (42.8%) **USA:** Water (64.8%); candy (30.4%), fruits (27.6%)
Shriver et al. 2018	97.50%	/	62% morning, 84% afternoon, and 72% evening	/	/
Vatanparast et al. 2019	**2-5:** 96.4% **6-12**: 92.9%	**2-5:** 18% snacked once, 64% 2-3 times, 19% 4 or more times **6-12:** 20% snacked once, 61% 2-3 times, 19% 4 or more times	/	/	/
Rebuli et al. 2020	/	39.8-56.1% total discretionary foods consumed between meals	Afternoon snack occasion contributed 30.6-96.7% towards daily upper limit of discretionary foods	/	Fruit (snacks contributed 50.5-59.3% total fruit intake), discretionary foods (49.7-56.1%) and dairy products (42.6-48.4%)
Other data sources					
Branscum and Sharma, 2011	/	/	/	/	/
Eloranta et al. 2011	/	Avg 2.7 snacks daily		/	/
Hutchinson et al. 2018	96% snacked daily	Mean 2.3 ± 0.7 snacks per day	Most frequently consumed afternoon snacks (82.1% consumed); morning 77.6%; evening 66.7%	/	Crackers, apples, Bear Paws (packaged cookies), yoghurt, granola bars

Jensen et al. 2019	95.2% reported at least 1 snacking event	Avg of 2.30 ± 0.03 snacks per day	/	Larger % of calories from snacks at school (35.5-36.0%) vs home (13.7-16.3%)	Fruits and vegetables (40.0% of participants), grain-based desserts (37.6%), dairy foods (34.8%)
Xue et al. 2019	/	2.2 times per day	/	/	/
Loth et al. 2020	/	Avg 1.8 snacking occasions/day	/	/	Snacking was an important source of fruit (Effect Size: 0.71) and dairy (ES:0.53), but also contributed to children's consumption of refined grains (ES: 0.68) and SSB (ES: 0.31)
Gage et al. 2021	94.9% consumed at least one snack	Participants consumed avg of 8.2 snacks per 10 h	Most snacks (55.9%) consumed in afternoon [29.7% in morning, 14.0% in evening]	Most consumed at home (47.5%), school (31.7%), public spaces (21.9%)	Confectionary (15.5%), snack foods (14.4%), cookies/cakes (12.4%)

Table 3. Position of snacking within children's diets, as reported by the included studies

	Position of snacking within diet				
Reference	Energy intake (kcal) from snacks *kJ converted	Contribution (%) to total energy intake *if calculated	Macronutrient intake	Micronutrient intake	Leading sources of energy/ nutrients
Nationally representative data sources					
Gilbert et al. 2012	AS snacks provided on avg 231kcal*	AS snacks contributed 13%	/	/	AS snacks contributing most energy: Sweet snacks, sugars, candies (mean 120kJ); Other beverages (117kJ); Cookies, biscuits and cereal bars (117kJ)

	Position of snacking within diet				
Reference	**Energy intake (kcal) from snacks *kJ converted**	**Contribution (%) to total energy intake *if calculated**	**Macronutrient intake**	**Micronutrient intake**	**Leading sources of energy/ nutrients**
Bleich and Wolfson, 2015	**Aged 2-5:** avg 171kcal from salty snacks, avg 215kcal from sweet snacks **Aged 6-11:** avg 230kcal from salty snacks, avg 321kcal from sweet snacks	***Aged 2-5**: salty snacks 10.7%, sweet snacks 13.5% **Aged 6-11:** salty snacks 11.6%, sweet snacks 16.1%	/	/	/

	Position of snacking within diet				
Reference	Energy intake (kcal) from snacks *kJ converted	Contribution (%) to total energy intake *if calculated	Macronutrient intake	Micronutrient intake	Leading sources of energy/ nutrients
Gevers et al. 2016	Mean 375 kcal*	/	/	/	/

	Position of snacking within diet				
Reference	Energy intake (kcal) from snacks *kJ converted	Contribution (%) to total energy intake *if calculated	Macronutrient intake	Micronutrient intake	Leading sources of energy/ nutrients
Wang et al. 2016	Avg 460kcal: morning 67kcal; afternoon 241 kcal; evening 152 kcal	25.1%: morning 3.8%; afternoon 13.3%; evening 8.0%	/	/	/
Murakami and Livingstone, 2016	Mean 403kcal/d*	/	% of energy: Protein:10.5%; fat 35.3%; SFA 15.5%; MUFA 11.2%; PUFA 4.8%; Carbohydrate 54.2%; Starch 22.5%; Total sugar 31.6%; Non-milk extrinsic	/	/

	Position of snacking within diet				
Reference	**Energy intake (kcal) from snacks *kJ converted**	**Contribution (%) to total energy intake *if calculated**	**Macronutrient intake**	**Micronutrient intake**	**Leading sources of energy/ nutrients**
			sugar 23.4%; Dietary fibre 12.3%		
Deming et al. 2017	• **24-35.9 month olds:** Mean 307kcal/d - 91kcal/d in morning, 137 kcal/d in afternoon, 79 kcal/d in evening • **36-47.9 month olds:** Mean 340kcal/d - 86 kcal/d in morning, 148 kcal/d in	• **24-35.9 month olds:** 24.6% • **36-47.9 month olds:** 25.0%	• **24-35.9 month olds:** 28.2% carbohydrates, 22.9% fat, 17.2% protein • **36-47.9 month olds:** 28.2% carbohydrates, 23.8% fat, 17.7% protein	• **24-35.9 month olds:** 27.3% vit C, 24.3% dietary fibre, 18.7% folate, 18.8% vit B12, 23.0% Ca, 20.8% vit D, 24.8% vit E, 18.4% Fe, 22.9% K • **36-47.9 month olds:** 25.9% vit C, 25.5% dietary fibre, 18.9% folate, 19.3% vit B12, 23.0% Ca, 21.2% vit	/

	Position of snacking within diet				
Reference	Energy intake (kcal) from snacks *kJ converted	Contribution (%) to total energy intake *if calculated	Macronutrient intake	Micronutrient intake	Leading sources of energy/ nutrients
	afternoon, 106 kcal/d in evening			D, 24.4% vit E, 18.4% Fe, 22.9% K	
Julian et al. 2017	/	/	/	/	/
Jacquier et al. 2018	/	21-28%	/	/	/

	Position of snacking within diet				
Reference	**Energy intake (kcal) from snacks *kJ converted**	**Contribution (%) to total energy intake *if calculated**	**Macronutrient intake**	**Micronutrient intake**	**Leading sources of energy/ nutrients**
Wang et al. 2018	AUS: Avg 565kcal USA: Avg 460kcal	**AUS:** 32.9% **USA:** 26.6%	**AUS:** Total sugars (kcal) 203; added sugars 99, total fat 73; saturated fat 36; protein 51; fibre (g) 6.3 **USA:** Total sugars 162; added sugars 103, total fat 146; saturated fat 55; protein 38; fibre (g) 3.1	**AUS:** Calcium (mg) 250; sodium 495; potassium 718; zinc 1.7; iron 2.1; vitamin C 34.7; vitamin D (µg) N/A; vitamin E as alpha-tocopherol (mg) 2.5 **USA:** Calcium (mg) 221; sodium 438; potassium 467; zinc 1.5; iron 2.6; vitamin C 22.6; vitamin D (µg) 1.0; vitamin E as alpha-tocopherol (mg) 1.7	/

