



National Foundation for Educational Research

THE FURTHER EVALUATION OF THE SCHOOL FRUIT AND VEGETABLE SCHEME

NFER

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Executive summary

1. Introduction

The National Foundation for Educational Research (NFER), in partnership with nutritionists at the University of Leeds, carried out a follow-up evaluation of the impact of the School Fruit and Vegetable Scheme (SFVS). The aim was to investigate the longer-term impact of the scheme following its implementation in 2004.

The methodology involved the collection of data using two quantitative instruments:

- The Child and Dietary Evaluation Tool (CADET), which records what children eat over a 24-hour period, developed and validated by the University of Leeds (also used in the previous evaluation)
- a school questionnaire, used to obtain information on school activities which could relate to the SFVS.

In total, 37 school questionnaires were returned along with 1666 CADET diaries.

2. The school questionnaire

The school questionnaire gathered information on policy and practice in relation to healthy eating, in order to provide context when exploring the CADET diary findings.

The majority of schools had a written policy relating to healthy eating; nearly all had been written and/or updated in the last year. All schools provided hot dinners. Only four schools restricted children's choice in what to select when having a school dinner. Nearly all schools had provided training for catering staff on health and safety, food hygiene and preparing balanced meals.

Some schools gave pupils opportunities to buy fruit, vegetables, milk, water and fruit juice on a regular basis. Some schools allowed crisps, sweets,

chocolate and cake to be purchased occasionally, the majority never. Water was freely available in all schools.

Most schools placed restrictions on what children were allowed to bring into school. Items most commonly banned or restricted were fizzy drinks, sweets and chocolate. Most schools devised their own rules and just over half had changed them in the last two years. The majority of schools reported involvement in several national and local health-related initiatives, and said that they were using a wide range of methods to promote healthy eating (such as classroom-based learning, posters and displays, tasting sessions and assemblies).

3. CADET

Key findings from the analysis of CADET diaries are summarised below.

General consumption

Consumption of fruit and vegetables had increased significantly since the previous study conducted two years earlier. Children were eating an average of 4.41 portions per day, compared with 3.65 in 2004. Overall, 44 per cent of pupils were reaching the '5 A Day' goal, compared with 32 per cent in 2004. This change was mainly due to a large increase in consumption of vegetables (from 1.61 to 2.14); the increase in fruit, although significant, was much smaller (1.65 to 1.82 portions). There was a small decrease in the quantity of snacks consumed, but this was not statistically significant.

Analysis of subgroups was consistent with findings from the earlier evaluation. There were no significant differences between boys and girls or between white UK and minority ethnic pupils. However, consumption of fruit and vegetables, at home and at school, decreased with age. There were very different patterns of eating between children who had school dinners and those who took a packed lunch to school. Children who had packed lunches consumed more fruit and fruit juice than those who had school dinners, but ate a lot less vegetables and a lot more snacks and desserts. Overall, children who had a packed lunch ate less fruit and vegetables than children on school dinners, but the additional fruit helped to compensate for the lack of vegetables.

General trends

All children were eating more fruit and vegetables than in 2004, although Year 3 children were still eating less than younger children, both at home and at school. This reflects the consistent finding from the earlier study, which showed that children eat less fruit and vegetables as they grow older. Over time, the scheme does not seem to have counteracted this effect; the gap in fruit and vegetable consumption between children in Years 2 and 3 was slightly greater in 2006, despite a general increase in consumption overall for all three cohorts.

The general increase in fruit and vegetable consumption applied to children having packed lunches and school dinners. However, packed lunch children had a larger increase in fruit, whereas children on school dinners had a much larger increase in vegetables. School dinner children also ate significantly less snacks and desserts than in 2004. A further analysis of consumption at lunch time confirmed the hypothesis that there had been an improvement in school dinners in the North East; children on school dinners had doubled their fruit consumption, more than doubled their vegetable consumption and also reduced the quantity of snacks and desserts consumed.

Multilevel modelling

Multilevel modelling, controlling for a wide range of school- and pupil-level factors, confirmed the findings reported above. It also indicated that children from schools which provided guidance on healthy packed lunches ate more vegetables. There were some negative correlations with the proportion of children known to be eligible for FSM, the proportion with EAL, and area-based deprivation measures. There appeared also to be a negative association with the school's adherence to food standards and its involvement in initiatives related to health in general or healthy eating in particular. However, these factors were minor compared with the two variables mainly affecting consumption: a Year 3 pupil is less than half as likely to reach the '5 A Day' goal as a younger child, and children who have school dinners are almost one and a half times as likely to do so as those who take a packed lunch.

Longitudinal analysis

Comparing the consumption of 249 individuals at two time points (November 2004 and November 2006), who were all in Year 3 in 2006, the findings showed that consumption of fruit decreased and consumption of vegetables

increased, resulting in total fruit and vegetable consumption remaining constant. This suggests an improvement since the previous study, which indicated a significant decrease in consumption when pupils moved to Year 3. However, this finding needs to be considered in the context of a large general increase in consumption of fruit and vegetables, which for these children had balanced out the age-related decline. Year 3 children in 2006 were eating the same amount of fruit and vegetables as in 2004 (when in Year 1), but still significantly less than the children now in Years 1 and 2.

Nutritional analysis

Between 2004 and 2006, there was an overall increase in fruit and vegetable consumption. This was associated with an increase intake of dietary fibre, carotene and Vitamin C.

In pupils taking school dinners, the increase in fruit and vegetable consumption was coupled with a corresponding increased intake of dietary fibre and carotene. This may result from the increased amount of vegetables eaten by these children, due to changes in lunch time menus. However, for pupils taking packed lunches dietary fibre and carotene intake did not increase.

Children who took packed lunches had slightly higher intakes of Vitamin C than children who took school dinners. This was observed in 2004 as well as in the current study; it may be due to the fruit content of the packed lunch.

As in 2004, salt intake was high and in excess of dietary guidelines. There was no strong indication that fruit and vegetables had displaced processed foods and snacks which are usually high in salt.

There was a drop in sugar intake among pupils taking school dinners. Interestingly this group decreased their intake of snacks and desserts over the same period. For pupils taking packed lunches, their intake of sugar remained the same as in 2004, and there was no difference in their intake of snacks and desserts.

4. Conclusions

There was a general increase in fruit and vegetable consumption across all cohorts. As a result, children in Year 3 ate as much fruit and vegetables as they did when in Year 1, rather than less. However, the age-related drop in consumption still exists, and Year 3 pupils still eat significantly less fruit and vegetables than pupils currently in Year 1 and 2.

Although there has been a significant positive change in fruit consumption, the increase over time has been mainly in terms of vegetables. Further investigation suggested that school dinners had contributed to this change (with by far the biggest increase being vegetable consumption amongst school dinner children). It should also be noted that, although consumption of fruit and vegetables had increased, there was not a significant decrease in consumption of snacks and desserts overall. Thus, overall, children were not replacing snacks and desserts with fruit and vegetables. There was, however, a small yet significant decrease in snack consumption for those having school dinners. This provides evidence to suggest that recent campaigns to improve school dinners, and the food-based standards introduced in 2006, are beginning to have an impact in the North East.

1. Introduction

1.1 Background to the evaluation

The Government's national '5 A DAY' programme forms part of the strategy to raise awareness of the health benefits of fruit and vegetable consumption, and to improve access to fruit and vegetables. One aspect of the '5 A DAY' programme is the School Fruit and Vegetable Scheme (SFVS)¹, which provides a free piece of fruit or a vegetable to children aged four to six years, each school day. The scheme was originally piloted in more than 500 schools throughout England in 2000 and 2001, to examine the practicalities of the scheme before rolling it out nationally. It was expanded region by region with funding from the Big Lottery Fund. Since April 2004, the Department of Health has been funding the SFVS which is now operating throughout England, and distributes around 440 million pieces of fruit and vegetables each year to over two million children in 18,000 schools.

In 2003, the New Opportunities Fund commissioned the National Foundation for Educational Research (NFER), in partnership with nutritionists from the University of Leeds, to evaluate the impact of the SFVS regional roll-out (Schagen *et al.*, 2005). Findings indicated that fruit consumption increased (by about half a portion a day) among children participating in the scheme, but there did not appear to be any wider impact on diet, and increased consumption was not sustained when children's participation in the scheme came to an end. Since, by the third phase of data collection, Year 3 pupils had been in the scheme for only four months, it was thought possible that the SFVS might have a longer-term impact on children who were exposed to the scheme for a greater period of time. The Department of Health (DH) commissioned NFER to undertake research to test this hypothesis and explore the impact of the SFVS further. This document reports the findings from the follow-up study.

¹ The SFVS was originally known as the National School Fruit Scheme and then the National School Fruit and Vegetable Scheme.

1.2 Research aims

The main aim of the study was to establish the longer-term impacts of the SFVS, after it had been implemented throughout the country and operating in schools for over two years. The data gathered in the earlier evaluation, added to that gathered in this study, made it possible to compare findings over a longer period of time. Specifically, it made it possible to achieve the following research objectives:

- to compare the consumption of fruit and vegetables of children in Year 3 (no longer eligible for the scheme) with the previous Year 3 cohort surveyed, to see whether participation in the scheme for a longer period had a more sustained impact
- to identify individual children (from Year 3) who were involved in the earlier surveys, and measure change over time in their fruit and vegetable consumption
- to compare all three cohorts with those surveyed in 2004, to look for general trends in consumption of fruit, vegetables and ‘snacks and desserts’²
- to compare eating patterns and nutrient intake across the three cohorts, to see whether the age-effect previously identified (children tend to eat less fruit as they grow older) had been affected by longer participation in the SFVS
- to collect information from schools that would be valuable in itself, but that would also help contextualise and explain the analysis of consumption data.

1.3 Methodology

The methodology involved the collection of data using two quantitative instruments:

- the Child and Dietary Evaluation Tool (CADET), which records what children eat over a 24-hour period, developed and validated by Leeds University
- a brief school questionnaire.

² Snacks and desserts refers to foods such as cakes, crisps and sweets, without reference to the time of day at which they were consumed. Food items in this category include cakes, buns, sponge puddings, sweet pies and tarts, biscuits, cereal and muesli bars, yogurt, jelly, ice lollies, ice cream, sweets, chocolate bars, savoury snacks and nuts.

The CADET diary was also used in the 2004 evaluation, which enabled valid comparisons with the data from the previous surveys. In the earlier evaluation CADET was completed three times on behalf of children in reception class, Year 1 and Year 2, in order to assess changes in eating patterns. The survey took place in the North East (where the scheme was implemented immediately after the baseline survey) and in Yorkshire and Humberside (where it was implemented after the final survey had been carried out).

This study returned to the same schools in the North East and surveyed children in Years 1–3. The oldest cohort included children who had participated in the original evaluation. In this study the CADET was completed once only and, as before, NFER administrators were responsible for coordinating the completion of CADET diaries, from morning break until the end of the school day. The CADET diaries were then given to children to take home, and parents were asked to complete CADETs for the remainder of the 24 hours (that is, until after breakfast on the following day) and return them to school with their child.

A school questionnaire designed to be completed by school staff was used to obtain information about school activities which could relate to the SFVS. Data obtained was analysed for indications as to whether, for example, the SFVS appeared to be more successful if implemented in the context of a whole-school approach to healthy eating. Issues explored by the school questionnaire included:

- whether the school had a healthy eating policy, and how this was implemented
- the level reached in terms of National Healthy Schools Programme accreditation
- whether there were rules about what food could/could not be brought into school
- what food, if any was available to children at school, either free or on sale
- whether drinking water was readily available to children at all times
- what kind of food was served for school dinners, and what degree of choice was available to pupils
- the extent to which issues related to healthy eating were discussed in the classroom
- any other school activities designed to promote healthy eating.

1.4 Implementing the research strategy

The administration of this study

Fifty-six schools in the North East which had participated in the previous evaluation were contacted in mid-October 2006 to ask for their agreement to take part in this study and to provide them with details about the organisation and timetabling of CADET days.

The procedure used was as for the previous study. Where possible, class lists (Pupil Data Lists) were obtained from all participating schools and the personal data of pupils was used to pre-print materials and to compile lists of those participating. Copies of the lists were sent in advance to schools and administrators to serve as a reminder of which pupils were expected to participate; the lists were also used to assemble school packs for despatch.

In contrast to the previous study, this evaluation employed a passive parental consent procedure, which involved letters sent to all parents via pupil post asking parents to notify their school if they did not wish their child/children to be involved in the CADET diary. Pupils whose parents declined participation did not receive a CADET.

Once schools returned their class lists, they were sent confirmation of 'CADET day' arrangements, a school questionnaire and comprehensive written guidance covering completion of the school questionnaire and the CADET diary. CADET days were all held in November 2006.

CADET day

On CADET day, NFER administrators were responsible for ensuring that the school questionnaires were returned to NFER and for coordinating the completion of CADET diaries, from morning break until the end of the school day. An NFER telephone helpline number (staffed from 9am to 5pm) was provided for any teacher, administrator or parent who had queries about completing the CADET.

As before, CADETs included questions on pupils' ethnicity and home postcode (see Appendix A). The opportunity was also taken to include a note thanking participants for their continued support and confirming that this would be the final time they would be asked to help.

CADET and school questionnaire response rates

The sample of 56 schools was composed of 49 schools that had been involved in all three phases of the previous study, and seven junior schools which had participated in the final phase of the evaluation. Two schools were withdrawn by the local authority (LA) and of the remaining 54 schools, 39 agreed to take part (including two junior schools). The main reasons for schools declining involvement was lack of time, pressure of work and staff commitments.

Thirty-nine school questionnaires were sent to schools and 37 responses were received. A total of 2,452 CADET diaries were dispatched (enough for all pupils in the classes involved) and 1,809 were returned from 38 schools (one school did not return any CADETs)³. Reasons for non-return were:

- parents withdrawing children from the research
- children being absent on CADET day
- parents failing to complete and return CADETs to school.

Of the CADETs returned, 249 were from pupils who had participated in the previous evaluation.

1.5 Structure of the report

This remainder of the report is divided into four chapters:

- Chapter 2 describes how the school questionnaire data was analysed and presents findings
- Chapter 3 describes how CADET data was analysed and presents findings relating to consumption
- Chapter 4 presents nutritional findings derived from CADET
- Chapter 5 provides a summary and discussion of key findings.

³ Further information about sample numbers and exclusions are provided in Chapter 3.

2. School questionnaire

In this section we present data derived from a questionnaire completed by 37 of the 39 schools taking part in the research. The questionnaire (see Appendix 2) gathered data about:

- schools' written policy covering healthy eating
- the food schools provided and allowed in school
- teaching and learning related to healthy eating
- initiatives related to healthy eating and/or programmes that schools were involved in
- if and how schools communicated about healthy eating with parents.

Because of the small number of schools, percentages are not used in the findings reported below.

