

# Diet and Nutrition Survey of Infants and Young Children in Scotland, 2011

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## Glossary

BIS	Bias index score
BMI	Body mass index
BTF	Blood tracking form
CASI	Computer assisted self-interview
CAPI	Computer assisted personal interview
CB	Child Benefit
CLIA	Chemiluminescence immunoassay
CO <sub>2</sub>	Carbon dioxide
COMA	Committee on Medical Aspects of Food and Nutrition Policy
CRF	Clinical Research Facility
CRP	C-reactive protein
DAPA	Diet and Physical Activity
DH	Department of Health
df	Degrees of freedom
DEQAS	Vitamin D External Quality Assessment Scheme
DNSIYC	Diet and Nutrition Survey of Infants and Young Children
DOB	Date of birth
DRV	Dietary Reference Value
EAR	Estimated Average Requirement
EDTA	Ethylenediaminetetraacetic acid
FBC	Full Blood Count
FSA	Food Standards Agency
FTP	File transfer protocol
g	grams
g/dL	grams per decilitre
GP	General Practitioner
HMRC	Her Majesty's Revenue and Customs
HNR	Human Nutrition Research
HRP	Household Reference Person
HS	Healthy Start
IDAS	Interviewer Diary Assessment Schedule
IFS	Infant Feeding Survey
IMD	Index of Multiple Deprivation
IMS	Intrinsic and milk sugars
kcal	kilocalorie
LRNI	Lower Reference Nutrient Intake
MAFF	Ministry of Agriculture, Fisheries and Food
MJ	Megajoules
ml	millilitres
MRBIS	Mean rolling bias index score
MRC	Medical Research Council

MRC HNR	Medical Research Council Human Nutrition Research
MRVIS	Mean running variance index score
MS	Microsoft
N <sub>2</sub>	Nitrogen
nmol/L	nanomoles per litre
NatCen	NatCen Social Research
NBA	Nutritional BioAnalysis
NDNS	National Diet and Nutrition Survey
NEQAS	National External Quality Assessment Service
NHS	National Health Service
NI	Northern Ireland
NIHR CRN	National Institute for Health Research Clinical Research Network
NISRA	Northern Ireland Statistics and Research Agency
NMES	Non-milk extrinsic sugars
NS-SEC	National Statistics Socio-economic Classification
NSP	Non-starch polysaccharides
PAL	Physical activity level
PETIA	Particle enhanced turbidimetric immunoassay
PSUs	Primary Sampling Units
QA	Quality Assurance
QC	Quality Control
R&D	Research and Development
REC	Research Ethics Committee
RLU	Relative light units
RNI	Reference Nutrient Intake
SACN	Scientific Advisory Committee on Nutrition
sd	Standard deviation
SE	Standard error
SLAP	Standard Light Antarctic Precipitation
SMOW	Standard Mean Ocean Water
TfR	Transferrin receptor
TMB	Tetramethylbenzidine
µg	micrograms
µg/l	micrograms per litre
UK	United Kingdom
WHO	World Health Organization
WTCRF	Wellcome Trust Clinical Research Facility
2H <sub>2</sub> O	Deuterium
25-OHD	25-hydroxyvitamin D



## Notes to text and tables

- 1 The data used in the report have been weighted. The weighting is described in Appendix B of this report. Unweighted sample sizes are shown at the foot of each table.
- 2 A weighting factor for non-response at the interview stage was used.
- 3 The data were analysed in SPSS version 20/21 using the complex surveys module.
- 4 The following conventions have been used in tables:
  - no observations (zero value)
  - 0 non-zero values of less than 0.5% and thus rounded to zero
  - [ ] used to warn of small sample bases, if the unweighted base is less than 50.
- 5 Because of rounding, row or column percentages may not add exactly to 100%.
- 6 A percentage may be quoted in the text for a single category that aggregates two or more of the percentages shown in a table. The percentage for the single category may, because of rounding, differ by one percentage point from the sum of the percentages in the table.
- 7 Values for means, medians, percentiles, standard deviations and standard errors are shown to an appropriate number of decimal places. For reasons of space, Standard Error may sometimes be abbreviated to SE and Standard Deviation to sd.
- 8 Where no result is available a missing value code has been assigned and the data are omitted from all tables and analyses. 'Missing values' occur for several reasons, including refusal or inability to answer a particular question; refusal to participate in an entire section of the survey (such as a self-completion questionnaire); cases where the question is not applicable to the participant; where a measurement has been removed as an outlier; and where a sample is invalid.
- 9 The group to whom each table refers is stated at the upper left corner of the table.
- 10 In chapters 3, 4, 5 and 6 differences highlighted in the text have been statistically tested at the 95% significance level. The term 'significant' refers to statistical significance and is not intended to imply substantive importance.

## **Executive summary**

### **Introduction**

The Scottish Government and the Food Standards Agency in Scotland (FSAS) funded a boost to the Department of Health (DH) and Food Standards Agency (FSA) commissioned Diet and Nutrition Survey of Infants and Young Children (DNSIYC)<sup>1</sup>. This report, the Diet and Nutrition Survey of Infants and Young Children in Scotland (DNSIYCS) provides the only source of high quality nationally representative detailed information on food consumption and nutrient intakes of infants and young children aged 4 up to 18 months<sup>2</sup> living in private households in Scotland. It will contribute to a robust evidence base for work in Scotland to develop and implement sound public health policies and food safety assessments. Results from this and other surveys carried out in Scotland will be invaluable in informing the progress of the Maternal and Infant Nutrition Framework for Action<sup>3</sup>, which was launched in January 2011. This framework for action can be taken by NHS Boards, local authorities and others to improve the nutrition of pregnant women, babies and young children.

The survey was carried out by a consortium of organisations: Medical Research Council Human Nutrition Research (MRC HNR), NatCen Social Research (NatCen), the MRC Epidemiology Unit and the Human Nutrition Research Centre at Newcastle University. Fieldwork was carried out between January and May 2011. Additional recruitment was undertaken among those in receipt of Healthy Start (HS)<sup>4</sup> vouchers in order to provide more detailed analysis of these populations.

### **Methods**

The key components of the survey carried out in the participant's home were:

- Detailed face-to-face interview to collect background information on family dietary habits, socio-demographic status and health information, feeding practices, eating patterns, developmental stages, sunlight exposure and gastrointestinal symptoms.
- Dietary data collection (estimated food diary, completed for four consecutive days) to provide a quantitative estimate of food consumption and nutrient intakes.
- Physical measurements (height and weight of mother; length, weight and head circumference of child).

### **Response rates and sample**

Of the 987 individuals living in Scotland sampled from Child Benefit Records, 97% were eligible to take part in the survey. Of these, 65% were fully productive, i.e. three or four dietary recording days<sup>5</sup> were completed resulting in a sample size of 616 fully productive

individuals. Weighting factors were applied to ensure that the results were representative of the Scottish population of children according to 2011 Child Benefit data.

The profile of the achieved Scotland sample was very close to that of the population of infants and young children in the United Kingdom (UK) in terms of age and sex and region, but not ethnicity. After applying weighting factors, 95% of children in DNSIYCS were white, a higher proportion than in the UK sample (82%). There was a wide range of socio-economic circumstances for the children in the survey; larger proportions of their parents were home owners (55%) than living in rented accommodation (42%). This compared to 47% and 46% respectively for the UK sample. A fifth (19%) received Healthy Start (HS) vouchers, a similar proportion to the UK sample.

## **Contents of this report**

The results in this report cover the following areas:

- Sample characteristics including use of child care, smoking and drinking habits of family members, neurological development, medical history, sun exposure and maternal characteristics
- Physical measurements
- Feeding practices
- Food consumption
- Use of dietary supplements
- Energy, macronutrients and micronutrient intake

## **Recommendations for infant feeding, diet and nutrition**

The Scottish Government recommends that:

- Mothers exclusively breastfeed for the first six months of the child's life<sup>4,6</sup>.
- Breastfeeding mothers should take vitamin D supplements of 10µg per day<sup>7</sup>.
- Scottish Government guidance regarding the safe preparation, storage and handling of infant formula should be followed if parents choose to formula feed their babies, for example: Powdered formula should be made up as needed, with boiled water that has been allowed to cool for no more than 30 minutes<sup>8</sup>.
- Follow-on formula, 'toddler' and 'Goodnight' milks are not nutritionally necessary. If formula feeding, whey based infant formula is recommended until the child is one year of age<sup>9</sup>.
- Soya based formula should not be given unless recommended by a health professional and goat's milk formula should not be given to infants under one year<sup>9,10</sup>.

- At six months of age suitable complementary foods<sup>11</sup> should be introduced alongside continued breastfeeding (and/or breast milk substitutes, if used)<sup>6</sup>.
- Cow's milk should not be introduced as a main drink until after 12 months<sup>9</sup>.
- Semi-skimmed milk can be given as a drink from two years of age, provided the child is a good eater and growing well. Skimmed and 1% milk should not be given as a drink until five years of age<sup>9</sup>.
- Salt should not be added to children's food<sup>12</sup>.
- Vitamin A, C and D supplements should be given from six months unless the child is formula fed and receiving more than 500ml of formula per day. Breastfed infants born to mothers with a low vitamin status may require supplements earlier, from the age of one month<sup>13</sup>.
- From about six months mothers should start to introduce infants to drinking from cups and beakers<sup>9</sup>.
- Tooth brushing twice a day should begin as soon as teeth begin to appear<sup>14</sup>.

Adequacy of nutrient intake for the population is assessed by comparing intake with age/sex specific UK Dietary Reference values (DRVs)<sup>7</sup>. The only DRVs set for this age group for macronutrients are an Estimated Average Requirement (EAR) for energy<sup>15</sup> and a Reference Nutrient Intake (RNI) for protein. For vitamins and minerals, mean intakes as a proportion of the RNI and the proportion with intakes below the Lower Reference Nutrient Intake (LRNI) are given. The RNIs and LRNIs set for each vitamin and mineral are shown in tables 6.22 and 6.33.

Results are presented for four age groups: 4 to 6 months, 7 to 9 months, 10 to 11 months and 12 to 18 months.

### **Methodological issues**

Mis-reporting of food consumption is known to be a problem in all dietary surveys, although it is generally considered to be less of an issue for younger children than adults. It is not known to what extent it is a problem for infants and young children aged 4 to 18 months. Biased estimates of intake can result from under- or over-reporting of actual intake or intake being modified during the recording period. In this age group there is a particular risk of over-reporting due to an underestimation of food wastage. There is also day-to-day variation in diet, making it difficult to capture habitual diet over the short assessment period of four days. The potential for some mis-reporting needs to be borne in mind when interpreting findings from this survey. Evidence suggests that some foods and nutrients may be under- or over- reported to a greater extent than others, but there is no information available on the extent to which different foods and nutrients are misreported in the survey.

## Key Findings

### Overall findings

Infants and young children aged 4 to 18 months in DNSIYCS were reported to consume a varied diet; dietary recommendations were generally met by the majority of the survey population. Food consumption patterns and macro and micronutrient intakes were in general very similar in Scotland as for the UK.

The proportion of children who had ever been breastfed was lower in DNSIYCS (68%) than in the UK DNSIYC sample (78%), and lower than the Scottish results in the Infant Feeding Survey (IFS) of 2010<sup>16</sup> (74%). Thirty two per cent of infants had never been breastfed, and of those who were breastfed, 65% were not breastfed beyond three months of age. Infant formula was the largest contributor to energy intake for children aged under 12 months (28% to 56%) while the food category 'milk and milk products' was the largest contributor (27%) for those aged 12 to 18 months, similar to the UK.

A progression in ability to eat pureed and lumpy foods, finger foods, drink from a cup or beaker with a spout, and use of a spoon was reported with age. Most of the children who had food other than milk 'almost always' or 'sometimes' (62%) had the same food as their parents, or 'sometimes' had a different meal to, but prepared by, their parents (49%). A substantial proportion (23%) 'never' had the same food as their parents, although this was more common for younger children. Over half (59%) of children who had food other than milk had eaten a commercial baby or toddler meal and a fifth had eaten a commercially prepared adult ready meal, which was similar to the UK. Baby rice was the most common first food for children in DNSIYCS (63%), followed by pureed fruit or vegetables (18%).

Mean total fruit and vegetable consumption, including the contribution from mixed dishes, was relatively high (similar to consumption in teenagers<sup>17</sup>) ranging from 96g per day for children aged 4 to 6 months to 176g per day for those aged 12 to 18 months, equivalent to one to two 80g adult portions per day. When tested statistically, results were similar to the UK with the exception of fruit consumption, which was significantly higher in Scotland for children aged 4 to 11 months.

White bread was the most commonly consumed bread in children aged 7 to 18 months (consumed by 36% to 69% across the age groups). At least 27% of children in these age groups consumed wholemeal bread. Breakfast cereal consumption increased with age, so that over 80% of those 12 to 18 months consumed this in the four day period. The proportion of children consuming biscuits (72% for the highest age group); 'buns, cakes, pastries and fruit pies' (34% the highest); savoury snacks (42% the highest); and 'sugar, preserves and confectionery' (65% the highest) increased with age.

Mean consumption of beverages other than milk increased with age, with the most frequent consumption in older age groups, after milk and water, being low calorie soft drinks, consumed by 4% of those aged 4 to 6 months, rising to 51% of those aged 12 to 18

months. Fruit juice was consumed by 9% of children aged 4 to 6 months rising to 25% of those aged 12 to 18 months. The food category 'yoghurt, fromage frais and other dairy desserts' was consumed by 48% of children aged 4 to 6 months, rising to 82% of those aged 12 to 18 months.

In general, children in DNSIYCS were taller (i.e. longer), heavier and had larger head circumferences than the UK-WHO Growth Standard for their age and sex. This was also seen for the UK sample. This might be partially explained by the predominance of formula feeding by this group at the time of the survey, as predominantly formula fed children are on average larger for their age compared to exclusively or predominantly breastfed children on which these growth standards are based. Research shows that breastfed children tend to gain weight at a slower and healthier pace. At age 4 to 11 months, both boys and girls in DNSIYCS were significantly taller (longer) than those in the DNSIYC UK sample. Girls in Scotland also had significantly greater average weight and head circumference measurements across the age groups than the UK sample.

### **Findings relevant to recommendations**

- Thirty two per cent of infants had never been breastfed, and of those who were breastfed, 65% were not breastfed beyond three months of age.
- Fifty seven per cent of breastfeeding mothers in Scotland reported taking any type of supplement, most often a multi-vitamin and mineral supplement, which was taken by 35% of breastfeeding mothers. The proportion taking supplements containing vitamin D is not known.
- The majority of children in the survey were drinking infant formula at the time of the survey, except in the oldest age group of 12 to 18 months. The majority of parents feeding their child infant formula in the home followed recommendations for preparation. For example, 75% reported making up the formula as needed and 68% used water that had been left to cool for no longer than 30 minutes. When feeding outside of the home however, the majority did not follow recommendations; for example, 54% made up formula using cold or cooled water. Results were similar to the UK sample.
- Twenty seven per cent of infants aged 4 to 6 months consumed follow-on formula, which is not recommended before six months and is not nutritionally necessary.
- Seventy seven per cent of children were given food apart from milk before six months of age, and were therefore not in compliance with the recommendation to delay the introduction of solids to six months.
- Thirteen per cent of children aged 4 to 6 months consumed whole cow's milk over the survey period, increasing to 80% of those aged 12 to 18 months. Children aged below 10 months consumed less than a quarter of a pint (146g) of whole milk per

day, generally in keeping with the recommendation. Among consumers aged 10 to 11 months however, consumption was greater at 189g per day.

- A small proportion of children consumed semi-skimmed milk, 4% of infants aged 4 to 6 months increasing to 12 to 13% of children aged 10 to 18 months. Small proportions of children consumed 'other milk and cream' including 1% milk, skimmed milk, increasing from 0% of those aged 4 to 6 months to 9% of those aged 12 to 18 months.
- For those children who had food other than milk, most parents (89%) reported never adding salt to the child's food.
- Over the four-day food diary period, 6% to 9% of children were given a micronutrient supplement, most often a multi-vitamin supplement. In relation to vitamin D exposure, nearly half of all infants and young children had been outside between the hours of 10am and 3pm every day in the previous seven days before the interview. Most had not been on a holiday with strong sun in the previous year.
- The proportion of children who had ever drunk from a cup or beaker with a spout increased with age, from 63% of those aged 4 to 6 months to 95% of those aged 12 to 18 months.
- A toothbrush was reported to be used at least once every day for 84% of children with at least one tooth. There was greater compliance with recommendations for brushing of teeth of young children in Scotland than in the UK sample.

### **Key findings in relation to the DRVs**

- Seventy seven per cent of boys and 74% of girls exceeded the EAR for energy.
- Mean protein intakes were well above the RNI in all age groups.
- Mean daily intakes of vitamins and minerals from all sources (including supplements), were above or close to the RNI for all age groups with the exception of vitamin D for non-breastfed children aged 12 to 18 months and for breastfed children (by any degree of breastfeeding), across all age groups, although these are underestimates as they do not include the contribution of breast milk to vitamin D intake.
- The proportion of children with daily intakes of vitamins and minerals from all sources below the LRNI was low (8% or less for all age groups) except for iron for children aged over 7 months (11% to 17%) and magnesium for infants aged 4 to 6 months (11%).
- Mean daily intakes of sodium were only 79% of the RNI for children aged 4 to 6 months, but increased to 203% for children aged 12 to 18 months. This equates to an intake of 2.5g salt per day for children aged 12 to 18 months, exceeding the population goal for this age group of no more than 2g salt per day.

## **Comparisons of dietary data to the UK report**

There were no statistically significant differences in intakes of energy and non-milk extrinsic sugars (NMES), and key vitamins and minerals between DNSIYCS and the UK sample, with the exception of vitamin C intake, which was significantly lower for children aged 12 to 18 months in Scotland when compared to the UK. Comparisons for intakes of protein, fat, carbohydrate, other sugars, non-starch polysaccharides and other micronutrients, were not tested for significance, but appeared similar between Scotland and the UK.

## **Dietary habits of mothers collected during the interview**

Diets of mothers in Scotland were largely similar to those in the UK sample, although mothers in Scotland reported eating crisps and sweets more frequently, drinking sweetened drinks more often, being more likely to use butter as spread, less likely to eat oily fish frequently and to have fresh vegetables available in the home. There were some encouraging aspects of the mothers' diets overall, such as the high proportion who had breakfast every day, did not eat the fat on meat and consumed water rather than other drinks when thirsty. As in the UK sample, the diets of older mothers were reported as generally healthier than younger mothers. As seen in the UK sample, there were some examples of mothers representing opposite ends of the health awareness and behaviour spectrum. For example, the two most common responses to use of salt were either 'always' adding salt to food or 'never' adding salt to food. This was also seen in the choice of diet or low calorie soft drinks, where 'always' and 'never' were the answers chosen most often. Most mothers (86%) were aware of the recommendation that five portions of fruit and vegetables should be eaten daily, but far fewer were aware of the recommendations for salt (13%) and oily fish (11%).



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## References and endnotes

<sup>1</sup> Details of the Diet and Nutrition Survey of Infants and Young Children UK report are available online: <http://www.dh.gov.uk/en/index.htm>

<sup>2</sup> Includes children aged up to 17 months and 28-31 days.

<sup>3</sup> 'Improving Maternal and Infant Nutrition: A Framework for Action' Scottish Government 2011. Available online: <http://www.scotland.gov.uk/Publications/2011/01/13095228/0>

<sup>4</sup> Healthy Start is a Government scheme set up to offer a nutritional safety net for pregnant women, new mothers and children under 4 years of age in very low income families, and encourage them to eat a healthier diet. The scheme provides vouchers to put towards the cost of milk, fruit and vegetables or infant formula, and coupons for free Healthy Start vitamin supplements, (see Annexe A of the main UK report for more details).

<sup>5</sup> Respondents completing three or four diary days were considered fully productive.

