



**A survey carried out on behalf of the  
Department of Health and  
Food Standards Agency**



# **Diet and Nutrition Survey of Infants and Young Children, 2011**

## **Executive Summary**

**Edited by: Alison Lennox, Jill Sommerville, Ken Ong,  
Helen Henderson and Rachel Allen.**

## **Executive summary**

### **Introduction**

The Diet and Nutrition Survey of Infants and Young Children (DNSIYC) was commissioned by the Department of Health (DH) and the Food Standards Agency (FSA) to provide detailed information on the food consumption, nutrient intakes and nutritional status of infants and young children aged 4 up to 18 months<sup>1</sup> living in private households in the UK. 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. The fieldwork in Northern Ireland (NI) was carried out by the Northern Ireland Statistics and Research Agency (NISRA). Fieldwork was carried out between January and August 2011.

DNSIYC provides the only source of high quality nationally representative data on the types and quantities of foods consumed by the 4 to 18 month age group, from which estimates of nutrient intakes are derived. This information will be used alongside data from the National Diet and Nutrition Survey (NDNS)<sup>2</sup>, which covers adults and children of all ages from 18 months, to provide a fuller picture of the diet, health and food safety of the nation, in supporting public health policy and food safety assessments. The survey was carried out in all four countries of the 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)<sup>3</sup> vouchers in order to provide more detailed analysis of these populations. These additional samples are referred to as 'boosts'. Results for the boosted Scottish sample form a separate report published on the Scottish Government website, and results for the boosted HS sample are presented in Annexe A of this report.

### **Methods**

The survey had two stages:

*Stage 1:* Carried out in the participant's home:

- Detailed face-to-face interview to collect background information on family dietary habits, socio-demographic status and health information, feeding practices, eating patterns, developmental stages, sunlight exposure and gastrointestinal symptoms.
- Dietary data collection (food diary, completed for 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).

*Stage 2:* Carried out in a clinic or mobile unit:

- Stable isotope assessment to estimate fluid intake, breast milk intake and body composition.
- Skinfold thickness to measure body composition.
- Blood sample collection for the analyses of iron and vitamin D status.

### **Response rates and sample**

A total of 4,451 individuals were sampled from Child Benefit (CB) Records, of which 97% were eligible to take part. Of those eligible, 62% completed three or four dietary recording days<sup>4</sup>. This gave a sample size of 2,683 fully productive individuals. Forty four per cent (i.e. 973) of eligible fully productive individuals (2,228 excluding Scottish boost) attended a clinic. At the clinic, 98% provided a skinfold thickness measurement, 87% completed the stable isotope component and 55% provided a blood sample. Weighting factors were applied to ensure that the results were representative of the UK population.

The profile of the achieved sample was close to that of the population of infants and young children achieved from CB records in the UK in terms of age, sex, ethnicity and region. After applying weighting factors, 82% of children in DNSIYC were white, 8% were Asian, 3% were black, and 7% were mixed or other. There was a wide range of socioeconomic circumstances for the children in the survey, and they were evenly distributed between housing that was owned and rented. A fifth (21%) received Healthy Start (HS) vouchers, which is in line with estimated uptake for children of this age in the general UK population.

### **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
- An estimation of breast milk consumption
- Food consumption

- Use of dietary supplements
- Energy, macronutrients and micronutrient intake
- Iron and vitamin D status

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

The Department of Health recommends that:

- Mothers exclusively breastfeed for around the first six months of the child's life<sup>5,6</sup>.
- For those who choose to use breast milk substitutes, follow-on formula and 'goodnight' milks should not be introduced before the child is six months of age<sup>7,8</sup>.
- At around six months of age a variety of complementary foods<sup>9</sup> should be introduced alongside continued breastfeeding (and/or breast milk substitutes, if used)<sup>5</sup>.
- Cow's milk should not be introduced as a main drink until after 12 months<sup>8</sup>. If provided, this should be whole (not semi-skimmed) milk until at least two years of age.
- Salt should not be added to children's food<sup>8</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>8</sup>.
- Breastfeeding mothers should take vitamin D supplements of 10µg per day<sup>10</sup>.
- If formula feeding, guidance regarding the safe preparation, storage and handling of infant formula should be followed, 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>11</sup>.
- For optimum dental health mothers should start to introduce infants to drinking from cups and beakers from about six months<sup>8</sup> and tooth brushing twice a day should begin as soon as teeth begin to appear<sup>12</sup>.

## **Reporting of results**

Adequacy of nutrient intake for the population is assessed by comparing intake with age/sex specific UK Dietary Reference values (DRVs)<sup>6</sup>. The only DRVs set for this age group for macronutrients are an Estimated Average Requirement (EAR) for energy<sup>13</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 for each vitamin and mineral are shown in tables 6.19 and 6.28.

