



School Food Standards and Child Health Outcomes: What Fifteen Years of Policy Evaluation Supports

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Abstract

Standards change what is served, and the evidence that this reaches child health outcomes is thinner than the policy case usually implies. Natural experimental evaluation of food and nutrient-based standards found that children eating school lunches afterwards took a lower percentage of total dietary energy from fat, at -1.8 percentage points (95% CI -2.8 to -0.9), and from saturated fat at -1.0 (-1.6 to -0.5), than children eating packed lunches. Universal infant provision raised uptake from 38 to 80 per cent and lowered crisps, total fat and sodium, but showed no impact on fruit and vegetables or sweetened beverages, with larger effects in low-income children. A review of six studies reported decreased obesity prevalence while no included study reported dietary intake or quality. In one sample of primary schools, 43 per cent had a compliant food policy.

Keywords: School food standards; Free school meals; Natural experiment; Dietary quality; Policy evaluation

Introduction

School meals in the United Kingdom are consistently found to be healthier than food brought from home, which is attributed partly to standards introduced between 2006 and 2015 to regulate meal quality [1,2]. Only 1 per cent of packed lunches meet those standards [1].

Food and nutrient-based standards were reintroduced with primary schools required to comply by September 2008, and universal free provision for infant pupils followed in September 2014 in England and January 2015 in Scotland [1,3]. Each has been evaluated as a natural experiment, which is the strongest design available where a policy is applied to a whole population by date rather than by allocation [3,4].

This review examines what fifteen years of such evaluation supports: what changed in children's diets, what did not, and where the evidence runs out before it reaches health outcomes.

Objective

This review sets out to establish four things from the published literature. First, what standards achieved in the composition of lunches and in children's total diets. Second, what universal provision achieved in uptake and dietary quality. Third, which food groups moved and which did not. And fourth, how far the evidence extends toward health outcomes, and whether compliance is sufficient for the standards to operate as intended.

Literature Review

What the standards changed in total diet: A natural experimental evaluation analysed cross-sectional dietary surveys in 12 primary schools in North East England before and after the policy, with data collected on four consecutive days from children aged 4 to 7 years, 385 in 2003 to 2004 and 632 in 2008 to 2009 [4]. After implementation, children eating school lunches consumed a lower percentage of energy from fat, at -1.8 percentage points (95% CI -2.8 to -0.9), and from saturated fat at -1.0 (-1.6 to -0.5), than children eating packed lunches (Figure 1) [4].

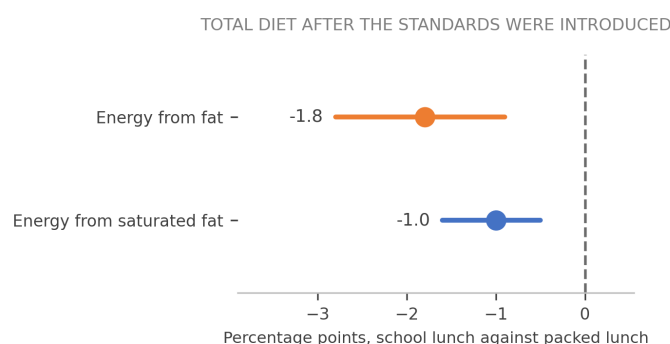


Figure 1: Total diet after the standards were introduced [4]

What else differed in the total diet: Children eating school lunches after implementation consumed significantly more carbohydrate at 16.4 g (5.3 to 27.6), protein at 3.6 g (1.1 to 6.0), non-starch polysaccharides at 1.5 g (0.5 to 1.9), vitamin C at 0.7 mg (0.6 to 0.8) and folate at 12.3 micrograms (9.7 to 20.4) in their total diet than children eating packed lunches. Both before and after implementation, children eating a school lunch consumed less sodium in total diet, at -128 mg (-183 to -73) (Table 1) [4].

Table 1: School lunch against packed lunch after implementation [4]

Nutrient in total diet	Difference	Interval
Energy from fat	-1.8 points	-2.8 to -0.9
Energy from saturated fat	-1.0 points	-1.6 to -0.5
Carbohydrate	+16.4 g	5.3 to 27.6
Protein	+3.6 g	1.1 to 6.0
Folate	+12.3 µg	9.7 to 20.4
Sodium	-128 mg	-183 to -73

What universal provision changed in uptake: Uptake among infant schoolchildren was 38 per cent in 2013 to 2014 and rose to 80 per cent in 2015 to 2016 following the universal policy (Figure 2) [1]. A difference-in-differences analysis using national survey data, comparing children aged 4 to 7 with those aged 8 to 11 who remained means-tested, found uptake rose by 25 percentage points (95% CI 14.2 to 35.9) and consumption of ultra-processed food by weight fell by 6.8 percentage points (-12.5 to -1.0) [3].