<sup>6</sup> [http://www.who.int/nutrition/topics/complementary\\_feeding/en/index.html](http://www.who.int/nutrition/topics/complementary_feeding/en/index.html)

<sup>7</sup> Report of Health and Social Subjects 41 *Dietary Reference Values (DRV's) for Food Energy and Nutrients for the UK*. Report on the Panel on DRV's of the Committee on Medical Aspects of Food Policy (COMA) 1991. The Stationery Office. London

<sup>8</sup> The key recommendations for making and storing powdered infant formula are:

- Feeds should be made up with boiled water that has been allowed to cool to no less than 70°C. Thus the feed should be made within 30 minutes after the water has boiled.
- When making the feed the boiled water should be added to the bottle first, followed by the correct amount of powdered formula.
- Once the feed is prepared it should be cooled as quickly as possible to feeding temperature.
- Ideally, powdered formula should be made up fresh for each feed rather than being stored. Although not ideal, feeds can be made up and stored below 5°C for a maximum of 24 hours.
- If mothers need to feed their infant when away from home they should make up fresh feeds as they need them, following the recommendations above.
- It is suggested that mothers may consider carrying a flask of just boiled water with them when away from the home. Alternatively, mothers could use a liquid ready-to-feed formula when away from home

NHS Health Scotland 'Formula Feeding: How to feed your baby safely 2011.  
<http://www.healthscotland.com/documents/5523.aspx>

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- <sup>9</sup> NHS Health Scotland Drinks for babies and young children 2012. Available online: <http://www.healthscotland.com/documents/5064.aspx>
- <sup>10</sup> Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment. 1996. Statement on Phytoestrogens. <http://cot.food.gov.uk/pdfs/cotstatementphyto96.pdf>
- <sup>11</sup> Complementary foods/feeding: the period where infants make the gradual transition from liquid foods to eating solid and family foods.
- <sup>12</sup> NHS Health Scotland, Fun First Foods. 2012. <http://www.healthscotland.com/documents/4276.aspx>
- <sup>13</sup> Department of Health. 1994. Weaning and the weaning diet. Report on health and social subjects, 45. HMSO, London.
- <sup>14</sup> NHS Health Scotland, Oral Health and Nutrition Guidance for Professionals, 2012. Available online: <http://www.healthscotland.com/documents/5885.aspx>
- <sup>15</sup> Scientific Advisory Committee on Nutrition. *Dietary Recommendations for Energy*. The Stationery Office (London, 2011).
- <sup>16</sup> The Infant Feeding Survey (IFS) is a longitudinal postal survey carried out every five years, which collects information on infant feeding practices across the UK for infants aged 4 weeks to 10 months. Available online: <http://www.ic.nhs.uk/statistics-and-data-collections/health-and-lifestyles-related-surveys/infant-feeding-survey/infant-feeding-survey-2010>
- <sup>17</sup> Bates B, Lennox A, Prentice A, Bates C, Swan G (2012) National Diet and Nutrition Survey; Headline results from Years 1, 2 and 3 (combined) of the Rolling Programme (2008/09- 2010/11) [Online]. Available online: [http://www.natcen.ac.uk/media/978078/ndns-y3-report\\_all-text-docs-combined.pdf](http://www.natcen.ac.uk/media/978078/ndns-y3-report_all-text-docs-combined.pdf)

## Chapter 1 Background and purpose

### 1.1. Introduction

The Scottish Government and the Food Standards Agency in Scotland (FSAS) funded a boost to the Department of Health (DH) and Food Standards Agency (FSA) commissioned Diet and Nutrition Survey of Infants and Young Children (DNSIYC). This report provides detailed information on food consumption and nutrient intakes of infants and young children in Scotland, which will be used to provide a robust evidence base for work in Scotland to develop and implement sound public health policies.

Breast milk is the ideal form of nutrition for infants and exclusive breastfeeding<sup>1</sup> is recommended for the first six months (26 weeks) of an infant's life<sup>2,3</sup>. The Scottish Government has adopted as policy the World Health Organisation guidance recommending exclusive breastfeeding for the first six months of an infant's life, and recommends around six months as the age for introduction of complementary foods<sup>4,5</sup>. Breastfeeding (and/or breast milk substitutes, if used) should continue beyond the first six months, and for as long as the mother wishes. Complementary feeding should be adequate, meaning that the complementary foods should be given in quantities and at a frequency and consistency that will meet the nutritional needs of the growing child while maintaining breastfeeding and/or feeding breast milk substitutes. A variety of foods should be used. The current feeding policy for infants and young children is designed to optimise nutrition at a specific stage of growth and development. Therefore, food and nutrient intakes should not be compared to nutrient guidelines set for older children or adults.

In January 2011, the Scottish Government published a framework to improve the nutritional health of both mothers and infants in Scotland entitled "Improving Maternal and Infant Nutrition: A Framework for Action"<sup>3</sup>. It is the first framework which looks at the nutrition of mothers before and during pregnancy, supports and promotes the benefits of breastfeeding and the importance of a healthy diet throughout early childhood. The framework was developed on the principles outlined in Better Health, Better Care<sup>6</sup>, Getting it Right for Every Child<sup>7</sup> and the NHS Healthcare Quality Strategy<sup>8</sup>. It stresses the importance of nutrition in the earliest years for long term health and wellbeing, and provides case studies demonstrating good practice already in place across Scotland. The framework action plan contains a number of actions to be taken forward by NHS Boards and other responsible organisations, designed to promote optimal nutrition for pregnant women, infants and young children and support parents to provide a healthy diet for their families.

In Scotland, the Scottish Government will obtain comprehensive information on the dietary habits and nutritional status of the Scottish population through a boost of the National Diet and Nutrition Survey (NDNS)<sup>9</sup> rolling programme, which is conducted on a sample of the UK population, including Scotland, aged 1½ years and over. Results for Scotland will be published early in 2014. However, the current NDNS rolling programme, and earlier

surveys including the survey of children aged 1½ to 4½ years (1995)<sup>10</sup>, do not collect information on those under 18 months of age. The last national survey of infants, an investigation of food and nutrient intakes of British infants aged 6 to 12 months<sup>11</sup>, was commissioned by the Ministry of Agriculture, Fisheries and Food (MAFF) and carried out in 1986/87. Since 1975, information about feeding practices of infants and young children up to the age of 10 months has been derived from the Infant Feeding Survey (IFS)<sup>12</sup>, which is currently carried out every five years, with support from the Scottish Government and the General Registrar of Scotland as well as the equivalent organisations from the other countries of the UK. However, the IFS does not collect information on actual quantities of foods consumed. Government advice on breastfeeding, complementary feeding and dietary habits has changed since the last dietary survey of this age group was carried out in the 1980s indicating a call for more current information. There was therefore a need to address the gap in the evidence base for this age group.

Following a tendering process, DH and the FSA commissioned a consortium comprising MRC Human Nutrition Research (HNR) based in Cambridge, NatCen Social Research<sup>13</sup> (NatCen) based in London, the MRC Epidemiology Unit based in Cambridge and the Human Nutrition Research Centre at Newcastle University to carry out DNSIYC, a survey of infants and young children aged 4 months up to 18 months in the UK<sup>14</sup>. The fieldwork in Northern Ireland (NI) was carried out by the Northern Ireland Statistics and Research Agency (NISRA).

DNSIYC provides detailed information on the diet and nutrition of individuals aged 4 up to 18 months<sup>15</sup>, from private households. The data from DNSIYC will be used alongside data from NDNS to provide a fuller picture of the diet and health of the nation, than is possible from data previously available, starting from the age at which complementary feeding typically begins. This will support public health policy and food safety assessments. The survey was carried out in all four countries of the United Kingdom (UK) and was designed to be representative of the UK population. Additional recruitment was undertaken in Scotland and among those in receipt of Healthy Start (HS) vouchers<sup>16</sup>, in order to provide more detailed analysis of these populations. This report summarises the results of the Diet and Nutrition Survey of Infants and Young Children in Scotland (DNSIYCS), which was commissioned as part of DNSIYC in the UK. The results for HS sample in Scotland are presented in Chapter 6 of this report. The UK DNSIYC survey forms a separate report published on the DH website and details of the boosted UK Healthy Start sample are presented in Annexe A of the UK report.

DNSIYCS provides important background data about the dietary intakes of children from 4 up to 18 months to inform the programmes resulting from the launch of the maternal and infant nutrition framework.

The UK survey involved two stages; Stage 1 consisted of a series of home visits to collect background information and carry out the dietary assessment components of the survey, as well as physical measurements of the child (length, weight and head circumference)

and mother (height and weight); Stage 2 was a clinic visit consisting of additional physical measurements of the child (skinfold thickness measurements), measurement of body composition of the child, and estimation of breast milk and fluid intake using stable isotopes. A blood sample was also taken from the child for assessment of iron and vitamin D status.

This report presents findings from the survey for Scotland. The Scottish survey was a dietary survey only and did not report results for the clinic stage of the survey as Scottish boost participants were not invited to attend a clinic. Fieldwork was carried out between 6 January 2011 and 23 May 2011. Pilot work to test methods of the survey is reported in Annexes B and C of the UK report.

The aims of DNSIYCS were therefore to:

- Provide detailed, quantitative information on the food and nutrient intakes and sources of nutrients of a representative sample of infants and young children aged 4 to 18 months from the Scottish population, as a basis for developing government policy and measuring progress towards government objectives.
- Provide detailed, quantitative information on breast milk and breast milk substitutes consumed by the population group under study.
- Describe the characteristics of participants with intakes of specific nutrients that are above and below national reference values, and evaluate the diet of this population compared to current national recommendations.
- Contribute to a database of food consumption to provide the basis for the calculation of likely dietary intakes of natural toxicants, contaminants, additives and other food chemicals for risk assessment.
- Provide height (length), weight and head circumference and examine their relationship with dietary intake and health and social factors.
- Examine the extent to which feeding practices adopted by carers of this population group differ from national policy for infant health.
- Provide some information on the dietary habits of the mother (and other key family members) and link this to the nutrient intakes of this population group.

National recommendations for nutrient intakes are listed in relevant chapters.

## 1.2. Structure of this report

The following chapters detail the methods and results for the Scotland sample, including the boosts.

- Chapter 1: Background and purpose of DNSIYC and DNSIYCS
- Chapter 2: Preliminary studies, research designs and methodology
- Chapter 3: Sample characteristics and survey response rates
- Chapter 4: Physical measurements
- Chapter 5: Feeding practices
- Chapter 6: Food consumption and nutrient intakes

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## References and endnotes

- <sup>1</sup> Exclusive breastfeeding: the infant only receives breast milk without any additional food or drink, not even water.
- <sup>2</sup> World Health Organization. The optimal duration of exclusive breastfeeding: Report on an expert consultation. Geneva (2001)
- <sup>3</sup> Improving Maternal and Infant Nutrition: A Framework for Action Scottish Government 2011. Available online at: <http://www.scotland.gov.uk/Publications/2011/01/13095228/0>
- <sup>4</sup> Complementary foods/feeding: the period where infants make the gradual transition from liquid foods to eating solid and family foods.
- <sup>5</sup> [http://www.who.int/nutrition/topics/complementary\\_feeding/en/index.html](http://www.who.int/nutrition/topics/complementary_feeding/en/index.html)
- <sup>6</sup> Better Health, Better Care. Scottish Government, 2007. Available online: <http://www.scotland.gov.uk/Publications/2007/12/11103453/0>
- <sup>7</sup> Getting it Right for Every Child. Scottish Government, 2007. Available online: <http://www.scotland.gov.uk/Publications/2007/01/22142141/4>
- <sup>8</sup> NHS Scotland Quality Strategy - putting people at the heart of our NHS. Scottish Government, 2010. Available online: <http://www.scotland.gov.uk/Publications/2010/05/10102307/0>
- <sup>9</sup> The National Diet and Nutrition Survey (NDNS) is a UK survey of the food consumption, nutrient intakes and nutritional status of people aged 1.5 years and older living in private households. The NDNS is currently structured as a 'rolling programme' of continuous fieldwork. Headline results are published annually: [http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsStatistics/DH\\_128166](http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsStatistics/DH_128166)
- <sup>10</sup> Gregory J, Collins DL, Davies PSW, Hughes and Clarke PC. National Diet and Nutrition Survey: Children aged 1½ to 4½ years. Volume 1: Report of the diet and nutrition survey. HMSO (London: 1995)
- <sup>11</sup> Mills A. and Tyler H. Food and Nutrient intakes of British infants Aged 6-12 months 1992. The Stationery Office
- <sup>12</sup> The Infant Feeding Survey (IFS) is a longitudinal postal survey carried out every five years, which collects information on infant feeding practices across the UK for infants aged 4 weeks to 10 months. Available online: <http://www.ic.nhs.uk/statistics-and-data-collections/health-and-lifestyles-related-surveys/infant-feeding-survey/infant-feeding-survey-2010>

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<sup>13</sup> Previously called the National Centre for Social Research (NatCen)

<sup>14</sup> Details of the Diet and Nutrition Survey of Infants and Young Children UK report are available online at: <http://www.dh.gov.uk/en/index.htm>

<sup>15</sup> Includes children aged up to 17 months and 28-31 days.

<sup>16</sup> Healthy Start is a Government scheme set up to offer a nutritional safety net for pregnant women, new mothers and children under 4 years of age in very low income families, and encourage them to eat a healthier diet. The scheme provides vouchers to put towards the cost of milk, fruit and vegetables or infant formula, and coupons for free Healthy Start vitamin supplements, (see Annexe A of the main UK report for more details).



## Chapter 2 Methodology

### 2.1. Preliminary/development work

A series of pilot studies were undertaken to determine the best way to measure what infants and young children eat and drink in a national survey such as the Diet and Nutrition Survey of Infants and Young Children (DNSIYC) and to assess the use of utensils in the estimation of portion sizes in this age group. This pilot work was undertaken by the Human Nutrition Research Centre at Newcastle University. In addition a Dress Rehearsal of the entire protocol was conducted by the survey consortium to ensure all components of the survey were effective and viable. These preliminary studies covered:

- A consultation designed to ascertain from mothers their views on the most convenient and feasible way of measuring children's food consumption.
- Two pilot studies to test food diaries and equipment.
- A Dress Rehearsal to test the overall response to the survey and all components included in the protocol.

See Annexe B of the UK report for details of the consultation and pilots and Annexe C of the UK report for details of the Dress Rehearsal.

The following recommendations were made at the end of the pilot work:

- The mean food intake (g) and mean energy intake (kcal) recorded by the estimated intake<sup>1</sup> method, supported by the use of measuring tubs and spoons, were statistically different to those of weighed intakes. The estimated intake method slightly underestimated the amount of food (on average 17g) and slightly overestimated energy intake (on average 32kcal). All estimates of food intake and 92% of estimates of energy intake lay within 50% of the weighed intake. The estimated intake method was, therefore, considered a feasible and viable method for use in the main survey.
- Parents had a preference for recording the amount of food served and left over, rather than calculating themselves the amount consumed so this was incorporated into the diary for the main survey.

Both these recommendations were adopted during the Dress Rehearsal. The recommendations made at the end of the Dress Rehearsal were numerous and are outlined in section 9, Annexe C of the UK report. These were all adopted during the mainstage survey.

Two significant outcomes were:

- It was decided not to use measuring equipment to assess quantities of foods consumed as it involved an avoidable step of converting volumes to weights. Household measures were used instead.
- Head circumference and infant length as well as weight were measured by interviewers.

## **2.2. Ethical approval**

Following reviews by HNR's internal Research Governance Committee, an application for external ethical approval for the survey was submitted on 4 November 2009, for review by the Cambridgeshire 4 Research Ethics Committee (REC) at their meeting on 26 November 2009. A favourable provisional opinion was given on 4 December 2009, subject to further information requested from the consortium and some administrative issues. Full ethical approval for the survey was received from the Cambridgeshire 4 REC on 18 January 2010.

Further information about the ethical process can be found in Appendix A.

## **2.3. Sample design**

A sample of infants and young children representative of the Scottish population aged 4 to 18 months was drawn using a multi-stage random probability design. Individuals were randomly selected from Child Benefit (CB) records provided by Her Majesty's Revenue and Customs (HMRC)<sup>2</sup>; the Healthy Start (HS) sample<sup>3</sup> was drawn from the HS recipient database provided by the Department of Health. The CB and HS samples were stratified by Government Office Region, Index of Multiple Deprivation (IMD) scores and population density to ensure representativeness (see Appendix A for details). At the time of the survey, CB was a universal credit with a high rate of take up (around 98%) making it a good sampling frame for a survey such as this. However, it does have limitations and these are discussed in Appendix A.

The Diet and Nutrition Survey of Infants and Young Children in Scotland (DNSIYCS) sample comprised three parts:

- 1) The children from Scotland who were part of the core sample of children selected at random from CB records covering all four countries of the UK.
- 2) A boost sample of children in Scotland, also drawn from CB records.

- 3) The children from Scotland who were part of a boost sample of children on the HS scheme selected at random from the DH's HS database. This boost sample was combined with children on the HS scheme in the core Scotland sample to form the Scottish Healthy Start sample.

These three groups comprised those reported together in DNSIYCS. Weighting factors were applied to ensure that the results were representative of the Scottish population (see section 2.3.5). More details about the sample selection process are provided in Appendix A.

### 2.3.1. Age

The sample drawn from the CB Register was selected in two waves. This was done to try to ensure that the sample contained sufficient numbers of children at each end of the eligible age range, i.e. from 4 to 18 months. Interviews with the parents of participants aged 17 months were prioritised to reduce the number of children who would become ineligible through being beyond the specified age range at the time of interview. Similarly, interviews with the parents of participants aged four months were prioritised to maximise participation of children of this age.

### 2.3.2. Inclusion/exclusion criteria

As stated in the introduction, exclusive breastfeeding is recommended for the first six months of an infant's life. However, complementary feeding often commences earlier than six months. Therefore, the sample included infants and children from four months to capture those infants who were receiving complementary foods earlier than six months. The full age range of the survey included children aged 4 to 18 months. Those who had turned 18 months by the time of the first interview were screened out.

Children with a birth weight under 2kg and/or those fed through a gastric tube at or after one week of age were excluded at the main interview stage. The latter criterion was chosen to exclude those individuals with congenital abnormalities likely to affect feeding practices<sup>4</sup>.

Participants who no longer lived at the selected address when the sample was drawn were still considered eligible to participate if they had moved locally and a new address could be obtained. The parent of the participant who had the most involvement in the feeding of the child was selected as the interviewee. Only parents or legal guardians could be selected to complete the interview and to provide consent.

All children for whom at least three days of the food diary had been completed were classed as fully productive participants.

### 2.3.3. Selecting postcode sectors

Postcode sectors were selected by NatCen using CB claimant records provided by HMRC and information about HS recipients from DH. See Appendix A for more information on selecting postcode sectors and participants.

### 2.3.4. Seasonality

Ideally, it would have been desirable to assess seasonal variation in diet across the sample, however, it was not possible for fieldwork to span an entire year due to limited access to CB records. Consequently, it was not possible to detect seasonal variation in the diet in DNSIYC or DNSIYCS and it is not reported.

### 2.3.5. Weighting factors

DNSIYCS required a set of weighting factors to adjust the sample for differences in sample selection and response. The weighting factors adjust for differential selection probabilities of boost sample members, non-response to the interviewer stage.

An interview weighting factor was required for participants who responded to the individual interview and completed three or four food diary days. This weighting factor was generated using a combination of logistic regression modelling and calibration. The aim was to reduce bias resulting from sampling error and differential non-response.

Further information about weighting the sample can be found in Appendix B.

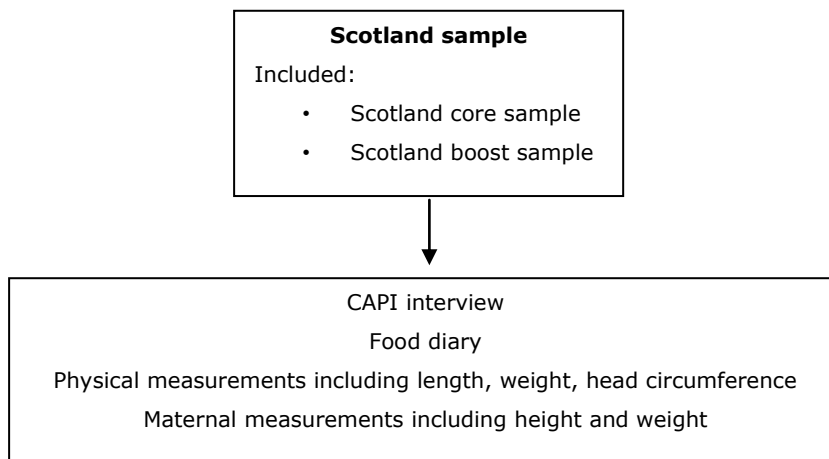
## 2.4. Overview of methodology

This section provides an overview of the methodology employed on DNSIYCS. The survey aimed to collect data from a representative sample of 500 infants and young children aged 4 to 18 months living in private households in Scotland. This sample size was chosen to enable robust analyses of the different age groups in Scotland. The key components were:

- Face-to-face interviews, conducted using Computer Assisted Personal Interviewing (CAPI) with the parent most involved in feeding the sampled child.
- Dietary data collection, using a four-day estimated food diary.
- Anthropometric measurements (maternal height and weight; infant length, weight and head circumference).