2.1 Written school food policies

Schools were asked if they had a written policy covering healthy eating; the majority, 22 of the 37, did so. Schools with a written policy were asked when their policy had been written and if and when it had been updated. Most policies (14 of 22) were written in the last year, while seven had been written more than a year previously. Furthermore, seven schools reported updating their policy since it had been first written, six within the last year and one more than a year ago.

Schools were also asked who had been involved in writing their policy; contributors mentioned were

- headteachers (18)
- PSHE coordinators (17)
- school governors (13)
- school's senior management team (12)
- class teachers (10)
- pupils (10)
- health advisors (9)

- parents (6)
- catering staff (5)
- the LA (5).

Schools were asked which topics their policies covered; those topics mentioned were:

- the school curriculum (22)
- water provision (21)
- a whole-school approach to teaching about healthy eating (20)
- food brought into school (16)
- food provided in or by the school (15)
- cooking activities (13)
- extra-curricula activities (10)
- equipment and resources (9)
- national healthy eating schemes (8)
- care and welfare issues (7)
- food bought in school (7)
- staff development and training (6).

Schools were asked if 'healthy eating' had been included in the school development plan; the majority of schools (28 of 37) said that it had.

2.2 Food in school

2.2.1 Provision of food by the school

Schools were asked if they provided hot lunches and if they did, whether these were cooked in the schools' kitchens or were delivered to school. All schools provided hot lunches; the majority had their own school kitchens, and just four schools had their lunches delivered.

Schools were given a list of food items and asked to state how often each was provided at school lunch. The list was developed using the new food-based standards for school lunches. Responses show that, generally, most schools were providing food in line with the standards.

Schools were also asked if they provided pupils with the freedom to select items from those available at lunch times; the majority of schools (33 of 37) provided pupils with a free choice, with only four reporting that they restricted pupil choice. Of the latter, two reported requiring children to pick one item from each food group (i.e. one from meat, one from vegetables), one school required children to select at least one vegetable or fruit option and two schools said that they tried to 'guide' or 'encourage' their pupils to select 'healthily'.

Schools were asked what kind of training had been provided for catering staff. The majority of schools had provided training covering health and safety (33), food hygiene (32) and preparing balanced meals (29). Schools were also asked if they had any further training planned for their catering staff; six schools reported planning further training, five in preparing balanced meals and one in food hygiene.

Schools were also asked about what types of food, other than lunch items, pupils could buy in school, and how often these items were available. Responses are summarised in Table 2.1 below. With the exception of fruit, the majority of schools 'never' made the items listed available for pupils to buy⁴. Five items were made available in some schools for pupils to buy, either on a daily or weekly basis: fruit, milk, bottled water, fruit juice and vegetables. These and other items were available occasionally for purchase in a minority of schools.

⁴ Note that fruit juice and vegetables are more likely to be provided at lunch times and that guidance to schools discourages the provision and drinking of large amounts of fruit juice, which can be sugar-rich. Milk and water can be, and often are, provided free at schools in line with national and/or local guidance/initiatives.

Table 2.1 Food items/drinks pupils are allowed to buy in school

Food/drink item	Allowed to buy in school:				* No response
	every day	every week	occasionally	never	
Crisps and savoury			4	29	4
Sweets			7	26	4
Chocolate			6	26	5
Cake			10	22	5
Fruit	17	2	1	17	
Vegetables	7	5	5	20	
Bottled water	6	1	1	26	3
Milk	12		1	19	5
Fruit juice	6		2	25	4
Fizzy drinks			1	32	4
N=37					

All of the schools said they made water freely available to pupils; the most frequently mentioned ways of making water available were via the tap, water coolers or water fountains. Nine schools also provided their water in water bottles.

2.2.2 Food brought into school

Schools were asked about whether they placed restrictions on, or had banned completely, certain items of food children might bring into school (see Table 2.2 below). Half of the schools had a total ban on sweets, and a higher proportion banned fizzy drinks. A smaller proportion of schools had banned chocolate, crisps (and savoury snacks) and cakes. Just under half the schools said they had placed some restrictions on children bringing in crisps (and savoury snacks) and cakes. Several schools had restrictions in force for chocolate, sweets and fizzy drinks. One school said that they waived their restrictions for 'special occasions'. A substantial number of schools did not respond to the question, implying perhaps that they had no bans or restrictions in force.

Table 2.2 Food items/drinks pupils were allowed to bring into school

Food/drink item	Total ban	Restricted
Crisps and savoury	5	17
Sweets	19	10
Chocolate	11	13
Cake	5	17
Fizzy drink	23	7
No response	10	16
N=37		

Schools were also asked what they allowed their pupils to bring in to eat at morning break times. Two thirds of the schools (25) said that they allowed only fruit. Four schools allowed ‘other’ items, such as ‘fruit or vegetables, cheese, healthy snack bars’ and one school said that they had a tuck shop available at break time.

2.3 School rules about food brought into school

Schools were asked who had devised their rules relating to what food children were allowed to bring to school. About three quarters (28) told us that they had formulated their own rules; only one school was using rules devised by the LA.

Schools were also asked about how they enforced their rules about what food children could bring to school. Twenty-three schools provided some response to this question, and the most frequently mentioned methods of enforcement were:

- written and/or verbal reminders to parents (8)
- staff observation (7)
- reminders to pupils/positive re-enforcement (6)
- trust/general school ethos (4).

Other methods of enforcement mentioned less frequently were confiscation of banned items, the school council, assemblies and a school brochure. One school mentioned that enforcement was difficult due to parental opposition.

Schools were asked if their rules about the food children could bring to school had changed in the last two years; just over half of the schools providing a response (18 of 32) said that they had. The most frequently mentioned changes included encouraging healthy packed lunches (5) and/or restrictions on packed lunch content (4). Less frequently mentioned changes included not allowing canned/bottled drinks, only allowing fruit to be consumed in the mornings and not allowing crisps.

Furthermore, schools were asked if they planned a review of their rules; just over half the schools providing a response (18 of 32) said a review was planned. One school noted that their rules were under review because of 'new legislation'.

The majority of schools (24) felt that most parents observed their rules, although four schools said that they did not. Schools were also asked if there had been any complaints about their rules; six schools had received complaints.

Schools were asked if they provided parents with any guidance about packed lunches: the majority of schools (25) said that they did. Schools were asked how they communicated with parents about their rules. The most frequently mentioned methods of communication were:

- printed material sent or given directly to parents (20)
- printed material sent via pupil post (16)
- at parents' evenings/events (16)
- via one-to-one contact (10).

Less frequently mentioned communication methods were via governors meetings, electronically (e.g. website/email), via PTA or similar. One school mentioned using notice boards and another said that they used newsletters.

2.4 Promoting healthy eating

Schools were asked if they were involved with any national and or local initiatives that promote healthy eating; responses are shown in Table 2.3 below. The majority of schools reported involvement with the National Healthy Schools Programme (NHSP). The next most frequently mentioned initiatives were those that promoted the ‘5 A DAY’ message and using cookery clubs to promote healthy eating. Less frequently mentioned initiatives were Schools Nutrition Action Groups (SNAGs), Growing Schools and Food Partnerships. One school also mentioned a Sure Start after-school event and another being involved in running a healthy breakfast club.

Table 2.3 School involvement in national/local healthy eating initiatives

Initiative	Number of schools
NHSP	28
‘5 A DAY’	18
Cookery clubs	17
SNAGs	8
Growing schools	6
Food partnerships	4
Focus on food	0
No response	5
N=37	

Schools were asked if they had achieved the healthy eating theme of the NHSP, and the majority (26) reported that they had. Finally, schools were asked which methods had been used to promote healthy eating in their school; responses are shown in Table 2.4 below. Most schools reported using a variety of methods, including classroom teaching/learning, posters/displays, food tasting sessions, PSHE activities, school assemblies, catering staff encouraging healthy choices and using school clubs (such as breakfast clubs). Less frequently mentioned promotional methods were parent/community meetings, visits by external speakers/organisations, training for staff and providing healthier food options.

Table 2.4 Methods used by schools to promote healthy eating

Methods	Number of schools
Classroom learning	34
Posters and displays	30
PSHE activities	29
Tasting sessions	29
Assemblies	28
Catering staff	26
Visitors coming to school	22
Healthy eating days	20
Healthy breakfast club	19
Healthy eating clubs	17
Parent/community meetings	13
External school visits	9
No response	1
N=37	

School responses indicate that most schools have adopted a broad whole-school approach in their efforts to facilitate, encourage and motivate children to eat healthily, and that they link these efforts with home through the development of school rules and home-school communication.

3. CADET

This chapter outlines the findings from the analysis of CADET food diaries completed on behalf of children participating in the evaluation. It describes the sample, and the methods of analysis used, and goes on to discuss the outcomes.

3.1 Pupils surveyed

Table 3.1 Sample profile

	N	%
Gender		
Girls	853	51
Boys	813	49
Year group		
Year 1	544	33
Year 2	577	35
Year 3	545	33
Lunch arrangements		
School dinner	880	53
Packed lunch	609	37
Home for lunch	3	-
Not specified	174	10
Ethnic group		
White UK	1420	85
Minority ethnic	55	3
Not specified	191	11
N= 1666		

In November 2006, CADET diaries were completed on behalf of 1809 pupils in 38 schools in the North East which had participated in the previous study. Some of the CADETs were excluded according to rules applied in the previous study:

- those which recorded that more than 16 fruits and vegetables (combined total) had been eaten over the 24-hour period
- those which fell outside the boundary of 10-40 ticks overall across all food categories and meal events
- those for whom gender was not recorded.

This left 1666 diaries to be included in the analysis. The sample profile is illustrated in Table 3.1 (see previous page).

3.2 Analysis of CADET data

The remainder of this chapter presents the findings from four different types of analysis:

- **Basic frequencies and descriptive statistics:** based on 1666 CADET diaries completed in this follow-up survey.
- **Analysis of general trends:** comparing findings for the cohorts included in the final survey of the previous evaluation (1905 children) with those included in the current study (1666). An analysis of trends in eating patterns was carried out, exploring change over time for year groups, boys and girls, and those who usually had a packed lunch or school dinner.
- **Longitudinal analysis:** exploring change over time for 249 individual children who had been involved in both studies, to see how their eating patterns had changed.
- **Multilevel modelling:**⁵ which takes into account all relevant school- and pupil-level variables to determine associations with key outcomes.

3.2.1 Outcomes explored

In order to compare findings with the previous study, the same outcomes were explored:

- consumption of **fruit** (not including juice)
- consumption of **fruit juice**

⁵ Multilevel modelling is a development of regression analysis which takes account of data which is grouped into similar clusters at different levels (see Goldstein, 2003). For example, individual pupils are grouped into year groups or cohorts, and those cohorts are grouped within schools. There may be more in common between pupils within the same cohort than with other cohorts, and there may be elements of similarity between different cohorts in the same school. Multilevel modelling allows us to take account of the hierarchical structure of the data and produce more accurate predictions, as well as estimates of the differences between pupils, between cohorts and between schools

- consumption of **vegetables** (counting beans, lentils and pulses only once, as specified in the Department of Health guidance, 2003)
- total consumption of **fruit, fruit juice and vegetables** (applying ‘5 A Day’ rules as stated in the guidance, so including fruit juice, beans, lentils and pulses only once)
- achievement of the ‘**5 A DAY**’ goal (calculated in accordance with the ‘5 A Day’ guidance (Department of Health, 2003))
- total fruit and vegetables **consumed at school**
- total fruit and vegetables **consumed at home**
- consumption of **snacks and desserts** (which refers to a category of food such as cakes, crisps, sweets etc., not the time of day at which the food was consumed).

It should be noted that fruit juice was not included in the separate analysis of consumption at home and at school. This is because, if a child had had two glasses of juice, one at home and one at school, only one could be counted, and there would be no criterion for deciding whether to classify it as home or school. Beans, lentils and pulses were excluded for essentially the same reason. Therefore, fruit and vegetables consumed at home and at school do not sum to figures given for fruit and vegetable consumption overall.

The ‘5 A DAY’ outcome is binary (yes/no), i.e. did pupils reach the ‘5 A DAY’ goal or not? All other outcomes were measured in terms of portions. It should be noted that one tick on CADET counts as a portion, but teachers/parents were asked to tick an item even if just one bite was taken, and therefore a tick could represent more or less than one portion.

This needs to be borne in mind when considering the tables presented below; portions are strictly ‘occurrences of consumption’, but for simplicity the former term is used. A standard age and sex-specific portion size is used in order to estimate nutrient intakes. Although there will be between-person variation, averages that are calculated over a large number of children should be accurate (Cade *et al.*, 2006).

3.3 Basic analysis of CADET

The following sections discuss the findings in relation to consumption across the whole sample and comparisons between subgroups.

3.3.1 Overall consumption

The average number of portions consumed by all children in 2006 is illustrated in Table 3.2 below. The table shows that, on average, children ate more vegetables than fruit. It also shows that, on average, children were not quite consuming the recommended five portions of fruit and/or vegetables a day, although there had been a positive change over time. General trends in consumption, comparing these figures with the previous study, are discussed in Section 3.4 below.

Table 3.2 Overall consumption

Food item/drink	2006
Fruit	1.82
Fruit juice	0.74
Vegetables	2.14
Fruit and vegetables combined	4.41
Snacks and desserts	2.97
Fruit and vegetables at school	1.75
Fruit and vegetables at home	1.96
N=1666	

Nearly half of the pupils (44 per cent) were achieving the ‘5 A DAY’ goal.

3.3.2 Differences between subgroups

The difference between groups in consumption of fruit, fruit juice, vegetables, fruit and vegetables combined, and snacks and desserts was explored. There was no significant difference in consumption between boys and girls or between white UK and minority ethnic pupils.⁶ However, there were some interesting differences in consumption between year groups and between children who had packed lunches and school dinners. These differences are explored below.

3.3.3 Differences between year groups

Table 3.3 below shows the difference in consumption between year groups. As before, consumption of fruit and vegetables decreased with age. Children in Year 3 ate significantly less fruit, vegetables and fruit and vegetables combined (at home and at school) than children in Year 1 and Year 2.

⁶ Only three per cent of the sample were classified (by their parents) as other than white UK (see Table 3.1). The numbers were too small to be analysed by individual ethnic group.

Table 3.3 Difference in consumption between year groups in 2006

Food item/drink	Year 1	Year 2	Year 3
Fruit	1.88	2.02	1.53*
Fruit juice	0.76	0.79	0.67
Vegetables	2.28	2.24	1.90*
Fruit and vegetables combined	4.60	4.75	3.86*
Snacks and desserts	3.01	2.91	2.99
Fruit and vegetables at school	1.87	1.92	1.44*
Fruit and vegetables at home	2.04	2.06	1.78*
N=	544	577	545

Indicates a significant difference for Year 3

Children in Year 3 were significantly less likely to have achieved the ‘5 A Day’ goal compared with those in other year groups. A third (33 per cent) of pupils in Year 3 achieved ‘5 A Day’ compared with around half of those in Year 1 (49 per cent) and Year 2 (51 per cent).