	Position of snacking within diet				
Reference	Energy intake (kcal) from snacks *kJ converted	Contribution (%) to total energy intake *if calculated	Macronutrient intake	Micronutrient intake	Leading sources of energy/ nutrients
Shriver et al. 2018	Mean 451kcal	28%	Snacks accounted for: 32% total carbohydrates; added sugars 39%; total fat 26.1%; sat fat 27%; dietary fibre 25.7%; 29.1% solid fats	Snacks accounted for: 32.8% vitamin C; iron 20.1%; sodium 19.2%; potassium 26.6%; vitamin A 21.3%; dietary folate equivalents 19.3%	Snacks and sweets food category (i.e., cookies and pastries) were the leading sources of energy (44%), total fat (52%), and added sugars (53%) consumed during snacking occasions

	Position of snacking within diet				
Reference	Energy intake (kcal) from snacks *kJ converted	Contribution (%) to total energy intake *if calculated	Macronutrient intake	Micronutrient intake	Leading sources of energy/ nutrients
Vatanparast et al. 2019	/	**2-5:** 27.0% **6-12:** 26.5%	Contribution of snacks **2-5:** Carbohydrates 29.9%; dietary fibres 30.4%; total sugars 37%; total fat 27.2%; SFA 26.8%; MUFA 26.6%; PUFA 27.8%; protein 19.6% **6-12:** Carbohydrates 29.8%; dietary fibres 29.6%; total sugars 35.8%; total fat 26.4%; SFA 25.9%; MUFA 25.8%; PUFA 26.7%; protein 17.0%	**2-5/6-12:** Vitamin A RAE (%) 20.0/20.0; Vitamin D (%) 17.7/16.9; Vitamin C (%) 30.2/29.7; Thiamin (%) 20.4/19.2; Riboflavin (%) 24.3/21.2; Niacin NEA (%) 18.7/16.8; Vitamin B6 (%) 22.6/20.8; Vitamin B12 (%) 18.4/16.1; Folic acid (%) 20.3/19.2; Folate DFE (%) 21.4/20.7; Calcium (%) 26.3/23.3;	/

	Position of snacking within diet				
Reference	Energy intake (kcal) from snacks *kJ converted	Contribution (%) to total energy intake *if calculated	Macronutrient intake	Micronutrient intake	Leading sources of energy/ nutrients
				Magnesium (%) 24.9/23.9; Iron (%) 21.9/21.3; Zinc (%) 20.5/18.4; Sodium (%) 18.6/18.1; Potassium (%) 25.7/24.5	
Rebuli et al. 2020	/	/	/	/	/

	Position of snacking within diet				
Reference	**Energy intake (kcal) from snacks *kJ converted**	**Contribution (%) to total energy intake *if calculated**	**Macronutrient intake**	**Micronutrient intake**	**Leading sources of energy/ nutrients**
Other data sources					
Branscum and Sharma, 2011	302.3 kcal (SD 265.11) from calorically dense snack foods	N/A	/	/	Energy: fried potato or corn chips, cookies, and candies
Eloranta et al. 2011	/	41.8% (41.3% in boys, 42.3% in girls)	• Proportion of total fat from TEI from snacks: 28.5% (boys) and 28.2% (girls) • SFA: 12.4%/12.3% • MUFA: 8.9%/8.8% •PUFA: 4.3% both •Sucrose 20.1%/20.2% • Fibre g/MJ 2.1% both	/	/

	Position of snacking within diet				
Reference	Energy intake (kcal) from snacks *kJ converted	Contribution (%) to total energy intake *if calculated	Macronutrient intake	Micronutrient intake	Leading sources of energy/ nutrients
Hutchinson et al. 2018	Avg 468kcal	33.20%	Avg snack composition: protein 12.4g (11.1% energy from protein in snacks); carbohydrate 73.8g (62.3% energy from carbohydrate in snacks); sugar 44.0g (37.2%) / 59.2% of carbohydrate from sugar; fibre 5.8g ; fat 14.8g/133.5kcal (28.9%); sat fat 6.1g; trans-fat 0.3g	Sodium 390mg	/

	Position of snacking within diet				
Reference	**Energy intake (kcal) from snacks *kJ converted**	**Contribution (%) to total energy intake *if calculated**	**Macronutrient intake**	**Micronutrient intake**	**Leading sources of energy/ nutrients**
Jensen et al. 2019	Avg 360kcal daily	28.90%	% of total intake: protein 20.0%, total carbohydrates 32.8%, fibre 28.7%, total sugars 41.7%, total fat 26.4%, sat fat 28.6%	% of total intake: 24.7% sodium	/
Xue et al. 2019	Mean 387kcal/day	Approx. 25%	% total fat from snack 23%; total carbohydrate 28%; total protein 16%; total sugar 32%	/	/
Loth et al. 2020	Approx 365 kcal/day	/	/	/	/

	Position of snacking within diet				
Reference	Energy intake (kcal) from snacks *kJ converted	Contribution (%) to total energy intake *if calculated	Macronutrient intake	Micronutrient intake	Leading sources of energy/ nutrients
Gage et al. 2021	/	/	/	/	/

Appendix 1. Quality assessment of included studies

Reference	Selection bias	Study design	Confounders	Blinding	Data collection method	Withdrawals and dropouts	OVERALL (no weak=strong, 1 weak=mod, >1 weak=weak)
Nationally representative data sources							
Gilbert et al. 2012	Strong	N/A	N/A	N/A	Strong	Strong	**Strong**
Bleich and Wolfson, 2015	Strong	N/A	N/A	N/A	Moderate	Strong	**Strong**
Gevers et al. 2016	Strong	N/A	N/A	N/A	Strong	Strong	**Strong**
Wang et al. 2016	Strong	N/A	N/A	N/A	Strong	Strong	**Strong**
Murakami and Livingstone, 2016	Strong	N/A	N/A	N/A	Strong	Strong	**Strong**
Deming et al. 2017	Strong	N/A	N/A	N/A	Strong	Strong	**Strong**
Julian et al. 2017	Strong	N/A	N/A	N/A	Strong	Strong	**Strong**
Jacquier et al. 2018	Strong	N/A	N/A	N/A	Strong	Strong	**Strong**
Wang et al. 2018	Strong	N/A	N/A	N/A	Strong	Strong	**Strong**