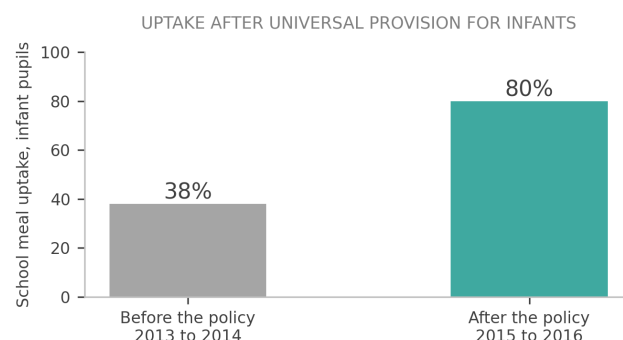


Figure 2: Uptake after universal provision for infants [1]

What moved and what did not: Evaluation of dietary quality under the same policy found no impacts on key food groups such as fruit and vegetables or sweetened beverages, while there was evidence that the policy lowered consumption of foods associated with packed lunches such as crisps, and of some nutrients including total fat and sodium (Figure 3) [1]. The authors concluded that evaluation demonstrated some improvements in dietary quality, and that school meal quality needs to be improved to realise the benefits fully [1].

Figure 3 is a table titled 'WHAT THE POLICY MOVED AND WHAT IT DID NOT'. It lists six categories and their corresponding impact: Crisps and packed-lunch foods (reduced), Total fat (reduced), Sodium (reduced), Fruit and vegetables (no impact seen), and Sweetened beverages (no impact seen).

Crisps and packed-lunch foods	reduced
Total fat	reduced
Sodium	reduced
Fruit and vegetables	no impact seen
Sweetened beverages	no impact seen

Figure 3: What the policy moved and what it did not [1]

Where the effect was largest: Policy impacts differed by income group, with larger effect sizes reported in children from low-income households (Figure 6) [1]. That group includes children who were not previously eligible under means testing and for whom universal provision represented the largest change in entitlement [1,3].

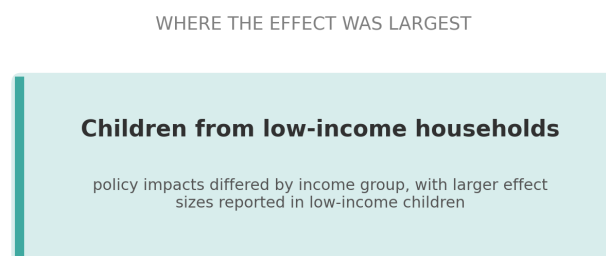


Figure 6: Where the effect was largest [1]

How far compliance extends: In a sample of London primary schools, 43 per cent had a food policy compliant with the standards (Figure 4) [1]. Budget constraints combined with a lack of incentives for complying are reported to contribute to non-compliance, and support from senior leadership is described

as inconsistent without adequate funding [1].

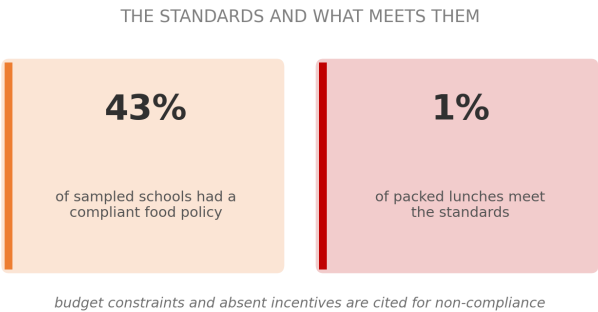


Figure 4: The standards and what meets them [1]

Where the evidence reaches health outcomes: A systematic review published in 2024 included six United States studies examining universal provision and reported increased meal participation and decreased obesity prevalence, while no included study reported dietary intake or quality (Figure 5) [5]. An evaluation of effects on attendance and health outcomes in primary school pupils found uptake increased but no evidence of impact on attendance, and systematic review has noted mixed impacts on attendance more generally [5,6].

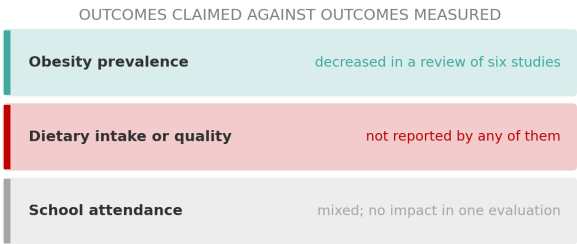


Figure 5: Outcomes claimed against outcomes measured [5,6]

Extension to secondary schools: A borough extended universal provision to all secondary pupils aged 11 to 16 in September 2023, evaluated as a natural experiment with three intervention and two control schools, with pupils completing four non-consecutive weekdays of dietary recording. Although stakeholders discussed positive impacts on food insecurity and hunger, the quantitative data did not demonstrate them [7]. Evidence on universal provision in secondary-aged children is described as limited [7] (Table 2).

Table 2: What each policy has and has not been shown to achieve

Table 3: What is and is not established across fifteen years of evaluation

Policy	Established effect	Not demonstrated
Nutrient-based standards	Improved total diet [4]	Health outcomes
Universal infant provision	Uptake 38% to 80% [1]	Fruit, vegetables, drinks [1]
Universal secondary provision	Evaluated as feasible [7]	Food insecurity effect [7]

How the standards developed: The history of school meal standards has been reviewed [14], following national survey work characterising what primary schools were serving before regulation [15]. Impacts of food-based and nutrient-based standards on lunchtime provision and consumption were evaluated separately in primary [16] and secondary schools [17]. Comparison of school meals against packed lunches across nearly two decades has been synthesised by meta-analysis [2].