Copies of all survey documents are included in Appendices C to H. The following diagram sets out the movement of participants through the survey.

**Figure 2.A.** Summary of stages included in DNSIYCS



Two weeks in advance of starting fieldwork, a letter describing the purpose of the survey was sent to each sampled child's parent or legal guardian (referred to as 'the parent'). This letter provided the parent or legal guardian of the sampled child with the opportunity to 'opt-out' of the survey prior to the beginning of fieldwork.

Parents of participants who took part in the CAPI interview and completed a food diary for at least three days were classified as 'fully productive'.

## **2.5. Overview of survey components and fieldwork procedures**

Further details of all survey components and fieldwork procedures can be found in Appendix A.

Fieldwork assignments were issued to interviewers in two waves:

**Wave 1:** 6 January – 1 March 2011

**Wave 2:** 28 March – 23 May 2011

The interview visit consisted of:

- Detailed face-to-face interview using CAPI to collect background information on family dietary habits, socio-demographic status and health information, as well as information about the child such as feeding practices, eating patterns, developmental stages, sunlight exposure and gastrointestinal symptoms (see Appendix C).

- Dietary data collection (estimated food diary, completed for four consecutive days) to provide a quantitative estimate of food consumption and nutrient intakes (see Appendices D and E).
- Physical measurements (height and weight of mother; length, weight and head circumference of child) in order to assess growth (see Appendix A).

Details of documents used by interviewers are provided in Appendices F to H. The full methods, and benefits and limitations of various methods are discussed in Appendix A.

## **2.6. Feedback to participants and General Practitioners (GPs)**

Various types of feedback were provided to participants' parents and General Practitioners (GPs) with parental agreement. These are described in Appendix A and examples can be found in Appendix I.

## **2.7. Fieldwork quality control**

Quality control measures for fieldwork were put in place to monitor the quality of completion of the food diaries and also to monitor interviewer measurements. Refer to Appendices A of this report and Appendix L of the UK report for further details.

## **2.8. Tokens of appreciation**

At the final interviewer visit, the interviewer gave a token of appreciation (£30 in high street vouchers) to all who completed at least three food diary recording days.

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## References and endnotes

<sup>1</sup> Estimated intake method recorded as served and left over.

<sup>2</sup> HMRC supplied a sample of names, addresses of CB claimants under Paragraph 9, Schedule 5, Tax Credits Act 2002 which gives authority to supply information to other Departments for the purposes of provision of information for health purposes. CB records were used as a sampling frame and selected sample supplied to DH for the purpose of DNSIYC. The sample transfer between HMRC and DH was in line with Government security standards and with the agreement of the HMRC Data Guardian from the business area from which data is sourced. Data transfer was in adherence to the strict data transfer rules, and with the correct legal gateways in place

<sup>3</sup> Details on the Healthy Start boost sample can be found in Chapter 6 and in Annexe A of the main UK report.

<sup>4</sup> A congenital abnormality that affects feeding is defined as a physical defect that was present at birth which is likely to impair feeding or growth.

## Chapter 3 Sample characteristics

### Summary of sample

- The Diet and Nutrition Survey of Infants and Young Children in Scotland (DNSIYCS) achieved a total sample of 616 infants and young children aged between 4 and 18 months.
- The profile of the achieved Scotland sample was very close to that of the population of infants and young children in the United Kingdom (UK) in terms of age and sex and region, but not ethnicity. After applying weighting factors, 95% of children in DNSIYCS were white; a higher proportion than in the UK sample (82%).
- There was a wide range of socioeconomic circumstances for the children in the survey; larger proportions of their parents were home owners (55%) than living in rented accommodation (42%). A fifth (19%) received Healthy Start (HS) vouchers.
- The mean age of the mothers in the survey was 30 years with very few under 20 years (3%) and 40 years or over (6%). Just under one-third were educated to degree level. Just over half of the mothers were married and living with their husband.
- In 62% of households no one smoked and in 87% of households someone drank alcohol. The proportions of mothers who smoked and drank alcohol at the time of the survey were higher in Scotland than in the UK sample. As in the UK sample, younger mothers were more likely to have smoked when they knew they were pregnant. On the other hand, older mothers were more likely to continue to drink alcohol when they knew they were pregnant. The proportions of mothers drinking alcohol at the time of the survey and in the three months before they knew they were pregnant were higher in Scotland than in the UK sample.
- For many children in the survey (44%), the parents were the only carers of the child; for those who did have childcare, grandparents were the most frequent carers (35%), caring more often than nurseries (13%), childminders or nannies (6%), or other relatives (7%).
- Infants and young children in DNSIYCS showed progressive rates of development in terms of picking up objects, sitting, crawling, standing, walking and speech, as expected with increasing age.
- In relation to health behaviours, it was interesting to note that there was greater compliance with recommendations for brushing of teeth of young children in Scotland than in the UK sample.
- Nearly half of all infants and young children had been outside between the hours of 10am and 3pm every day in the previous seven days before the interview. Most had not been on a holiday with strong sun in the previous year.
- Diets of mothers in Scotland were largely similar to those in the UK sample, although mothers in Scotland reported eating crisps and sweets more frequently,



drinking sweetened drinks more often, being more likely to use butter as spread, and less likely to eat oily fish frequently and to have fresh vegetables available in the home.

- There were some encouraging aspects of the mothers' diets overall, such as the high proportion who had breakfast every day, water being the most common drink consumed when thirsty and none of the fat on meat being consumed. As in the UK sample, the diets of older mothers were reported as generally healthier than younger mothers.
- As seen in the UK sample, there were some examples of mothers representing opposite ends of the health awareness and behaviour spectrum. For example, the two most common responses to use of salt were either 'always' adding salt to food or 'never' adding salt to food. This was also seen in the choice of diet or low calorie soft drinks, where 'always' and 'never' were the answers chosen most often.
- Most mothers (86%) were aware of the recommendation that five portions of fruit and vegetables should be eaten daily, but far fewer were aware of the recommended amount of salt (13%) and oily fish (11%) that should be consumed.
- Fifty seven per cent of breastfeeding mothers in Scotland reported taking any type of supplement. The most common supplement taken was a multi-vitamin and mineral supplement, taken by 35%.

### **3.1. Representativeness of the sample**

#### **3.1.1. Achieved Scottish sample compared to Child Benefit extract for recipients living in Scotland**

The Diet and Nutrition Survey of Infants and Young Children in Scotland (DNSIYCS) achieved a total sample of 616 infants and young children aged between 4 and 18 months. Table 3.1.1 shows population characteristics for Child Benefit (CB) recipients living in Scotland. These were compared with the achieved Scottish sample (this includes parents from the core sample and Scottish boost sample, but excludes the Healthy Start (HS) boost)<sup>1,2</sup>. No weighting factors were applied to the achieved sample for this comparison.

The profile of the achieved sample was very close to that of the population of infants and young children in Scotland. There were, however, a few differences; for example, responding parents tended to be slightly older and responding households tended to contain more children. These two factors are likely to be linked, as older mothers tend to have more children. The achieved sample had a very similar distribution to the population for the age and sex of the child and a similar distribution in terms of sex to the recipients of child benefit. There was no evidence of large biases caused by sampling error or non-response.

The small differences in age of mothers and household size were corrected using non-response weighting factors. When these weighting factors were applied, differences in

participant profiles were corrected and the profile of the achieved sample was brought closer to that of the Scottish population. The analyses presented in chapters 3 through 6 of the report are based on data which has had weighting factors applied.

**Table 3.1.1**

### 3.2. Response rates

This section describes response rates for DNSIYCS.

#### 3.2.1. Individual level response

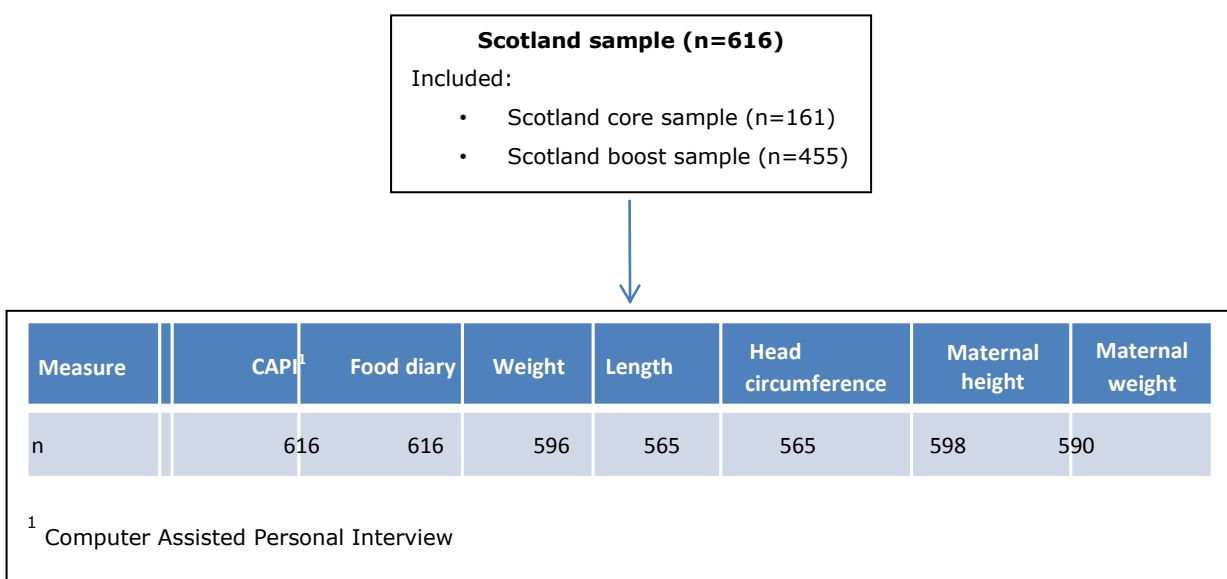
Of the 987 children living in Scotland sampled from CB Records, 97% were eligible to take part in the survey. Ineligible cases included those where the selected child had a birth weight of less than 2kg, had used a feeding tube at or after one week of age, no longer lived at the sampled address, had died, or was aged 18 months or older at the time of interview. Three per cent of eligible cases opted out of the survey either by phone call or letter (2% before fieldwork and 1% during fieldwork). These cases were either not issued to interviewers or not approached at the doorstep.

Of those eligible to take part, 65% were fully productive, i.e. three or four dietary recording days were completed. This gave a sample size of 616 fully productive participants. The percentage of fully productive participants was very similar in DNSIYCS to the UK sample (62%).

**Table 3.2.1**

Figure 3.A details the number of children who completed each component of the survey.

**Figure 3.A.** Summary of response to stages in DNSIYCS



### **3.3. The child and their environment**

The results presented in this chapter derive from the Computer Assisted Personal Interview (CAPI). This section describes some of the background characteristics of the infants and young children in DNSIYCS and the households in which they lived.

The survey is based on 616 infants and young children for whom parents answered questions and provided dietary information. Results in this section are based on data that have had weighting factors applied for different selection probabilities of boost sample members and non-response to the individual questionnaire as indicated in Chapter 2 (to reflect the Scotland population more accurately).

Any comparisons by age in Chapter 3 were tested at the 95% significance level and only statistically significant differences are highlighted in the text. Comparisons of policy interest in Chapter 3 were also tested at the 95% significance level against the Diet and Nutrition Survey of Infants and Young Children (DNSIYC) UK sample. Again, statistically significant differences are highlighted in the text.

#### **3.3.1. Age**

When weighting factors were applied, the final proportions of children in the four age groups studied were 12% of children aged 4 to 6 months, 23% aged 7 to 9 months, 17% aged 10 to 11 months and 49% aged 12 to 18 months. These proportions were similar to those in the UK sample although there were fewer children aged 7 to 9 months in Scotland and more aged 12 to 18 months. The proportions of children of each sex in each age group were very similar.

**Table 3.3.1**

#### **3.3.2. Household structure**

In 47% of cases; the surveyed child was the only child in the family; 35% of children were one of two children; 13% were one of three and 4% were one of four or more. Forty nine per cent of children surveyed were their mother's first child, similar to the UK sample. Ninety eight per cent were single births, as in the UK.

**Table 3.3.2**

### 3.3.3. Ethnicity

Overall, 95% of children in DNSIYCS were white, 2% were Asian, 1% were black, and 2% were mixed or 'other'. There was a significantly higher proportion of white children in Scotland than in the UK sample, where white children were 82% of the total.

**Table 3.3.3**

### 3.3.4. National Statistics Socio-economic Classification (NS-SEC), housing tenure

Twenty two per cent of surveyed children lived in a household where the Household Reference Person (HRP) was in a lower managerial and professional occupation, about 17% in higher managerial and professional occupation or a semi-routine occupation and 11% in a routine occupation. Smaller proportions of surveyed children lived in households where HRPs were in other types of occupation, had never worked, were unemployed or were not classified. These proportions were very similar to the UK sample.

Overall, 51% of surveyed children lived in households where HRPs owned their own homes with a mortgage and 42% were in rented accommodation. Very small proportions were in other types of accommodation, such as owning outright, shared ownership or living rent-free.

**Tables 3.3.4**

### 3.3.5 Household smoking and drinking

For 62% of children overall, no one in the household smoked. This proportion was higher for children aged 4 to 6 months (78%) than for the other age groups, unlike the UK sample, there was little variation with age of child. For 25% of children, the interviewee smoked; this was usually, but not always, the mother; for another 19% of children, the interviewee's partner smoked and for 8%, someone else in the household smoked.

In 87% of households, someone in the household drank alcohol, significantly higher than in the UK sample (74%); for 74% of households the interviewee drank alcohol, for 59% the interviewee's partner drank, both higher proportions than in the UK sample. These proportions varied little with the age of the child.

**Table 3.3.5.1 and 3.3.5.2**

### 3.3.6. Healthy Start voucher recipients

HS vouchers were received in 19% of the responding households with little variation with the age of the child, and similar to the UK sample.

Of the households receiving HS vouchers, 55% spent all or most of their vouchers on infant formula (refer to Chapter 6 for more details on the use of HS vouchers in Scotland and Annexe A of the UK report for the UK) and 27% were mainly spent on fruit and vegetables, both similar to the UK. For a much smaller proportion of households HS vouchers were spent only or mainly on cow's milk (6% overall), or on a combination of fruit and vegetables and infant formula or cow's milk, or on supplements. In 1% of households receiving HS vouchers, the vouchers were received but not used.

**Tables 3.3.6.1 and 3.3.6.2**

### 3.3.7. Childcare

In 44% of households it was reported that no one other than the parents (in the household) looked after the child, the same as in the UK sample. For 35% of children, grandparents provided care; 13% of children overall went to a day nursery; and smaller proportions of households used other types of childcare to look after the child (1 to 6%).

In the week preceding the survey children spent an average of 14.9 hours being looked after by family members. This was similar to the UK sample.

Of children receiving childcare, the majority (77% to 91% overall) received meals when in childcare. Children looked after in a nursery, crèche or playgroup were more likely to be offered water (80%) and less likely to be offered squash (10%) than those looked after by relatives (61% and 30%) or by a childminder, babysitter or other unrelated carer (61% and 24%). The proportion of children offered water and squash in a nursery, crèche or playgroup in the DNSIYCS was similar to the UK survey.

**Tables 3.3.7.1 to 3.3.7.4b**

### 3.3.8. Neurological development

Children showed development in terms of picking up objects, sitting, crawling, standing, walking and speech, as was to be expected with increasing age.

**Tables 3.3.8.1 to 3.3.8.3**

### 3.3.9 Teeth

At the time of the survey the proportion of children in Scotland with no teeth decreased with age from 68% of those aged 4 to 6 months to 1% of those 12 to 18 months. The number of teeth increased with age so the largest proportion (37%) of children aged 12 to 18 months had five to eight teeth.

For children with at least one tooth, the age the first tooth appeared varied widely. The most common age was 6 months (21%), with 15% at 5 months and 7 months, 12% at 8 months, and lesser proportions at younger and older ages. Five per cent had their first tooth before three months of age and 4% were over 12 months before the first tooth appeared.

The Scottish Government recommends that tooth brushing twice a day should begin as soon as teeth begin to appear<sup>3</sup>. All children in Scotland with 13 or more teeth used a toothbrush at least 'sometimes'. Eight per cent of children with at least one tooth were reported to never use a toothbrush at the time of the survey, significantly lower than in the UK sample (19%).

#### **Tables 3.3.9.1 to 3.3.9.3**

### 3.3.10. Advice about diet and feeding

The parents of only a small proportion of children (5%) had received any advice from a dietitian on feeding their child. This was similar to the UK sample. The number of children for whom advice on feeding had been given to parents was too small to determine the main reasons for this advice.

#### **Tables 3.3.10.1**

### 3.3.11. Medications

At the time of the survey only 8% of children overall in Scotland were taking prescribed medications, with higher proportions in those aged over seven months. The purpose of the medications was evenly distributed for treating the gastro-intestinal system, respiratory system, central nervous system, infections and other conditions, as in the UK sample.

#### **Table 3.3.11**

### 3.3.12. Health problems and hospital visits

Overall, since birth, 74% of children had had a health problem necessitating consultation with a health professional (General Practitioner (GP), health visitor, National Health Service (NHS) direct or hospital). Nine per cent required admission to hospital, significantly lower than in the UK sample (13%), with little variation with age. Respiratory infections were particularly common.

#### **Tables 3.3.12.1 and 3.3.12.2**

### 3.3.13. Bowel habit

All children were still wearing nappies at the time of the survey. Parents reported that most children (66%) had a dirty nappy two to three times a day with little variation with age<sup>4</sup>. Fewer children had a dirty nappy less often (21% once a day and 2% once in two to four days) or more often (9% four or more times per day). Unlike the UK sample, there was no variation with age for the frequency of having dirty nappies only once a day in Scotland.

#### **Table 3.3.13**

### 3.3.14. Sun exposure

Children in DNSIYC were born between the months of August 2009 and November 2010. Interviews were carried out between January and May, so children born in the autumn and winter, aged under 12 months, were unlikely to have experienced any summertime sunshine in their lifetime at the time of the interview. Details of sun exposure given below and in the tables should therefore be interpreted in light of the opportunities for sun exposure.

In the seven days prior to the survey interview, 4% of children overall had not been outside between 10am and 3pm at all, with little variation with age. Forty seven per cent had been outside between these hours every day. Much smaller proportions of children (2% to 12%) had been outside on one to six days. The proportions of children and the time they spent outside were similar to the UK sample.

Most children (85%) who spent time outside in the seven days before the interview usually spent three hours or less outside each day.

Fifty five per cent of children had never been in sun strong enough to tan or burn, significantly less than for the UK sample (63%). This proportion decreased with age from 77% of children 4 to 6 months to 42% of those aged 12 to 18 months. The three main precautions that were taken when children were exposed to strong sun were trying to keep the child in the shade as much as possible (41% of all children), using sun cream (41%) and covering the child up as much as possible (39%). Thirty per cent limited the amount of time the child spent outdoors. The proportions of interviewees reported to take each of the

different precautions in strong sunshine were all significantly higher in the Scottish sample compared to the UK sample.

In the previous seven days sun cream had been used for 25% of children, more in those aged 12 to 18 months (29%) than in the other age groups. For 44% of children, sun cream had not been used in the last seven days but was used regularly when the child was out in the sun. For the remaining children it was not clear if the child had been in the sun or not, or if they had, whether sun cream had been used.

In the 12 months prior to the survey 23% of children had been on a holiday or a trip to a sunny place for more than two days. This increased steadily with age from 6% for those aged 4 to 6 months to 31% for those aged 12 to 18 months.

The latitudes of all holiday destinations have been determined and categorised into bands of 10° of latitude. The section that follows describes these destinations, and since the analysis is by holiday and not by participant, results are unweighted.

One hundred and eighty holidays were reported to have been taken by the 616 children from Scotland. Twenty five children had been on more than one holiday. Most, but not all, of these children were aged 12 to 18 months at the time of the survey. Most children had been on two holidays, but two had taken three holidays and one had taken four holidays. The largest proportion of holidays (40%) was taken at 40°N, which is the latitude for the southern countries of Europe, followed by 50° N (32%), 30°N (12%) and 60°N (9%). For 40°N latitude, the most common destination for holidays was Spain, where 58% of holidays were taken, followed by Portugal (14%), Italy (10%) and Turkey (7%). For 30°N latitude, the most common destination was the Canary Islands (60%), while for holidays at 50°N, the most common location was England followed by France. The most common month for holidays was July (21%), followed by September (17%). The majority of holidays were taken by those in the managerial and professional category (58%), followed by intermediate (23%) and routine and manual (19%).