Reference	Selection bias	Study design	Confounders	Blinding	Data collection method	Withdrawals and dropouts	OVERALL (no weak=strong, 1 weak=mod, >1 weak=weak)
Shriver et al. 2018	Strong	N/A	N/A	N/A	Strong	Strong	**Strong**
Vatanparast et al. 2019	Strong	N/A	N/A	N/A	Strong	Strong	**Strong**
Rebuli et al. 2020	Strong	N/A	N/A	N/A	Strong	Strong	**Strong**
Other data sources							
Branscum and Sharma, 2011	Weak	N/A	N/A	N/A	Strong	Strong	**Moderate**
Eloranta et al. 2011	Strong	N/A	N/A	N/A	Strong	Strong	**Strong**
Hutchinson et al. 2018	Moderate	N/A	N/A	N/A	Strong	Strong	**Moderate**
Jensen et al. 2019	Weak	N/A	N/A	N/A	Strong	Strong	**Moderate**
Xue et al. 2019	Strong	N/A	N/A	N/A	Strong	Strong	**Strong**
Loth et al. 2020	Weak	N/A	N/A	N/A	Strong	Strong	**Moderate**
Gage et al. 2021	Weak	N/A	N/A	N/A	Strong	Strong	**Moderate**

Appendix III: Literature review - the available food-based dietary guidelines with respect to treat foods and snacks for children globally

Abstract

Background: The childhood years are a crucial period of growth and development during which a balanced and nutrient-dense diet is important to ensure optimal growth and development. It is widely acknowledged that dietary habits and preferences established during this period can continue into later life and adulthood, and thus a balanced diet and lifestyle during these early years can support optimal health and aid in the prevention of diet-related diseases in later life. This global review aims to investigate the dietary guidelines for children with respect to 'treat foods' and 'snacks' from countries with developed economies.

Methods: This review includes Food-Based Dietary Guidelines (FBDG) on 'treat foods' and 'snacking' for children from countries with developed economies. Countries with developed economies were identified according to the United Nations (UN) classification and FBDG were sourced using the Food and Agricultural Organization, European Commission and the European Food Information Council databases. FBDG were included if they were accessible online, published in English and contained guidelines for children. The data for the present review were collected between June and September 2021.

Results: Out of 36 countries with a developed economy, 12 countries had FBDG which met the criteria and are included in this review. All the FBDG included contained guidelines for children and five countries have published FBDG specifically for children (rather than for the general population including children). All the FBDG included had specific guidelines relating to the consumption of 'treat foods' while nine had specific guidelines relating to 'snacking'. Guidelines relating to 'treat foods' included qualitative recommendations on calorie amounts, serving sizes and frequency of consumption, and qualitative recommendations on limiting foods/making different choices or general recommendations on frequency/amount (without measurable quantities). Guidelines relating to 'snacking' included qualitative guidelines on the number and timing of snacks throughout the day and qualitative guidelines on foods to limit as snacks,

foods to include as 'healthy snacks', or guidance on timing/scheduling of snacks throughout the day.

Conclusion: There is a lack of a standardised term for these types of foods globally and they are described using various terms which may have important implications for comparisons between countries or for research related to the consumption of 'treat foods' and their impact on the diet of populations. The review found that references to 'treat foods' in FBDG typically referred to those foods which are high in fat, salt and sugar and are not needed for good health, and all countries recommended that these should be limited in some form. Guidelines on 'snacks' generally recommended that those foods which are high in fat, salt and sugar should not be consumed as snacks and that snacks should be 'healthy' and 'balanced', for example, fruits, vegetables, nuts and seeds, wholegrains, yogurt, breads and cheese, etc. The present review provides an overview of the dietary guidelines for children with respect to 'treat foods' and 'snacks' from countries with developed economies globally and may be of use to stakeholders, including researchers and policy makers.

Introduction

The childhood years are a crucial period of growth and development during which a balanced and nutrient-dense diet is important to ensure optimal growth and development. It is widely acknowledged that dietary habits and preferences established during this period can track into later life and adulthood and thus a balanced diet and lifestyle during these years can support optimal health and aid in the prevention of diet-related diseases in later life[1-5]. However, high rates of overweight and obesity have been reported in children globally, and childhood obesity has been identified as a global public health challenge which is associated with serious co-morbidities, which can track into adulthood[6-11].

Diet (as well as physical activity) has a key role to play in the prevention of overweight and obesity and in the treatment of same. It is widely recommended that children (as with all populations) should have a healthy, balanced and nutritious diet of main meals and snacks in between. However, there is no standardised definition for snacks, and snacks consumed between meals can be both 'healthy' and 'unhealthy foods'[12]. These 'unhealthy type foods' can also be termed 'treat foods' (although there is no standardised definition) and are foods which are high in saturated fat, salt and sugar. Data from nationally representative surveys in the US and Australia have shown that snacking contributed >25% of total energy intake in young children and while snacks positively contributed to dietary fibre intake, they also contributed substantially to carbohydrate, added sugars and total fat intakes (32%, 39% and 26%, respectively)[13-15] due to the inclusion of a mix of these 'healthy and unhealthy foods'. As snacking and 'treat foods' are often used interchangeably in both the scientific literature and in the media, it is important to review the actual guidance that is available surrounding 'treat foods' and 'snacking', and

particularly for children. This global review aims to investigate the available dietary guidelines for children with respect to 'treat foods' and 'snacks' in countries with developed economies.

Methods

The present review includes guidelines for children for 'treat foods' and snacking from Food-Based Dietary Guidelines (FBDG) in countries with developed economies. Countries with developed economies were identified according to the United Nations (UN) classification[16]. In order to review the dietary guidelines, the Food and Agricultural Organization[17], European Commission[18] and the European Food Information Council[19] databases were used to source the FBDG of each country identified by the UN classification and FBDG. Due to the lack of a standard term for 'treat foods', guidelines relating to this were identified in the following ways: 1. If they were listed as foods to limit/restrict/not necessary for health (or foods described using similar terminology) within the FBDG; and 2: If they were depicted in the accompanying graphic for the FBDG as 'off shelf' or 'off plate', or depicted using similar imaging to indicate they are not recommended as part of a healthy diet. Guidelines for snacking were identified by searching key terms within the FBDG such as 'snack', 'snacks', 'snacking' and 'meals' (these guidelines relate solely to the practice of 'snacking' or using 'snacks' alongside meals, and do not include where, for example, FBDG provide advice on the consumption of the food group often termed 'savoury snacks'). FBDG were included in this review if they met the above criteria (countries with developed economies, accessible online, and published in English). Additionally, as this review is intended to summarise dietary guidelines for children, where FBDG met the above criteria but were not inclusive of the child/adolescent population (e.g., for adults only) they were excluded. It should be noted that some FBDG included in this review covered recommendations for children, adolescents and adults, and thus refer to guidelines on the consumption of alcohol within their reports; these references were excluded from the present review, as alcohol should not be consumed by children and the guidance was not intended for this population group. The data for the present review were collected between June and September 2021. Of the 36 countries with a developed economy (according to the UN classification), 12 countries had FBDG which met the criteria and are included in this review.