There was no difference in overall consumption of snacks and desserts between year groups. Children in Year 3 ate significantly more than the other year groups during morning break, but even in Year 3 consumption at this time was only 0.08 portions. The difference may reflect the fact that children in Year 3 are no longer eligible for free fruit, which is often consumed during morning break, and thus might eat a different type of snack instead. However, the very small amount, even for Year 3, suggests that more schools are allowing children to eat only fruit at break time, or otherwise limit the range of foods that children are allowed to bring to school.

3.3.4 Differences between school dinners and packed lunches

Table 3.4 below compares consumption for children who usually had a school dinner with that for children who usually had a packed lunch.

Those who usually ate a packed lunch consumed significantly more fruit and fruit juice than those who usually had school dinners. The biggest difference in fruit consumption was evident at lunch time, when packed lunch pupils ate double the amount of fruit that the school dinner pupils ate (0.69 portions for packed lunch children and 0.34 for school dinner children).

Table 3.4 Difference in consumption by lunch arrangements in 2006

Food item/drink	Packed lunches	School dinners
Fruit	2.15*	1.67
Fruit juice	0.97*	0.64
Vegetables	1.66*	2.50
Fruit and vegetables combined	4.36	4.60
Snacks and desserts	3.58*	2.62
Fruit and vegetables at school	1.52*	1.85
Fruit and vegetables at home	2.15	2.01
N=	609	880

* Indicates a significant difference between the groups

In contrast, ‘school dinner’ children ate significantly more vegetables overall, including 0.94 portions at lunchtime compared with 0.18 portions for those who had packed lunches. There was no significant difference at the evening meal, which indicates that packed lunch children were not compensating for lack of lunchtime vegetables by eating more in the evening. However, the additional fruit and fruit juice consumed by packed lunch children helped to balance the additional vegetables consumed by children on school dinners, so the difference in total consumption of fruit and vegetables was not statistically significant, although in terms of school-based consumption children on school dinners ate significantly more.

Children who usually had a packed lunch ate significantly more snacks and desserts compared with those who usually had a school dinner. In particular, ‘packed lunch’ children ate more than double the quantity of snacks and desserts at lunch time (2.05 portions compared with 0.87 amongst those having school dinners); it might be expected that lunch boxes would contain items such as crisps and chocolate bars, and that children who have school dinners would eat fewer of these items. It is interesting to note that ‘school dinner’ children ate more snacks and desserts than ‘packed lunch’ outside school before tea (0.54 portions compared with 0.41 portions); although this difference was significant, it is small in comparison to the difference in consumption of snacks and desserts at lunch time.

The findings described above are not surprising. School dinners seem to be ‘healthier’ overall than packed lunches, although those eating packed lunches eat more fruit. Most packed lunches contain at least one item from the ‘snack

or dessert' category, and more than half contain fruit, but relatively few contain vegetables.⁷ By contrast, school dinners are likely to contain vegetables, but children may have a choice of a snack (e.g. a cake) or a piece of fruit for dessert, and may opt for the former.

3.4 Trends

The findings from all three cohorts (Years 1, 2 and 3) were compared with the findings for children in the same year groups at the time of the last survey, to explore trends in consumption of fruit, vegetables and snacks and desserts, and to ascertain whether the SFVS had had a particular impact on certain subgroups of children. Findings are based on 1666 children in the current study and 1905 in the previous evaluation.

3.4.1 Comparing the total samples

Overall, pupils in the current study consumed significantly more fruit, fruit juice, vegetables and fruit and vegetables combined (at home and at school) compared with pupils in the last round of the previous evaluation (see Table 3.5 below). This improvement is good news, and the SFVS could be one of the factors contributing to it. However, it should be noted that the largest increase was in vegetable consumption, not fruit, which may perhaps indicate that changes in school meals had had a greater impact (this is explored further below).

⁷ See Jefferson and Cowbrough (2004), whose findings are supported by research currently being undertaken by Leeds University and the NFER for the Food Standards Agency.

Table 3.5 Comparing the overall samples

Outcomes	Mean portions in:	
	2004	2006
Fruit	1.65	1.82*
Fruit juice	0.56	0.74*
Vegetables	1.61	2.14*
Fruit and vegetables combined	3.65	4.41*
Fruit and vegetables at home	1.70	1.96*
Fruit and vegetables in school	1.33	1.75*
Snacks	3.06	2.97
N=	1905	1666

**Indicates a significant change since the previous survey*

The proportion of pupils achieving the ‘5 A Day’ goal increased from 32 per cent in the previous evaluation to 44 per cent in the current study.

There was no significant change in consumption of snacks and desserts, suggesting that pupils are eating more fruit and vegetables *in addition to* their usual diet; there is no evidence that they are eating fruit or vegetables *instead of* snacks and desserts.

3.4.2 Comparing year group cohorts

Table 3.6 below illustrates the general trends in consumption over time for all three year groups.

Table 3.6 Comparing cohorts

Outcomes	Mean portions Year 1		Mean portions Year 2		Mean portions Year 3	
	2004	2006	2004	2006	2004	2006
Fruit	1.81	1.88	1.74	2.02*	1.36	1.53*
Fruit juice	0.57	0.76*	0.51	0.79*	0.60	0.67
Vegetables	1.68	2.28*	1.71	2.24*	1.45	1.90*
Fruit and vegetables combined	3.88	4.60*	3.83	4.75*	3.22	3.86*
Fruit and vegetables at home	1.74	2.04*	1.76	2.06*	1.61	1.78
Fruit and vegetables at school	1.52	1.87*	1.48	1.92*	0.97	1.44*
Snacks	3.04	3.01	3.09	2.91*	3.06	2.99
N=	659	544	642	577	604	545

**Indicates a significant change since the previous survey*

Amongst Year 1 pupils, there was a significant increase in consumption of fruit and vegetables combined, at home and at school. But as Table 3.6 illustrates, this was due to significantly increased consumption of vegetables and fruit juice; consumption of fruit remained virtually unchanged. Overall, a greater proportion of pupils in Year 1 achieved the '5 A Day' goal (an increase from 36 per cent to 49 per cent).

For the Year 2 children, there was a significant decrease in consumption of snacks and desserts since the previous evaluation, and a significant increase in all other categories. There was a significant increase in the proportion of pupils in Year 2 achieving the '5 A Day' goal from 35 per cent to 51 per cent. The current Year 2 cohort was the first to enjoy the benefits of the SFVS from entry into Reception, so it is encouraging that their outcomes are so positive.

Pupils in Year 3 are particularly interesting as they are no longer eligible for the SFVS so are no longer receiving free fruit. The previous research showed that an increase in fruit consumption was not sustained when children's participation in the SFVS came to an end in Year 3. Because the previous evaluation was only able to capture data in the first year of the scheme, Year 3 children in 2004 had been involved in the scheme for only about four months.

We wished to explore the possibility that the scheme might have a longer-term impact on children who had been involved for a longer period of time. The current Year 3 pupils had received free fruit for over two years, and thus a comparison between the two cohorts should be informative.

The findings show that average portions consumed by Year 3 reflected the overall pattern, as described above; fruit and vegetable intake had increased significantly compared with the previous study, while consumption of snacks and desserts had remained more or less the same. However, as noted above, consumption of fruit and vegetables in Year 3 was still significantly lower than in other year groups. This reflects the consistent finding from the earlier study, which showed that children eat less fruit and vegetables as they grow older. The key question was whether the SFVS has helped to counteract that effect, by encouraging children who had formed the habit of eating fruit to continue doing so when they no longer receive free fruit at school.

Table 3.7 below explores this question by showing gaps in consumption between pupils in Year 2 and Year 3 in 2004, and again in 2006. Unfortunately, the scheme does not appear to have counteracted the effect of consumption decreasing with age, as the gap in fruit and vegetable consumption between Year 2 and Year 3 was slightly greater in 2006 than in 2004. This was true in percentage terms also: there was a 16 per cent drop between Years 2 and 3 in 2004 and a 19 per cent drop in 2006.

The gap in fruit and vegetable consumption *at school* decreased over time (34 per cent in 2004 and 25 per cent in 2006). This could suggest that children in Year 3 are continuing to eat fruit at school, even though they no longer receive it free (as noted above, school rules could have had an impact on this). However, the gap in fruit and vegetables consumed *at home* is greater in 2006, so the findings do not suggest that the SFVS has encouraged children to continue fruit consumption in their home environment.

Table 3.7 Mean portions and the difference in portions consumed over time

Outcome	2004			2006		
	Y2 mean portions	Y3 mean portions	<i>Difference in portions</i>	Y2 mean portions	Y3 mean portions	<i>Difference in portions</i>
Fruit	1.74	1.36	-0.38	2.02	1.53	-0.49
Vegetables	1.71	1.45	-0.26	2.24	1.90	-0.34
Fruit and vegetables	3.83	3.22	-0.61	4.75	3.86	-0.89
Fruit and vegetables at home	1.76	1.61	-0.15	2.06	1.78	-0.28
Fruit and vegetables at school	1.48	0.97	-0.51	1.92	1.44	-0.48
N=	642	604		577	545	

In summary, the findings show that, although children of all ages were eating more fruit and vegetables than in the previous study, there was still an age-related drop when children were no longer eligible for the scheme.

3.4.3 Gender trends

Compared with the findings from the previous evaluation, there was a significant increase in consumption of fruit, vegetables and fruit and vegetables combined for both boys and girls. There was a significant increase in the proportion of girls achieving the '5 A Day' goal since the last survey (from 34 per cent to 44 per cent) and an even greater increase for boys (31 per cent to 44 per cent). There was no significant change in the number of portions of snacks and desserts consumed by either boys or girls.

3.4.4 Trends associated with lunch time arrangements

Table 3.8 below shows change over time for children who usually had a packed lunch compared with those who usually had a school dinner.

Table 3.8 Change over time for packed lunches and school dinner

Outcome	Packed lunch in:		School dinner in:	
	2004	2006	2004	2006
Fruit	1.84	2.15*	1.53	1.67*
Vegetables	1.46	1.66*	1.79	2.50*
Fruit and vegetables	3.79	4.36*	3.66	4.60*
Fruit and vegetables at home	1.76	2.15*	1.77	2.01*
Fruit and vegetables at school	1.38	1.52*	1.29	1.85*
Snacks and desserts	3.61	3.58	2.77	2.62*
N=	690	609	989	880

* Indicates a significant difference between 2004 and 2006

Since the previous study, there was an increase in consumption of fruit, vegetables, and fruit and vegetables combined (both at home and at school) for pupils who had school dinners and those who had a packed lunch. The increase in fruit consumption was greater for ‘packed lunch’ children, but the greatest increase by far was that seen in vegetable consumption amongst the ‘school dinner’ children. This made their increase in total fruit and vegetable consumption greater than that for ‘packed lunch’ children: up from 3.66 to 4.60 portions per day.

Similarly, there was a significant increase in the proportion of pupils having school dinners who achieved the ‘5 A Day’ goal, from a third (32 per cent) to just under half (48 per cent), and an increase (although much smaller) amongst those who had packed lunches (36 per cent to 43 per cent). ‘School dinner’ children ate significantly fewer snacks and desserts over time, but there was no such significant difference for those who had packed lunches.

These findings suggest an improvement in school dinners in the North East following the introduction of the new standards which came into force in September 2006. It was noted in our previous study (Schagen *et al.*, 2005) that school dinners in Yorks and Humber (the comparison group area) appeared to have a much higher vegetable content than those in the North East. It may be therefore that the North East was starting from a low base, and therefore improvements have been noticeable.

To explore this further, analysis of consumption at lunchtime was carried out (see Table 3.9 below).

Table 3.9 Change over time *at lunch time* for packed lunches and school dinner

Outcome	Packed lunch in:		School dinner in:	
	2004	2006	2004	2006
Fruit	0.56	0.69*	0.17	0.34*
Vegetables	0.16	0.18	0.41	0.94*
Snacks and desserts	2.09	2.05	1.07	0.87*
N=	690	609	989	880

* Indicates a significant difference between 2004 and 2006

Between 2004 and 2006, for packed lunch children, there was a significant increase in fruit consumption, but virtually no change in terms of vegetables or snacks. However, children on school dinners had doubled their fruit consumption, more than doubled their vegetable intake, and also reduced the quantity of snacks and desserts consumed. This evidence confirms the hypothesis of a considerable improvement in school meals, at least in the North East.⁸

3.5 Multilevel modelling

Multilevel modelling enables us to explore the impact of a wider range of variables, and to consider them all simultaneously. Models were created to further explore the outcomes listed in Section 3.2, except for fruit juice, which was not investigated as a separate outcome, though it is included in other categories.

3.5.1 Variables included

Parents were asked to provide some background information on the CADET forms, including home postcodes, which were then linked with census data. Further school-level information derived from the school questionnaire was added to that available from the NFER's Register of Schools. Variables included in the modelling were as follows:

⁸ Since all the schools in the sample were in the North East region, we cannot generalise the findings nationwide.

Pupil-level background variables

- gender (boy or girl)
- year group (Year 1, 2 or 3)
- ethnicity (white UK or minority ethnic)
- lunch arrangement (whether they usually had a packed lunch, went home for lunch or had a school dinner)
- percentage of people in the postcode area aged 16-74 with no qualifications
- percentage of people in the postcode area not in good health
- overall deprivation index.

School-level background variables

- school type (infant, junior or primary)
- percentage of pupils with special educational needs (SEN)
- percentage of pupils with English as an additional language (EAL)
- percentage of pupils eligible for free school meals (FSM)
- key stage 1 average attainment (banded)
- school policy (whether the school had a policy on healthy eating, and who was involved in developing it)
- food in school (a measure of compliance with the 2006 standards)
- school rules (a measure of food items banned or restricted in school)
- parental communications (whether school provided guidance on healthy packed lunches, and ways in which they communicated with parents)
- teaching and learning (involvement in health-related initiatives, and methods used to promote healthy eating).⁹

3.5.2 Outcomes

Table 3.10 summarises the results for the six outcomes defined in terms of portions.

⁹ Details of the scoring system used are provided in Appendix 3.