#### **Tables 3.3.14.1a to 3.3.14.4**

### **3.4. Maternal characteristics**

This section describes a number of characteristics of the mothers of the children in DNSIYCS and seeks to explore factors specifically associated with the mothers that may have an influence on the diet and health of the child.

#### **3.4.1. Age**

There were 616 participants in DNSIYCS, for whom the age of the mothers ranged from 17 to 47 years, with a mean (and median) age of 30 years. Over 50% of mothers were between the ages of 25 and 34 years, with the remainder evenly distributed below and above this age range. There were only 16 mothers (3% of the total) below the age of 20 years and 43 mothers (6%) aged 40 years or over. For this reason, the two youngest age



groups and the two oldest age groups have been combined when describing characteristics of the mothers. The age distribution of the mothers in Scotland was virtually identical to the distribution in the UK sample.

**Table 3.4.1**

### 3.4.2. Height and weight

There were 2% of mothers with a body mass index (BMI) less than 18.5, 43% had a BMI between 18.5 and 25, 31% between 25 and 30 and 24% above 30. Women take varying lengths of time to lose any weight gained during pregnancy, and interpretation of results for BMI calculated from weights taken post pregnancy should take this into account.

**Table 3.4.2**

### 3.4.3. Marital status

Just over half (52%) of the mothers of DNSIYCS participants were married and living with their husband whilst 26% were not married but living with a partner. Twenty one per cent were single (i.e. not living as a couple and had never been married). There was variation with age, with 17% of mothers under 25 being married compared with 71% for mothers aged 35 years or over.

**Table 3.4.3**

### 3.4.4. Ethnic minorities

Overall, 95% of mothers were white, 2% were Asian, 1% were black, and 2% were mixed or 'other'. The proportion of white mothers was significantly higher in Scotland than in the UK sample.

**Table 3.4.4**

### 3.4.5. Education

Overall, 91% of mothers in DNSIYCS had some kind of qualification<sup>5</sup>. Thirty three per cent were educated to degree level or above. These proportions were similar to the UK sample.

**Table 3.4.5**

### 3.4.6. Smoking and drinking

Around half of mothers (54%) reported that they had ever smoked. This proportion was higher in the younger age group ranging from 68% of those aged under 25 years, to between 47% to 57% of those aged above 25 years. In total 29% of mothers reported smoking in the three months before they knew they were pregnant, which reduced to 18% reporting they smoked after they knew they were pregnant. Overall 25% of mothers reported that they smoked at the time of the survey. This proportion also decreased with age from 45% of those under 25 years to 18% or less for those aged 30 years or over. These trends were similar to the UK sample.

Overall 74% of mothers reported drinking alcohol at the time of the survey, significantly higher than the UK sample (62%). Fifty eight per cent of mothers overall reported drinking alcohol in the three months before they knew they were pregnant and was similar for all age groups. The proportion drinking before they knew they were pregnant was significantly higher than in the UK sample but did not increase with age as in the UK sample. Twenty three per cent of mothers overall reported drinking alcohol once they knew they were pregnant, similar to the UK sample. The proportion drinking once they knew they were pregnant increased with age from 13% of mothers aged under 25 years to 38% of mothers aged 35 years or over. The number of units of alcohol consumed was not collected. Women who are pregnant or planning to get pregnant are advised to avoid alcohol, due to the potential risk to the unborn child. If women do decide to drink alcohol during pregnancy they should not drink more than one or two units once or twice a week<sup>6</sup>.

#### **Tables 3.4.6.1 and 3.4.6.2**

### 3.4.7. Dietary habits

A small proportion of those interviewed were not the mothers of the children and they are not included in this section.

#### 3.4.7.1. Usual dietary habits

##### **Breakfast**

Of the mothers in the survey 62% reported eating breakfast every day, the same proportion as in the UK sample. This proportion increased with age, rising from 38% of those aged under 25 years to over 70% for those aged 30 years or over. The proportion of mothers who never ate breakfast decreased with age, from 15% of those aged under 25 years to 6% or less of those aged 30 years or over, similar to the UK sample.

#### **Table 3.4.7.1.1**

## **Fruit**

Sixty two per cent of mothers reported eating fruit at least once a day, similar to the UK sample. This proportion increased with age, from 36% of those aged under 25 years to over 70% of those aged 30 years or over. Only a small proportion (3%) reported never eating fruit, and this decreased with age.

## **Vegetables**

Seventy four per cent of mothers reported eating vegetables every day, similar to the UK sample. The proportion eating vegetables every day increased with age from 48% of those aged under 25 years to over 80% of those aged 30 years or over, as seen in the UK. Very few mothers (4%) ate vegetables less than one to three times a month. No mothers aged 35 years or over ate vegetables less often than one to three times a week.

## **Dairy products**

In terms of dairy products, 53% of mothers reported eating these every day, with a similar pattern to the UK sample by age (although not significant), with older mothers more likely to eat dairy products every day. Overall 3% of mothers reported never eating dairy products. These proportions were similar to the UK sample.

## **Crisps**

Fifty seven per cent of mothers reported eating crisps one to three times a week, and a further 23% ate crisps every day. The youngest mothers were more likely to eat crisps every day, with 31% of those aged under 25 years saying they ate crisps every day compared with 17% of those aged 35 years or over. Four per cent of mothers overall reported never eating crisps. These proportions were similar to the UK sample, although there was an overall tendency to more frequent crisp consumption in Scotland (once a day to 3 times a week).

## **Cakes**

The overall frequency of consumption of cakes was very similar to that for crisps, with 53% of mothers eating cakes one to three times a week, and a further 23% eating cakes daily. Older mothers were more likely to eat cakes every day. Thirty five per cent of mothers aged 35 or over ate cakes daily compared with 15% of mothers aged under 25 years. These proportions were similar to the UK sample.

## **Sweets**

Sixty per cent of mothers reported eating sweets one to three times a week, with a further 25% saying they ate sweets at least once a day. Only a small proportion (3%) reported never eating sweets. Frequency of sweet eating varied little with age. Overall there was a slight tendency for more frequent consumption of sweets (at least once a day) by mothers in Scotland than in the UK sample.

### **Table 3.4.7.1.2**

## **Drinks**

When asked what they usually drank when they were thirsty, 44% of mothers in Scotland reported that they drank water, significantly lower than in the UK sample (52%). Twenty four per cent of mothers indicated that they drank tea and coffee when thirsty, similar to the UK. Thirty per cent of mothers overall reported usually drinking artificially sweetened drinks when thirsty, significantly higher than the UK sample (20%). Twenty three per cent of mothers overall consumed sweetened drinks when thirsty, significantly higher than in the UK sample (14% for UK sample). The younger age groups were more likely to consume sweetened drinks, with 37% of those under 25 years indicating that they drank these. Four per cent of mothers overall drank fruit juice when thirsty. Very small proportions drank other types of drinks.

When drinking water at home, most mothers (80%) usually drank tap water; this proportion varied little with age, but was significantly higher than the UK sample (74%). Five per cent drank filtered tap water, with no trend with age and lower than the UK sample; 12% usually drank bottled water, as in the UK sample. A small proportion (2%) reported that they did not drink water, similar to the UK sample.

When asked about type of milk consumed, 60% of mothers reported usually using semi-skimmed milk, 26% full fat milk and 8% skimmed milk, similar to the UK sample. Older mothers were more likely to drink skimmed and semi-skimmed milk than younger mothers, who were more likely to consume full fat milk.

### **Tables 3.4.7.1.3 to 3.4.7.1.6**

## **Bread**

White bread was the most popular type of bread consumed, with 37% of mothers saying that this is what they usually ate. White bread consumption decreased from over 65% of mothers aged under 25 years to 17% of mothers aged 35 years or over. This trend was also seen in the UK sample but was more marked in Scotland. The second most commonly consumed type of bread was wholemeal at 24% overall, increasing with age from 8% of mothers aged under 25 years, to over 37% of those aged 35 years or over. The overall proportion was the same as for the UK sample, but the trend with age was more marked in Scotland. Twenty one per cent of mothers usually consumed 50/50 bread, higher than in the UK, and a further 12% usually ate brown/wholegrain/multigrain bread.

Overall, 63% of mothers reported eating one to two slices of bread per day and there was little variation with age, as in the UK sample. Thirty three per cent of mothers reported that they ate either less than one slice or three to four slices per day, with little variation with age.

### **Tables 3.4.7.1.7 and 3.4.7.1.8**

## **Fats and Spreads**

Butter (37%) and polyunsaturated margarine (29%) were the most common spreads used by mothers. Consumption of butter was more common than in the UK sample (30%), 12% mainly used low fat spread and smaller proportions used other kinds of spread or did not use spread. The most common fats used in cooking were the sub-food groups 'olive oil/hazelnut oil/rapeseed oil' (37% overall), vegetable oil (22%) and 'sunflower oil/corn oil/soya oil' (20%). Older mothers were more likely to use the sub-food group 'olive oil/hazelnut oil/rapeseed oil', while younger mothers were more likely to use 'sunflower oil/corn oil/ soya oil' and other vegetable oil.

Overall 73% of mothers reported that they usually ate none of the fat on meat, 14% indicated that they ate some of the fat on meat, and 7% indicated that they ate all of the fat on meat. These proportions differed from the UK with mothers in Scotland significantly more likely to eat none of the fat on meat and less likely to eat some or all of the fat. Seven per cent of mothers indicated that they did not eat meat. There was little variation in these proportions by age, as in the UK.

### **Tables 3.4.7.1.9 to 3.4.7.1.11**

## **Oily fish**

When asked about eating oily fish, 65% of mothers reported that they 'never' ate tinned oily fish, significantly higher than in the UK sample (58%); this proportion decreased with age, with 79% of mothers aged under 25 years indicating that they 'never' ate tinned oily fish, decreasing to 56% of those aged 35 years or over. Those mothers who did eat tinned oily fish mainly did so infrequently, with 16% less than once a month and 9% one to three days a month. Only 9% overall indicated that they ate tinned oily fish at least once a week and less than 1% did so at least three times per week. These figures were similar to the UK sample.

Overall 41% of mothers reported that they never ate fresh or frozen oily fish; this proportion also decreased with age, with 60% of those aged under 25 years saying that they 'never' ate fresh or frozen oily fish, decreasing to 21% of those aged 35 years or over. Twenty six per cent of mothers reported that they ate fresh or frozen oily fish at least once a week and this increased with age. This pattern was similar to the UK.

### **Table 3.4.7.1.12**

## **Salt**

Very similar proportions of mothers either 'always' added salt to food (23%) or 'never' added salt to food (22%), with smaller proportions saying that they added salt 'often', 'sometimes' or 'rarely'. There was little variation with age. This pattern was similar to the UK sample except that in the UK sample, significantly higher proportions indicated that they 'never' add salt to food (27%).

### **Table 3.4.7.1.13**

### **Availability of fresh fruit and vegetables**

Fresh fruit was reported to be 'always' available in the home by 79% of mothers in Scotland. This proportion showed some increases with age, from 57% of mothers under 25 years to 92% of those 35 years or over. This picture was similar to the UK sample. Only 1% of mothers overall indicated that they 'rarely' or 'never' had fresh fruit available in the home.

A similar pattern was seen for the availability of fresh vegetables in the home, with 69% saying that fresh vegetables were 'always' available, significantly lower than in the UK sample (77%). As with fruit, this proportion increased with age. Thirty per cent and 22% of those aged under 25 years and between 25 and 29 years respectively, had vegetables often available.

#### **Table 3.4.7.1.14**

### 3.4.7.2. Awareness of dietary recommendations for adults

Overall 86% of mothers in Scotland were aware that the recommended minimum number of fruit and vegetable portions that should be consumed each day was five, with little variation with age. Small proportions thought the number of portions recommended was higher (3%), lower (7%) or did not know (3%). These proportions also varied little with age.

Only 13% of mothers were aware that the maximum recommended amount of salt to be consumed each day was 6g, with no clear trend with age. Twenty seven per cent thought the maximum daily recommendation was less than 6g, 4% thought more than 6g and 56% overall said they did not know. These proportions varied with age but not consistently.

Overall, 11% of mothers were aware of the recommendation to eat at least one portion of oily fish each week. Fifty eight per cent thought the recommendation was higher than this and 31% did not know. There were no significant variations with age in Scotland, which is in contrast to the UK sample where there were significant age trends.

#### **Table 3.4.7.2**

### 3.4.7.3. Use of dietary supplements

Fifty seven per cent of breastfeeding mothers in Scotland reported taking any type of supplement. The most common supplement taken was a multi-vitamin and mineral (35% of breastfeeding mothers took these). Mothers were not asked about supplement use in pregnancy. For details of the supplement use in children in DNSIYCS refer to section 6.3.

#### **Table 3.4.7.3**

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## References and endnotes

<sup>1</sup> Only 27 parents in Scotland opted out of the survey (20 before fieldwork started and seven during fieldwork). Due to the small number it is not possible to compare the profile of these opting out parents to the Scottish population.

<sup>2</sup> As individuals within the HS boost sample living in Scotland (7) were not selected from CB records they could not be included in the comparisons to Scottish population data derived from CB records. They were, however, included in the dietary analysis present throughout this report, as application of the final weighting factors (see Appendix B for an explanation of the weighting factors) ensured the combined core and HS boost sample was representative of the Scottish population.

<sup>3</sup> NHS Health Scotland, Oral Health and Nutrition Guidance for Professionals, 2012. Available online: <http://www.healthscotland.com/uploads/documents/18891-OralHealthAndNutritionGuidance.pdf>

<sup>4</sup> A dirty nappy refers to faeces being present in the nappy.

<sup>5</sup> Qualifications were defined as degree level or above, or an educational, professional, vocational or other work-related qualification for which a certificate was received.

<sup>6</sup> Improving Maternal and Infant Nutrition: A Framework for Action Scottish Government 2011. Available online: <http://www.scotland.gov.uk/Publications/2011/01/13095228/0>

## Chapter 4 Physical measurements

### Summary of findings

- Boys and girls in the Diet and Nutrition Survey of Infants and Young Children in Scotland (DNSIYCS) were, in general, taller (longer), heavier and had larger head circumferences than the UK World Health Organization (UK-WHO) Growth Standard for their age and sex.
- At age 4 to 11 months, both boys and girls in DNSIYCS were significantly taller (longer) than those in the DNSIYC UK sample. Girls in the Scottish sample also had significantly greater average weight and head circumference measurements across the age groups than the UK sample.

### 4.1. Introduction

Results in this chapter are presented by age at the Computer Assisted Personal Interview (CAPI) interview. Weight, length and head circumference measurements were taken. The small numbers in the individual age groups should be borne in mind when interpreting results, particularly when examining percentages beyond the outer centiles.

Revised UK World Health Organisation (UK-WHO) growth charts for birth to two years were introduced for all new births in Scotland from January 2010. These are based on UK-WHO Growth Standards from data in infants who were exclusively or predominantly breastfed<sup>1,2</sup>. Predominantly formula fed children are on average larger for their age compared to predominantly breastfed children on which these standards are based.

In Chapter 4, all comparisons to the main Diet and Nutrition Survey of Infants and Young Children (DNSIYC) UK sample were tested at the 95% significance level. Statistically significant differences are highlighted in the text.

### 4.2. Results

#### 4.2.1 Length, weight and head circumference

Of the 616 fully productive children, valid length and head circumference was achieved for 92%, and weight for 97% of these children. According to standard practice, a measurement was deemed invalid if either a) the derived sex- and age-adjusted UK-WHO Z-score<sup>3</sup> was below -6 or above +6 or b) in the opinion of the interviewer, the measurement taken was unreliable.

The mean length of all boys in the Diet and Nutrition Survey of Infants and Young Children in Scotland (DNSIYCS) was 77.0cm; that is 73.9cm for those aged 4 to 11 months and



80.5cm for those aged 12 to 18 months. When compared with the UK-WHO Growth Standard for their age and sex, 81% of boys aged 4 to 11 months and 68% aged 12 to 18 months were above the 50<sup>th</sup> percentile.

The mean length for all girls was 75.9cm. For those aged 4 to 11 months mean length was 72.5cm and 79.5cm for those aged 12 to 18 months. The proportion of girls in DNSIYCS above the 50<sup>th</sup> percentile for length was 79% of girls aged 4 to 11 months and 67% of girls aged 12 to 18 months.

For all boys in DNSIYCS the mean weight was 10.3kg. For those aged 4 to 11 months the mean weight was 9.5kg and 11.2kg for boys aged 12 to 18 months. When compared with the UK-WHO Growth Standard for their age and sex, 76% of all boys were above the 50<sup>th</sup> percentile; that is 76% of boys aged 4 to 11 months and 77% of boys aged 12 to 18 months.

For all girls the mean weight was 9.9kg. For those aged 4 to 11 months the mean weight was 9.0kg and 10.8kg for 12 to 18 months. The proportion of all girls in DNSIYCS above the 50<sup>th</sup> percentile for weight was 81%; 81% of those aged 4 to 11 months and 83% of those aged 12 to 18 months.

For all boys in DNSIYCS the mean head circumference was 47.1cm; that is 46.3cm for those aged 4 to 11 months and 48.0cm for children aged 12 to 18 months. When compared with the UK-WHO Growth Standard for their age and sex, 83% of all boys were above the 50<sup>th</sup> percentile. For each age group the percentage of boys above the 50<sup>th</sup> percentile was at least 80%.

For all girls in DNSIYCS the mean head circumference was 46.1cm, that is 45.1cm for those aged 4 to 11 months and 47.1cm for 12 to 18 months. When compared with the UK-WHO Growth Standard for their age and sex, 85% of all girls were above the 50<sup>th</sup> percentile for head circumference; at least 84% across each age group.

As shown in Table 4.1, more than 50% of children within the DNSIYCS sample exceeded the 50<sup>th</sup> percentiles for growth compared to the UK-WHO growth standard for their age and sex. This might be partially explained by the predominance of formula feeding by this group at the time of the survey, while the growth standards are based on exclusively or predominantly breastfed children.

**Table 4.1**

#### 4.2.2 Comparisons between the Scotland and the DNSIYC UK samples

When compared statistically to the entire DNSIYC UK sample, at age 4 to 11 months boys in Scotland had a significantly larger average length (73.9cm) than the UK sample

(73.3cm). There were no other significant differences in physical measurements between boys in Scotland and the UK.

Girls aged 4 to 11 months in Scotland had a significantly larger average length (72.5cm) than the UK sample (71.5cm). Girls in Scotland aged 4 to 11 months (9.0 kg) were significantly heavier than girls in the UK (8.7kg), as were girls aged 12 to 18 months (10.8kg in Scotland compared to 10.6kg in the UK sample). Girls in Scotland aged 4 to 11 months had a significantly larger average head circumference (45.1cm) than girls of the same age in the UK (44.6cm) as did girls aged 12 to 18 months (47.1cm in Scotland compared to 46.8cm in the UK sample).

**Table 4.2**

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## References and endnotes

<sup>1</sup> Royal College of Paediatrics and Child Health/World Health Organisation. The UK\_WHO\_Growth Charts: Early Years. London: RCPCH, 2009 Available online: <http://www.rcpch.ac.uk/growthcharts>

<sup>2</sup> The new UK-WHO 0-4 years Growth Standards were introduced in the UK because they represent an international standard of growth for infants and young children in good health who were exclusively or predominantly breastfed for at least four months. The new charts were constructed using the WHO Growth Standards for infants aged two weeks to four years, which used data from children from around the world with no known health or environmental constraints to growth. WHO Growth Standards represent a pattern of linear growth, which is remarkably consistent between different countries and ethnic groups following recommended feeding practices. They are applicable to all children in the UK, including those from ethnic minority groups. The WHO data are combined with birth data for gestations 23 to 42 weeks from the UK 1990 growth reference for various reasons.

<sup>3</sup> The Z-score classification system is a means to interpret weight-for-height, height-for-age and weight-for-age. The Z-score (standard deviation scores) is widely recognised as the best system for analysis and presentation of anthropometric data. The Z-score system expresses the anthropometric value as a number of standard deviations or Z-scores below or above the reference mean or median value.