Food-Based Dietary Guidelines overview

Table 1 presents an overview of the FBDG which are included in this review. All 12 FBDG were published within the last 10 years. Depending on the country, FBDG were developed for the general population for those starting at birth (Finland, USA)[20-21], 1 year old (Ireland)[22-26], 2 years old (Canada, Denmark, the Netherlands, New Zealand, UK)[24-29], 3 years old (Malta)[27-36], 4 years old (Switzerland)[39-41], and guidelines for the general population with the specific age not

specified (Australia, Sweden)[42-44]. Almost all of the countries (excluding Sweden) have guidelines specific to children either mentioned within the body of the main published report or guidelines published specific to the child population, e.g., Finland (0-8 years), Ireland (1-5 years), Malta (3-12 years), New Zealand (2-12 years and 2-18 years) and Switzerland (4-12 years)[20,22-26,,33-35,37-41]. The written text of the FBDG have been translated into a graphical representation in 8 of the 12 countries, with Australia, Canada, Malta, the Netherlands, the UK and US displaying their guidelines as a circular graphic, e.g., plate/wheel, while Ireland displays its guidelines as a food pyramid and Switzerland displays its guidelines in both a plate and pyramid format. All of the FBDG examined had specific guidelines relating to the consumption of 'treat foods', while nine had specific guidelines relating to 'snacking'.

Food-Based Dietary Guidelines relating to 'treat foods'

Table 2 presents an overview of the FBDG relating to 'treat foods', which includes the nomenclature used to describe this category, the guidelines (quantitative and qualitative), and an outline of the foods and beverages classed as examples of 'treat foods'

Nomenclature used in FBDG

There is no universally accepted definition or term for 'treat foods'; therefore, how they are defined and named varies across FBDG for each country. Australia refers to these foods as 'discretionary choices' or 'discretionary foods', Canada and Malta refer to 'highly processed products' and 'processed food and sweets'. Denmark and Switzerland refer to these as 'sweet, salty and fatty foods' and 'sweet and salty foods', respectively. Malta, the UK and US refer to these as 'limit your intakes of these types of food', 'foods to eat less often and in small amounts' and 'limit foods and beverages higher in added sugars, saturated fat and sodium', respectively, while Sweden simply uses the term 'less'. Ireland and the UK refer to these foods as 'foods high in fat, sugar or salt' while New Zealand describes them as 'high fat, sugar and salt foods, or HFSS foods'. Ireland also refers to these as 'other foods' and 'treat foods' and the Netherlands refers to these as 'foods not included in the wheel of five', 'choice of the day' and 'choice of the week'.

Quantitative guidelines for 'treat foods' foods

Quantitative guidelines with regard to limiting 'treat foods' were specified for seven of the 12 countries, while Canada, Finland, Malta, Sweden and the UK did not specify any quantitative recommendations. Quantitative recommendations for 'treat foods' in the FBDG include recommendations for calorie allowance or per serving, recommendations on serving sizes or gram allowances, and guidelines on the frequency of consumption.

Quantitative guidelines for 'treat foods': Energy (kcal) recommendations

Australia has specified that a serving of discretionary choices can provide 500-600kJ (and has provided guidance on serving sizes of foods which meet this criteria). The US has specified that approximately 15% of daily calories (equating to 250-300kcal) are available for foods with added sugars or saturated fat.

Quantitative guidelines for 'treat foods': Serving size/gram recommendations

Australia has provided detailed information on examples of serving sizes (g) for discretionary choices (Table 2) which would fit within the 600kJ recommendation. Denmark has provided recommended serving sizes/amount recommendations for sugary drinks and sweet, salty and fatty foods by age-group (e.g., 4–6-years: maximum of 1/4 litre of sugary drinks/week or 30g of sweet, salty and fatty foods; 7-9 years: maximum of 1/3 litre of sugary drinks/week or 60g of sweet, salty and fatty foods; and older children and adults: maximum of ¼ litre of sugary drinks/week or 120g of sweet, salty and fatty foods). Ireland has specified that serving sizes for young children (1-5 years) should be tiny portions equivalent to one square of chocolate, three crisps, half of a plain biscuit or three soft sweets. The Netherlands has specified portion sizes for the choice of the day as a small cookie, an ice-cream, a piece of chocolate, honey for yogurt, or a tablespoon of tomato ketchup; and portion sizes for the weekly choice may be bigger, e.g., a croissant, a piece of cake, a bag of chips, a glass of soft drink, a frozen pizza, or a bowl of sweetened breakfast cereals). Switzerland has specified serving sizes of 'treat foods' as a row of chocolate or 20g of chocolate spread, three pieces of petit beurre or a ball of ice cream, or a small handful (20-30g) of salty snacks.

Quantitative guidelines for 'treat foods': Frequency of consumption recommendations

Some countries have provided guidance on the frequency with which 'treat foods' should be consumed (some providing general population guidance and some age-specific). Australia has recommended 0-3 servings of discretionary choices per day for most people, with no more than ½ serving per day up to the age of 8 years (unless the child is taller or more active, 0-2 servings could be allowed), 0-2½ servings for older children and adolescents who are more active and in a healthy weight range, and up to three servings per day for very active adolescents and for adults. Ireland has recommended that food and drinks high in fat, salt and sugar should not be consumed every day and should be limited to once or twice a week. For young children (1-4 years) they have also recommended that foods like frozen pizza, chicken nuggets, burgers and chips should be limited to small amounts once a week (as they are high in fat and salt). The Netherlands has specified daily allowances of three to four servings for the general childhood population and up to five servings for big eaters (e.g., growing teenagers, etc.) and that weekly

choices should be limited to three servings per week. New Zealand has recommended that HFSS foods and drinks can be enjoyed occasionally (less than once a week). Switzerland has recommended that sweet and salty foods should be consumed in small quantities only, either one portion of sweet or salty food per day.

Qualitative guidelines for 'treat foods'

Qualitative guidelines for treat foods are included in FBDG for all countries with the exception of Switzerland, which did not specify any qualitative recommendations. Qualitative recommendations can be broadly described as recommendations related to 'treat foods' and general recommendations on amount and timing (without measurable quantities, etc.)

Qualitative guidelines for 'treat foods': General recommendations

Most countries provide qualitative guidelines for the consumption of 'treat foods'. For example, Australia, Canada, Denmark, Ireland, Malta, New Zealand, Sweden, the UK and the US recommend that foods and beverages that are high in fat (saturated), sugar and salt should be limited or cut down, or should not be bought to avoid the temptation to eat too much. Most recommend that these should not be consumed every day. Canada and New Zealand further provide advice to choose products, or adapt to foods, lower in fat, sugar or salt. Malta and Sweden provide specific advice to avoid adding salt during the preparation/cooking of food or at the table, and Sweden recommends using salt with iodine when it is used. Malta and New Zealand recommend limiting the consumption of processed meat, while Canada recommends eating less highly processed foods or else eat them in small amounts/replace with healthier options. The UK provides some recommendations for 'healthier' swaps, such as lower fat spreads using calorie free sweeteners, etc. Ireland provides some advice specific to children to limit the amount of sugar-coated and chocolate-coated breakfast cereals to be offered a child, and also advises that high fat/salt takeaways should not be part of a child's diet. Canada, Denmark, Finland, Ireland, New Zealand, Sweden, the UK and the US all recommend limiting the intake of sugary drinks, while Ireland, the UK and US further specify that sugary drinks are not recommended for young children (Irish FBDG state that if these are offered at all it should be with meals). Denmark, Finland and New Zealand further specify that energy drinks are not recommended for children.