Table 3.10 Significant coefficients for background variables relative to food intakes expressed as portions

Variable	Total fruit	Total vegetables	Total fruit and vegetables	Fruit and Vegetables at school	Fruit and vegetables at home	Snacks
Girls				0.1		
Infant school			0.5			
Year 2						
Year 3	-0.4	-0.3	-0.7	-0.4	-0.2	
Per cent entitled to free school meals*					-0.1	
Per cent pupils with statement of SEN (2005)*						
Per cent EAL pupils (2005)*					-0.2	
Achievement band (KS1 overall performance)	0.2					
Ethnicity other than white UK						
Per cent of people aged 16-74 with no qualifications*						
Per cent of people in postcode area not in good health*		-0.3				
Mean deprivation index*	-0.0		-0.1	-0.0	-0.0	
School lunch		0.5	0.8		0.8	
Packed lunch	0.5	-0.4	0.5	-0.4	0.9	0.9
School policy		-0.0	-0.1		-0.0	
Food in school		-0.1				
School rules						
Parental communications		0.1	0.2			
Teaching and learning		-0.1	-0.1			

* Value given is actual expected change for ten percentage point change in the background variables. 0.0 indicates that the coefficient was less than 0.05. A minus sign indicates a negative coefficient.

The coefficients in each row indicate the impact of the factor named on the relevant outcome(s). It should be noted that the differences shown in the table are after controlling for other factors. The figures should be understood as illustrating significant differences between the category named and the 'base case', i.e. a white UK boy in Year 1 whose lunch arrangements were not

specified. Thus a 0.5 in the 'Girls' row would mean that girls consumed 0.5 portions more than boys; a 0.3 in the 'Year 2' row would mean that Year 2 pupils ate 0.3 portions more than Year 1 pupils. A girl in Year 2 would belong to both groups, and would therefore eat 0.8 portions more than a boy in Year 1. If there was 0.8 in the 'school lunch' row and 0.2 for 'packed lunch', this would mean that children eating school dinners consumed 0.6 portions more than those taking packed lunches.

Below we discuss, with reference to the table, the findings for each of the six outcomes.

Fruit

Modelling confirmed the findings from the previous sections, that Year 3 children ate less fruit (0.4 portions) than other children, and children taking packed lunches to school ate 0.5 portions more. In addition, pupils from higher-achieving schools were likely to eat more fruit, and there was a slight negative association with deprivation.

Vegetables

As for fruit, year group and lunch arrangements had by far the greatest impact on vegetable consumption. Children in Year 3 ate 0.3 portions less than children in other years. Those who had school dinners ate 0.5 portions more than the default group (those who went home for lunch and those whose lunch arrangements were not specified), while those taking packed lunches ate 0.4 portions less. Thus the difference between school dinner and packed lunch children was almost one whole portion of vegetables.

Some school- or area-level factors also emerged as significant, though the differences were much smaller. Children from schools which communicated with parents on the topic of healthy eating ate more vegetables than expected, while those from areas with a high proportion of people not in good health ate less. These associations are not surprising; it is harder to explain the lower levels of vegetable consumption by children from schools which fare well in terms of policies on healthy eating, food provided in school and teaching and learning about healthy eating. It seems unlikely that providing healthy food and teaching about healthy eating would have a negative impact on vegetable consumption, but it is evidently insufficient to outweigh other influences. There was some evidence (although not very strong) of a negative correlation

between the policy scores and measures of deprivation. Further, it should be noted that scores for ‘healthy food’ fell within a very narrow range; there was little difference between the schools in terms of compliance with the standards, and so this would not be expected to have a significant impact.

Total fruit and vegetables (according to ‘5 A DAY’ rules)

As noted above, ‘packed lunch’ children ate more fruit than those having school dinners, while the latter ate more vegetables. In terms of total fruit and vegetable consumption, the coefficient for school dinners is larger than that for packed lunches, indicating that children on school dinners ate more fruit and vegetables in total (0.3 portions more than those on packed lunches).

Since Year 3 children ate less fruit, and less vegetables, than younger children, they did of course eat less fruit and vegetables combined (0.7 portions). Consistent with findings above, children from schools with good parental communication ate more, while those from schools which scored well in terms of policies and teaching and learning ate less, as did children from deprived areas. One other significant factor was school type: children from infant schools apparently ate more fruit and vegetables than children from primary schools. There was a similar finding in the second, but not the third round of our earlier study (children in infant schools were more likely to achieve ‘5 A DAY’) but there is no obvious explanation. Given that the sample includes only five infant schools, the difference may relate to those particular schools, rather than to infant schools as such.

Fruit and vegetables at school

Although there were no gender differences in terms of overall consumption, girls ate more fruit and vegetables at school than did boys.¹⁰ Year 3 pupils ate a lot less, as did those taking packed lunches (as we have already seen, packed lunch children ate more fruit at school, but this was outweighed by the much greater consumption of vegetables by those on school dinners). There was a negative association between living in a deprived area and consumption of fruit and vegetables at home, but although statistically significant, this difference was very small.

¹⁰ It should be noted that this is the only significant gender difference (relating to food outcomes) to emerge in this evaluation. In the previous study, girls ate more fruit and vegetables than boys, and fewer snacks and desserts (Schagen *et al.*, 2005).

Fruit and vegetables at home

Children taking packed lunches, and those on school dinners, ate substantially more fruit and vegetables *at home* than those whose lunch arrangements were not specified. This tells us little, as it is impossible to know what kind of children constituted the latter group. More importantly, the packed lunch children ate more fruit and vegetables at home than the school dinner children, although the difference was small (and insufficient to compensate for the larger quantity eaten in school by those having school dinners).

Year 3 children ate less fruit and vegetables at home than other children, further confirmation of our consistent finding that children eat less fruit and vegetables as they grow older. Other factors negatively associated with consumption of fruit and vegetables at home were the proportion of children in the school eligible for FSM, area-level deprivation, percentage of children with EAL and schools with policies on healthy eating. The first two of these factors are of course likely to be correlated.

Snacks and desserts

Only one factor emerged as significantly correlated with the number of snacks and desserts eaten. Children on packed lunches ate 0.9 portions more than those on school dinners (and those whose lunch arrangements were not specified).

Achieving ‘5 A DAY’

The final outcome to be explored by multilevel modelling was ‘5 A DAY’: did children achieve this goal or not? As this is a binary (yes/no) outcome, it requires a logistic multilevel model, which produces odds ratios indicating the likelihood of various groups achieving the desired outcomes. The results of the analysis are shown in Table 3.11.

Table 3.11 Significant odds ratio for background variables relative to reaching the '5 A DAY' standard

Variables	Odds ratio
Girls	
Infant school	
Year 2	
Year 3	0.48
Per cent entitled to free school meals*	
Per cent with statement of SEN-2005*	
Per cent EAL pupils (2005)*	
Achievement band (KS1 overall performance 2002)	
Ethnicity other than white UK	
Per cent of people aged 16-74 with no qualifications in OA*	
Per cent of people in OA with not good health*	
Mean deprivation index*	0.99
School lunch	1.41
Packed lunch	
Home lunch	
School policies	0.95
Food in school	
School rules	
Parental communications	1.15
Teaching and learning	0.95

* Value given is actual expected change for ten percentage points change in the background variable.

The two groups of pupils significantly more likely than average to achieve the '5 A DAY' goal were those on school dinners and those from schools with good parental communication, although the former had a much greater impact than the latter. Children on school dinners were almost one and a half times as likely to achieve '5 A DAY' than other children.

Consistent with all the findings noted throughout this report, Year 3 children were less than half as likely to reach the goal than those in Year 1 and Year 2. Children with a slightly less than average chance of reaching the goal were those living in deprived areas, and those from schools which ranked positively in terms of policy and teaching and learning.

3.6 Longitudinal analysis

We were able to match 249 children from whom data was collected in the final round of the previous evaluation, as well as the present study. Their consumption at the two timepoints (November 2004 and November 2006) is illustrated in Table 3.12. Consumption of fruit had decreased, and consumption of vegetables had increased, but neither of these changes were significant. Their overall consumption of fruit and vegetables (according to ‘5 A DAY’ rules) had therefore remained constant.

Table 3.12 Selected food group intake for children in both surveys

Outcomes	Mean portions in:	
	2004	2006
Fruit	1.72	1.53
Fruit juice	0.57	0.69
Vegetables	1.69	1.82
Fruit and vegetables combined	3.80	3.82
Snacks	3.06	2.90
N=249		

None of the differences over time are statistically significant.

This is a much better picture than in the previous study, which indicated a significant decrease in fruit and vegetable consumption when pupils moved into Year 3. However, we need to take into account the findings reported earlier in this chapter, which indicate a large general increase in consumption of fruit and vegetables (particularly the latter) between 2004 and 2006 (see Tables 3.5 and 3.6). The evidence suggests that this general increase has balanced out the decline which occurs with age and particularly when the children enter Year 3 (see Schagen *et al.*, 2005, and also Table 3.3 of the present report). Today’s Year 3 children are eating the same amount of fruit and vegetables as Year 1 children in 2004, but still significantly less than children now in Years 1 and 2.

4. Nutritional analysis

The purpose of the nutritional analysis in this follow-up evaluation of the SFVS was to identify any changes in children's energy and nutrient intakes between the final survey of the previous study (November 2004) and the survey undertaken for the current research project in 2006. Associations between nutrient intakes and background characteristics were investigated by multilevel models.

It should be noted that children for whom dates of birth were not available could not be included in the nutritional analysis. The total number of pupils was therefore reduced to 1,628.

4.1 Basic analysis of nutrient intake

Nutrient intakes were compared to national intake levels for similar-aged children from the National Diet and Nutrition Survey (NDNS) (Gregory *et al.*, 2001) and also to population recommended intakes (RNIs) published in 1991 (Department of Health, 1991).¹¹ Table 4.1 shows the average daily intake of total energy and selected nutrients by gender and year groups. It is worth noting that older children in Year 2 and 3 are expected to have a higher nutrient requirement. Arithmetic mean intake of the nutrients was presented here although some nutrient intakes such as carotene varied greatly between individuals. Nutrients with a highly skewed distribution were log-transformed before analysis.

¹¹ RNIs relevant to the children in this evaluation are provided in Appendix 4. Not all nutrients had a reference value and estimated average requirement was provided for total energy instead.

Table 4.1 Average daily intake of selected nutrients by years and gender

	Mean daily intake (s.d)**					
	Year 1		Year 2		Year 3	
	Boys	Girls	Boys	Girls	Boys	Girls
Energy kcal	1677 (428)	1403 (365)	1607 (393)	1519 (387)	1614 (445)	1556 (395)
Energy MJ	7.06 (1.80)	5.90 (1.53)	6.77 (1.65)	6.40 (1.63)	6.79 (1.87)	6.55 (1.66)
Protein g	59.2 (17.6)	47.9 (15.3)	56.2 (16.0)	52.8 (17.3)	56.1 (19.0)	55.4 (19.4)
CHO g	236.4 (63.0)	197.1 (52.7)	229.2 (58.7)	215.2 (53.1)	224.9 (61.0)	217.2 (55.2)
Fibre g	12.1 (4.2)	10.0 (3.6)	12.1 (4.2)	11.4 (4.4)	11.5 (4.3)	11.3 (4.3)
Fat g	61.5 (19.6)	52.4 (17.3)	58.1 (17.6)	55.6 (18.8)	60.7 (21.1)	57.8 (18.2)
Per cent energy from fat	32.8 (4.8)	33.4 (5.2)	32.4 (4.6)	32.7 (5.1)	33.6 (5.2)	33.2 (5.0)
Total sugar g	122.7 (45.1)	99.3 (34.0)	118.1 (37.9)	107.7 (35.8)	104.3 (37.0)	109.0 (37.9)
Iron mg	9.9 (3.6)	8.0 (2.6)	9.4 (2.9)	9.0 (3.5)	9.5 (3.6)	9.3 (3.5)
Calcium mg	796.5 (305.0)	636.5 (228.0)	753.6 (259.1)	693.1 (256.6)	714.6 (283.0)	689.9 (297.8)
Potassium mg	2408.9 (690.5)	1961.5 (567.5)	2386.3 (687.3)	2251.1 (641.5)	2237.1 (657.7)	2255.7 (703.8)
Salt* g	5.6 (1.6)	4.7 (1.5)	5.5 (1.6)	5.0 (1.5)	5.6 (2.1)	5.3 (1.8)
Folate µg	199.9 (59.1)	167.5 (56.9)	209.6 (65.0)	188.5 (63.4)	190.1 (69.2)	186.5 (63.7)
Carotene µg	2116.0 (1831.9)	1667.4 (1388.9)	2492.0 (2303.4)	1687.0 (1581.6)	2092.7 (2459.0)	1834.2 (1491.8)
Retinol µg	292.2 (389.3)	229.7 (271.3)	239.4 (109.5)	247.2 (268.9)	243.6 (120.8)	250.1 (285.5)
Vit C mg	94.4 (55.0)	81.3 (44.4)	97.5 (53.2)	94.1 (52.6)	80.0 (45.1)	88.1 (51.0)
N = 1628	250	281	280	286	263	268

* Derived from sodium intake

** Figures in brackets are standard deviations of the nutrient intakes

4.1.1 Macronutrient intake

Macronutrient intakes in 2006 were very similar to those observed in the previous survey. Energy intake remained lower than the average requirement estimated for age groups of children and was of greater concern among boys who did not appear to have increased their energy intake as required as they grew older. Protein, carbohydrate and fat intake had met the nutritional requirements expected in these children. The percentage energy from fat was 33 per cent. This is slightly lower than that reported for similar-aged children in the NDNS. The dietary reference value for total fat is 35 per cent of food energy in adults. There is no specific recommendation for children.

In general macronutrient intakes were higher in boys than in girls across the year groups as expected. The general decrease in fruit and vegetable consumption with age observed in this and earlier surveys may correspond to the smaller dietary fibre intake within the Year 3 pupils, but the effect was only observed in boys (Table 4.1).

4.1.2 Micronutrient intake

In general, micronutrient intakes in 2006 were similar to the NDNS and appeared to exceed what was expected nutritionally for children aged 4–7 years. As in the previous study, salt intake was high (at least 5g/day, except for Year 1 girls). It is difficult to measure salt intake using dietary assessment accurately. For this evaluation, salt intake was derived from sodium intake ($2.5 \times \text{Na}/1000\text{g}$). Sodium is present in fruit and vegetables, but in minute quantities compared to processed foods. Intakes of carotene and retinol, the two main components of Vitamin A, appeared to be adequate and met the RNI of 400 – 500 $\mu\text{g}/\text{day}$. As expected, micronutrient intakes in boys were mostly higher than in girls across the year groups. Table 4.2 is a summary of the basic findings in micronutrient intakes.