## Chapter 5 Feeding practices

### Summary of findings

- The proportion of children who had ever been breastfed was significantly lower in the Diet and Nutrition Survey of Infants and Young Children in Scotland (DNSIYCS) (68%) than in the UK sample (78%), and lower than the Scottish results in the Infant Feeding Survey (IFS) of 2010 (74%). Of those who were breastfed, the majority of children (65%) were not breastfed beyond three months of age. Thirty two per cent had never been breastfed.
- The majority of children in the survey were drinking infant formula at the time of the survey, except in the oldest age group of 12 to 18 months. The majority of parents feeding their child infant formula in the home followed recommendations for preparation, for example, 75% reported making up the formula as needed and 68% used water that had been left to cool for no longer than 30 minutes. When feeding outside of the home however, the majority did not follow recommendations, for example 54% made up formula using cold or cooled water. Results were similar to the UK sample.
- For children aged over 12 months, cow's milk was the drink provided most often to the majority of children (36%), followed by water (19%) and formula (16%). Some children aged over 12 months were given squash (17%), juice (3%) or flavoured water (4%) most often.
- Seventy seven per cent of children were given food other than milk before six months of age, and were therefore not in compliance with the recommendation to delay the introduction of solids to six months.
- Baby rice was the most common first food for children in the DNSIYCS (63%), pureed fruit or vegetable was also popular as a first food (18%). Other foods, such as yoghurt or finger foods were the first food for very small proportion of children.
- Most of the children who ate food other than milk 'almost always' (31%) for 'sometimes' (31%) had the same food as their parents, and 'sometimes' had a different meal to, but prepared by, their parents (49%). A substantial proportion 'never' had the same food as their parents (23%), although this was more common for younger children.
- The majority of children who had food other than milk had eaten a commercially prepared baby or toddler meal (59%). Twenty one per cent of children who had food other than milk had eaten a commercially prepared adult ready meal. These were similar proportions as in the UK sample.

- For those children who had food other than milk, most parents (89%) never added salt to their food.
- Children in the DNSIYCS showed progression with age in ability to drink from a cup or beaker with a spout, to eat finger foods, and to use a spoon. Children aged 4 to 6 months in Scotland were significantly more likely to drink from a cup or beaker with a spout compared to those of the same age in the UK (63% and 47% respectively).

## 5.1. Introduction

The results presented in this chapter derive from the Computer Assisted Personal Interview (CAPI). This chapter describes the practices used in feeding the children in the Diet and Nutrition Survey of Infants and Young Children in Scotland (DNSIYCS). When describing children's ages in this chapter the age discussed is the age at interview, unless otherwise stated.

Comparisons by age in Chapter 5 were tested at the 95% significance level and only statistically significant differences are highlighted in the text. Comparisons of policy interest in Chapter 5 were also tested at the 95% significance level against the Diet and Nutrition Survey of Infants and Young Children (DNSIYC) UK sample. Again, only statistically significant differences are highlighted in the text.

## 5.2. Milk and drinks

### 5.2.1. Breastfeeding

Sixty eight per cent of children were reported to have ever been breastfed, with little variation with age. This is significantly less than the proportion for the UK sample (78%). In the Infant Feeding Survey (IFS) of 2010<sup>1</sup>, 74% of those in Scotland had breastfed initially, which is an increase from 63% in 2005 and 71% in 2000<sup>2</sup>. Thirty two per cent of children had never been breastfed in Scotland, significantly higher than in the UK sample (22%). For those children no longer being breastfed, the age at which they consumed their last breast milk was three months or under in 65% of cases. A further 18% had their last breast milk between 4 and 6 months. Only a small proportion of those who were no longer being breastfed had stopped at 12 to 18 months (4%).

The DNSIYCS sample included children ranging in age from 4 to 18 months. Hence the older children were likely to be having breast milk less frequently than the younger children, as foods were introduced. As expected, the proportion of children still receiving breast milk at the time of the survey decreased with age from 20% of those aged 4 to 6 months and 22% of those 7 to 9 months to 7% of those 12 to 18 months. In the UK sample, a greater proportion (30%) were still breastfeeding at 4 to 6 months. All children still being breastfed at the time of the survey were breastfed at least once a day. For those aged 4 to 6 months, 46% were fed five to six times a day, with over 32% fed more often

than this. For those aged 7 to 9 months and 10 to 11 months, the greatest proportion (over 40%), were fed 3 to 4 times a day, with smaller proportions fed more or less often. For those aged 12 to 18 months who were still breastfeeding, 48% were fed one to two times a day, with smaller proportions fed more frequently. Only 1% of children were reportedly fed nine times or more each day, lower than in the UK sample.<sup>3</sup>

### **Tables 5.2.1 to 5.2.3**

#### **5.2.2. Use of formula**

The proportion of children being given any type of infant formula in DNSIYCS at the time of the survey was 88% to 92% for those aged 4 to 11 months and 31% for those aged 12 to 18 months.

Powdered infant formula is not sterile and can become contaminated with microorganisms, which can cause serious illness. The Scottish Government therefore provide guidance about the safe preparation, storage and handling of infant formula<sup>4</sup>. These are referred to as formula preparation recommendations in this report.

The large majority of parents made up the formula as needed (67% to 83%) in line with recommendations, with 24% of parents of those aged 4 to 6 months and 25% of those aged 7 to 9 months making up several feeds at once. There were lower proportions of parents who reported doing this for children aged 10 months or over. This was similar to the UK sample, although the proportion making up several feeds at once was significantly higher for those aged 7 to 9 months in Scotland. When making up formula, 68% of parents overall used water that had been boiled and left to cool for no longer than 30 minutes in line with recommendations, although 32% used water that had boiled but left for longer than 30 minutes. These results were similar to the UK sample.

### **Tables 5.2.4 to 5.2.6**

When parents were asked about feeding their child infant formula away from home, 16% of those with children aged 10 to 11 months and 27% of those with children aged 12 to 18 months never fed their children when away from home, with much smaller proportions for younger children, similar to the UK sample. Parents of those aged 4 to 6 months were most likely to make up an infant formula feed while away from home, while for the older age groups, the formula feed was more likely to be made up before leaving home (30 to 35%). Overall, 22% were likely to take a ready to feed formula with them when going away from home, similar to the UK sample. For those aged 7 to 9 months, 7% of parents only breastfed when away from home, with small proportions for the other age groups. There were no mothers in Scotland who expressed breast milk when away from home.

For those parents who made up formula before leaving home, the majority did not keep the formula chilled, not in line with the recommendations, except for those aged 12 to 18

months. For those who made up the formula while out, the proportions making up feeds with cold or cooled water (not in line with recommendations) and the proportions making up the feed from hot water (as recommended), either obtained while out of the home or having it in a flask, were similar, and varied by age, but not consistently. In the UK sample significantly more parents made up formula with cold or cooled water when out than in the Scotland sample.

### **Tables 5.2.7 to 5.2.9**

#### **5.2.3. Drinks given most often**

For those children who were reported to be given drinks other than or as well as breast milk, the drink most often given to those aged under a year old was infant formula (83% for those aged 4 to 6 months, 60% for those aged 7 to 9 months and 43% for those aged 10 to 11 months). Follow on milk was more likely to be given to children aged between six months and a year (16% for those aged 7 to 9 months and 27% for those aged 10 to 11 months) than the youngest and oldest age groups (5% for those aged 4 to 6 months and 8% for those aged 12 to 18 months). As in the UK sample, the drink given most often to those aged 12 to 18 months was cow's milk (36%), with very small proportions giving this most often in the younger age groups. Twelve per cent of children aged 4 to 6 months were given breast milk most often. This proportion reduced with age to 4% of children aged 12 to 18 months. These figures were significantly lower for those aged 4 to 6 months in Scotland than in the UK sample. Ten per cent and 19% of children aged 10 to 11 months and 12 to 18 months respectively were given water as a drink most often. The proportions given other drinks most often were small; for children aged 12 to 18 months, 5% were given non-low calorie squash/soft drinks most often and 11% were given low calorie squash/soft drinks most often (significantly higher than the UK sample).

### **Tables 5.2.10 and 5.2.11**

## **5.3. Eating patterns**

### **5.3.1. First foods consumed**

The Scottish Government recommends that complementary foods should be introduced at six months of age<sup>5</sup>. Overall, 99% of children in DNSIYCS had been given food apart from milk, as in the UK sample. Of these, 13% of children had food by three months of age, 30% at four months, 33% at five months, and 21% at six months. A very small proportion of children were given food for the first time aged seven months or over (3%). These are similar proportions to the UK sample. These proportions can be compared to the 2010 IFS Scotland results where 6% of children had received solid food by three months of age, lower than DNSIYCS (13%); 32% by four months in 2010, compared to 44% in DNSIYCS; 74% by five months compared to 77% in DNSIYCS; and 94% by six months compared to 97% in DNSIYCS. There was a noticeable reduction in the proportion fed solid food by four

months in the 2010 IFS (32%) compared to the 2005 (60%) and 2000 (83%) surveys. By six months of age, most children had been given solid food in DNSIYC and IFS surveys.

### **Table 5.3.1**

For children who had been fed complementary foods, the most common type of first food was baby rice, this being the first food in 63% of cases overall. Results were similar to the UK sample except that proportions were rather lower for some age groups with a higher proportion of 'other' as the first food. This included rather more instances of porridge or baby porridge than in the UK sample. The second most common type of first food was pureed fruit or vegetables, for 17% of children given their first food at the age of four months, and for 6% of those given their first food aged three months or under. This compared to 14% of those having pureed fruit and vegetables as their first food at three months or under in the UK sample. Other foods, such as pureed or lumpy meat or fish, finger foods or yoghurt were given as a first food to smaller numbers of children, as seen in the UK sample.

### **Table 5.3.2**

#### 5.3.2. Introduction of solids

For children who had been fed complementary foods, 88% were reported to suck or chew on finger foods by 7 to 9 months of age, with a much smaller proportion (54%) of those aged 4 to 6 months. These results were similar to the UK sample. Sixty per cent of children aged 4 to 6 months usually ate smooth pureed food; for older children, much smaller proportions usually consumed their food this way. The majority of those aged 7 to 9 months (72%) and 10 to 11 months (59%) usually ate their food with some lumps, with lesser proportions for those aged 4 to 6 months (39%) and 12 to 18 months (29%). These results are similar to the UK sample although the proportion of those aged 4 to 6 months consuming food with lumps was significantly higher in Scotland. By 12 to 18 months, 70% of children usually ate their food unblended or unmashed, similar to the UK sample. The most common age at which children started having meals with lumps was 7 to 9 months (52%), with 35% starting to have food with lumps aged 4 to 6 months, 9% not until 10 to 11 months and very small numbers at three months or under and at 12 to 18 months, a similar distribution to the UK sample.

For 89% of children overall, parents reported that it was not difficult to introduce solid foods. For the remaining 11% for whom parents did report difficulties, the main reasons given were that the child would not take solids, was disinterested in food, preferred drinks to food, or would only take certain solids. In the IFS, (only provided for the UK as whole), these same four reasons were also common reasons for having difficulty introducing solid foods, although the proportion of children who refused only certain foods was higher in IFS (42%) than in DNSIYCS (25%), where there was a greater proportion not taking solids at all.



For children of all ages, the vast majority of parents indicated that their child was 'often' or 'always' interested in food, 'often' or 'always' had a big appetite and 'never' or 'rarely' took more than 30 minutes to finish a meal, as was found in the UK sample. When parents were asked whether the child was full before the meal was finished, about 40% overall indicated that this happened 'never', 'rarely' or 'sometimes', with little variation with age; 18% indicated that this happened 'often' or 'always', with no trend with age.

### **Tables 5.3.3 to 5.3.8**

#### **5.3.3 Meals consumed**

For children who had been fed complementary foods, over 90% of those aged seven months or over ate solid food three or more times per day; for those aged 4 to 6 months, 68% ate solid foods this often. This was similar to the UK sample. At 4 to 6 months, 7% of children eating complementary food 'always' or 'almost always' ate the same food as their parents. This proportion rose steadily with age such that for those aged 12 to 18 months, 67% of children 'always' or 'almost always' ate the same food as their parents, a trend also seen in the UK sample. Conversely 73% of those aged 4 to 6 months 'never' ate the same food as their parents; this proportion decreased with age. However, at aged 12 to 18 months, 6% of children still 'never' ate the same food as their parents.

Thirty four per cent of children aged 4 to 6 months 'always' or 'almost always' ate a meal prepared by, but different from, their parents, 31% for those aged 7 to 9 months. This proportion was lower for the older age groups decreasing to 14% for children aged 12 to 18 months.

For children aged 4 to 6 months, 35% 'always' or 'almost always' ate a commercially prepared baby or toddler meal for the main meal of the day. This proportion steadily decreased with age so that for those aged 12 to 18 months, only 4% 'always' or 'almost always' ate a commercially prepared baby or toddler meal for the main meal. Conversely 29% of those aged 4 to 6 months and 20% of those 7 to 9 months 'never' ate a commercially prepared baby or toddler meal for the main meal, rising with age to 59% for those 12 to 18 months. The proportions eating or not eating commercially prepared baby or toddler food as the main meal were similar to the UK sample. Very few of those 4 to 6 months and 7 to 9 months (1% and 10%) had ever eaten a commercially prepared adult ready meal. This proportion increased with age to 17% for those aged 10 to 11 months and 32% for 12 to 18 months, similar proportions to the UK sample.

For all children in DNSIYCS aged 4 to 6 months, parents had 'never' added salt to their food, including in cooking. This proportion decreased with age but remained high, such that 82% of parents had 'never' added to salt to the food of a child aged 12 to 18 months. Although also high in the UK sample, overall the proportion reporting not adding salt to children's food in Scotland was significantly higher (89%) than in the UK sample (83%).

### **Tables 5.3.9 to 5.3.14**

#### 5.3.4 Foods avoided

For children in DNSIYCS who had been fed complementary foods, 37% of parents overall had avoided giving certain foods to their children, the same as in the UK sample. This proportion increased with age from 14% for those aged 4 to 6 months to 42% for those aged 12 to 18 months. Of those avoiding giving certain foods, the most commonly avoided foods were nuts (42%), followed by all meat, poultry, fish, seafood and offal (35%), all eggs and dairy (26%), spicy foods (25%), sweets and chocolate (22%), and processed foods (18%). These proportions were similar to those for the UK. Other foods were mentioned by smaller numbers, such as salad vegetables, fresh fruit and wheat. Numbers were too small in DNSIYCS to analyse the various reasons for avoidance.

**Tables 5.3.15 to 5.3.16**

#### 5.4. Developmental feeding practices

The Scottish Government recommends that from six months mothers start to introduce children to drinking from cups and beakers. This helps to reduce bottle use and thereby reduces the risk of tooth decay<sup>6</sup>.

The proportion of children who had ever drunk from a cup or beaker with a spout increased with age, from 63% of those aged 4 to 6 months, rising steadily to 95% of those aged 12 to 18 months. They were similar to the IFS Scottish results, where 62% of children had used a cup or beaker with a spout by six months, compared with 58% in DNSIYCS, and 88% by nine months, compared with 85% in DNSIYCS. For those aged 4 to 6 months, the proportions who had ever drunk from a cup or beaker with a spout were significantly higher in Scotland than in the UK sample (63% and 47% respectively).

For children aged 4 to 6 months who drank from a cup or beaker with a spout in DNSIYCS, the majority (64%) drank this way 'sometimes', with a smaller proportion (24%) drinking this way 'usually'.

Of those children who had been given food other than milk, 42% of those aged 4 to 6 months could feed themselves a rusk or similar food. This figure increased to 87% of those aged 7 to 9 months and 99% of those aged 10 to 11 months and 12 to 18 months, similar proportions to the UK sample. Of those children who had been given food other than milk, 9% of those aged 4 to 6 months could feed themselves with a spoon. This also increased with age to 70% of children aged 12 to 18 months.

**Tables 5.4.1 to 5.4.7**

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## References and endnotes

<sup>1</sup> The Infant Feeding Survey (IFS) is a longitudinal postal survey carried out every five years, which collects information on infant feeding practices across the UK for infants aged 4 weeks to 10 months. Available online:

<http://www.ic.nhs.uk/statistics-and-data-collections/health-and-lifestyles-related-surveys/infant-feeding-survey/infant-feeding-survey-2010>

<sup>2</sup> <http://www.ic.nhs.uk/pubs/ifs2005>

<sup>3</sup> A question was asked in DNSIYC to obtain data on frequency of exclusive breastfeeding. However, it is clear from the responses that some of those interviewed misunderstood the question and hence no results are available on the frequency of exclusive breastfeeding at the time of the survey from the CAPI data. The diet diary provides reliable results on the number of children being exclusively breastfed at the time of the survey.

<sup>4</sup> The key recommendations for making and storing powdered infant formula are:

- Feeds should be made up with boiled water that has been allowed to cool to no less than 70°C. Thus the feed should be made within 30 minutes after the water has boiled.
- When making the feed the boiled water should be added to the bottle first, followed by the correct amount of powdered formula.
- Once the feed is prepared it should be cooled as quickly as possible to feeding temperature.
- Ideally, powdered formula should be made up fresh for each feed rather than being stored. Although not ideal, feeds can be made up and stored below 5°C for a maximum of 24 hours.
- If mothers need to feed their infant when away from home they should make up fresh feeds as they need them following the recommendations above.
- It is suggested that mothers may consider carrying a flask of just boiled water with them when away from the home. Alternatively, mothers could use a liquid ready-to-feed formula when away from home

NHS Health Scotland 'Formula Feeding': How to feed your baby safely 2011

<http://www.healthscotland.com/documents/5523.aspx>

<sup>5</sup> Improving Maternal and Infant Nutrition: A Framework for Action' Scottish Government 2011. Available online: <http://www.scotland.gov.uk/Publications/2011/01/13095228/0>

<sup>6</sup> NHS Health Scotland Drinks for babies and young children 2012

<http://www.healthscotland.com/documents/5064.aspx>

## Chapter 6 Food consumption and nutrient intake

### Summary of findings

- Food consumption patterns and macro and micronutrient intakes were in general very similar in the Diet and Nutrition Survey of Infants and Young Children in Scotland (DNSIYCS) as for the UK sample. Comparisons to the UK sample have not been tested for statistical significance, unless specifically stated.
- Nineteen per cent of children aged 4 to 6 months in DNSIYCS consumed breast milk during the four-day food diary period compared to 29% in the UK sample (not significantly different). Breast milk consumption decreased to 7% of those 12 to 18 months. No children were exclusively breastfed in DNSIYCS at the time of the survey.
- Thirteen per cent of children aged 4 to 6 months consumed whole milk over the survey period this increased to 80% of those aged 12 to 18 months. 'Yoghurt, fromage frais and other dairy desserts' were consumed by 48% of children aged 4 to 6 months, rising to 82% of those aged 12 to 18 months.
- The mean total fruit and vegetable consumption including contribution from mixed dishes ranged from 96g per day in the younger group to 169g per day in the older group. This is equivalent to one to two adult portions per day. When tested statistically results were similar to the UK sample with the exception of fruit consumption which was significantly higher in Scotland for children aged 4 to 11 months.
- Commercial infant foods (meat, fish, fruit, dairy or cereal based) contributed 13% to 19% of daily energy intake for children aged 4 to 11 months, and 6% in children aged 12 to 18 months.
- White bread was the most commonly consumed bread in children aged 7 to 18 months (consumed by 36% to 69% across the age groups). At least 27% of children in these age groups consumed wholemeal bread. Breakfast cereal consumption increased with age, so that over 80% of those aged 12 to 18 months had this in the four-day food diary period.
- The proportion of children consuming biscuits, increased to 72% of those aged 12 to 18 months; 'buns, cakes, pastries and fruit pies', increased to 34%; savoury snacks to 42%; and 'sugar, preserves and confectionery' to 65% of children aged 12 to 18 months.

- Mean consumption of beverages other than milk increased with age, with the most frequent consumption in older age groups, after milk and water, being low calorie soft drinks, consumed by 4% of those aged 4 to 6 months, rising to 51% of those aged 12 to 18 months. Fruit juice was consumed by 9% of children aged 4 to 6 months rising to 25% of those aged 12 to 18 months.
- There were no statistically significant differences in intakes of energy and NMES between the Scotland and UK samples. Comparisons for intakes of other macronutrients were not tested for significance, but appeared similar between Scotland and the UK. All vitamins and minerals, with the exception of vitamin C intake which was significantly lower for children aged 12 to 18 months in Scotland were similar between DNSIYCS and the UK sample.
- Mean daily intakes of all vitamins and minerals from all sources (including supplements), were above or close to the Reference Nutrient Intake (RNI) for all age groups with the exception of vitamin D for breastfed children (by any degree of breastfeeding) for all ages, and for non-breastfed children aged 12 to 18 months. It should be noted that these are underestimates as they do not include the contribution of breast milk to vitamin D intake.
- The proportion of children with daily intakes of vitamins and minerals from all sources below the Lower Reference Nutrient Intake (LRNI) was low (8% or less for all age groups), except for iron for children aged over seven months and magnesium for infants aged 4 to 6 months.
- Mean daily intakes of sodium were 79% of the RNI for children aged 4 to 6 months but increased to 203% for children aged 12 to 18 months, which equates to 2.5g salt per day, exceeding the recommendation for this age group.
- Fruit consumption was significantly lower for children in receipt of Healthy Start vouchers in Scotland compared to the entire Scotland sample for both those aged 4 to 11 months and those 12 to 18 months. Vegetable consumption was significantly lower for children in receipt of Healthy Start vouchers compared to the entire Scotland sample for those aged 4 to 11 months.
- Vitamin A intake was significantly lower for children in receipt of Healthy Start vouchers in Scotland compared to the entire Scotland sample for both those aged 4 to 11 months and those 12 to 18 months.

