
School lunch and learning behaviour in secondary schools: baseline dietary data

Key findings

School meals in eleven secondary schools in England were more nutritious than packed lunches, but further modification of school meal provision is needed to reach nutrient-based standards for energy and iron.

- Baseline data from a study of the effect of modifying school meal provision and dining environment were used to describe the school meals, packed lunches and the lunchtime energy and nutrient intakes of secondary school pupils. Data were collected at 11 co-educational secondary schools from four Local Authorities in England before the modifications began.
- Examination of school food menu cycles and food provision inventories showed progress towards the food based standards for school meals. One school met all the food-based standards, three schools failed on only one standard and the remaining seven schools failed on three or more standards.
- Pupils eating school meals had higher average intakes of energy and key nutrients including carbohydrate, protein, fibre, Vitamin C, folate, calcium and zinc compared with those eating packed lunches.
- Pupils who ate school meals in the current study had higher average lunchtime intakes of protein, carbohydrate, fibre, vitamin A, vitamin C, calcium and iron and lower intakes of fat, sodium and saturated fatty acids (in girls) than those observed in the 2004 School Meals in Secondary Schools in England Survey¹. There was no difference in intake from school meals of energy, non-milk extrinsic sugars or folate between the two studies.
- The percentage of pupils whose meal met the new standards² ranged from 81%-86% for protein, through 42%-62% for fat, carbohydrate, dietary fibre, non-milk extrinsic sugars, vitamin C and sodium, to 21%-33% for vitamin A and calcium, and 10%-15% for iron.
- The food-based standards have had a clear and beneficial impact on the foods being served and the nutrient content of school meals compared with 2004. Further improvements should be achieved with the introduction of nutrient-based standards in secondary schools in September 2009.

Background

Following the introduction of the food-based standards for school meals in September 2006⁴ and the standards for food other than lunch in September 2007², there has been interest in the effect on the dietary intakes of young people and the extent to which school meal provision now meets the food-based standards. Data from an ongoing study of secondary school pupils by the School Food Trust ("the Trust") provides the opportunity to report on both the progress towards meeting the food-based standards and on the nutrient intakes prior to the introduction of the nutrient-based standards in September 2009.

Objectives

1. To examine progress towards compliance with the food-based standards in school meals in a group of secondary schools recruited on the basis of their potential to improve lunchtime food and dining experiences.
2. To estimate the lunchtime nutrient intakes of pupils attending these schools using data collected in June 2008 and to compare these with average intakes reported in a national survey of school meals carried out in 2004.

Methods

Selection of schools and pupils

In January 2008, all the co-educational secondary schools in four Local Authorities were approached and offered screening for participation in a study on school lunch and behaviour. Sheffield, Manchester, Leicester City and Essex were selected as being Local Authorities that represented diverse socio-economic characteristics. Schools were assessed on a number of criteria: dining room characteristics (based on a checklist developed by the Trust), the school roll, the potential for change, ethnic diversity, the catering provider (LA vs. non-LA), free school meal eligibility, Healthy School status, school meal take up, and willingness to participate. Twelve secondary schools were recruited initially, but one was not able to continue due to difficulties in recruiting an adequate number of pupils in the time available.

In June 2008, pupils in each school dining room were randomly selected at two-minute intervals after they had chosen and paid for their school meal. For those eating packed lunches, every 6th pupil who entered the dining room was chosen for participation.

Data collection

Data on all food and drink provided for lunchtime consumption were collected over five consecutive days using a food inventory designed by the Trust, together with the planned menu cycles. Duplicate portions of a selection of 12 items each day (60 foods per school) were weighed by the observer in the dining room at the start of service.

The lunchtime choices of at least 5 pupils consuming a school lunch and 5 pupils eating a packed lunch were recorded each day over the five day period of measurement coinciding with the data collection on school lunch provision. Trained fieldworkers recorded the foods chosen by the pupils and photographed lunch trays to verify the recordings. Food and drink leftover were weighed to allow calculation of the weight of foods actually eaten by the pupils.

Analysis

Compliance with the food-based standards was assessed using the food inventory booklet and the published menu cycle. Nutrition information for the foods consumed was obtained from the FSA nutrient databank. Mean nutrient intakes were calculated using SPSS Release 15.0.1.1, 2007 (SPSS Inc, Chicago IL).

Results

Compliance with the food-based standards

Analysis of the menu cycles show that only one of the 11 participating schools complied fully with the food-based standards. Three schools failed on one standard. There was no consistency in this with each school failing on a different standard: the standard for white fish, the standard for red meat and the standard for savoury snacks. The remaining schools failed on three or more standards. All schools complied with at least half of the standards.

The standard for meat products was least frequently met. Although some menu cycles appeared to meet this standard, these were not always supported by the food inventory data. Two schools served meat products every day, but these were not on the menu. Conversely, one school did not serve the full range of vegetables which did appear on the menu.

Lunchtime nutrient intakes: school lunch vs packed lunch

Dietary data were collected from 506 pupils. In total, 362 school meals were recorded (165 girls and 197 boys) and 139 packed lunches (53 boys and 86 girls). None of the schools had a packed lunch policy. Eight schools had whole school food policies.