Table 4.2 Summary of findings on micronutrient intake

Micronutrient	Comment
Iron	Figures were similar to those reported in the NDNS and above the RNI of 6.1–8.7mg/day for children aged 4 to 7
Calcium	Figures were similar to those reported in the NDNS and above the RNI of 450–550mg/day for the age groups
Potassium	Above the values reported in the NDNS, potassium intakes exceed that of 1100–2000mg/day recommended. Younger boys (Year 1) had twice as much as the RNI but there was no adverse health risk to this level of intake
Folate	Similar to the values reported in the NDNS, folate intakes were found to be above the recommended intake of 100–150µg/day
Salt	Similar to figures in the NDNS. Salt intakes were found to be higher than the 3–5g/day recommended by the Food Standard Agency and the Department of Health for these age groups. Year 1 pupils had notably high intakes. Values were almost as high as the older children.
Carotene	While there was no recommended intake for this nutrient, figures were well above those reported in the NDNS. Carotene is found in highly pigmented fruit and vegetables. It is converted into Vitamin A in the body and any residue is quickly eliminated
Retinol	Retinol intakes were found to be generally lower than those reported in the NDNS. Retinol is one of the two main components of Vitamin A and is only found in animal sources such as egg yolk, oily fish, milk and milk products
Vitamin A	Vitamin A intake was derived by adding the two major components – carotene and retinol – together. Figures were similar to those reported in the NDNS and was within the recommended intake of 400–500 µg/day
Vitamin C	Figures were higher than the values reported in the NDNS. Vitamin C intakes were well above the RNI of 30mg/day for the age groups. This nutrient is widely available in most fresh fruit and vegetables, but can also present in soft drinks and juice

4.2 Comparisons of nutrient intakes between 2004 and 2006

Possible impact on nutrient intakes associated with longer-term involvement in the SFVS was investigated by comparing mean nutrient intakes captured in November 2004 with those collected two years later. Table 4.3 shows the overall average daily intake of total energy and selected nutrients at these two timepoints, and Tables 4.4 - 4.6 present the same results by gender, year group and lunchtime arrangements. The stratification restricted any possible impact

to be observed within a group of children with the same characteristic as mentioned but other background characteristics were not taken into account. Differences between the mean nutrient intakes are discussed below.

Table 4.3 Average daily intake of selected nutrients in 2004 and 2006

	Mean daily intake (s.d)**	
	2004	2006
Energy kcal	1544 (390)	1560 (410)
CHO g	140.3 (84.4)	219.6 (58.5)
Fibre g	10.5 (3.8)	11.4 (4.2)
Fat g	57.1 (17.5)	57.6 (19.0)
Per cent energy from fat	33.1 (4.8)	33.0 (5.0)
Total sugar g	112.6 (37.3)	110.0 (38.7)
Iron mg	8.6 (3.1)	9.2 (3.3)
Calcium mg	669.4 (257.2)	712.5 (276.0)
Salt* g	5.1 (1.6)	5.3 (1.7)
Beta carotene µg	1733.3 (1823.0)	1977.7 (1902.1)
Vitamin C mg	79.4 (44.8)	89.3 (50.7)
N = 3532	1904	1628

* Derived from sodium intake

** Figures in brackets are standard deviations of the nutrient intakes

Table 4.4 Average daily intake of selected nutrients by gender in 2004 and 2006

	Mean daily intake (s.d)**			
	Boys		Girls	
	2004	2006	2004	2006
Energy kcal	1614 (386)	1631 (422)	1473 (381)	1492 (387)
CHO g	146.8 (87.3)	230.0 (61.0)	133.9 (80.9)	209.7 (54.3)
Fibre g	11.0 (3.9)	11.9 (4.2)	10.0 (3.7)	10.9 (4.1)
Fat g	59.2 (17.5)	60.0 (19.5)	54.9 (17.1)	55.2 (18.2)
Per cent energy from fat	32.9 (4.7)	32.9 (4.9)	33.4 (4.9)	33.1 (5.1)
Total sugar g	118.2 (38.0)	115.0 (40.7)	107.0 (35.7)	105.3 (36.1)
Iron mg	9.1 (3.0)	9.6 (3.4)	8.2 (3.1)	8.8 (3.3)
Calcium mg	715.1 (264.6)	754.2 (283.7)	623.7 (241.2)	673.0 (262.7)
Salt* g	5.3 (1.7)	5.6 (1.8)	4.9 (1.6)	5.0 (1.6)
Beta carotene µg	1952.9 (2098.6)	2241.0 (2226.9)	1513.7 (1480.9)	1727.7 (1490.1)
Vitamin C mg	79.3 (45.6)	90.7 (51.8)	79.5 (44.1)	87.9 (49.7)
N = 3532	952	793	952	835

* Derived from sodium intake

** Figures in brackets are standard deviations of the nutrient intakes

Table 4.5 Average daily intake of selected nutrients by year groups in 2004 and 2006

	Mean daily intake (s.d)**					
	Year 1		Year 2		Year 3	
	2004	2006	2004	2006	2004	2006
Energy kcal	1518 (390)	1532 (418)	1545 (385)	1563 (392)	1570 (393)	1585 (421)
CHO g	134.3 (72.7)	215.6 (61.0)	139.9 (85.2)	222.1 (56.3)	147.5 (94.4)	221.0 (58.2)
Fibre g	10.2 (3.7)	11.0 (4.0)	10.9 (3.8)	11.8 (4.3)	10.4 (4.0)	11.4 (4.3)
Fat g	55.4 (17.3)	56.7 (19.0)	57.3 (17.0)	56.9 (18.2)	58.6 (17.9)	59.2 (19.8)
Per cent energy from fat	32.7 (4.9)	33.1 (5.0)	33.2 (4.6)	32.5 (4.9)	33.5 (4.8)	33.4 (5.1)
Total sugar g	115.0 (38.4)	110.3 (41.3)	111.6 (36.4)	112.9 (37.2)	111.1 (36.9)	106.7 (37.5)
Iron mg	8.4 (3.0)	8.9 (3.2)	8.7 (2.9)	9.2 (3.2)	8.8(3.4)	9.4 (3.6)
Calcium mg	670.5 (266.8)	711.8 (278.5)	661.8 (244.4)	723.0 (259.4)	676.3 (259.9)	702.1 (290.5)
Salt* g	4.9 (1.5)	5.1 (1.6)	5.1 (1.6)	5.3 (1.6)	5.3 (1.7)	5.5 (2.0)
Carotene µg	1686.7 (1700.0)	1878.6 (1626.6)	1940.8 (1960.4)	2085.2 (2011.0)	1563.3 (1801.7)	1962.2 (2031.5)
Vit C mg	78.5 (44.6)	87.5 (50.1)	82.1 (43.6)	95.8 (52.8)	77.4 (46.3)	84.1 (48.3)
N = 3532	659	531	642	566	603	531

* Derived from sodium intake

** Figures in brackets are standard deviations of the nutrient intakes

Table 4.6 Average daily intake of selected nutrients by lunchtime arrangements in 2004 and 2006

	Mean daily intake (s.d) **					
	Lunch unspecified		School lunch		Packed lunch	
	2004	2006	2004	2006	2004	2006
Energy kcal	1417 (437)	1388 (421)	1555 (383)	1582 (424)	1566 (377)	1576 (377)
CHO g	131.7 (94.1)	190.8 (57.0)	142.8 (82.8)	221.4 (59.3)	139.4 (83.5)	225.1 (55.5)
Fibre g	9.8 (3.7)	10.0 (4.3)	10.8 (4.1)	12.2 (4.3)	10.3 (3.5)	10.6 (3.9)
Fat g	53.0 (19.3)	52.9 (20.0)	57.5 (17.0)	58.3 (19.8)	57.7 (17.4)	57.8 (17.3)
Per cent energy from fat	33.5 (4.9)	34.1 (5.7)	33.1 (4.7)	32.9 (5.1)	33.0 (4.9)	32.8 (4.6)
Total sugar g	98.8 (33.7)	91.4 (36.4)	110.7 (36.2)	106.8 (37.7)	119.7 (38.2)	119.7 (38.3)
Iron mg	7.9 (3.5)	8.0 (3.3)	8.8 (3.2)	9.5 (3.3)	8.6 (2.8)	9.0 (3.3)
Calcium mg	599.6 (242.5)	606.6 (252.8)	662.9 (256.2)	724.4 (288.1)	700.7 (258.5)	726.1 (258.8)
Salt* g	4.8 (1.8)	4.7 (2.0)	5.0 (1.6)	5.4 (1.8)	5.3 (1.6)	5.3 (1.5)
Carotene µg	1329.7 (1512.7)	1796.2 (1814.1)	1834.5 (1831.7)	2235.5 (1993.1)	1717.1 (1903.0)	1671.8 (1741.8)
Vit C mg	68.4 (38.9)	68.7 (46.0)	78.6 (44.2)	88.2 (49.4)	83.8 (47.0)	96.4 (52.0)
N =	219	171	988	851	690	603

* Derived from sodium intake

** Figures in brackets are standard deviations of the nutrient intakes

Pupils who went home for lunch (7 in 2004, 3 in 2006) are not included in the table

4.2.1 Changes in macronutrient intake

Energy

Overall, energy intake was very similar to that recorded in 2004 (Table 4.3). The same was observed when these children were stratified by gender, year group and lunchtime arrangements (Table 4.4 - 4.6).

Carbohydrate

Carbohydrate intake had increased since 2004, as shown in the overall and subgroup analyses. Figures were close to those reported in the NDNS for children in the same age groups (190–250g/day), while the value reported in 2004 was particularly low (overall 140g). This overall 80g increase in carbohydrate, equivalent to about 320kcal, was not reflected in an increase in total energy intake (Table 4.3). It is possible that the source of carbohydrate had changed between 2004 and 2006 as total sugar intake had decreased.

Carbohydrate is a combination of total sugar and complex carbohydrate. Sugars are readily digested by the body and too much can lead to over-consumption of energy. Most of the energy from carbohydrate in the diet should be made up from complex carbohydrates including starches. Fruits, vegetables and cereals provide an excellent source of these nutrients.

Dietary fibre

An overall slight increase in dietary fibre intake was observed (Table 4.3), which is consistent with the general increase in fruit and vegetables consumption reported (see Section 3.4.1). An increase in consumption was also observed within subgroups by gender and year group. Dietary fibre intakes in those who had packed lunches remained comparable to the last survey, but an increase was seen among those who had school dinners. This suggests a possible contribution of school dinners towards the slight increase in dietary fibre intake. Fruit and vegetables are a good source of dietary fibre, and 1.5g of dietary fibre is equivalent approximately to 100g apple, however, dietary fibre can also come from cereals and cereal products.

Fat

Fat intakes were similar to the previous survey in all analyses performed. The differences in mean intakes varied slightly between the groups.

Percentage energy from fat

Overall fat intake, energy intake and hence percentage energy from fat remained stable between 2004 and 2006, except for a small decrease (0.7 per cent) in the Year 2 pupils. The decrease remained when the same analysis was controlled for total energy intake, which means the difference was brought about by the slight drop in fat content of the food consumed rather than by the variations in individual energy intakes. There was a small increase in dietary fibre intake in Year 2 pupils but there is no evidence to suggest that fruit and vegetables had replaced snacks that are usually high in fat content in the diet of these children (see Section 3.4.1). As noted above, percentage energy from fat in these children aged 4-7 years was close to the level in adults whose recommended intake is a maximum of 30 per cent of their diet.

Total sugar

Between 2004 and 2006, there was a small overall drop in total sugar intake, equivalent to approximately half a teaspoon of sugar. The drop was evident in boys, girls, Year 1 and Year 3 pupils. Pupils with school dinners had also decreased their total sugar intake, which corresponds to the overall decrease in snacks and desserts observed in these pupils (see Section 3.4.4). All of these results were sustained when total energy intake was accounted for, which means the drop may be due to consuming food items with less sugar.

The total sugar intake of pupils taking packed lunches remained the same. This is consistent with the finding reported in Section 3.4.4, that the quantity of snacks and desserts in packed lunches had remained stable. Against the trend in all others, Year 2 pupils had a small increase in total sugar intake.

4.2.2 Changes in micronutrient intake

Iron

A small increase in iron intake was observed in all children across the subgroups. Although many foods contain iron this increase was unlikely to be linked to the intake of fruit and vegetables. Iron intakes were log-transformed before analysis.

Calcium

Overall, calcium intake had increased in 2006 compared to the previous survey, although the increase was quite small, equivalent to the content of

approximately 35ml semi-skimmed milk. The same was observed in all subgroups, with a slight variation in the magnitude of the increase. The increase persisted when total energy intake was adjusted for, apart from Year 3 pupils and those who had packed lunches. The sustained impact on calcium after energy adjustment means that foods with a higher calcium content such as milk and milk products were consumed.

Salt

Salt intake was comparable to that recorded in the previous survey. Although there was an indication of an increase within certain groups, the difference was small ($\leq 0.3\text{g}$). Salt intake within these children had exceeded the current dietary guidelines of 3-5g/day. It did not appear that fruit and vegetables had displaced snacks or other processed foods that are normally high in salt contents in their diet (see Section 3.4.1). However, levels of salt in commonly consumed foods are being changed by food manufacturers. Our analysis did not take account of these changes, and it is therefore possible that intakes were lower than measured. Measuring salt intake using dietary assessment is prone to report and measurement errors. Further, discretionary use of salt was not captured by CADET.

Carotene

Carotene intake was found to vary greatly between individual pupils. Comparison between 2004 and 2006 was performed after the mean intakes were log-transformed. It showed that carotene intake had increased, and the difference persisted across the gender and year groups. The increase in carotene intake could be a result of an increase in fruit and vegetable consumption as carotene is commonly found in highly pigmented fruit and vegetables such as carrots, apricots and tomatoes. Interestingly, an increase was observed in pupils who had school dinners, but not in pupils who had packed lunches. It appears that school dinners may have contributed to the increase in carotene intake in the children, which is consistent with the large increase in their vegetable consumption (see Section 3.4.4).

Vitamin C

Similarly to carotene, Vitamin C intake varied greatly and the distribution was positively skewed, so values were log-transformed before analysis. Overall, there was a very small increase in Vitamin C intake which was equivalent to

less than 20g of an orange. The small increase was observed across all sub-groups with slight variations in the magnitude of the increase.

4.3 Multilevel modelling

In this section we discuss how nutrient intakes varied in association with the background characteristics in the children. Then we focus specifically on the Year 3 pupils who participated in the survey, compared with the Year 3 pupils in November 2004.

4.3.1 Background characteristics analysis

Energy and nutrient intakes were investigated with regard to the background characteristics of the children. Multilevel models were used to study how these nutrients varied between particular groups of children while controlling for other characteristics. As with the modelling of food intakes (Section 3.5), school-level factors derived from the school questionnaire were included (see Appendix 3 for the scoring system).

Table 4.7 summarises the results of the modelling for each of the nutrients. As in Section 3.5, the coefficients in each row indicate the impact of the factor named on the relevant outcome(s), controlling for other factors. Only statistically significant results ($P < 0.05$) are presented. Table 4.8 shows the estimates from the same model adjusted for total energy intake. Energy and most nutrients are expressed in the original units used in the descriptive analysis, but iron, carotene and Vitamin C were log-transformed before analysis, so any changes in these nutrients were regarded as a percentage change between the groups.