Qualitative guidelines for 'treat foods': Frequency/amount recommendations

Australia states that 'discretionary foods should only be consumed sometimes and in small amounts'. Canada recommends eating highly processed foods less often, eating them in small amounts or replacing them with healthier options. Denmark states that you can eat a limited

amount of sweet, salty and fatty food. Ireland recommends that these foods should not be consumed every day (5-50+ years) and, where they are consumed, smaller portions should be chosen, e.g., share a standard size or opt for 'fun' sizes. Ireland further specifies that it is best not to offer these foods and drinks to children aged 1-to-4 years old at all; however, you may give tiny amounts occasionally. The Netherlands recommends that children younger than 4 years have little room for 'day choices' or 'choices of the week' due to the calorie content of such foods, and that young children up to 8 years can have a choice of the day as a spread on bread but not as a snack. The UK states that these foods should be consumed infrequently and in small amounts.

While some countries provide examples of foods classified as 'treat foods', these lists are not generally intended to be exhaustive. However, they commonly list items such as biscuits, confectionery, cakes and buns, chocolate, sweets, sweetened cereals, savoury snacks/crips, sweet drinks, processed meat, takeaway/deep fried foods and ready-meals as examples of 'treat foods' which are not needed for good health and should be consumed in small amounts.

Food-Based Dietary Guidelines for 'snacking'

Table 3 presents an overview of the FBDG relating to 'snacking', including the guidelines (quantitative and qualitative) and an outline of the foods and beverages recommended as snacks.

Quantitative guidelines for 'snacking'

Quantitative guidelines regarding snacking were provided by four of the 10 countries that had guidelines for snacking: Finland, Ireland, Malta and New Zealand. These quantitative guidelines were typically related to the number of snacks recommended throughout the day.

Quantitative guidelines for snacking: number of snacks per day

Both Malta and Finland provide general meal and snack guidelines for the total population, with Finland recommending that both adults and children should eat 4-6 meals a day at regular intervals (for example, breakfast, lunch and dinner, supper and snacks), while Malta recommends three main meals daily, and allows some people to include one or two smaller snacks. Ireland and New Zealand provide quantitative guidelines for snacking specific to children. Ireland recommends that young children should have four main meals and three to four healthy snacks every day, while New Zealand recommend that children and young people should have three main meals and two to three small snacks at regular times during the day, suggesting that snacks can be considered 'mini-meals' that make a valuable contribution to energy and nutrient intake between main meals. New Zealand states that many children will

need snacks mid-morning and mid-afternoon, while after-dinner snacks can be included for older children (especially during the growth spurt). Both Ireland and New Zealand acknowledge that all food (including snacks) for this age should be nourishing and that the size and timing of snacks should be considered so that it does not interfere with overall appetite or intakes.

Qualitative guidelines for 'snacking'

Qualitative guidelines for snacks and snacking are included in FBDG for nine of the 10 countries that had guidelines for snacking, Denmark being the exception. These qualitative guidelines can be broadly described as guidelines for snacking, and are related to foods to limit, 'healthy' snacks and guidelines on timing/scheduling of snacks.

Qualitative guidelines for snacking: foods to limit or avoid as snacks

Avoiding or limiting foods high in fat, salt and sugar as snacks was recommended by Australia, Canada and Ireland. Australia recommends that the intake of energy-dense hot fried potato chips as a snack or with meals should be limited, while Canada recommends limiting the use of highly processed items such as spreads and dressings in meals and snacks. Ireland recommends that snacking on sugary foods and drinks should be avoided and advises the purchase of very little unhealthy snack foods such as biscuits, chocolate and sweets (these should be the last option as snacks as they are high in fat and calories but are not filling).

Qualitative guidelines for snacking: healthy snacks

'Healthy', 'nutritious' and 'balanced' are terms frequently used in the FBDG of Canada, Finland, Ireland, Malta, New Zealand, the UK and US to describe the types of foods and snacks that should be consumed. Canada recommends stocking your kitchen with healthy snacks, to cook and prepare healthy meals and snacks using nutritious foods and ingredients that have little to no added sodium, sugars or saturated fat, and to plan meals and snacks in advance in order to include vegetables, fruit, wholegrain and protein foods. Finland states that balanced snacks are important, that the energy content of meals and snacks must be sufficient, and acknowledges that, as children who are choosy eaters receive a higher energy intake from snacks and less from main meals, it must be ensured that the snacks of pickier eaters are balanced. Ireland recommends that healthy snacking is all about eating fruits, vegetables, low-fat dairy and high-fibre breads and cereals instead of high-fat, high-sugar and high-salt snacks and confectionery and suggests that children's meals and snacks should be based on fresh foods where possible. Malta recommends including wholegrains with meals and snacks, and for the education of children about healthy choices to guide and encourage them to choose nutritious foods and snacks. New Zealand also recommends preparing foods or to choose pre-prepared foods as

snacks and drinks that are low in fat (especially saturated fat) and sugar, and especially added sugar and salt. New Zealand also recommends offering mainly healthy and nutritious snacks to children, and advises that ideal snacks provide energy, protein, carbohydrate, vitamins, minerals, dietary fibre and a good balance of dietary fats. However, New Zealand also acknowledges that foods high in fat, salt and sugar which are low in vitamins, minerals and fibre are commonly produced, packaged and marketed as appropriate snacks for children and young children. The UK and US recommends having fruit available as convenient and healthy snacks (with the US also recommending fruit and vegetables over chips or cookies, etc.). The US states that whole fruits should be chosen as snacks and included in meals.

Qualitative guidelines for snacking: snack timing/scheduling

Some FBDG also provide qualitative guidance on the timing of snacks throughout the day. Finland states that long intervals between meals can result in uncontrolled eating and unnecessary snacking, and that children should be offered snacks according to their usual schedule, i.e., if a meal is delayed, they can be offered snacks. They also acknowledge that while children can self-regulate their portion size, they should be offered food more frequently than adults, which is why the quality of snacks is important. Ireland recommends having regular times for meals and snacks to set up healthy eating habits for life. However, it is acknowledged that some days children may be hungrier than others and need filling, healthy snacks between meals. New Zealand recommends discouraging continuous eating or grazing and to stick to set meal and snack times. Sweden recommends eating when you are hungry (not when you fancy something) and to have breakfast, lunch and dinner and maybe a tasty snack between meals. The US acknowledges that young children are fully reliant on others to provide their meals and snacks, and that snacks can be used as a way to promote the intake of nutrient dense foods (e.g., fruit and vegetables).

A commonly occurring theme between FBDG regarding snacking is that foods which can be classified as ‘treat foods’ (as outlined above) should not be consumed as snacks and that snacks should be ‘healthy’ and ‘balanced’, for example fruits, vegetables, nuts and seeds, wholegrains, yogurt, breads and cheese, etc.