## 6.1. Introduction

The results presented in this chapter derive from the dietary assessment using the four-day food and drink diary and represent a daily average of the days assessed. The survey

was designed to start on a random day, such that all days of the week would be equally represented. If the allocated day was inconvenient for parents of participants they were asked to start the following day and if this was not possible, then the next convenient day. This was to offer flexibility in order to maintain high response rates. As shown in Table 6.A, there was a greater proportion of Fridays, Saturdays and Sundays in the completed diary days for the Diet and Nutrition Survey of Infants and Young Children in Scotland (DNSIYCS), suggesting that there was a preference to complete diaries at the weekend. This pattern was also seen for the UK sample. In this age group, the type and quantity of foods eaten would not be expected to differ between week days and weekend days and hence the greater proportion of weekend days was not considered to have created bias in the data.

**Table 6.A.** Percentage of diary records by day of week

Day of Week	Days Recorded	% of total days
Monday	319	13.0
Tuesday	255	10.4
Wednesday	258	10.5
Thursday	342	14.0
Friday	409	16.7
Saturday	448	18.3
Sunday	417	17.0
All	2448	100

Mis-reporting of food consumption is known to be a problem in all dietary surveys, although it is generally considered to be less of an issue for younger children than adults. It is not known to what extent it is a problem for this age group. Biased estimates of intake can result from under- or over-reporting of actual intake or intake being modified during the recording period. In this age group there may be a particular risk of under or overestimating food wastage. There is also day-to-day variation in diet, making it difficult to capture habitual diet over the short assessment period of four days. The potential for some mis-reporting needs to be borne in mind when interpreting findings from this survey. Evidence suggests that some foods and nutrients may be under- or over-reported to a greater extent than others but there is no information available on the level to which different foods and nutrients are mis-reported in the survey.

Items of policy interest have been statistically tested at the 95% significance level for two age groups, 4 to 11 months and 12 to 18 months; significant comparisons are discussed in the text. All other comparisons discussed have not been tested for significance and are therefore only observations.

## 6.2. Foods consumed

The commentary in this section excludes non-consumers unless otherwise stated (e.g. the results for disaggregated food groups are presented for the whole population i.e. consumers and non-consumers). This is because many foods were not consumed regularly by substantial proportions of the entire population. This is a different approach to the National Diet and Nutrition Survey (NDNS)<sup>1</sup> where the main focus is on mean intakes for the whole population. No statistical testing has been carried out between age groups for these reasons and therefore any differences between age groups are only observations.

Tables 6.1 and 6.2 report consumption of foods and drinks as they are reported (referred to as 'non-disaggregated') in the four-day food diary. However consumption of fruit and vegetables, and meat and fish, are also reported in table 6.3 including the contribution from composite dishes, but excluding other components of the dish such as pasta or pastry (referred to as 'disaggregated'). The methodology for this 'disaggregation' of composite dishes is provided in Appendix D.

It should be noted that the quantity and variety of different foods consumed was expected to increase with age across the age range of children in DNSIYCS due to the gradual introduction of complementary foods alongside breast milk and/or infant formula milk. It was also expected therefore that the contribution of these foods to nutrient intake would change with age.

### Tables 6.1 and 6.2

#### 6.2.1 Cereals and cereal products

Within the cereals category, the food group consumed by the greatest proportion of children was 'pasta, rice, pizza and other miscellaneous cereals', ranging from 10% of children aged 4 to 6 months increasing to 82% of children aged 12 to 18 months. Mean daily consumption among consumers ranged from 22g in the youngest age group up to 51g in the eldest age group.

White bread was the major type of bread consumed in all age groups. The proportion of children consuming white bread and the amount consumed increased with age. At least 27% of children aged 7 to 18 months consumed wholemeal bread.

The proportion of children consuming breakfast cereal increased with age from 25% of the youngest age group up to 83% in the eldest age group. Mean daily consumption among consumers ranged from 11g up to 24g across the age groups.

The proportion of children consuming the sub-food group biscuits increased with age to 72% of those aged 12 to 18 months; the proportion consuming 'buns, cakes, pastries and

fruit pies' increased with age to 34%. Mean consumption of puddings ranged from 25g to 39g per day among consumers across the age groups. These patterns were all generally similar to those seen for the UK sample.

**Tables 6.1 and 6.2**

### 6.2.2 Milk and milk products

Results provided in this section do not include consumption of infant formula or breast milk. Whole milk was the most commonly consumed type of cow's milk for all age groups. The proportion of consumers increased with age, ranging from 13% of those aged 4 to 6 months up to 80% of those aged 12 to 18 months. Mean consumption ranged from 46g to 189g per day for consumers aged 4 to 11 months increasing to 326g per day for consumers aged 12 to 18 months. Children aged below 10 months consumed less than a quarter of a pint (146g) of whole milk per day. This is in keeping with the recommendation that cow's milk should only be used as a main drink after the age of one year<sup>2</sup>. Among consumers aged 10 to 11 months however consumption was greater at 189g per day. Four per cent of those aged 4 to 6 months, up to 12% of those aged 12 to 18 months consumed semi-skimmed milk over the survey period.

The proportion of children consuming the sub-food group 'yoghurt, fromage frais and other dairy desserts', ranged from 48% of those aged 4 to 6 months, up to 82% of children aged 12 to 18 months. Mean intakes ranged from 43g to 61g among consumers across the age groups. To help visualise portion sizes consumed, a typical child yoghurt pot weighs approximately 50g; consumers therefore ate about a children's pot of yoghurt per day. The proportion of children consuming cheese increased with age from 11% of the youngest age group to 66% of those aged 10 to 11 months and 65% of those aged 12 to 18 months. The mean daily intakes also increased with age among consumers, ranging from 4g to 12g per day. These patterns of consumption were similar to the UK sample although not tested for significance.

**Tables 6.1 and 6.2**

### 6.2.3 Eggs and egg dishes

The proportion of children consuming 'eggs and egg dishes' increased with age from 3% of those aged 4 to 6 months to 36% of those aged 12 to 18 months. The quantities for consumers ranged from 7g per day for those aged 4 to 6 months to 23g per day for those aged 12 to 18 months.

**Tables 6.1 and 6.2**



#### 6.2.4 Fat spreads

Mean intakes of fat spreads including butter, ranged from 3g to 9g per day among consumers. Reduced and low fat spreads were the most commonly consumed, by 12% for those aged 4 to 6 months, rising to 61% for those aged 12 to 18 months. These patterns were also seen in the UK sample.

**Tables 6.1 and 6.2**

#### 6.2.5 Meat and meat products

The proportion of infants and young children consuming commercially prepared 'red meat and dishes' (bacon, ham, beef, veal, lamb and pork) ranged from 1% of those aged 4 to 6 months to 8% of those aged 12 to 18 months. This contrasted with homemade 'red meat and dishes', where the proportion of consumers increased from 13% of those aged 4 to 6 months to up to 71% of those aged 12 to 18 months. Commercially prepared 'burgers, kebabs, sausages, meat pies and pastries' were not consumed by any children aged 4 to 6 months increasing to 20% for those aged 12 to 18 months, while homemade types were consumed by 1% of those aged 4 to 6 months, rising to 41% of those aged 12 to 18 months. These patterns were similar to those for the UK sample but there was an indication that those in Scotland consumed more burgers, both commercially prepared and homemade, and less 'chicken and dishes' than those in the UK sample although this was not tested for significance.

**Tables 6.1 and 6.2**

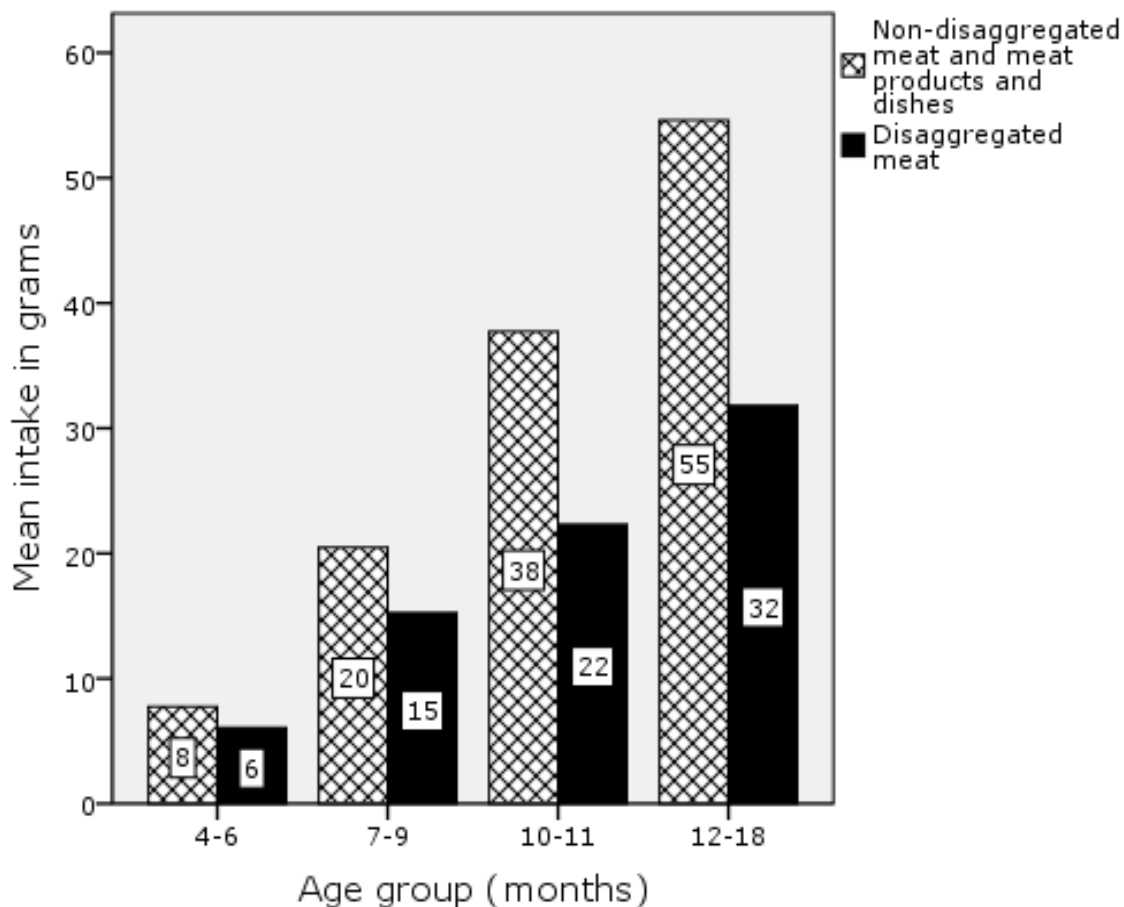
Estimates of meat consumption from all sources including composite dishes were calculated from disaggregated data. These estimates are much lower than those shown in Table 6.1 as the disaggregated estimates do not include the non-meat components of meat dishes e.g. the pasta and cheese in meat lasagne. Using the disaggregated data, each type of meat consumed was sub-categorised as red meat which included beef, lamb, pork, sausages, burgers and kebabs, or white meat, which included chicken and turkey.

Mean consumption of total meat for the whole population including non-consumers based on disaggregated data was estimated at 6g per day for children aged 4 to 6 months, up to 32g per day for those aged 12 to 18 months. This was around 25% less than non-disaggregated intakes (refer to Figure 6.A). Red meat comprised 50% total meat consumption for children aged 4 to 6 months increasing up to 72% for those aged 12 to 18 months, similar to the UK sample.

There was no statistically significant difference in meat consumption after disaggregation between DNSIYCS and the UK sample for the two age groups 4 to 11 months and 12 to 18 months.

**Tables 6.1 to 6.4**

**Figure 6.A.** Non-disaggregated and disaggregated meat (mean in grams) consumption for the entire population including non-consumers.



#### 6.2.6 Fish and fish dishes

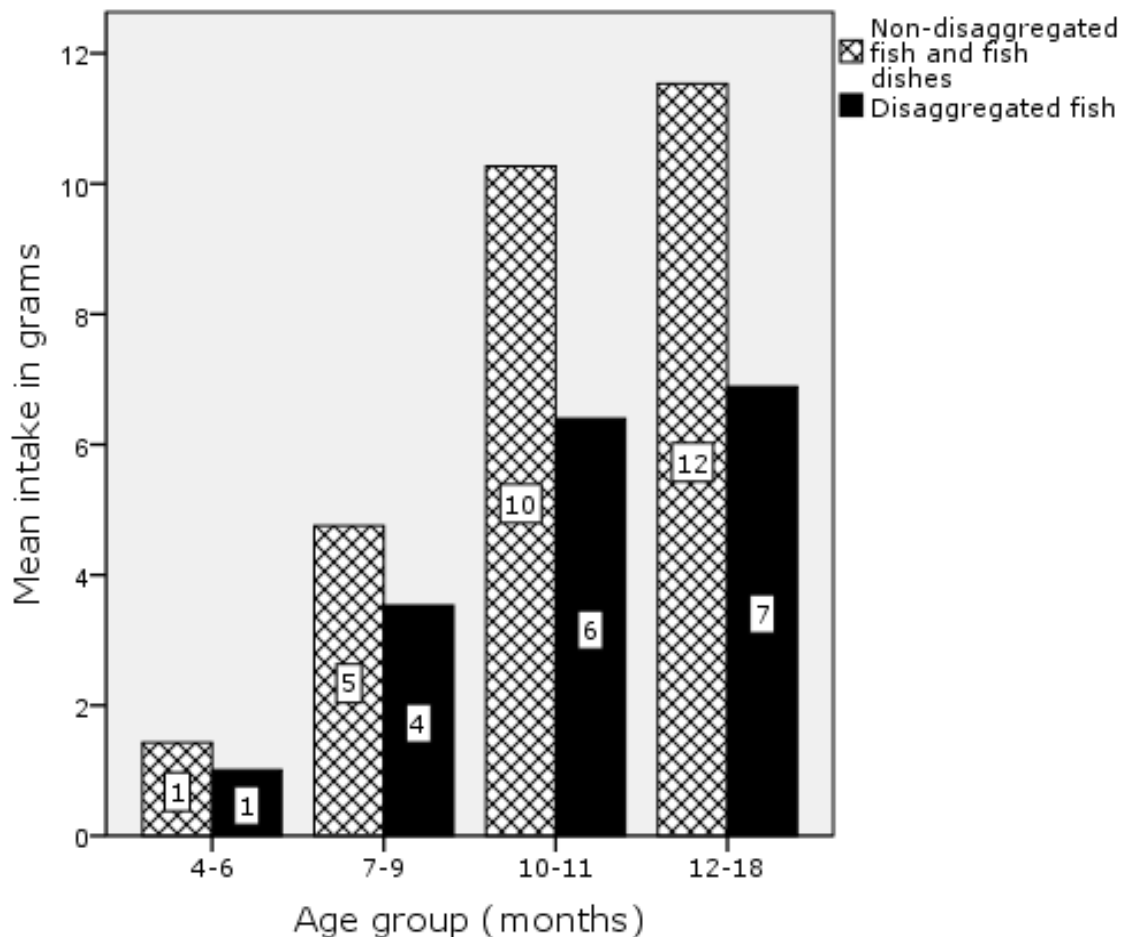
The proportion of infants and young children consuming 'fish and fish products' increased with age from 13% of those aged 4 to 6 months up to 54% of those aged 12 to 18 months, similar to those for the UK sample. Mean daily intakes ranged from 11g at 4 to 6 months to 21g for those aged 12 to 18 months among consumers.

After disaggregation of composite dishes, mean consumption of fish from all sources for the entire population including non-consumers ranged from 1g per day for children aged 4 to 6 months to 7g per day for those aged 12 to 18 months. When disaggregated to exclude non-fish components for composite dishes, fish consumption was almost 50% lower for children aged 10 to 18 months than the non-disaggregated totals (refer to figure 6.B). This was similar to the UK sample and showed similar differences compared to non-disaggregated figures as seen for meat for children aged 10 to 18 months.

There was no statistically significant difference in fish consumption after disaggregation between DNSIYCS and the UK sample for the two age groups 4 to 11 months and 12 to 18 months.

**Tables 6.1 to 6.4**

**Figure 6.B.** Non-disaggregated and disaggregated fish (mean in grams) consumption for the entire population including non-consumers.



**6.2.7 Vegetables and fruit**

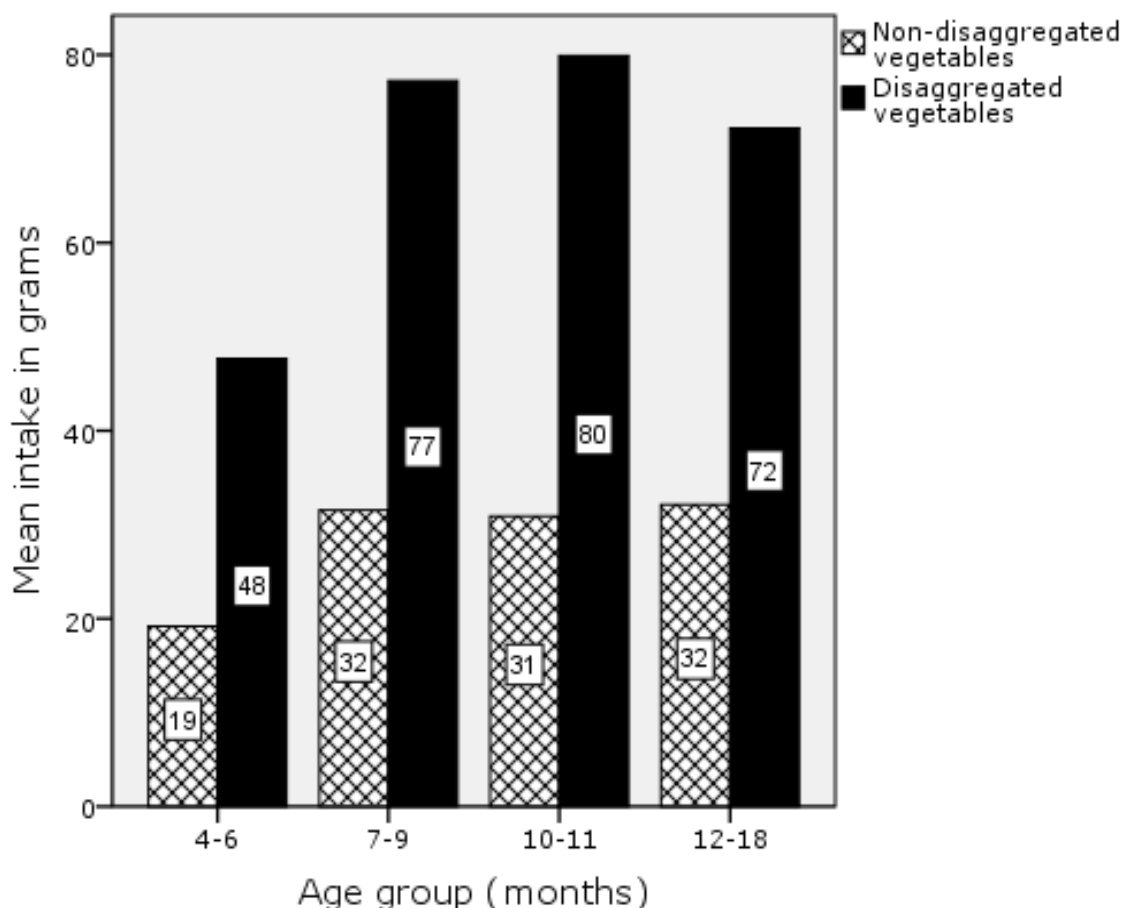
Tables 6.1 and 6.2 provide results for fruit and vegetable consumption excluding the contribution from composite dishes. This section describes consumption of fruit and vegetables including the contribution from composite dishes.