Table 4.7 Significant coefficients for background variables relative to nutrient intakes

Variables	Energy	Fat	Fat %	CHO	Sugar	Fibre	Calcium	Iron**	Carotene**	VitC**	Salt
Year 2			-0.6			0.5		5		10	
Year 3	53	2.9						7			0.3
Ethnicity other than white UK											0.6
Girls	-135	-4.6		-20	-10	-0.9	-79	-9	-13		-0.5
Infant school			-1.5		9	1.0				31	
Per cent eligible for FSM*											
Per cent with SEN*						2.1					
Per cent with EAL*											
Achievement band (KS1 overall performance)		-2.5							-9		
School lunch	174	5.0	-0.9	27	13	1.7	92	19	44	30	0.4
Packed lunch	169	4.6	-1.0	31	25		98	11		36	0.4
Mean deprivation index*											0.0
Per cent of people aged 16-74 with no qualifications*											
Per cent of people in OA with not good health*										-1	
School policy											
Food in school						0.5					
School rules						-0.1				-1	
Parental communications									11	6	
Teaching and learning			0.1			-0.2		-1	-5	-3	-0.1

**These outcomes have been log-transformed before analysis – coefficients should be interpreted as percentage change

* Value given is actual expected change for ten percentage point change in the background variables. 0.0 indicates that the coefficient was less than 0.05. A minus sign indicates a negative coefficient.

Table 4.8 Significant coefficients for background variables relative to nutrient intakes controlling for total energy intake

Variables	Fat	Fat (%)	CHO	Sugar	Fibre	Calcium	Iron**	Carotene**	Vit C**	Salt
Year 2		-0.6			0.6				11	
Year 3				-7.1		-31				0.2
Ethnicity other than white UK				-12.2						0.3
Girls	1.0									-0.1
Infant school	-2.4	-1.5	5						29	
Per cent eligible for FSM*										
Per cent with SEN*										
Per cent with EAL*										
Achievement band (KS1 overall performance)										
School lunch	-2.2	-1.3	6		0.7		6	41	21	
Packed lunch	-2.5	-1.3	10	13.0					29	
Mean deprivation index*										
Per cent of people aged 16-74 with no qualifications*										
Per cent of people in OA with not good health*									-1	
School policy										
Food in school										
School rules										
Parental communications								10	5	
Teaching and learning	0.2	0.2					-1	-4	-3	-0.0
Energy consumed	24.3	1.3	75.4	39.2	3.2	280.0	0.0	0.0	0.0	1.9

** These outcome have been log-transformed before analysis – coefficients should be interpreted as percentage change

* Value given is actual expected change for ten percentage point change in the background variables. 0.0 indicates that the coefficient was less than 0.05. A minus sign indicates a negative coefficient.

Table 4.9 Significant coefficients comparing 2006 to 2004 Year 3 pupils, adjusting for background characteristics and total energy intake

Variables	Fat	Fat (%)	CHO	Sugar	Fibre	Calcium	Iron**	Carotene**	Vit C**	Salt
Year 3 in 2006			72.5		1.0		5	31	20	
Girls				7.2					17	
Infant school	-2.9	-2.7								
Per cent eligible for FSM*										
Per cent pupils with statement of SEN (2005)*										
Per cent EAL pupils (2005)*									-1	
Achievement band (KS1 overall performance)										
Ethnicity other than white UK				-9.0						
Per cent of people aged 16-74 with no qualifications*										
Per cent of people in OA with not good health*										
Mean deprivation index*										
School lunch				9.9	0.7		3	39	24	-0.3
Packed lunch				13.4		29			23	
2006 by school lunch				-11.6					-16	
2006 by packed lunch										
2006 by gender										
2006 by deprivation index										
Energy consumed	23.7	1.0	71.1	36.1	3.2	266.0	0.0	0.0	0.0	2.0

**These outcomes have been log-transformed before analysis – coefficients should be interpreted as percentage change

* Value given is actual expected change for ten percentage point change in the background variables. 0.0 indicates that the coefficient was less than 0.05. A minus sign indicates a negative coefficient.

Energy

A small but significantly higher total energy intake was shown in Year 3 pupils compared to Year 1 pupils. Girls were shown to consume approximately 135kcal less than boys and this result confirmed what was observed in the basic statistical analysis. Girls consumed less energy (mostly in the form of carbohydrate as presented in the models), but they have a lower requirement compared to boys.

Children on school dinners had a slightly higher energy intake than those on packed lunches.¹² However, the impact on nutrient intakes of other meals and snacks consumed during the day has not been assessed. Energy was significantly associated with all nutrient intakes. Therefore, to obtain an individual effect on the nutrient intakes, we have to account for the difference in total energy consumption.

Carbohydrate

Girls consumed about 20g less carbohydrate than boys, but the difference did not remain significant when total energy intake was adjusted. Packed lunches provided slightly more carbohydrate than school dinners, and this effect persisted when total energy intake was taken into account.

Dietary fibre

Compared to Year 1 pupils, dietary fibre was found to be significantly higher in Year 2 pupils after controlling for total energy intake, but the difference was very small (0.6g). There was no significant difference in dietary fibre intake in Year 3 pupils compared to Year 1 pupils when all other factors were taken into account. Pupils who ate school dinners consumed slightly more dietary fibre than other pupils, but the actual difference in dietary fibre intake was just slightly more than half a gram when energy intake was taken into account. School dinners may have provided the extra dietary fibre, but the amount was very small.

There was a positive association between percentage with SEN in schools and dietary fibre intake, but the result became non-significant after adjusting for total energy. There was also a positive correlation between dietary fibre intake and extent of the school's adherence to the new food standards. The

¹² Both groups were higher than those whose lunch arrangements were not specified, but this tells us little since we know nothing about the children in the latter group.

association was lost when total energy was adjusted, meaning that pupils in these schools consumed more foods which contained dietary fibre but these foods did not necessarily carry a higher fibre content.

Fat

Girls consumed less fat than boys but the difference became smaller and positive when total energy intake was adjusted for.

Percentage energy from fat

Year 2 pupils, and those in Infant schools, appeared to have less of their energy derived from fat. There was a positive association with teaching and learning about healthy eating. But these effects, although statistically significant, were very small.

Total sugar

Girls consumed less total sugar than boys, while pupils in infant schools consumed more total sugar than pupils in junior and primary schools. These results became non-significant after adjusting for total energy intake. Pupils with packed lunch were found to consume more sugary foods, which may be explained by the common practice of packing sugary snacks and drinks in the lunchbox. The higher total sugar intake in these pupils remained significant after adjusting for total energy intake.

Iron

Pupils who ate school dinners had six per cent more iron intake than other pupils when total energy intake was adjusted.

Calcium

The significantly lower calcium intake observed in girls compared to boys (79mg) became non-significant after adjusting for total energy intake.

Salt

Year 3 pupils and minority ethnic pupils consumed slightly more salt than others; girls slightly less. Although statistically significant, these difference were every small.

Carotene

Pupils who ate school dinners had 41 per cent more carotene intake than other pupils. A ten per cent increase in carotene intake was observed for each additional point scored by the school in terms of communication with parents, but a four per cent decrease was associated with higher scores for promoting healthy eating in school.

Vitamin C

Controlling for total energy intake, Vitamin C intake in Year 2 pupils was 11 per cent higher than Year 1 pupils. Pupils taking packed lunches had higher Vitamin C than those on school dinners, perhaps due to their higher fruit and fruit juice intakes (see Section 3.3.4). Pupils in infant schools had a 29 per cent higher intake of Vitamin C than pupils in junior and primary schools. A five per cent increase in Vitamin C intake was observed when a school scored one point higher in communications with parents, but there was a three per cent drop in Vitamin C intake when a school scored one point higher for promoting healthy eating in school.

4.3.2 Multilevel modelling of Year 3 pupils from 2004 and 2006 surveys

The earlier evaluation of the SFVS (Schagen *et al.*, 2005) showed that the impact of the SFVS was not sustained when pupils entered Year 3 and no longer received free fruit. Their intakes of fruit and vegetables returned to the level recorded at baseline, and this change had an impact on certain nutrient intakes. However, the Year 3 pupils in 2004 had participated in the scheme for only about four months, while the current Year 3 had participated for two years and four months. So comparing the two cohorts could provide us with an insight into how nutrient intakes of the children were affected by the length of involvement in the intervention.

Nutrient intakes in current and previous Year 3 pupils were examined in multilevel models controlling for total energy intake and background characteristics, as above. Table 4.9 shows the multilevel model estimates for these Year 3 pupils, but only results that were statistically significant ($P < 0.05$) are presented. Iron, carotene and Vitamin C intakes were log-transformed, so any changes in these nutrients were regarded as a percentage change from 2004. Other nutrients are expressed in the original units used in the descriptive analysis.

Energy

Energy was significantly associated with all nutrient intakes as seen in Table 4.9. Therefore, the difference in total energy consumption was controlled for in order to obtain an individual effect on the nutrient intakes.

Carbohydrate

Carbohydrate intake had increased by about 72g in the current Year 3 pupils compared to previous Year 3 pupils. This is in line with the overall increase in carbohydrate intake, as discussed above. No statistically significant increase in total sugar intake was shown, so the increase in carbohydrate intake may be due to an increase in other complex carbohydrates.

Dietary fibre

Dietary fibre intake had increased by 1g in the current Year 3 pupils compared to previous Year 3 pupils. The actual increase was small but statistically significant and corresponded to the general increase in fruit and vegetable consumption. Since the significant impact from school dinners was accounted for in this analysis, other factors may have caused this increase in dietary fibre consumption.

Total sugar

Girls consumed about 7g more total sugar than boys, while packed lunches provided about 3.5g more total sugar than school dinners in these Year 3 pupils. Interestingly, pupils who ate school dinners had about 12g less sugar in 2006 than in 2004 (2006 by school lunch, Table 4.9). This is consistent with the decrease in snacks and desserts consumed by children on school dinners (see Section 3.4.4).

Minority ethnic pupils consumed about 9g less total sugar than white UK pupils. When all of these factors were accounted for in the multilevel model, total sugar intakes in current and previous Year 3 pupils did not differ significantly.

Iron

There was a five per cent increase in iron intake in current Year 3 pupils compared to Year 3 pupils in 2004. The iron intake of children on school dinners was three per cent higher than others.

Calcium

A statistically significant higher calcium intake (29g) was observed in pupils with packed lunches. When this effect was accounted for, no significant difference in calcium consumption in current and previous Year 3 pupils was observed.

Carotene

A 31 per cent increase in carotene intake was observed in the current Year 3 pupils compared to the previous Year 3 pupils. The carotene intake of pupils who ate school dinners was significantly higher than that of other pupils.

Vitamin C

Girls consumed 17 per cent more Vitamin C than boys. Children who ate school dinners had about 16 per cent less Vitamin C in 2006 than in the previous survey (2006 by school lunch, Table 4.9). When all these significant factors were accounted for, it was observed that current Year 3 pupils had increased their Vitamin C intake by 20 per cent compared to Year 3 pupils in 2004.

Other nutrients

The changes in fat, percentage energy from fat and salt intakes were not statistically significant when current Year 3 pupils were compared to the previous Year 3 pupils.

5. Summary and conclusions

This chapter summarises the findings from the research study and presents some conclusions.

5.1 Summary of key findings

Valid CADET data was collected in November 2006 on behalf of 1666 children from Years 1-3 in 38 schools which had participated in the previous study. Relevant school-level data was provided by 37 schools; it was analysed in its own right and also used as background information in the analysis of pupil data.

5.1.1 School policies and practice

The majority of schools had a written policy relating to healthy eating; nearly all of these had been written and/or updated in the past year.

All schools provided hot dinners, although in four cases these were delivered to the school. Only four schools reported restricting children's choice in what to select when having a school dinner. Nearly all schools had provided training for catering staff.

Some schools gave pupils opportunities to buy fruit, vegetables, fruit juice, milk or water on a regular basis. Some schools allowed crisps, sweets, chocolate and cake to be purchased occasionally, the majority never. All schools made water freely available to pupils.

Most schools placed restrictions on what children were allowed to bring into school. Items most commonly banned or restricted were fizzy drinks, sweets and chocolate. In most cases schools had devised their own rules; just over half reported that their rules had been changed within the past two years, and a similar number said that they planned a (further) review. A small number of schools had received complaints from parents about school rules.

A majority of schools had provided parents with guidance about healthy packed lunches. They also reported involvement in several national and local health-related initiatives, and said that they were using a wide range of methods to promote healthy eating.

5.1.2 Differences in consumption

Consumption of fruit and vegetables had increased significantly since the previous survey was undertaken exactly two years earlier. The children were eating an average of 4.41 portions per day, compared with 3.65 in 2004; 44 per cent were reaching the '5 A DAY' goal, compared with 32 per cent in 2004. This is a large and highly significant change over time. It should be noted that the change was mainly due to a large increase in the consumption of vegetables (up from 1.61 to 2.14 portions); the increase in fruit, although significant, was much smaller.

There was a small decrease in the quantity of snacks consumed, but this was not statistically significant.

Analysis by subgroups was mainly consistent with findings from the earlier evaluation of the SFVS. Girls ate more fruit and vegetables at school than did boys, but there was no difference in overall consumption. There were no significant differences between white UK and minority ethnic pupils. However, consumption of fruit and vegetables, at home and school, decreased with age. There were very different patterns of eating between children who ate school dinners and those who took packed lunches to school. Packed lunch children consumed more fruit and fruit juice, but they ate a lot less vegetables and a lot more snacks (the latter two differences were almost a whole portion). Overall, they ate less fruit and vegetables than children on school dinners, although the additional fruit compensated to some extent for the lack of vegetables.

5.1.3 Trends over time

The general increase in fruit and vegetable consumption was evident in all three cohorts. All children were eating more than in 2004, although Year 3 pupils were still eating less than the younger children, both at home and at school. There was no evidence to suggest that the sustained impact of the SFVS had reduced the 'drop' which occurs between Year 2 and Year 3.

The increase in consumption of fruit and vegetables applied to children taking packed lunches and those having school dinners. However, packed lunch children had a larger increase in fruit, and children on school dinners had a much larger increase in vegetables. The latter also ate significantly fewer snacks and desserts when compared with 2004. Further analysis of consumption at lunch-time only tended to confirm the hypothesis that there had been a significant improvement in school dinners in the North East over the past two years.

Multilevel modelling, controlling for a wide range of school- and pupil-level factors, confirmed the findings reported above. It also indicated that children from schools which provided guidance on healthy packed lunches ate more vegetables. There were some negative correlations with the proportion of children known to be eligible for FSM, the proportion with EAL, and area-based deprivation measures. Strangely, there appeared also to be a negative association with the school's adherence to food standards and its involvement in initiatives related to health in general or healthy eating in particular.

It should be noted, however, that the factors mentioned in the preceding paragraph, although statistically significant, were very minor compared to the two principal variables affecting consumption of food, vegetables and snacks. Overall, a Year 3 pupil is less than half as likely to reach the '5 A DAY' goal as a younger child; and children who have school dinners are almost one and a half times as likely to do so than those who take packed lunches.