Conclusions

This review aimed to investigate dietary guidelines for children with respect to ‘treat foods’ and ‘snacks’ from countries with developed economies globally. Out of 36 countries with a developed economy (according to the UN classification), 12 countries had FBDG which met the

criteria and are included in this review. All of the FBDG included contained guidelines for children (most within their guidelines for the general population), with just five countries having published FBDG specifically for this population group; these FBDG generally give very clear guidance on the consumption of 'treat foods' and 'snacks' (often by age-group) for children, which is important in this vulnerable population who have very high nutrient requirements for optimal growth and who are developing food preferences and dietary patterns to track into adulthood. All of the FBDG included had specific guidelines relating to the consumption of 'treat foods'. However, there is a lack of a standardised term for these types of foods globally and they are described using various terms which may have important implications for comparisons between countries, or for research related to the consumption of 'treat foods' and their impact on the diet of populations. Generally, 'treat foods' were typically those foods which are high in fat, salt and sugar and are not needed for good health, and all countries recommended that these should be limited in some form. Nine countries had specific guidelines relating to the consumption of 'snacks' and these guidelines generally recommended that those foods which are high in fat, salt and sugar should not be consumed as snacks and that snacks should be 'healthy' and 'balanced', for example, fruits, vegetables, nuts and seeds, wholegrains, yogurt, breads and cheese, etc. The present review provides an overview of the dietary guidelines for children with respect to 'treat foods' and 'snacks' from countries with developed economies globally and may be of use to stakeholders, including researchers and policy makers.

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Table 1. An overview of countries with data available for this review, including year of publication, target population, graphic availability and type, and if there are specific guidelines for children, 'treat foods' or snacking

Country	Year	Guidelines	Target population	Graphics	Guidelines specific for children	Guidelines on 'treat foods'	Guidelines for snacking
Australia [42,43]	2013	Australian Dietary Guidelines Summary	General Population (age not specified)	Food Guide (circular/plate format)	Yes	Yes	Yes
Canada [27,28]	2019	Canada's Dietary Guidelines for health professionals and policy makers	2 years +	Food Guide (circular/plate format)	Yes	Yes	Yes
Denmark [29]	2021	The Official Dietary Guidelines – good for health and climate	2-65 years	None	Yes	Yes	Yes
Finland [20]	2019	Eating Together- food recommendations for families with children	0-18 years	None	Yes	Yes	Yes
Ireland [22-26]	2020	Scientific Recommendations for Food-Based Dietary Guidelines for 1- to 5-Year-Olds in Ireland	1-5 years	Food Pyramid	Yes	Yes	Yes
	2011	Scientific Recommendations for Healthy Eating Guidelines in Ireland	5-64 years	Food Pyramid	Yes	Yes	Yes
Malta [37,38]	2018	Dietary Guidelines for Maltese Children the Mediterranean Way!	3-12 years	Healthy Plate	Yes	Yes	Yes
Netherlands [30-32]	2015	Dutch Dietary Guidelines 2015	2 years + (excluding pregnant women)	Wheel of Five	Yes	Yes	No
New Zealand [33-35]	2012	Food and Nutrition Guidelines for Healthy Children and Young People (Aged 2–18 years)	2-18 years	None	Yes	Yes	Yes
	2017	Eating Healthy for Children From 2 to 12 Years	2-12 years	None	Yes	Yes	Yes

Sweden [44]	2015	The Swedish Dietary Guidelines Find Your Way to Eat greener, not too much and Being Active	General Population (age not specified)	None	No	Yes	No
Switzerland [39-41]	2017	Eating well and staying healthy Swiss Nutrition Policy 2017-2024	4-12 years	Pyramid & Disc	Yes	Yes	No
United Kingdom [36]	2018	Eat Well Guide helping you eat a healthy, balanced diet	2+	Eatwell Guide (plate format)	Yes	Yes	Yes
United States [21]	2020	Dietary Guidelines for Americans 2020-2025	All ages (birth +)	My Plate	Yes	Yes	Yes

Table 2. Food based dietary guidelines relating to 'treat foods' in countries with developed economies including the nomenclature used to describe 'treat foods', quantitative and qualitative guidelines for 'treat foods' and foods classed as 'treat foods'.

Country	Nomenclature used to describe 'treat foods'	Guidelines for 'treat foods'		Foods and drinks classed as 'treat foods'
		Quantitative	Qualitative	
Australia [42,43]	Discretionary choices Discretionary foods	A serve of discretionary choices provides 500-600kJ. Examples are: 2 scoops (75g) ice-cream, 2 slices (50–60g) processed meats, salami or mettwurst, 1½ thick or 2 thin (50–70g) regular sausages, ½ snack size packet (30g) salty crackers or crisps, 2–3 (35g) sweet biscuits, 1 (40g) doughnut, 1 slice (40g) plain cake or small cake-type muffin, 5–6 (40g) sugar confectionary/small lollies, 1 tablespoons (60g) jam/honey, ½ small bar (25g) chocolate, 2 tablespoons (40g) cream, 1 tablespoon (20g) butter, 1 can (375ml) soft drink, ¼ (60g) commercial meat pie or pastie, 12 (60g) fried hot chips. 0 to 3 servings a day will be suitable for most people, depending on age, height and activity level. For younger children, up to about the age of 8, discretionary choices are best avoided or limited. No more than ½ serve a day unless the child is taller or more active, in which case they could have 0–2 servings a day. Older children and adolescents who are more active and a healthy weight range	Limit intake of foods containing saturated fat, added salt, and added sugar. Discretionary foods should only be consumed sometimes and in small amounts.	Biscuits, cakes, commercial burgers, confectionary, cordials, crisps, energy drinks, fried foods, fruit drinks, other savoury snacks, pastries, pies, pizza, potato chips, processed meats, sports drinks, sugar-sweetened soft drinks and vitamin waters.

		could have extra servings from the five food groups and/or a combination of 0–2½ serves per day of discretionary choices. Older adolescents who are still growing and/or very active could increase discretionary choices up to 3 servings or more per day.		
Canada [27,28]	Highly processed products	None specified	Eat highly processed foods less often or eat them in small amounts or replace them with healthier options. Swap sugary drinks for water. Make homemade versions of your favourite highly processed foods, i.e.,try a healthy muffin recipe to replace store-bought muffins or make your own frozen dinners by choosing a healthy recipe and freezing it in meal-sized portions. Choose foods that have little to no added sodium, sugars or saturated fat. Compare the nutrition facts table on foods to choose products that are lower in sodium, sugars or saturated fat.	Bakery products, buns, burgers, biscuits, cakes, confectionery, candies, chocolate, sugary breakfast cereals, sugary drinks, fast foods, french fries, frozen desserts, frozen entrées, ice cream, muffins, processed meats, deep-fried foods and many ready-to-heat packaged dishes.
Denmark [29]	Sweet, salty and fatty foods	Young children 4-6 years of age should consume a maximum ¼ litre per week of sugary drinks, or 30g of sweet, salty, fatty foods, e.g., one chocolate biscuit, two ice lollies and one small handful of sweets per week. Children 7-9 years of age should consume a maximum 1/3 litres per week of sugary drinks, or 60g of sweet, salty, fatty foods, e.g., one chocolate biscuit, two ice lollies	You can eat a limited amount of sweet, salty and fatty food. Do not stock up on sweet, salty and fatty food to avoid being tempted to eat too much of it. Limit your intake of sweet beverages such as soft drinks, lemonade, sports- and energy drinks. Cut down on how often you eat sweets, cake, chocolate, ice cream, biscuits and chips.	Biscuits, burgers, cake, chips, chocolate, fast food, fries, ice cream, pizza and sweets.