Table 6.3 shows mean consumption of vegetables for the entire population including non-consumers based on disaggregated data, ranged from 48g per day for children aged 4 to 6 months, up to 72g per day for those aged 12 to 18 months. This is very similar to the consumption for the UK sample. Mean fruit consumption after disaggregation ranged from 48g per day for children aged 4 to 6 months up to 96g per day for those aged 12 to 18 months. These figures are considerably higher than those shown in Table 6.1 as the latter

are based on fruit, salad and cooked vegetables consumed and reported as discrete items, and exclude fruit and vegetables in mixed dishes that are reported according to the main component of the dish. Taking vegetables from composite dishes into account (i.e. after disaggregation), vegetable consumption was over 100% higher for all age groups than the non-disaggregated totals (refer to Figure 6.C). Fruit consumption after disaggregation was 100% higher for those aged 4 to 6 months, decreasing to 23% higher for those aged 12 to 18 months (refer to Figure 6.D). The differences between estimates for non-disaggregated and disaggregated consumption are much greater than for older age groups as seen in NDNS (adults aged 19-64 years), probably due to the high number of commercial infant foods containing fruit or vegetables consumed by children in DNSIYC which are not included in the non-disaggregated vegetable and fruit totals.

**Tables 6.1 to 6.3**

**Figure 6.C.** Non-disaggregated and disaggregated vegetable (mean in grams) consumption for the entire population including non-consumers.

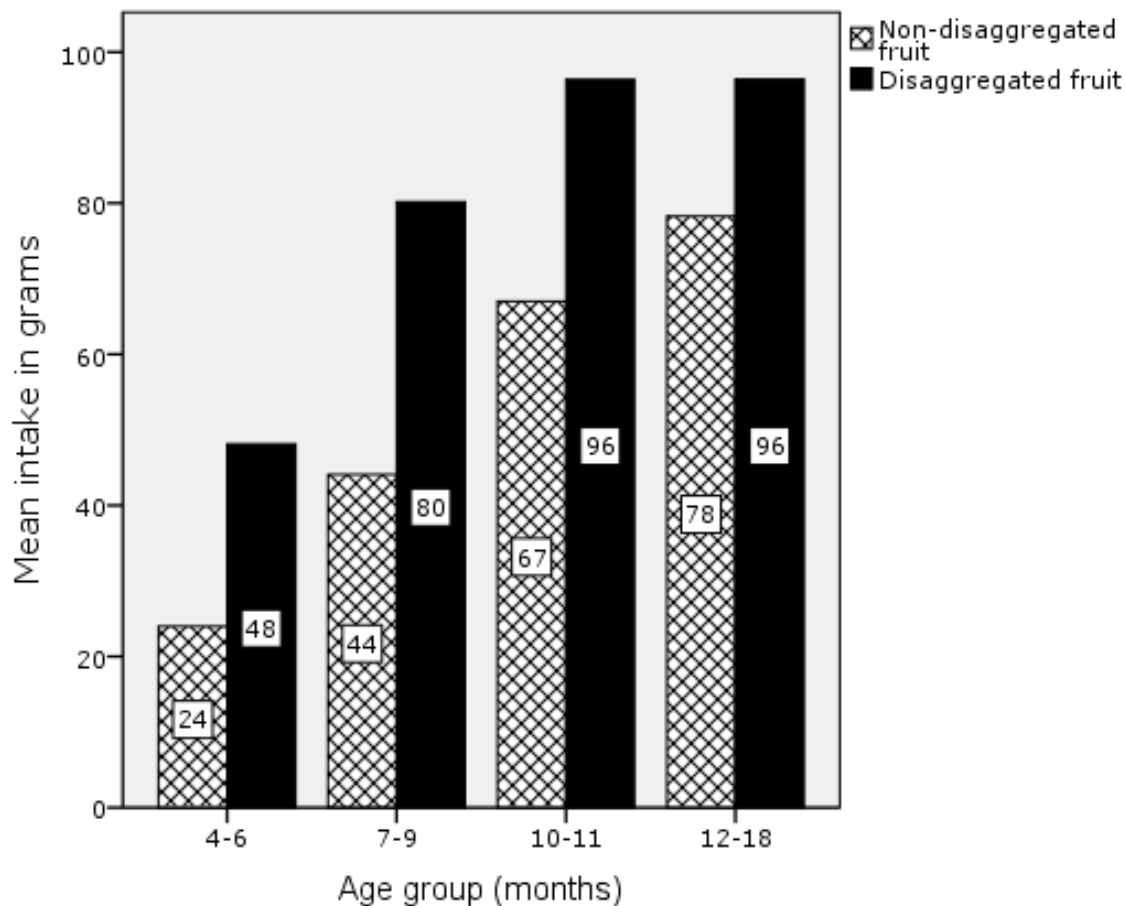


When compared statistically, mean daily intake of fruit excluding fruit juice was significantly higher for children aged 4 to 11 months in DNSIYCS (78g) compared to children of the same age in the UK sample (70g). Mean consumption of total fruit and vegetables (excluding fruit juice) ranged from 96g per day for children aged 4 to 6 months, to 169g per

day for those aged 12 to 18 months. These quantities are relatively high and were similar to the UK sample. For example, mean total fruit and vegetable consumption by those aged 12 to 18 months was similar to the mean consumption of total fruit and vegetables after disaggregation by those aged 11 to 18 years in NDNS (177g). Mean fruit consumption of children aged 7 to 18 months in DNSIYCS (80g to 96g) was higher than the 11 to 18 year age group in NDNS (62g). There is currently no recommendation for the number of portions of fruit and vegetables consumed per day or the recommended portion size for this age group. To put it into context adults are advised to consume five 80g portions of fruit and vegetables per day (400g), so children in DNSIYCS consumed about one to two adult portions a day, which is relatively high given their body size at this age.

**Table 6.3 and 6.4**

**Figure 6.D.** Non-disaggregated and disaggregated fruit (mean in grams) consumption for the entire population including non-consumers.



Fruit and vegetable consumption based on disaggregated data was compared statistically between the entire Scotland sample and the Healthy Start Scotland sample, for two age groups, 4 to 11 months and 12 to 18 months. For those aged 4 to 11 months, vegetable consumption was significantly lower for children receiving HS vouchers (51g per day) in Scotland than for all Scottish children (71g per day), while consumption of vegetables for those aged 12 to 18 months was similar. Children receiving HS vouchers consumed less

fruit, both for those aged 4 to 11 months (41g per day compared to 78g per day for all Scottish children) and for those aged 12 to 18 months (69g per day compared to 96g per day for all Scottish children). Total fruit and vegetable consumption was significantly lower for children receiving HS vouchers aged 4 to 11 months (92g per day compared to 149g per day for all Scottish children) and aged 12 to 18 months (141g per day compared to 169g per day for all Scottish children).

### **Table 6.5**

#### **6.2.8 Savoury snacks, sugar and confectionery**

Mean consumption of savoury snacks was 5g or less per day for consumers in all groups although the proportions of children consuming these foods increased with age from 0% of those aged 4 to 6 months to 42% of those aged 12 to 18 months. Hence although they ate small amounts, substantial proportions of older children were given these in the four-day food diary period. A higher proportion of children aged 4 to 6 months consumed savoury snacks in the UK (7%) compared to Scotland although this was not tested for significance.

Mean consumption of 'sugar, preserves and confectionery' ranged from 2g to 8g per day. However, like savoury snacks, the proportion having these foods increased with age, such that 65% of those aged 12 to 18 months were consuming these foods, similar to the UK sample.

### **Tables 6.1 and 6.2**

#### **6.2.9 Beverages**

The proportion of children consuming water ranged from 61% of those aged 4 to 6 months and 67% or more for those aged 7 to 18 months. Mean daily consumption ranged from 52g among consumers aged 4 to 6 months up to 147g for those aged 12 to 18 months.

Fruit juice was consumed by 9% of children aged 4 to 6 months, rising to 25% for those aged 12 to 18 months, with mean daily intakes ranging from 7g for consumers aged 4 to 6 months to 63g per day for consumers aged 12 to 18 months.

To help visualise the quantities consumed, an individual carton of fruit juice typically weighs about 200g, so children in DNSIYCS were typically consuming between a quarter of a carton to two and a quarter cartons of fruit juice per week.

The proportion of children consuming soft drinks (not low calorie) (1% to 22%) was very similar to the proportion of children consuming juice (9% to 25%) across the age groups. However, the quantities of soft drinks (not low calorie) consumed were greater, with a mean daily consumption of 73g for consumers aged 4 to 6 months, increasing to 180g for those aged 12 to 18 months.

Somewhat higher proportions drank low calorie than non-low calorie soft drinks, particularly in the older age groups, with 51% of children aged 12 to 18 months consuming low calorie soft drinks compared to 22% consuming non-low calorie soft drinks. Quantities were also higher for low calorie soft drinks; mean consumption ranged from 21g per day for consumers aged 4 to 6 months, to 214g per day for consumers aged 12 to 18 months. These patterns of consumption were generally similar to the UK sample.

## Tables 6.1 and 6.2

### 6.2.10 Breast milk and infant formula

Breast milk is the best form of nutrition for infants and exclusive breastfeeding is recommended for the first six months (26 weeks) of an infant's life<sup>3,4</sup>. Infant formula milk is the only substitute for breast milk and although there are a variety of types available on the market, unless advised by a health professional 'first milk' is the only type of formula an infant requires until the age of 12 months when cow's milk can be introduced as a main drink into the diet. There are therefore no requirements for children to consume other types of formula including: 'hungrier babies milk' (also known as 'second milk'); follow-on formula; 'goodnight milk'; or 'growing up milk'. Follow-on formula and 'goodnight milk' are not recommended before six months and 'growing up milk' is not designed for children aged under 12 months. Complementary foods should be introduced at six months and breastfeeding (and/or infant formula, if used) should continue beyond this time alongside appropriate types and amounts of complementary foods<sup>5</sup>.

Nineteen per cent of children aged 4 to 6 months consumed breast milk in the four-day diary period, 22% of those aged 7 to 9 months, 17% of those aged 10 to 11 months and 7% of those aged 12 to 18 months. This was not significantly different to the UK.

Mean breast milk consumption estimated from the recorded feeding time and volumes (if expressed) for consumers decreased with age from 680g per day for those aged 4 to 6 months to 300g per day for those aged 12 to 18 months. There were no children aged 4 to 18 months who were exclusively breastfed at the time of the survey in DNSIYCS.

Forty seven per cent of children aged 4 to 6 months consumed 'first milk', decreasing to only 4% of those aged 12 to 18 months; similarly 20% of those aged 4 to 6 months consumed 'hungrier babies milk', again decreasing to only 2% of those aged 12 to 18 months. Twenty seven per cent of those aged 4 to 6 months consumed follow-on milk, rising to 40% of those aged 7 to 9 months, and 52% of those aged 10 to 11 months, but decreasing to 8% of those aged 12 to 18 months. There was little consumption of 'growing up milk', none up to age nine months, 3% of those aged 10 to 11 months and 14% of those aged 12 to 18 months. Very small proportions (0% to 4%) of children consumed soy or other infant specific milks. These patterns were similar to the UK sample, although the actual proportion varied in some cases.

The 27% of infants aged 4 to 6 months consuming follow-on milk may include some infants aged 4 or 5 months, i.e. younger than 6 months, not observing the recommendation that follow-on milk is not nutritionally necessary and not suitable at this age.

## **Tables 6.1 and 6.2**

### **6.2.11 Commercial infant foods**

'Commercial infant foods' were consumed mainly by children under the age of 12 months, with those aged 12 to 18 months more commonly consuming non-infant specific foods. Over 60% of children aged 4 months to 11 months consumed infant 'meat and fish based products and dishes' during the four-day food diary period, decreasing to 31% of those aged 12 to 18 months, and over 40% of those aged 4 months to 9 months had 'other savoury based foods and dishes', decreasing to 11% of those aged 12 to 18 months. 'Other savoury based foods and dishes', 'fruit based foods and dishes', 'dairy based foods and dishes', and 'cereal based foods and dishes' also showed similar patterns of consumption. The only type of 'commercial infant foods' for which there was an increase with age was for snacks, both sweet and savoury where 46% of children aged 4 to 6 months consumed these, rising to over 60% for those aged 7 to 11 months then falling to 37% of those aged 12 to 18 months. Mean consumption of infant specific snacks (sweet and savoury) ranged between 6g to 8g per day among consumers. These patterns of consumption of 'commercial infant foods' were largely similar to those seen for the UK sample.

## **Tables 6.1 and 6.2**

### **6.3. Supplements**

Information on consumption of dietary supplements was collected both in the four-day food and drink diary and in the Computer Assisted Personal Interview (CAPI), which asks about consumption in the year before interview. Dietary supplements were defined for parents as products intended to provide additional nutrients or give health benefits and taken in liquid, powder, tablet or capsule form. In the CAPI, parents were asked to list any dietary supplements given to their children over the past year. In the diary parents wrote down the details of any supplements they gave to their children on each diary recording day. Statistical tests were carried out to compare supplement intakes in DNSIYCS compared to the entire UK sample.

Six per cent of children aged 4 to 6 months, 9% of those aged 7 to 9 months, 3% of those aged 10 to 11 months and 7% of those aged 12 to 18 months were given at least one supplement during the four-day food diary recording period. The main supplement given to children during the four-day food diary was a multi-vitamin supplement.



When compared statistically for age groups 4 to 11 months and 12 to 18 months, supplement consumption during diary recording period was similar for DNSIYCS and the UK sample. Only the consumption of other nutrient supplements was significantly different, being 1% in DNSIYCS compared to 4% for the UK sample.

#### **Tables 6.6a and 6.7a**

A higher proportion of parents reported having given at least one supplement to their children during the previous year than had done so in the four-day food diary period. Five per cent of children aged 4 to 6 months, 11% of those aged 7 to 9 months, 9% of children aged 10 to 11 months and 15% of those aged 12 to 18 months had been given a supplement in the past year. The main supplement given to children in the past year was a multi-vitamin supplement.

When compared statistically, supplement consumption over the past year was similar for DNSIYCS and the UK sample for those aged 4 to 11 months. For those aged 12 to 18 months, both consumption of other nutrient supplements (5% for DNSIYCS compared to 8% for the UK sample) and any type of supplement (15% for DNSIYCS compared to 20% for the UK sample) were significantly higher for the UK sample than for DNSIYCS.

#### **Tables 6.6b and 6.7b**

### **6.4. Nutrient intakes**

This section presents daily intakes of energy, macronutrients (protein, fat, carbohydrate, sugars and non-starch polysaccharides) and micronutrients (vitamins and minerals) for the entire population estimated from the food consumption data, including from the consumption of supplements. It also shows the percentage contribution of the major food types to intake of each nutrient for the entire population, including non-consumers. This analysis has been carried out using the food groups generally used in Department of Health (DH) dietary surveys and not disaggregated food groups.

Dietary Reference Values (DRVs) for food energy and nutrients provide a best estimate of the requirements of the UK population and its subgroups, and present criteria against which to judge the adequacy of their intake<sup>6</sup>. These DRVs apply to groups of people in health and are not appropriate for the definition of requirements for individuals. The DRV for food energy is defined as the Estimated Average Requirement (EAR), that is, the average energy requirement for any population group. During infancy and childhood, the energy requirement has to meet the needs for healthy growth and development.

In this report, average daily intakes of total energy<sup>7</sup> for boys and girls were compared to age and sex specific UK reference values taken from the Scientific Advisory Committee on Nutrition (SACN) energy report<sup>8</sup> by calculating the EAR for each child in DNSIYC based on

their body weight. For children aged under 12 months, figures were used for mixed or unknown feeding i.e. it was assumed the proportions of breast milk and formula milk substitute used were not known. The median physical activity level (PAL)<sup>9</sup> value adjusted for growth was used for children aged over 12 months. Macronutrients and micronutrients for children were compared to the 1991 COMA report on Dietary Reference Values for Food Energy and Nutrients for the United Kingdom<sup>10</sup>. The only macronutrient, other than energy, for which DRVs are set for this age group is protein.

Where the UK Reference Nutrient Intakes (RNIs) and Lower Reference Nutrient Intakes (LRNIs) have been published for this age group<sup>6</sup>, intakes as a proportion of the RNI and the proportion with intakes below the LRNI are given. The RNI for a vitamin or mineral is the amount of the nutrient that is sufficient for about 97.5% of people in the population. If the average intake of a sample is at the RNI, then the risk of deficiency in the sample is judged to be very small. The inadequacy of vitamin or mineral intake can be expressed as the proportion of individuals with intakes below the LRNI. The LRNI for a vitamin or mineral is set at the level of intake considered likely to be sufficient to meet the needs of only 2.5% of the population. However, it should be noted that DRV's for some micronutrients such as magnesium, potassium, selenium and zinc are based on very limited data so caution should be used when assessing adequacy of intake using the LRNI.

Intakes of vitamins and minerals are reported in two ways: 1) intakes from all sources, that is, including supplements as recorded in the four-day food diary; and 2) for recommended vitamins (A, C and D), intakes from food sources only. The proportion of children taking supplements was small, as reported in section 6.3. The percentage contribution of the major food types to selected vitamins and minerals are shown in Tables 6.25 to 6.27 and 6.32 to 6.35.

Other than for energy, DRVs have not been set for exclusively breastfed infants as breast milk is recommended to provide the best nutrition for infants. DRVs are set only for infants whose nutrient intakes are dependent on the composition of breast milk substitutes (i.e. infant formula) being offered. The vitamin D content of breast milk is not known (see Annexe D of the UK report). In DNSIYC the contribution of breast milk to vitamin D intakes for breastfed infants has therefore been excluded, however this provides an underestimation of vitamin D intake for breastfed infants<sup>10</sup>.

The commentary in this section refers to mean intakes for the total population. Statistical testing has been carried out in this section for energy and specific nutrients for two age groups, 4 to 11 months and 12 to 18 months; any differences noted between age groups and other statements comparing DNSIYCS to the entire UK sample are only observations.

Wherever they exist, the DRVs (that is the EARs, RNIs and LRNIs) are provided in tables.

### 6.4.1 Energy

The mean daily intakes of total energy<sup>7</sup> for children aged 4 to 6 months was 2.83 MJ (674 kcal), 3.28 MJ (780 kcal) for children aged 7 to 9 months, 3.70 MJ (879 kcal) for children aged 10 to 11 months and 4.11 MJ (977 kcal) for children aged 12 to 18 months. There were no statistically significant differences in energy intake between DNSIYCS and the UK sample for either those aged 4 to 11 months or those aged 12 to 18 months.

#### **Table 6.8**

The percentage of children calculated as exceeding the age and sex specific EAR for energy<sup>9</sup> (calculated for the individual based on body weight) was similar for boys and for girls, 77% and 74% respectively. The percentage of boys exceeding the EAR was 50% for children aged 4 to 6 months, 81% for those aged 7 to 9 months, 71% for those aged 10 to 11 months and 85% for children aged 12 to 18 months. For girls the percentage exceeding the EAR increased with age, from 45% for children aged 4 to 6 months, 52% for those aged 7 to 9 months, 70% for those aged 10 to 11 months and up to 92% for children aged 12 to 18 months, providing evidence that energy intakes increase with age following the introduction of complementary foods. It should be noted that 50% of the population are expected to have requirements exceeding the EAR.

#### **Tables 6.9a and 6.9b**

Infant formula was the main source of energy for children aged 4 to 11 months while for children aged 12 to 18 months, the food group 'milk and milk products' was the main source of energy (26%) followed by the food group 'cereals and cereal products' (25%).

In general, infant formula, breast milk and the food group 'commercial infant foods' contributed decreasing proportions of energy with age. For example, the contribution of infant formula decreased from 57% for children aged 4 to 6 months to 8% for children aged 12 to 18 months. Breast milk consumption followed a similar pattern contributing 12% for children aged 4 to 6 months down to 2% for children aged 12 to 18 months and 'commercial infant foods' contributing 18% for children aged 4 to 6 months decreasing to 6% for those aged 12 to 18 months. In contrast, the contribution of non-infant specific foods increased with age. For example, the food group 'cereals and cereal products' increased from 2% for children aged 4 to 6 months to 25% for those aged 12 to 18 months.

#### **Tables 6.10 and 6.11**

### 6.4.2. Protein

Mean protein intakes were well above the RNI in all age groups (the RNI for protein ranges from 12.7g to 14.5g per day for the DNSIYCS age range)<sup>6</sup>. Protein provided 10% of total

energy for children aged 4 to 6 months increasing to 16% for children aged 12 to 18 months.