Blood analyte measures for iron and vitamin D are compared with threshold values. These generally indicate the proportion of people at greater risk of deficiency of a nutrient due to depleted stores or tissue concentrations.

Results for the dietary data are presented for four age groups: 4 to 6 months, 7 to 9 months, 10 to 11 months and 12 to 18 months. Results for the data collected at the clinic, including blood status data and stable isotope estimates of breast milk consumption, are presented for two age groups: aged 5 to 11 months and aged 12 months or over. This is due to the small sample sizes and the ageing of the child between the home and clinic visits.

### **Methodological issues**

Mis-reporting of food consumption is known to be a problem in all dietary surveys, although it is not known to what extent it is a problem for infants and young children aged 4 to 18 months. In this age group there may be a particular risk of under or overestimating food wastage. The potential for some mis-reporting needs to be borne in mind when interpreting findings from this survey.

The results based on assessment of food consumption over four days indicate dietary intake over a short period, so infrequently consumed foods may be under or overestimated. Analysis of blood samples provides an indication of the nutritional status of the population usually over a longer period. Nutritional status means the concentration of nutrients available to the body (after absorption) for use in metabolic processes and in this age group includes any stores acquired in utero. In DNSIYC, dietary intake therefore cannot be compared directly to nutritional status, as status does not just reflect the intake of nutrients from the diet.

### **Key Findings**

#### *Overall findings*

Infants and young children aged 4 to 18 months in DNSIYC were reported to consume a varied diet; dietary recommendations were generally met by the majority of the population. The proportion of children in DNSIYC who had ever been breastfed (78%), the duration of breastfeeding (57% were not breastfed beyond 3 months), and the frequency of feeding through the day for those being breastfed at the time of the survey (ranging from one to nine or more times a day depending on age) were similar to the Infant Feeding Survey (IFS) of 2010<sup>14</sup>. Twenty nine per cent of children aged 4 to 6 months consumed breast

milk during the four-day food diary period, decreasing to 8% of those aged 12 to 18 months. Two children (aged 4 to 6 months) were exclusively breastfed at the time of the survey. Infant formula was the largest contributor to energy intake for children aged under 12 months (31% to 51%) while the food category 'milk and milk products' was the largest contributor for those aged 12 to 18 months. A progression in ability to eat pureed and lumpy foods, finger foods, drink from a cup or beaker with a spout, and use a spoon was reported with age. Most of the children who had food other than milk 'almost always' (28%) or 'sometimes' (31%) had the same food as their parents, or 'sometimes' had a different meal to, but prepared by, their parents (41%). Twenty four per cent never had the same food as their parents, although this was more common for younger children. Over half (58%) 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. Baby rice was the most common first food for children in DNSIYC (65%), followed by pureed fruit or vegetables (21%).

The mean total fruit and vegetable consumption, including contribution from mixed dishes, was relatively high (similar to consumption in teenagers<sup>2</sup>) ranging from 100g per day for children aged 4 to 6 months to 170g per day for those aged 12 to 18 months, equivalent to one to two 80g adult portions per day. Consumption was significantly lower in the routine and manual socio-economic category compared to the managerial and professional category and significantly lower in South Asian and children of 'other' ethnicity compared to white children aged 4 to 18 months.

Mean intakes of breast milk estimated from stable isotope methods were 470g, 350g, 400g for children aged 6 to 9 months, 10 to 11 months and 12 months and over respectively.

In general, children in DNSIYC were taller (i.e. longer), heavier and had larger head circumferences and subscapular skinfold thickness than the UK-WHO Growth Standard for their age and sex. This might be partially explained by the predominance of formula feeding in 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.

Food consumption patterns were in general similar in the DNSIYC HS sample as for the DNSIYC UK sample. There did not appear to be any consistent variations in the diet by socio-economic category or ethnicity, other than specific differences mentioned here.