		and two small handfuls of sweets per week. Older children and adults should consume a maximum ½ litre per week of sugary drinks or 120g of sweet, salty, fatty foods, e.g., one chocolate biscuit, two ice lollies and one bag of sweets per week.	Children should not drink energy drinks.	
Finland [20]	None specified	None specified	Limit your consumption of sugar-containing drinks to mealtimes. Cookies and biscuits should not be part of the daily diet. They can be replaced with healthier food options. Energy drinks are not recommended for children and adolescents under the age of 15 years.	Energy drinks.
Ireland [22-26]	Other foods Treat foods Foods high in fat, sugar or salt	Foods and drinks high in fat, sugar and salt not every day; limit to once or twice a week. A tiny portion once a week suitable for 1–4-year-olds is equivalent to: one square of chocolate, three crisps, half a plain biscuit or three soft sweets. Frozen pizza can be high in fat so limit it to a very small slice once a week (1-4 years). Frozen foods like chicken nuggets, burgers or chips can be high in fat and salt and should be limited to small amounts once a week.	Salt and salty foods should be limited. Everyone needs to limit these foods (foods and drinks high in fat, sugar and salt). Choose smaller portions. e.g., share a standard size or opt for 'fun size'. Not an everyday recommendation for all age groups (5-50+ years old) for both genders. It's best not to offer these foods and drinks to children aged 1-4 years old at all; however, you may give tiny amounts occasionally. Avoid sugar-containing fizzy drinks and cordials. Limit the amount of sugar-coated and chocolate-coated breakfast cereals you offer your child. Foods such as confectionery, cakes, crisps, biscuits, sugar-coated breakfast cereals,	Biscuits, cakes, chips, confectionery, crisps, fizzy drinks, crackers, frozen foods- pizza, chicken nuggets, chips, burgers, takeaway foods and sugar coated cereal.

			etc., are not recommended for 1–5-year-olds. High fat/ salt takeaways should not be part of your child's diet.	
Malta [37,38]	Processed food and sweets Limit your intake of these types of food	None specified	Do not offer sweets as a treat for good behaviour. Instead offer non-food rewards. Educate your child to avoid eating processed foods and sweets. Choose food products that contain the least amount of salt, sugar, saturated and trans fats (found in hydrogenated or partially hydrogenated vegetables oils/fat). Limit the consumption of ready-made foods containing high amounts of added sugar, salt/sodium; saturated and hydrogenated or partially hydrogenated (trans) fats. Limit consumption of sweets, sugar and fat-rich desserts, ice-cream, cakes, pastries, spreads and other confectionaries. Consume them on an occasional basis and as part of the main meal. Limit intake of fried foods, cream-based sauces, ice creams and creamy pastries, gateaux and desserts. Limit the consumption of processed meat. Avoid adding salt to your food during cooking or at the table.	Anchovies, bagged savoury snacks, brown sauces, burgers, cakes, cereal bars, chocolate, commercial nuggets, confectionary foods, cream and butter, energy drinks, fatty flavourings, fried date-rolls (imqaret), fried food, fruit drinks, fruit juices, ħelwa tat-tork, ice-cream, iced tea, meat pies and pastries, muffins, nougat, other salty savoury snacks, pasti tal-krema pastizzi, pasti u pastini, processed meats, qassatat sfineġ, salted french fries/fried potato, chips, salted processed fish, salty, savoury snacks, sundried tomatoes, salty pickled vegetables, sausages, soft drinks, soy sauce, stock cubes, salty flavouring, sweet biscuits, sweet desserts, Turkish Delight and tomato sauce.

Netherlands [30-32]	Foods not included in the Wheel of Five Choice of the day Choice of the week	Portion size of a choice of the day: A small cookie, an ice cream, a piece of chocolate, honey for yogurt or a tablespoon of tomato ketchup. Big eaters, such as growing teenagers, can take up to five servings. Less big eaters assume a maximum of three to four servings. A weekly choice is a bit bigger: A croissant, a piece of cake, a bag of chips, a glass of soft drink, a frozen pizza or a bowl of sweetened breakfast cereals. These choices will match each week, but choose no more than three servings per week in total.	Children under four years old have little room for day choices or for choices of the week due to the calorie content of such food items. Children from 4-8-years-old can be given a choice of the day as a spread on bread but preferably not as a snack. Snacks such as cookies, soft drinks and chips do not belong in the Wheel of Five. Give a young child a choice of the day as a spread on bread, but preferably not as a snack.	Cookie, ice cream, chocolate, honey, tomato ketchup, croissant, cake, chips, soft drink, a frozen pizza and sweetened breakfast cereal.
New Zealand [33-35]	High fat, sugar and salty food HFSS foods	HFSS foods and drinks can be enjoyed as occasional (less than once a week) foods only. Choose foods with the least amount of salt. Avoid high-salt foods with more than 600mg of sodium per 100g of food.	Intake of high fat, sugar and salt (HFSS) foods and drinks needs to be limited, and should not be consumed every day. Where possible, healthier choices should be made, or food adapted to be lower in fat, sugar or salt. Limit the amount of sugary drinks that you have. Fruit juices, cordials, non-diet fizzy and energy drinks all contain a lot of sugar. Limit processed meats, such as luncheon, salami, bacon and ham as they are usually high in saturated fat and/or salt.	Biscuits, cakes, chocolate, chocolate or cream-confectionery, cordial, crisps, deep-fried foods, fast food, fizzy drinks (including diet drinks), fruit drink, fruit juice, instant noodles, pastries, pies, pizza, potato chips, processed meats, savoury snacks, sports drinks, sports water and sugary drinks.
Sweden [44]	'Less'	None specified	Hold back on the sweets, pastries, ice creams and other products containing lots of sugar. Cut back on sweet drinks in particular.	Ice creams, pastries, sweet drinks and sweets.