5.1.4 Nutritional outcomes

Overall, with the exception of an 80g increase in carbohydrate intake, the macronutrient intakes in 2006 were mostly similar to those reported in the November 2004 survey. As for the micronutrients, a small increase was observed in 2006. The increase in dietary fibre, carotene and Vitamin C intakes suggests a contribution from the general increase in fruit and vegetable consumption. School dinners appeared to have provided a good source of fruit and vegetables, but school policy and practices that aspire to promote healthy eating generally did not seem to have much impact on the nutrient intakes. It is worth noting the small percentage increase in carotene and Vitamin C intakes when a school scored higher in parent communications, but a small percentage decrease was also observed with a higher score in promoting healthy eating in school.

There was no strong indication that the SFVS had an indirect impact on nutrient intakes by promoting fruit and vegetable consumption in lieu of unhealthy snack foods. Total sugar intake adjusted for energy was higher in pupils who had packed lunches, suggesting that they consumed more sugary foods and drinks.

Comparing Year 3 children between studies showed a significant effect of school dinners on sugar intake. Children who ate school dinners had about 12g less sugar in 2006 than they had done in 2004. There was no significant change in fat and salt intakes.

Overall, the nutrient intakes in Year 2 pupils and Year 3 pupils were similar to Year 1 pupils. The age-effect observed in both the 2004 and 2006 surveys, that children tend to eat less fruit as they grow older, was not reflected in corresponding differences in relevant nutrient intakes between age groups in the multilevel model, although Year 3 children did eat less sugar than the other year groups, some of which could have come from fruit. It is possible that the overall difference in nutrient intake between Year 1 and Year 3 remained neutral because of the opposite effects observed between the subgroups. There was a drop in dietary fibre, total sugar, carotene and Vitamin C intakes in Year 3 boys compared with Year 1 boys, but an increase was observed in girls as shown in the simple subgroup analysis.

In the 2004 survey, the nutrient intakes of Year 3 pupils returned to baseline levels after they ceased to participate in the SFVS. The current Year 3 pupils, who had been in the scheme for much longer (over two years) were doing better than the previous Year 3 cohort in terms of intakes of Vitamin C, carotene, fibre, iron and carbohydrate, although their intakes of carotene and Vitamin C were considerably lower than the current Year 2.

The lower than average energy intake in boys was a concern, especially as energy intake did not appear to increase in line with demand that is higher when they grow older. It is possible that the age-specific portion sizes used to calculate nutrient intakes from the CADET data were not sensitive enough for the task, or that heightened awareness of children's diets had led to social desirability bias in reporting of diets. Nevertheless, overall nutrient intakes were adequate and comparable to the figures in the NDNS.

5.2 Discussion and conclusions

On the basis of a full-scale evaluation of the SFVS, we concluded that the scheme did significantly impact on children's fruit consumption, but that it did not have any wider impact on diet, and that increased consumption was not sustained when children's participation in the scheme came to an end. The present study was designed specifically to explore the issue of sustained impact. When we carried out the final survey of the previous study, in November 2004, the oldest cohort of participating children were in Year 3, and no longer eligible for the scheme. Their fruit consumption had reverted to below baseline, indicating that the SFVS had not encouraged them to continue eating fruit.

We noted at that time that this cohort of children had been involved in the scheme for only about four months, and considered the possibility that the scheme might have a greater impact on those who had been involved for longer. The present study was designed to test that hypothesis. The Year 3 pupils surveyed in November 2006 had been involved in the scheme for *two years* and four months. Their fruit (and vegetable) consumption was much higher than the Year 3 children in 2004. Moreover, when we identified a group of children who were in both surveys, we found that their consumption of fruit and vegetables combined was the same in 2006 as it was in 2004 (when they were in Year 1); there was no sign of a decrease in consumption as the children grew older, as we had found in the previous study.

This sounds like good news, and indeed it is. However, when the evidence just quoted is examined in context, it becomes clear that the changes are not due to the impact of the SFVS. Although the Year 3 children in the longitudinal analysis were eating as much fruit and vegetables as they did in Year 1, they were not eating nearly as much as the current Year 1. The drop in consumption between Year 2 and Year 3 is still present, and is as big as it was in the previous study.

What has happened is that, over the past two years, there has been a general increase in children's fruit and vegetable consumption, applicable to all three cohorts. Average daily consumption has risen from 3.65 portions to 4.41 portions. For the Year 3 children, this general increase has compensated for

the decrease which occurs with age; hence, they are eating as much as they did in Year 1, but not nearly as much as the current Year 1 pupils.

Of course, it could be that the SFVS is one of the factors that has contributed to the general increase over time. However, it seems unlikely that it is an important factor, because the SFVS provides mainly fruit, while the increase over time has been mainly in terms of vegetables. In 2004, there was little difference between fruit consumption (1.65 portions per day) and vegetables (1.61). By 2006, fruit consumption had increased to 1.82 portions, and vegetables to 2.14 portions.

Further exploration of the evidence suggested that improvements to school dinners had contributed to the change over time. There are very distinct differences in the eating patterns of children having school dinners and those taking packed lunches. Packed lunch children consume more fruit, fruit juice and snacks, while school dinner children eat a lot more vegetables. Over time, both groups increased their consumption of fruit and vegetables, but the biggest increase by far was in vegetables for children eating school dinners. This was particularly evident at lunch time; both groups had increased their fruit consumption, but children on school dinners had more than doubled their consumption of vegetables, while the quantity consumed by packed lunch children was unchanged.

It seems therefore that the recent campaigns to improve school dinners, and in particular the new food-based standards introduced in 2006, have led to a significant improved in children's vegetable intake, at least in the North East region. In this context, it should also be noted that there was a significant decrease in the quantity of snacks and desserts eaten as part of school dinners.

There is one further point to consider. There is now great concern about rising levels of obesity among children. The SFVS – and the '5 A DAY' campaign of which it forms part – could help to address this issue, as well as bringing the other health-related benefits deriving from fruit and vegetable consumption. However, this will only be the case if children eat more fruit and vegetables *instead of* items such as cakes, crisps and chocolate, which are likely to increase weight. When we undertook the original evaluation of the SFVS, we decided to monitor consumption of 'snacks and desserts', to see whether any identified increase in fruit consumption was correlated with a

decrease in consumption of snacks and desserts. As noted above, overall consumption of fruit and vegetables has increased substantially over the past two years, but although there was an overall decrease in snacks and desserts, it was relatively small and significant only for children having school dinners.

References

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Appendix 1 CADET

School:



CADET

Child and Diet Evaluation Tool



When you have filled in this diary please make sure it is placed in your child's bag and sent back to school



This diary belongs to:

Pupil Name:

Year Group:



Dear Parent or Carer

This diary will record everything your child eats and drinks over 24 hours (from morning break today to morning break tomorrow). All you need to do is to tick the food and drink your child eats while not at school. There are some additional questions that we would like you to complete at the end of the diary (pages 12,13 & 14).

How to fill in the CADET DIARY

- ◆ Starting with the column headed 'Before tea' tick ✓ all the items of food and drink that your child eats and drinks after finishing school today until their evening meal.
- ◆ In the next two columns, tick ✓ everything your child eats or drinks during their evening meal and afterwards until breakfast the next day.
- ◆ In the morning, tick ✓ all the items of food and drink your child has eaten at home in the 'Breakfast' column (if your child eats anywhere else, this will be filled in by a teacher).
- ◆ If they do not have anything to eat or drink at a mealtime, please tick ✓ 'nothing to eat' and/or 'nothing to drink' on page 11.

Please complete the diary in black ink

- ◆ Make sure you ask your child if she/he ate or drank anything between leaving school and getting home. If your child ate or drank with someone else after school, ask your child or the person they were with what they ate and tick ✓ the foods and drinks they consumed (if your child attended an after-school club **on school premises**, any food/drink consumed by your child will have been filled in by a teacher, but you should tick ✓ any food or drink your child consumed at any other club).
- ◆ School staff will have ticked everything your child has eaten and drunk at school today. Please ensure you tick all items of food and drink consumed when your child is with you or another carer (and if they are off school sick). You should record all food and drink consumed since your child left the school.



- ◆ Try not to leave out anything your child has eaten and drunk at home today. Remember all drinks and snacks eaten during the night also count.
- ◆ If for some reason your child is not at school tomorrow please return the diary as soon as possible. If your child is not well please do your best to record what he/she ate.
- ◆ If you cannot find the exact food or drink listed, **please tick ✓ the item you think is the closest match** e.g. the nearest match to:

Fruit Winder is: → sweets, crisps etc ✓

Spaghetti Bolognese is: → pasta with meat, fish (and sauce) ✓

Milk shake is: → milk, milky drink ✓

Popodom is: → crisps/savoury snack ✓

When the diary is completed, please make sure it is placed in your child's bag and sent back to school

Example

If your child ate a bowl of Rice Krispies with milk and sugar at breakfast - tick ✓ Rice Krispies and milk in the column labelled 'Breakfast/before school'. The sugar that was added can be ticked in the diary (see Q9 on page 13).

To be ticked ✓ by parents/carers (or school staff if child goes to after-school club on the school premises or if breakfast is consumed outside the home).

To be ticked ✓ by school staff

To be ticked ✓ by parent/carer

		To be ticked ✓ by school staff			To be ticked ✓ by parent/carer			
		Morning break	Lunch time	Afternoon break	Before tea (after school)	Evening meal/tea	After tea/ during night	Breakfast/ before school
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
A	CEREAL							
1	Cornflakes, Rice Krispies etc	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Sugar coated e.g. Frosties, SugarPuffs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3	Hi-fibre e.g. Branflakes, Weetabix, Shreddies, Muesli	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Milk on Cereal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5	Porridge, Ready Brek	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

All sugar eaten is recorded in Q9 on page 13

Please look through the pages of this diary and then you are ready to start

1. Please tick in each column the food or drink your child has today.

Remember, anything your child ate or drank at school will have already been ticked (including anything eaten and drunk at an after-school club on the school premises).

		Morning break	Lunch time	Afternoon break	Before tea (after school)	Evening meal/tea	After tea/ during night	Breakfast/ before school
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
A	CEREALS							
1	Sugar-coated e.g. Frosties, Sugar Puffs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Hi-fibre e.g. Branflakes, Weetabix, Shreddies, Muesli	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Other e.g. Cornflakes, Rice Krispies etc	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Milk on cereal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Porridge, Ready Brek	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
All sugar eaten is recorded in Q9 on page 13								
B	SANDWICH, BREADS, CAKES, BISCUITS							
1	Sandwich (tick filling separately), bread, roll, toast, crumpet etc	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Croissant, sweet waffles, pop tarts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Garlic bread, naan	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Chapatti, pitta bread etc	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Cracker, crispbread etc	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Cake, bun, sponge pudding	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Sweet pies, tarts, crumbles	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- (D)**
- 5 Scrambled egg, omelette, fried egg
- 6 Poached, boiled egg
- E CHICKEN, TURKEY**
- 1sliced
- 2nuggets, dippers, kiev etc
- 3in a creamy sauce, curry
- F OTHER MEATS e.g.**
- 1sliced, roast, steak, chops
- 2stew, casserole, mince, curry
- 3beefburger, hamburger
- 4 Bacon
- 5 Ham
- 6 Sausages
- 7 Sausage rolls, meat pie, pasty

	Morning break	Lunch time	Afternoon break	Before tea (after school)	Evening meal/tea	After tea/ during night	Breakfast/ before school
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- 8** Corned beef, luncheon meats, salami, pepperoni
- 9** Offal, e.g. liver, kidney
- G FISH**
- 1** Fish fingers
- 2** Fried fish in batter (as in fish & chips)
- 3** White fish (not fried) e.g. cod, haddock, plaice
- 4** Tuna or other oily fish e.g. salmon (including canned and fresh)
- 5** Shellfish e.g. prawns, mussels
- H VEGETARIAN**
- 1** Vegetable pie, pasty
- 2** Samosa, pakora, bhajee
- 3** Quorn, veggie mince, sausages etc
- I PIZZA, PASTA, RICE ETC**
- 1** Pizza
- 2** Boiled rice
- 3** Fried rice
- 4** Noodles

<input type="checkbox"/>							
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<input type="checkbox"/>							
<input type="checkbox"/>							
<input type="checkbox"/>							

I. Continued overleaf

(I)

5 Pasta - plain

6 Pasta with tomato sauce (no meat)

7 Pasta with cheese sauce

8 Pasta with meat, fish (and sauce)

J DESSERTS, PUDDINGS ETC

1 Yoghurt

2 Jelly, ice lolly

3 Ice cream, frozen dessert (e.g. Vienetta)

K SWEETS, CRISPS ETC

1 Sweets, toffees, mints

2 Chocolate bar, e.g. Mars, Galaxy

3 Crisps, savoury snacks (e.g. Cheddars)

4 Nuts

Morning break (1)	Lunch time (2)	Afternoon break (3)	Before tea (after school) (4)	Evening meal/tea (5)	After tea/ during night (6)	Breakfast/ before school (7)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

L VEGETABLES & BEANS

- 1** Cucumber
- 2** Tomatoes
- 3** Celery
- 4** Coleslaw
- 5** Other salad vegetable e.g. lettuce
- 6** Stir-fried vegetables
- 7** Broccoli, brussel sprouts, cabbage
- 8** Carrots
- 9** Cauliflower
- 10** Peas, sweetcorn
- 11** Mixed vegetables
- 12** Celeriac/swede
- 13** Peppers, red, green, yellow etc
- 14** Other vegetable
- 15** Baked beans

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		Morning break	Lunch time	Afternoon break	Before tea (after school)	Evening meal/tea	After tea/ during night	Breakfast/ before school
(L)		(1)	(2)	(3)	(4)	(5)	(6)	(7)
16	Lentils, Dahl	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17	Other beans, pulses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18	Seeds, e.g. sunflower, sesame	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
M POTATO								
1	Boiled, mashed, jacket	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Chips, roast, potato faces etc	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
N FRUIT								
1	Apple	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Pear	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Banana	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Orange, satsuma etc	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Grapes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Melon	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Pineapple	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Strawberry, raspberry etc	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

R

This section is to be filled in by parents/carers

These questions provide us with more detail about the amounts and types of food and drink usually eaten by your child on an average day. Please tick ✓ the closest answer.