### *Findings relevant to recommendations*

- Twenty two per cent had never been breastfed, of those who were breastfed, 57% were not breastfed beyond three months of age.
- Thirty two per cent of infants aged 4 to 6 months consumed follow-on formula, which is not recommended before six months.
- Complementary foods were introduced before the age of three months for 10% of children, and before five months for 75% of children. For 22% of children, foods were introduced at six months and 3% at seven months or more.
- Children aged below one year generally consumed no more than a quarter of a pint (146g) of whole milk per day, in keeping with the recommendation. For example, 15% aged 4 to 6 months consumed whole cow's milk over the survey period with a mean consumption of 53g per day among consumers. This increased to 79% of those aged 12 to 18 months with a mean consumption of 329g per day.
- A small proportion of children consumed semi-skimmed milk, 5% of infants aged 4 to 6 months with mean intakes of 40g per day among consumers increasing to 13% of children aged 12 to 18 months with mean intakes of 169g per day among consumers. Small proportions of children consumed other milk including 1% milk, skimmed milk and cream, increasing from 1% of those aged 4 to 6 months to 10% of those aged 12 to 18 months.
- For those children who had food other than milk, most parents (83%) reported 'never' adding salt to the child's food.
- Over the four-day food diary period, the proportion of children given a micronutrient supplement ranged from 5% for those aged 4 to 6 months to 10% for those aged 12 to 18 months, most often a multi-vitamin supplement. Children aged 4 to 18 months of South Asian and 'other' ethnicities were more likely to be given at least one supplement during the four-day food diary period than white children.
- Nearly half (46%) of breastfeeding mothers took supplements, most often a multi-vitamin and mineral supplement, which were taken by 27% of all breastfeeding mothers. The proportion taking supplements containing 10µg vitamin D is not known.
- The majority of parents feeding their child infant formula in the home followed recommendations for preparation. For example, 79% reported making up the formula as needed and 68% used water that had been left to cool for no longer than 30 minutes.
- The proportion of children who had ever drunk from a cup or beaker with a spout increased with age, from 47% of those aged 4 to 6 months, rising steadily to 95% of those aged 12 to 18 months.

- A toothbrush was reported to be used at least once every day for 66% of children with at least one tooth.

*DRVs and blood analyte threshold values*

- Seventy five per cent of boys and 76% of girls exceeded the EAR for energy.
- Mean protein intakes were well above the RNI in all age groups.
- Mean daily intakes of key 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) except for iron for all age groups (10% to 14%) and magnesium for infants aged 4 to 6 months (10%).
- For those aged 12 to 18 months, the proportion with intakes of iron below the LRNI was significantly greater for South Asian (28%) and 'other' (19%) children compared to white children (11%), as well as for children in the routine and manual category (17%) compared to the managerial and professional category (8%).
- Mean daily intakes of sodium were only 85% of the RNI for children aged 4 to 6 months, but increased to 181% for children aged 12 to 18 months. This equates to an intake of 2.3g salt per day for children aged 12 to 18 months, exceeding the population recommendation for this age group of no more than 2g salt per day.
- The majority of children had adequate haemoglobin and serum ferritin concentrations, with only about 3% below the thresholds at which anaemia is indicated.
- Ninety four per cent of children aged 5 to 11 months and 98% of children 12 months or over, had 25-hydroxyvitamin D (25-OHD) concentrations above the lower threshold for vitamin D adequacy.



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## References and endnotes

<sup>1</sup> Includes children aged up to 17 months and 28-31 days.

<sup>2</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>3</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 for more details).

<sup>4</sup> Respondents completing three or four diary days were considered fully productive.

<sup>5</sup> World Health Organization. The optimal duration of exclusive breastfeeding: Report on an expert consultation. Geneva (2001)

<sup>6</sup> Department of Health, Infant Feeding Recommendation, 2003. Available online:  
[http://www.dh.gov.uk/prod\\_consum\\_dh/groups/dh\\_digitalassets/@dh/@en/documents/digitalasset/dh\\_4096999.pdf](http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/documents/digitalasset/dh_4096999.pdf)

<sup>7</sup> Department of Health. 1994. Weaning and the weaning diet. Report on health and social subjects, 45. HMSO, London.

<sup>8</sup> Scientific Advisory Committee on Nutrition. 2008. Consideration of the Place of 'Goodnight Milk' products in the diet of infants aged 6 months and above. Available online: [http://www.sacn.gov.uk/pdfs/final\\_sacn\\_statement\\_on\\_good\\_night\\_milks.pdf](http://www.sacn.gov.uk/pdfs/final_sacn_statement_on_good_night_milks.pdf)

<sup>9</sup> Complementary foods/feeding: the period where infants make the gradual transition from liquid foods to eating solid and family foods.

<sup>10</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>11</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.

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- 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 Guide to Bottle Feeding 2011. Available online:

[http://www.dh.gov.uk/prod\\_consum\\_dh/groups/dh\\_digitalassets/documents/digitalasset/dh\\_124526.pdf](http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/documents/digitalasset/dh_124526.pdf)

<sup>12</sup> Department of Health, Delivering Better Oral Health (2<sup>nd</sup> edition 2009). Available online:

[http://www.dh.gov.uk/prod\\_consum\\_dh/groups/dh\\_digitalassets/documents/digitalasset/dh\\_102982.pdf](http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/documents/digitalasset/dh_102982.pdf)

<sup>13</sup> Scientific Advisory Committee on Nutrition. *Dietary Recommendations for Energy*. The Stationery Office (London, 2011).

<sup>14</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/searchcatalogue?productid=9569&q=infant+feeding+survey&sort=Relevance&size=10&page=1#top>