			Choose food with less salt. Use less salt when you cook, but choose salt with iodine when you do use it.	
Switzerland [39-41]	Sweet and salty foods	Enjoy sweet and salty foods in small quantities only, either one portion of sweet food or one portion of salty food. Examples of a serving size: a row of chocolate or 20 g of chocolate spread or three pieces of petit beurre or a ball of ice cream or a small handful (20-30 g) of salty snacks or a glass (2-3 dl) of sweet drink or a glass of an alcoholic drink (e. B. 2-3 dl beer, 1 dl wine).	None Specified.	Biscuits, bubble tea, cakes, cereal bars, cola, chocolate, chocolate spread, energy drinks, flavoured and sweetened mineral water, honey, ice cream, iced tea, jam, light and zero drinks, sugar, sweet drinks, salty snacks, sweetened breakfast cereals, sweets, syrup and tonic.
United Kingdom [36]	Foods high in fat, salt and sugars Foods to eat less often and in small amounts	None specified	They should only be consumed infrequently and in small amounts. Most of us need to cut down on the amount of high fat, salt and sugar foods we eat and drinks. Use lower-fat spread instead of butter. Swap cakes and biscuits for a slice of malt loaf or a teacake with low-fat spread. If you add sugar to your food or drinks, gradually reduce the amount you add until your taste buds adapt and you can cut it out altogether. Alternatively, try using calorie-free sweetener instead. Avoid foods which are high in fat, salt and sugar. Sugary drinks have no place in a child's daily diet.	Biscuits, butter, cakes, chocolate, cream, crisps, full-sugar soft drinks, honey, ice cream, jam, mayonnaise, pastries, puddings, sauces and sweets.
United States [21]	Limit foods and beverages higher in added	For most people, 85% of their daily calorie needs are met by nutrient-dense food groups. The remaining calories (15%) are	Limit foods and beverages higher in added sugars, saturated fat, and sodium.	Cakes, candies, cookies, desserts, sugar-sweetened beverages, sweet snacks,

	sugars, saturated fat and sodium	calories available for foods with added sugars or saturated fat. This equates to 250 to 350 remaining calories.	Foods and beverages high in calories from added sugars should be limited to help achieve healthy dietary patterns within calorie limits. Sugar-sweetened beverages (e.g., regular soda, juice drinks - not 100% fruit juice -, sports drinks and flavoured water with sugar) should not be given to children younger than age 2.	sweetened breakfast cereals, sweetened coffees, sweetened tea and sweets.

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Table 3. Food based dietary guidelines relating to snacking in developed countries with developed economies, including qualitative and quantitative snacking guidelines, and recommended snacks

Country	Guidelines for snacking		Recommended snacks
	Quantitative	Qualitative	
Australia [42,43]	None specified	For children and adolescents the intake of energy-dense hot fried potato chips as a snack or with meals should be limited.	Legumes, nuts, seeds, fruit and reduced-fat yogurt.
Canada [27,28]	None specified	Cook and prepare healthy meals and snacks (and using ingredients) that have little to no added sodium, sugars or saturated fat. Stock your kitchen with healthy snacks. Plan your meals and snacks in advance to include vegetables, fruit, wholegrain and protein foods. Limit the use of highly processed spreads and dressings in your meals and snacks.	Nuts, carrots, fruit, hardboiled eggs, protein foods, vegetables and wholegrains.
Denmark [29]	None specified	None specified	Fruit and unsalted nuts.
Finland [20])	Both adults and children should eat at regular intervals (every 3-4 hours) every day which equates to 4-6 meals a day, for example, breakfast, lunch and dinner, supper and snacks.	Long intervals between meals can result in uncontrolled eating and unnecessary snacking. Offer snacks to children according to the schedule they are used to. If a meal is delayed, children can be offered snacks to ease their restlessness before a meal. Children can self-regulate their portion size, but they should be offered food more frequently than adults, which is why the quality of snacks is important. Children who are choosy eaters receive a higher intake of energy from snacks and less from the main meals than other children; thus it is especially important that the snacks of pickier eaters are balanced. Balanced snacks are important as well. The energy content of meals and snacks must be sufficient.	Bread rolls, fruit, juice, karelian pasties, nuts, vegetables and yogurt.

Ireland [22-26]	1-to-4-year-old children have small tummies. They can only eat small amounts. Offer them three meals and two to three healthy snacks every day. All their food and drink needs to be nourishing.	Having regular times for meals and snacks sets up healthy eating habits for life. Some days your child may be hungrier than others and need filling, healthy snacks between meals. Buy very little unhealthy snack foods like biscuits, chocolate and sweets. Base a child's meals and snacks on fresh foods when possible. Snacking on sugary foods and drinks should be avoided. Healthy snacking is all about eating fruits, vegetables, low-fat dairy and high-fibre breads and cereals instead of high-fat, high-sugar and high-salt snacks and confectionery. Sensible Snacking for Weight Control: extra fruit and vegetables - filling up on these foods will not increase weight. Still hungry? Extra cereal, yoghurt or milk (nutritious calories) make a good choice. Biscuits, cakes and confectionery should be the last option. These foods are high in fat and calories but are not filling.	Banana bread, banana on brown bread, baked apple slices, 1/2 bagel with peanut butter, beans on wholemeal toast, breadsticks with hummus, cheese, crackers with cheese, cucumber sticks, fresh fruit, fromage frais, hardboiled egg, homemade rice pudding, low-fat yogurt, milk, rice cakes, salad, slice of toast with mashed or chopped banana, small portion homemade soup, small portion of breakfast cereal and milk, small slice of fruit loaf, vegetables, 1/2 wholemeal scone with spread, raspberry, wholemeal salad sandwich, scrambled eggs on brown bread and whole fruits.
Malta [37,38]	Three main meals are usually eaten daily; and some people may include one or two smaller snacks throughout the day.	Include whole grains such as oats, couscous, quinoa, bulgur wheat, barley, and millet, pasta and rice with meals and snacks. Educate your child about healthy choices. Guide and encourage them to choose nutritious foods and snacks.	Legume-based dips, hummus dip, slices of vegetables, spread on toast, plain yogurt.

New Zealand [33-35]	Three meals and two to three small snacks, at regular times during the day, are recommended for children and young people. Snacks can be considered 'mini-meals' that make a valuable contribution to energy and nutrient intake between main meals. Many children will need snacks mid-morning and mid-afternoon, while after-dinner snacks can also be included for older children, especially during the adolescent growth spurt. The size and timing of snacks need to be considered with the aim of not interfering with appetite for main meals.	Prepare foods or choose pre-prepared foods, snacks and drinks that are low in fat, especially saturated fat, low in sugar, especially added sugar, low in salt (if using salt, use iodised salt). Offer mainly healthy and nutritious snacks. The ideal snacks provide energy, protein, carbohydrate, vitamins, minerals, dietary fibre and a good balance of dietary fats. However, foods high in fat, sugar and salt and low in vitamins, minerals and fibre are commonly produced, packaged and marketed as appropriate snacks for children and young people. Don't encourage continuous eating or grazing – stick to set meal and snack times. Choose healthy snacks that are low in fat, salt and sugar. Don't give popcorn to children under 3 years of age.	Fruit, fresh fruit smoothie, vegetable sticks with a low-fat dip (e.g., hummus or yoghurt-based dips), mini-sandwiches, plain popcorn, nuts and seeds, unsweetened breakfast cereal with milk, and yogurt.
Sweden [44]	None specified	Eat when you're hungry, but not every time you fancy eating something. Have breakfast, lunch and dinner and maybe a tasty snack between meals.	Unsalted nuts.
United Kingdom [36]	None specified	Remember to keep fruit in your bag as a convenient and healthy snack.	Fruit.
United States [21]	None specified	Choose whole fruits as snacks and include them in meals. Young children are fully reliant on others to provide their meals and snacks. Snacks can be used as a way to promote the intake of nutrient-dense fruits and vegetables like carrot sticks and hummus or apple slices rather than chips or cookies.	Fruits, hummus, fat-free or low-fat yogurt and vegetables.

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