Compared with packed lunches, average nutrient intakes from school meals were more likely to achieve the forthcoming secondary school standards for energy, carbohydrate, protein, fibre, vitamin C, folate, iron and zinc. The mean energy intake for packed lunches was, on average, 100 calories less than the minimum standard for energy intake. Average intakes for saturated fat, non-milk extrinsic sugars (NMES) and sodium from both packed lunches and school meals were higher than the nutrient-based standards for secondary schools.

Comparison of current lunchtime intakes with the 2004 Survey

Pupils who ate school meals in the current study had higher average lunchtime intakes of protein, carbohydrate, fibre, vitamin A, vitamin C, calcium and iron and lower intakes of fat, sodium and saturated fatty acids (in girls) than those observed in the 2004 (School Meals in Secondary Schools in England Survey¹) (Table 1). There was no difference in intake from school meals of energy, non-milk extrinsic sugars or folate between the two studies.

Table 1. Mean energy and nutrient intake at lunchtime for pupils consuming a school lunch, by sex

Nutrient	Boys				Girls					
	Year	n	Year	n	Year	n	Year	n		
	2004	2534	2008	165	2004	3161	2008	197		
	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
Energy (kcal)	678.0	302.0	678.0	259.3	596.0	270.0	621.0	271.4		
Protein (g)	20.3	12.1	24.1	13.1	**	17.1	10.7	20.8	9.7	**
Fat (g)	32.1	17.8	26.1	13.6	**	27.9	15.9	24.0	14.7	**
Carbohydrate (g)	82.0	39.0	92.8	38.4	**	74.0	35.0	85.8	39.1	**
SFA (g)	10.5	7.5	9.7	6.2		9.4	6.7	8.3	5.8	*
Fibre (g NSP)	4.0	2.5	5.7	3.2	**	3.7	2.3	5.3	2.7	**
NMES (g)	23.4	23.4	24.2	19.1		21.2	21.6	20.0	17.5	
Vitamin A (mcg)	125.0	183.0	225.4	240.5	**	111.0	132.0	178.4	202.5	**
Vitamin C (mg)	23.0	24.0	31.5	34.2	**	23.0	24.0	32.8	40.2	**
Folate (mcg)	66.0	40.0	68.5	37.1		60.0	39.0	64.9	37.0	
Sodium (mg)	1059.0	2814.0	770.0	416.0	**	906.0	2789.0	705.2	415.3	**
Calcium (mg)	217.0	186.0	307.0	197.4	**	189.0	170.0	244.2	180.0	**
Iron (mg)	2.8	2.1	3.4	1.6	**	2.3	1.7	3.1	1.5	**

*p<0.05, **p<0.002

Percentage of meals meeting the nutrient-based standards

The percentage of pupils whose meals met the new standards² ranged from 81%-86% for protein, through 42%-62% for fat, carbohydrate, dietary fibre, non-milk extrinsic sugars, vitamin C and sodium, to 21%-33% for vitamin A and calcium, to 10%-15% for iron (Table 2).

Table 2. Percentage of pupils whose meals met the relevant nutrient-based standard for an average school meal, by sex

Nutrient	Boys		Girls	
	Standard	% meeting	Standard	% meeting
Energy (kcal)	614-678	-	614-678	-
Protein (g)	13.3	86	13.3	81
Fat (g)*	25.1	54	25.1	60
Carbohydrate (g)	86.1	52	86.1	45
SFA (g)*	7.9	22	7.9	30
Fibre (g NSP)	5.2	50	5.2	48
NMES (g)*	18.9	42	18.9	51
Vitamin A (mcg)	245.0	32	245.0	21
Vitamin C (mg)	14.0	62	14.0	57
Folate (mcg)	70.0	42	70.0	35
Sodium (mg)*	714.0	50	714.0	54
Calcium (mg)	350.0	33	350.0	22
Iron (mg)	5.2	15	5.2	10

- percentage meeting the standard for energy is not shown, as the standard relates strictly to an average meal

* Except for those denoted by an asterisk, all standards are recommended minimum values. The standards are mixed comprehensive schools

Discussion

This study of secondary schools, selected on the basis of their potential to benefit from an intervention to modify food and dining provision, shows that even before the intervention, considerable progress had been made towards complying with 2007 food-based standards for school meals. There is clearly, however, room for improvement, especially in relation to the nutrient-based standards due to be introduced in September 2009. The improvements observed in the current study illustrate the benefits to pupils' nutrition associated with implementing food-based school lunch standards, even where full compliance has not yet been achieved. Taken together, these observations present a joint challenge to school caterers to achieve compliance with food-based and nutrient-based standards whilst increasing school meal take up. This study reinforces once again the significant differences in the nutritional quality of packed lunches compared with school meals.

Conclusions

Although this sample was not representative of all secondary schools in England, the observations on nutrient intakes and compliance with the standards may be typical of many schools. The food-based standards have had a clear and beneficial impact on the profile of foods being served and the nutrient content of school meals compared with 2004. Further improvements, particularly for vitamin A, folate, calcium and iron, should be achieved with the introduction of nutrient-based standards in secondary schools in September 2009.

School Food Trust website: www.schoolfoodtrust.org.uk. Printed copies of these findings are available from the School Food Trust, GH1 Moorfoot, Sheffield S1 4PQ. Analysis of the impact of the intervention on compliance with the food-based and nutrient-based standards will be published in Autumn 2009.

References

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