**Table 6.8**

For children aged 4 to 9 months, infant formula was the largest contributor to protein intake, providing 49% of intake for children aged 4 to 6 months and 29% for children aged 7 to 9 months; the food group 'commercial infant foods' was the second largest contributor (22% for both). For children aged 10 to 18 months, the food group 'milk and milk products' was the largest contributor to protein intake providing 21% for children aged 10 to 11 months and 34% for those aged 12 to 18 months. The second largest contributor to protein intake for children aged 10 to 11 months was infant formula (providing 19%) and for children aged 12 to 18 months was the food group 'cereals and cereal products' (19%).

In general, the contribution of the food group 'meat and meat products and dishes' to protein intake increased with age, from 3% for children aged 4 to 6 months to 17% for those aged 12 to 18 months. A similar pattern was seen for the intake of the food groups 'cereals and cereal products' and 'milk and milk products', rising from 2% to 19% and 8% to 34% respectively for children aged 4 to 6 months to children aged 12 to 18 months. This is as expected as the variety of complementary foods introduced increases with age.

**Table 6.12**

6.4.3. Total fat

It should be noted that the maximum dietary recommendations regarding the proportion of energy intake as fat for the general population do not apply for children aged under five years. This is due to the importance of dietary fat in achieving energy requirements for this age group while consuming a manageable volume of food.

Total fat provided an average of 40% of total energy for children aged 4 to 6 months, 36% for those aged 7 to 11 months and 35% for children aged 12 to 18 months.

**Table 6.8**

The major contributor to total fat intake for children aged 4 to 11 months was infant formula, with the contribution highest in children aged 4 to 6 months at 68%, 51% for children aged 7 to 9 months and 37% for children aged 10 to 11 months. For children aged 4 to 6 months, the second largest contributor to total fat intake was breast milk, providing 14% and for children aged 7 to 9 was 'commercial infant foods', providing 11%. For children aged 10 to 11 months, the second largest contributor was the food group 'milk and milk products' (18%). For children aged 12 to 18 months, the main contributor was 'milk and milk products' (36%) followed by the food group 'cereals and cereal products' (14%).

**Table 6.13**

#### 6.4.3.1. Saturated fatty acids

Saturated fatty acids provided an average of 16% to 18% of total energy across all age groups.

The main source of saturated fatty acids for children aged 4 to 11 months was infant formula, providing an average of 69% of saturated fat intake for children aged 4 to 6 months, 51% for 7 to 9 months and 37% for 10 to 11 months. The second largest contributor was breast milk for children aged 4 to 6 months (15%) and both breast milk and the food group 'milk and milk products' for children aged 7 to 9 months (both 11%). The food group 'milk and milk products' (24%) was the second largest contributor for children aged 10 to 11 months. For children aged 12 to 18 months, 'milk and milk products' (47%), particularly whole milk (32%), was the main source of saturated fatty acids with the food group 'cereals and cereal products' the second largest contributor (12%).

**Tables 6.8 and 6.14**

#### 6.4.3.2. Trans fatty acids

Trans fatty acids are derived from two sources in the diet: those that occur naturally in meat and dairy products of ruminant animals, and those produced artificially through food processing. Trans fatty acids provided an average of 0.5% or less of total energy across all age groups. The main source of trans fatty acids were natural sources, as the food group 'milk and milk products' was one of the largest contributors (31% to 52%) for all age groups. The food group 'commercial infant foods' contributed 46% of trans fatty acid intake for children aged 4 to 6 months. For children aged 7 to 18 months, the contributions to trans fatty acid intake from other sources, such as the food groups 'commercial infant

foods' (5% to 30%), fat spreads (3% to 8%) and 'cereals and cereal products' (1% to 11%) were smaller.

#### **Tables 6.8 and 6.15**

#### 6.4.4. Carbohydrate

Total carbohydrate provided an average of 50% of total energy intake for children aged 4 to 6 months, 52% for children aged 7 to 9 months, 50% for children aged 10 to 11 months and 49% for children aged 12 to 18 months.

The major contributor to carbohydrate intake for children aged 4 to 11 months was infant formula (51% for those aged 4 to 6 months; 34% for those aged 7 to 9 months; and 26% for those aged 10 to 11 months). The second largest contributor to carbohydrate intake for children aged 4 to 9 months was the food group 'commercial infant foods' (at least 23%), while for children aged 10 to 11 months, it was the food group 'cereals and cereal products' (21%). For children aged 12 to 18 months the major contributor to carbohydrate intake was 'cereals and cereal products' (35%) followed by the food group 'milk and milk products' (17%, with whole milk providing 10%).

Overall, the contribution from infant formula, breast milk and the food group 'commercial infant foods' to carbohydrate intake decreased with age, as expected, from 85% for children aged 4 to 6 months to 16% for children aged 12 to 18 months.

#### **Tables 6.8 and 6.16**

#### 6.4.4.1. Total sugars

Sugars provided an average of 40% of total energy for children aged 4 to 6 months, 34% for those aged 7 to 9 months, 30% for those aged 10 to 11 months and 25% for children aged 12 to 18 months.

The main contributor to total sugars intake for children aged 4 to 11 months was infant formula (60%, 46% and 37% for children aged 4 to 6 months, 7 to 9 months and 10 to 11 months respectively). The second largest contributor was the food group 'commercial infant foods' for children aged 4 to 6 months (14%) and 7 to 9 months (16%), and the food group 'milk and milk products' (16%) for those aged 10 to 11 months. For children aged 12 to 18 months, 'milk and milk products' was the main source of total sugars (32%) followed by fruit (20%). The contribution of milk to total sugars was mainly due to the presence of milk sugars, especially lactose.

#### **Tables 6.8 and 6.17**

#### 6.4.4.2. Non-milk extrinsic sugars (NMES)

Non-milk extrinsic sugars (NMES) intakes increased with age, providing between 5% of total energy for children aged 4 to 6 months and 8% for children aged 12 to 18 months. There were no statistically significant differences in NMES intake (g per day or % energy) between DNSIYCS and the UK sample for either those aged 4 to 11 months or those aged 12 to 18 months.

#### **Table 6.8 and 6.11**

The main contributor to NMES for children aged 4 to 6 months and 7 to 9 months was the food group 'commercial infant foods' (51% and 36% respectively), particularly 'fruit based foods and dishes' and 'cereal based foods and dishes'. For children aged 10 to 18 months, the main contributor to NMES was the food group 'milk and milk products'; 29% for children aged 10 to 11 months and 24% for children aged 12 to 18 months. This came almost entirely from 'yoghurt, fromage frais and other dairy desserts'.

Other contributors to NMES, in smaller proportions, were the food groups 'cereals and cereal products' (1% for children aged 4 to 6 months rising to 24% for children aged 12 to 18 months), 'sugars, preserves and confectionery' (0% for children aged 4 to 6 months increasing to 14% for children aged 12 to 18 months) and beverages (1% for children aged 4 to 6 months increasing to 10% for children aged 12 to 18 months). It should be noted that all sugars in fruit juice are NMES, as are half the sugars in pureed fruit. These foods, particularly pureed fruit, make a major contribution to NMES intakes in this age group.

#### **Tables 6.11 and 6.18**

#### 6.4.4.3. Intrinsic and milk sugars (IMS)

Intrinsic and milk sugars (IMS) provided an average of 35% of total energy for children aged 4 to 6 months, 27% for those aged 7 to 9 months, 23% for those aged 10 to 11 months and 18% for children aged 12 to 18 months.

Infant formula was the largest contributor to IMS for children aged 4 to 11 months, with 68% for children aged 4 to 6 months, 54% for those aged 7 to 9 months and 42% for children aged 10 to 11 months. The second largest contributors to IMS intake were breast milk for those aged 4 to 6 months (14%), the food group 'commercial infant foods' for children aged 7 to 9 months (14%) and fruit for those aged 10 to 11 months (18%). For children aged 12 to 18 months, the largest contributor to IMS intake was the food group 'milk and milk products' (37%) followed by fruit (26%).

#### **Tables 6.8 and 6.19**

#### 6.4.4.4. Starch

Starch provided an average of 10% of total energy for children aged 4 to 6 months, 18% for children aged 7 to 9 months, 20% for children aged 10 to 11 months and 24% for children aged 12 to 18 months.

For children aged 4 to 6 months and 7 to 9 months, the main contributor to starch intake was the food group 'commercial infant foods' (64% and 44% respectively), and in particular 'cereal based foods and dishes' (25% and 16%) and 'meat and fish based products and dishes' (15% and 14%). For children aged 4 to 6 months the second largest source of starch was infant formula (13%) and for those aged 7 to 9 months, was the food group 'cereals and cereal products' (31%). For children aged 10 to 11 months and 12 to 18 months, the main source of starch was 'cereals and cereal products', providing 44% and 59% respectively. The second largest contributor for children aged 10 to 11 months was 'commercial infant foods' (25%) and was the food group 'vegetables and potatoes' (14%) for children aged 12 to 18 months.

**Tables 6.8 and 6.20**

#### 6.4.5. Non-starch polysaccharides (NSP)

Mean daily intakes of non-starch polysaccharides (NSP) were 4.3g for all children aged 4 to 6 months, 6.2g for those aged 7 to 9 months, 6.7g for those aged 10 to 11 months and 7.3g for those aged 12 to 18 months. The main contributor to NSP intake for children aged 4 to 6 months was the food group 'commercial infant foods' (41%), followed by the food group infant formula (29%). For children aged 7 to 9 months, the main contributor was 'commercial infant foods' (35%) followed by infant formula (19%). The major contributor to NSP for children aged 10 to 11 months was the food group 'cereals and cereal products' (24%) followed by 'commercial infant foods' (23%) and, for children aged 12 to 18 months, 'cereals and cereal products' (37%) followed by the food group 'vegetables and potatoes' (19%). 'Vegetables and potatoes' contributed 12% to 19% to NSP intakes across the age groups and fruit contributed 10% to 14%.

**Tables 6.8 and 6.21**

#### 6.4.6. Vitamins

In this section breastfeeding status is denoted by the presence or absence of breast milk in the four-day food diary. The vitamin D content of breast milk is not known (see Annexe D of the UK report), therefore the results for vitamin D intake are presented in two ways: 1) for children who were not breastfed; and 2) for children who were breastfed, excluding the contribution from breast milk, this is therefore an underestimation of vitamin D intake.



Mean daily intakes of vitamins from all sources (including supplements), with the exception of vitamin D, were above the RNI for all age groups. Mean intakes of vitamin D were below the RNI for non-breastfed children aged 12 to 18 months (48% of the RNI), although this is an underestimation of vitamin D intake for this group. Mean intakes of vitamin D (excluding the contribution from breast milk) were below the RNI across the age groups for children who were breastfed (by any degree of breastfeeding) at the time that the food diary was completed (ranging from 45% to 55% of the RNI). The proportion of children below the LRNI for most vitamins from all sources were very small (0% to 3%), with 6% and 8% of children aged 4 to 6 months and below the LRNI for vitamin B<sub>6</sub> and vitamin B<sub>12</sub> respectively. There is no LRNI set for vitamin D.

#### **Tables 6.22 to 6.25**

There was little change in the mean intakes of vitamins A, C and D from food sources only (i.e. excluding supplements) compared to mean intakes from all sources with age. For those children who were breastfed the average intake of vitamin D from food sources as a percentage of the RNI ranged from 18% of the RNI to 50% of the RNI, slightly lower than the percentage meeting the RNI from all sources. Dietary supplements providing vitamins A and C had no effect on the proportions with intakes meeting the RNI and below the LRNI.

When tested statistically, there was a lower average vitamin C intake for children aged 12 to 18 months in DNSIYCS than in the UK sample. There were no significant differences in intakes of any other vitamins between DNSIYCS and the UK sample for either those aged 4 to 11 months or those aged 12 to 18 months.

#### **Tables 6.26 to 6.31**

As the vitamin D content of breast milk is not known the results for the percentage contribution of foods to vitamin D are presented only for children who were not breastfed at the time that the food and drink diary was completed. The major contributor to vitamin D intake from food for all age groups of children not receiving any breast milk was infant formula, providing 85% for children aged 4 to 6 months, 80% for those aged 7 to 9 months, 70% for those aged 10 to 11 months and 23% for children aged 12 to 18 months. The second largest contributor for children aged 4 to 11 months was the food group 'commercial infant foods' (12% to 13%), particularly 'cereal based foods and dishes' (7% to 9%) which are often fortified. For those aged 12 to 18 months the second largest contributor to vitamin D intake was the food group 'meat and meat products and dishes' (18%). It is difficult to get enough vitamin D through food alone and the main source of vitamin D is direct sunlight on the skin, although this will vary by the degree of exposure of the child's skin to summer sunshine.

#### **Table 6.28**

Infant formula was the main contributor to folate intakes for children aged 4 to 6 months, 7 to 9 months and 10 to 11 months (59%, 43% and 32% respectively) followed by the food group 'commercial infant foods' for the two younger age groups (17% and 19% respectively) and the food group 'cereals and cereal products' (14%) for those aged 10 to 11 months. For those aged 12 to 18 months, the food groups 'cereals and cereal products' (26%) and 'milk and milk products' (22%) were the main sources of folate.

**Table 6.29**

Infant formula was also the largest contributor to vitamin A intake for the three youngest age groups (45%, 35% and 29% respectively) followed by the food group 'commercial infant foods' (25%, 29% and 23% respectively). For children aged 12 to 18 months, the food group 'milk and milk products' (26%) was the largest contributor to vitamin A intake followed by the food group 'vegetables and potatoes' (15%). Breast milk contributed smaller proportions, from 10% for children aged 4 to 6 months decreasing to 2% for children aged 12 to 18 months.

**Table 6.30**

Intakes of vitamins A, C and D (from all sources) were compared statistically between children in receipt of Healthy Start vouchers in Scotland and the entire Scottish sample for two age groups, 4 to 11 months and 12 to 18 months. Because of a very small number of breastfed children receiving HS vouchers, the vitamin D comparison was limited to the non-breastfed children. Children receiving HS vouchers had significantly lower vitamin A intakes, both for those aged 4 to 11 months (840µg per day for children receiving HS vouchers and 942µg per day for all Scottish children) and for those aged 12 to 18 months (565µg per day for children receiving HS vouchers and 663µg per day for all Scottish children). There were no significant differences in vitamin C or D intakes between children receiving HS vouchers and the Scotland sample for either age group.

**Table 6.32**

#### 6.4.7. Minerals

Average daily intakes of minerals from all sources (including supplements) were above the RNI for most age groups<sup>6</sup>. Mean iron intakes were below the RNI for children aged 7 to 9 months (89% of the RNI), and were close to the RNI for those aged 10 to 11 months (97% of the RNI) and for those aged 12 to 18 months (92% of the RNI). Children aged 4 to 6 months had mean calcium intakes close to the RNI (96% of the RNI). The proportion of children with daily intakes of minerals from all sources below the LRNI was low (≤6%) for most minerals, except for iron where 8% to 17% had intakes below the LRNI across all age groups. Eleven per cent of children aged 4 to 6 months had magnesium intakes below the LRNI.

**Tables 6.33 to 6.36**

Mean sodium intakes for children aged 4 to 6 months were below the RNI at 79%, but increased to 203% for children aged 12 to 18 months, which equates to 2.5g salt per day. Twelve per cent and 9% of children aged 4 to 6 months and 7 to 9 months respectively were below the LRNI for sodium. It should be noted that the DRVs set for sodium are based on physiological requirements for children, the RNI for sodium ranges from 280mg to 500mg per day and the LRNI ranges from 140mg to 200mg per day for children aged 4 to 18 months. The Scottish Government recommends less than 400mg sodium (1g salt) per day for children aged 0 to 12 months and less than 800mg sodium (2g salt) per day for children aged 1 to 3 years<sup>11</sup>. Mean sodium intakes for children aged 12 to 18 months therefore exceeded the recommendation for this age group. The most reliable estimates of sodium intake are obtained from chemical urinary analysis as estimates derived from patterns of food consumption cannot consider salt added during food preparation.

There were no statistically significant differences in intakes of iron, calcium, magnesium, potassium, zinc, copper, selenium, iodine and sodium between DNSIYCS and the UK sample for either those aged 4 to 11 months or those aged 12 to 18 months.

#### **Tables 6.33, 6.36 and 6.37**

The major contributor to iron intake for children aged 4 to 6 months, 7 to 9 months and 10 to 11 months was infant formula (providing 59%, 47% and 40% respectively) followed by the food group 'commercial infant foods' (both 22%) for children aged 4 to 6 months and 7 to 9 months respectively and the food group 'cereals and cereal products' (20%) for those aged 10 to 11 months. For children aged 12 to 18 months, the main contributor was 'cereals and cereal products' (44%) followed by infant formula (13%).

#### **Table 6.38**

Infant formula was the main contributor to zinc intake for children aged 4 to 6 months, 7 to 9 months and 10 to 11 months (64%, 48% and 39% respectively) followed by the food group 'commercial infant foods' (15% and 17% respectively) for children aged 4 to 6 and 7 to 9 months and the food group 'milk and milk products' (15%) for children aged 10 to 11 months. For children aged 12 to 18 months, the main contributor was 'milk and milk products' (31%) followed by the food group 'cereals and cereal products' (20%).

#### **Table 6.39**

The main contributor to calcium intake was infant formula for children aged 4 to 6 months and 7 to 9 months, at 59% and 44% respectively. The second largest contributor to calcium intake was the food group 'commercial infant foods' (17%) for children aged 4 to 6 months, while for children aged 7 to 9 months, it was the food groups 'milk and milk products' and 'commercial infant foods' (both 17%). For children aged 10 to 11 months, the main contributor was infant formula (34%) followed by 'milk and milk products' (31%).

For children aged 12 to 18 months, the main contributor was 'milk and milk products' (54%) followed by the food group 'cereals and cereal products' (18%).

**Table 6.40**

Infant formula was the main contributor to sodium intake for children aged 4 to 6 months (50%) and 7 to 9 months (26%) followed by the food group 'commercial infant foods' (18%) for children aged 4 to 6 months and 'cereals and cereal products' for children aged 7 to 9 months (18%). The food group 'cereals and cereal products' was the main contributor for children aged 10 to 11 months (24%) and children aged 12 to 18 months (31%). The second largest contributor to sodium intake was the food group 'milk and milk products' for children aged 10 to 11 months (15%) and 12 to 18 months (20%).

**Table 6.41**

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## References and endnotes

<sup>1</sup> The National Diet and Nutrition Survey (NDNS) is a UK survey of the food consumption, nutrient intakes and nutritional status of people aged 1.5 years and older living in private households. The NDNS is currently structured as a 'rolling programme' of continuous fieldwork. Headline results are published annually:

<http://transparency.dh.gov.uk/2012/07/25/ndns-3-years-report/>

<sup>2</sup> <http://www.healthscotland.com/documents/5064.aspx> Children.pdf

<sup>3</sup> World Health Organization. The optimal duration of exclusive breastfeeding: Report on an expert consultation. Geneva (2001)

<sup>4</sup> Improving Maternal and Infant Nutrition: 'A Framework for Action' Scottish Government 2011. Available online: <http://www.scotland.gov.uk/Publications/2011/01/13095228/0>

<sup>5</sup> Complementary foods/feeding: the period where infants make the gradual transition from liquid foods to eating solid and family foods.

<sup>6</sup> Report of Health and Social Subjects 41 *Dietary Reference Values (DRVs) for Food Energy and Nutrients for the UK*. Report on the Panel on DRVs of the Committee on Medical Aspects of Food Policy (COMA) 1991. The Stationery Office. London

<sup>7</sup> Total energy is equivalent to food energy as no alcohol is consumed by children of this age and is therefore named energy.

<sup>8</sup> Scientific Advisory Committee on Nutrition. *Dietary Recommendations for Energy*. The Stationery Office (London, 2011).

<sup>9</sup> For children aged under one year, energy intakes are compared with the figure for the mixed or unknown feeding group for EAR for energy. For those aged 12 to 18 months, intakes are compared to the median physical activity level (PAL) value adjusted for growth for boys and girls.

<sup>10</sup> A recent study, not considered in Annexe D of the UK report, reported median values or the vitamin D content of human breast milk from a sample of 108 European women (two to three weeks postpartum) of 2.2µg/L (interquartile range of 1.6µg/L to 4.4µg/L) Zhang JY, Lucey AJ, Galvin K, Nolan L, Cashman KD, Higgins JR and Kiely M. Vitamin D content of human milk and associations with milk fat content and maternal serum 25-hydroxyvitamin D concentrations. *Proceedings of the Nutrition Society* (2012), 71 (OCE2), E54.

<sup>11</sup> Scientific Advisory Committee on Nutrition (SACN). *Salt and Health*. The Stationery Office (London, 2003). Available online: [http://www.sacn.gov.uk/pdfs/sacn\\_salt\\_final.pdf](http://www.sacn.gov.uk/pdfs/sacn_salt_final.pdf)

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