1. How much milk in total does your child usually have on an average day e.g. on cereal and in drinks? (one average child's beaker = $\frac{1}{4}$ pint)

none ¹ $\frac{1}{4}$ pint ² $\frac{1}{2}$ pint ³ $\frac{3}{4}$ pint ⁴ 1 pint ⁵ more than 1 pint ⁶

2. What type of milk does your child usually have? (tick all that apply)

full cream (silver top, sterilised) ¹ semi-skimmed (half fat) ² skimmed ³ other ⁴

3. What type of bread/roll/toast does your child usually eat? (tick all that apply)

none ¹ white ² white with added fibre ³ wholemeal ⁴ granary brown ⁵ other ⁶

4. What type of fat spread does your child usually eat? (tick all that apply)

Butter e.g. Anchor, Lurpak ¹
Butter-type spread e.g. Utterly Butterly, Golden Churn, Clover ²
Soft Margarine e.g. Stork ³
Polyunsaturated e.g. Flora, Benecol, Vitalite ⁴
Olive spread e.g. Olivio, Asda Olive Gold ⁵
Low-fat spread e.g. Flora Light, Asda Olive Gold Light ⁶
Does not have spread ⁷

5. How much pure fruit juice in total does your child usually drink on an average day? (one average child's beaker = $\frac{1}{4}$ pint)

none ¹ $\frac{1}{4}$ pint ² $\frac{1}{2}$ pint ³ $\frac{3}{4}$ pint ⁴ 1 pint ⁵ more than 1 pint ⁶

6. How many servings of fruit in total (fruit eaten at home and school) does your child usually have on an average day? (A serving of fruit is classed as a whole fruit e.g. an apple, a banana.)

none ¹ $\frac{1}{4}$ ² $\frac{1}{2}$ ³ one ⁴ two ⁵ three ⁶ four ⁷ five ⁸ six ⁹

7. How many servings of vegetables and salad in total (vegetables eaten at home and school) does your child usually have on an average day? A serving of vegetables or salad is classed as a heaped serving spoon, or whole vegetable. Potatoes are not included.

none ¹ $\frac{1}{4}$ ² $\frac{1}{2}$ ³ one ⁴ two ⁵ three ⁶ four ⁷ five ⁸ six ⁹

8. When your child eats fruit, how much of the whole fruit e.g. apple, banana, orange is usually eaten?

a bite ¹ $\frac{1}{4}$ ² $\frac{1}{2}$ ³ $\frac{3}{4}$ ⁴ whole thing (excluding skin, pips etc) ⁵

9. How much sugar in total does your child usually have added to food or drink on an average day? (2 teaspoons = 1 dessert spoon)

none ¹ 1-2 teaspoons ² 3-4 teaspoons ³ 5-6 teaspoons ⁴ 7+ teaspoons ⁵

10. Where did your child eat today? (tick all places)

home ¹ school ² friend/relative ³ childcare ⁴ other ⁵

11. What does your child usually do at lunch time? (tick one box only)

have a school lunch ¹ take a packed lunch to school ² go home for lunch ³ other ⁴

We would be very grateful if you could give us the following information. This information is used only to sort survey responses into groups and will not be used for any other purpose.

12. What is your postcode? (please write your postcode in the box below, for example SL1 2DQ)

13. How would you describe your child's ethnic background? (tick one box only)

White

British ¹
Irish ²
Any other White background ³

Mixed

White and Black Caribbean ⁴
White and Black African ⁵
White and Asian ⁶
Any other Mixed background ⁷

Asian or Asian British

Indian ⁸
Pakistani ⁹
Bangladeshi ¹⁰
Any other Asian background ¹¹

Black or Black British

Caribbean ¹²
African ¹³
Any other Black background ¹⁴

Chinese or other ethnic group

Chinese ¹⁵
Any other ethnic group ¹⁶

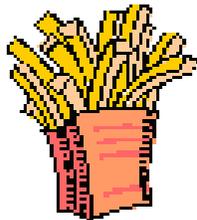
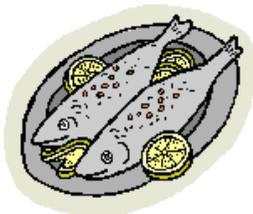
Prefer not to say

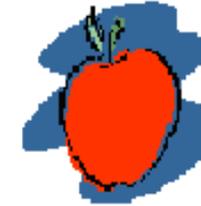
¹⁷



Thank You

Thank you for taking the time to fill in this CADET diary. Please don't forget to give it to your child to bring back to school tomorrow ready to hand in to his/her class teacher.





If you would like to ask any questions about completing this questionnaire please contact:

Catherine Cox
on 01753 637344
between 9.00am and 5.00pm

Appendix 2 School questionnaire



Evaluation of the School Fruit and Vegetable Scheme

School Questionnaire

As you will be aware, your school is taking part in an evaluation of the School Fruit and Vegetable Scheme. The Department of Health has commissioned NFER to carry out a follow-up study, to assess the long-term impact on children.

It would be very helpful to have some background information about your school, to include in our analysis. We would be very grateful if you could answer the questions below, or ask a colleague to do so (it may be that different people are best placed to answer different sections of the questionnaire). Nearly all the questions are in tickbox format and should take very little time to complete. We would like to assure you that no individual schools will be identified when our report is written.

An NFER administrator will be visiting your school in the near future, to help with the administration of the CADET food diaries for the children. Please give the completed questionnaire to him/her.

Please use a black pen/ biro to complete this questionnaire.

Thank you very much for helping us with our research.

A. School Food Policies

1. Does your school have a written policy covering healthy eating/food in school?
(please tick **one** box only)

Yes

No

If No, please go to **Question 4**

2a) When was the policy written? (please tick **one** box only)

This term 1

Not this term, but within the last year 2

More than a year ago 3

If the policy was written more than a year ago, when was it last updated? (please tick **one** box only)

This term 1

Not this term, but within the last year 2

More than a year ago 3

b) Who was involved in developing the policy? (please tick **all** that apply)

Headteacher 1

Senior management team 2

PSHE coordinator 3

Class teachers 4

Catering staff 5

School governors 6

Pupils 7

Parents/carers 8

Local Authority 9

Health advisor/s 10

Other (please state) 11

3. What topics does the policy cover? (please tick **all** that apply)

- The school curriculum 1
- Equipment and resources 2
- Whole-school approach to teaching about food and nutrition 3
- Cooking activities in school 4
- Food brought into school from home 5
- Food provided in school (e.g. breakfast club, school dinners, and use of food as a reward) 6
- Water provision and consumption 7
- Food bought in school (e.g. tuck shops or vending machines) 8
- Extra-curricular activities and clubs (e.g. cookery club) 9
- National schemes and/or special events 10
- Care and welfare issues (e.g. behaviour or free school meals) 11
- Staff development and training 12

4. Is healthy eating mentioned in your school development plan?
(please tick **one** box only)

Yes No

B. Food provided in school

School lunches

5. Do you provide hot lunches at your school? (please tick **one** of the following options)

- Hot lunches are cooked in our own kitchens
- Hot lunches are delivered to the school
- We do not provide hot lunches

If you do not provide hot lunches, please go to **Question 9**

6.

Please indicate how often the items listed below are available at school lunch.
(please tick **one** box in each row)

	Every day	At least once a week	At least once a month	Less often/ Never
	1	2	3	4
Potatoes (cooked in oil or fat)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Starchy foods such as bread, rice and pasta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Meat and other sources of protein (e.g. cheese or pulses)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Red meat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fish	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Vegetables and salad	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Milk and dairy products	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fruit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fruit-based desserts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cakes and other desserts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Crisps and other savoury snacks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Deep fried foods	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ready/prepared meals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fresh drinking water	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fruit juice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fizzy drinks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Salt cellars on dinner tables	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7.

Do children have a free choice of the food you provide at lunch time?
(please tick **one** box only)

Yes No

If **No**, please describe how pupil choice is limited

8. What kind of training, if any, have your catering staff undertaken during the past year? What further training is planned? *(please tick **all** boxes that apply)*

	Completed in the last year	Planned
Training in health and safety	<input type="checkbox"/> 1	<input type="checkbox"/> 1
Training in food hygiene	<input type="checkbox"/> 2	<input type="checkbox"/> 2
Training in preparing healthy balanced meals	<input type="checkbox"/> 3	<input type="checkbox"/> 3

Other food and drink available in school

9. Apart from lunches, what other food or drink can children buy in school? *(please tick **one** box in each row)*

	Every day 1	Every week 2	Occasionally 3	Never 4
Crisps and other savoury snacks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sweets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Chocolate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cakes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fruit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Vegetables (e.g. carrot sticks)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bottled water	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Milk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fruit juice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fizzy drinks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

10. Is drinking water freely available to pupils, throughout the school day? *(please tick **one** box only)*

Yes **No**

If **yes**, how is this made available? *(please tick **all** that apply)*

Taps	<input type="checkbox"/> 1	Water coolers	<input type="checkbox"/> 3
Fountains	<input type="checkbox"/> 2	Other <i>(please state)</i>	<input type="checkbox"/> 4

C. Food brought into school

11. Please indicate which food or drink items, if any, children are **NOT** allowed to bring into school. (please tick **all that apply**; tick **total ban** if the item is not allowed in school at all; tick **restricted** if you allow only a certain quantity or type)

	Total ban	Restricted
Crisps and other savoury snacks	<input type="checkbox"/> 1	<input type="checkbox"/> 1
Cakes	<input type="checkbox"/> 2	<input type="checkbox"/> 2
Sweets	<input type="checkbox"/> 3	<input type="checkbox"/> 3
Chocolate	<input type="checkbox"/> 4	<input type="checkbox"/> 4
Fizzy drinks	<input type="checkbox"/> 5	<input type="checkbox"/> 5
Other (please specify)	<input type="checkbox"/> 6	<input type="checkbox"/> 6

12. What are children allowed to bring into school to eat at morning break? (please tick **one** box only)

Fruit only	<input type="checkbox"/>
Only certain items (please list)	<input type="checkbox"/>
Anything they choose, subject to the rules outlined in Question 11	<input type="checkbox"/>

If you do not have any rules about food and drink that children can bring into school, please go to **Question 16**

13. Are school rules about what food and drink children can bring to school devised by the school or by the local authority (LA)? (please tick **one** box only)

School **Local Authority**

14. How are school rules about what food and drink children can bring to school enforced?

15. In relation to school rules about what food and drink children can bring to school...
(please tick **one** box in each row)

	Yes	No
Have there been any changes in the last two years?	<input type="checkbox"/>	<input type="checkbox"/>
Is any review planned?	<input type="checkbox"/>	<input type="checkbox"/>
Do most parents observe the rules?	<input type="checkbox"/>	<input type="checkbox"/>
Are there any complaints about the rules?	<input type="checkbox"/>	<input type="checkbox"/>

If you have changed these rules in the last two years, please briefly tell us what changes were made and when you made them.

16. Does the school provide any guidance to parents about what might constitute a healthy balanced packed lunch? (please tick **one** box only)

Yes No

17. Have you communicated with parents about school guidance or rules relating to food over the past year? If, so, please indicate which method(s) of communication have been used. (please tick **all** that apply)

Printed material sent directly to parents	<input type="checkbox"/>	1
Printed material by pupil post	<input type="checkbox"/>	2
Parent events/meetings	<input type="checkbox"/>	3
One-to-one parent contact	<input type="checkbox"/>	4
Via PTA or similar group	<input type="checkbox"/>	5
Via governors' meetings	<input type="checkbox"/>	6
Electronically (email/website)	<input type="checkbox"/>	7
Other (please specify)	<input type="checkbox"/>	8

D. Promoting healthy eating

18. Is your school involved in any national or local initiatives which promote healthy eating? (please tick **all** that apply)

- | | | |
|---|--------------------------|---|
| National Healthy School Programme | <input type="checkbox"/> | 1 |
| 5-A-Day (e.g. local initiatives that address the aims of the national campaign) | <input type="checkbox"/> | 2 |
| Growing schools (e.g. outdoor classroom) | <input type="checkbox"/> | 3 |
| Focus on food (e.g. cooking bus) | <input type="checkbox"/> | 4 |
| Schools Nutrition Action Groups (SNAGs) (e.g. alliances between staff, pupils, caterers and health professionals) | <input type="checkbox"/> | 5 |
| Cookery clubs | <input type="checkbox"/> | 6 |
| Food partnerships | <input type="checkbox"/> | 7 |
| Other (please specify) | <input type="checkbox"/> | 8 |

19. Has your school achieved the Healthy Eating Theme required for Healthy School Status? (please tick **one** box only)

Yes No

20. Over the past year, which of the following has been used in your school to promote healthy eating? (please tick **all** that apply)

- | | | | | | |
|--|--------------------------|---|--|--------------------------|----|
| Classroom learning | <input type="checkbox"/> | 1 | Themed 'healthy eating' day/ week | <input type="checkbox"/> | 8 |
| PSHE activities/circle time | <input type="checkbox"/> | 2 | Posters/displays around the school | <input type="checkbox"/> | 9 |
| Healthy breakfast club | <input type="checkbox"/> | 3 | Clubs (e.g. cooking club, gardening) | <input type="checkbox"/> | 10 |
| Assemblies | <input type="checkbox"/> | 4 | Tasting sessions | <input type="checkbox"/> | 11 |
| Parent/community meetings | <input type="checkbox"/> | 5 | Catering staff promoting healthy choices | <input type="checkbox"/> | 12 |
| Visitors to the school (e.g. chef/dietician) | <input type="checkbox"/> | 6 | Other (please specify) | <input type="checkbox"/> | 13 |
| External visits (e.g. to local farms/shops) | <input type="checkbox"/> | 7 | | | |

Appendix 3 Scoring system

Certain questions on the school questionnaire were scored to yield factors which could be included in the multilevel modelling. Details of the scoring are given below.

School policies

Schools were given one point if they had a policy (Question 1) and one point for each box ticked on Question 2b. It was felt that a high level of involvement in policy development would be an indicator of a whole-school approach.

Food in school

Scores were based on Question 6. For each food item, a point was given for the most appropriate answer, i.e. the one which most closely reflected the food-based standards for school lunches which were introduced in 2006.

School rules

Scores were derived from Question 11: two points for each item banned and one point for each item restricted.

Parental communications

A point was given if the school provided guidance to parents about healthy balanced packed lunches (Question 16) and a further point for each box ticked in Question 17. The total score thus reflected the extent of communication with parents on the topic of healthy eating.

Teaching and learning

A point was given for each box ticked in Questions 18 and 20, showing the extent of involvement in initiatives related to healthy eating, and the number of channels used to promote healthy eating. It thus proves another indicator of a whole-school approach.

Appendix 4 Reference nutrient intakes

Reference nutrient intakes (RNIs) for total energy and nutrients for children aged 4–10 years*

	Boys		Girls	
	4 – 6 years	7 – 10 years	4 – 6 years	7 – 10 years
Total energy (kcal) (EARs)	1715	1970	1545	1740
Protein (g)	19.7	28.3	19.7	28.3
Iron (mg)	6.1	8.7	6.1	8.7
Calcium (mg)	450	550	450	550
Potassium (mg)	1100	2000	1100	2000
Salt (g)	3	5	3	5
Folate (µg)	100	150	100	150
Vitamin A (µg)	400	500	400	500
Vitamin C (mg)	30	30	30	30

* There were only a small number of children who were over 7 years old in 2006