Effects beyond nutrition: An intervention study examined school lunch and learning behaviour in primary schools [18], and a randomised controlled trial tested food and dining room modifications on classroom behaviour in secondary pupils [19]. Economic analysis has examined healthy school meals and educational outcomes [20]. Body weight outcomes following universal provision have been analysed directly [8], and a pilot in secondary schools evaluated by mixed methods [9]. Systematic review has drawn participation, attendance, academic performance, diet quality, food security and body mass index together [21], and school-provided meals have been positioned within obesity prevention more broadly [10].

Evidence from other systems: Revised national standards elsewhere have been assessed for their impact on food selection, consumption and waste [22], on the nutritional quality of meals selected and on participation rates [23], and on dietary quality among children in a national lunch programme [24]. Systematic review and meta-analysis has examined the effectiveness of school food environment policies on dietary behaviours [25], and a separate review the effect of environment changes on eating behaviour or body weight [26]. Cross-national comparison has asked whether school meals are a viable tool for improving diet [29,30].

Why implementation varies: Local factors shaping nutrition policy implementation have been examined qualitatively [27], as have barriers to nutrition promotion reported by parents and teachers [28]. The school food environment has been assessed directly [32], and school staff views on implementing healthy lifestyle programmes explored [33]. Opportunities for intervention and innovation within school food have been set out [31], and comparable implementation questions arise for physical activity provision in the same settings [34]. Breakfast provision has been studied separately for its effect on socio-economic inequalities in consumption [11,12], and eating outside the home characterised in national survey data [13] (Table 3).

Question	What the evidence supports
Do standards change lunches?	Yes, and total diet [4,16]
Does universal provision raise uptake?	38 to 80 per cent [1]
Do fruit and vegetables increase?	No impact seen [1]
Does obesity prevalence fall?	Reported, without dietary data [5]

Are the standards complied with?	43% of one sample [1]
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Method

Search strategy: PubMed and the archives of the major public health nutrition, child health and behavioural nutrition journals were searched for evaluations of school food policy. Search terms combined school food standards and free school meals with natural experiment, dietary quality, uptake, obesity and attendance. Reference lists of the universal infant provision evaluation [1] and the standards evaluation [4] were screened by hand for primary sources.

Eligibility: Studies were included if they evaluated a school food policy against a comparison group or period and reported dietary, uptake or health outcomes. Reviews are cited for their pooled conclusions and identified as such. Where a study reported stakeholder perceptions alongside quantitative measurement, both are reported.

Data extraction and handling: Population, policy, comparison group, outcome measured and the reported estimate were extracted as published. Whether an outcome was dietary, anthropometric or educational is stated in every case, because reviews reporting reduced obesity prevalence and reviews reporting improved dietary quality draw on largely separate studies and are frequently cited together as though they supported one another. This review reports published findings and does not constitute dietary guidance for any child, family or school, nor any recommendation on what children should eat. No pooling or re-analysis was performed. Figures 1 to 6 and Tables 1 to 3 reproduce published values only. This is a narrative synthesis of published literature and was not registered as a systematic review.

Concluding Remarks

Fifteen years of evaluation supports a narrow and reasonably firm claim: standards improve what is in a school lunch, and that improvement is detectable in children's total diet rather than only at lunchtime [4]. The differences are modest in size, around one to two percentage points of energy, but they are measured against packed lunches in the same schools and they persist across the whole day.

Universal provision then determines how many children receive that lunch, and the change is large: uptake among infant pupils rose from 38 to 80 per cent [1]. Since only 1 per cent of packed lunches meet the standards, moving a child from packed to provided lunch is the mechanism by which a standard reaches a diet at all [1].

What did not move is as instructive as what did. Evaluation found no impact on fruit and vegetables or on sweetened beverages, the two food groups most prominent in public

discussion of children's diets, while crisps, total fat and sodium fell [1]. A policy described in general terms as improving children's diets did specific things, and those are not the things most people would assume.

The gap between dietary and health evidence is where the policy case is usually overstated. A review of six studies reported decreased obesity prevalence, and no included study reported dietary intake or quality [5]. The dietary evaluations and the obesity evaluations are therefore largely separate literatures, and citing them together implies a chain of evidence from standard to nutrient to body weight that no single study reviewed here establishes.

Attendance deserves particular caution because it is frequently offered as a justification. One evaluation found uptake increased with no evidence of impact on attendance, and systematic review reports mixed impacts [5,6]. Similarly, in the secondary school extension, stakeholders described benefits to food insecurity that the quantitative data did not show [7].

The compliance finding limits everything above. Standards operate through what schools actually do, and 43 per cent of a sampled group had a compliant food policy, with budget constraints and absent incentives cited [1]. An evaluation comparing schools before and after a standard is measuring the average of compliant and non-compliant practice, which will understate what a fully implemented standard achieves and overstate what an unenforced one does.

Three limitations belong with these conclusions. The standards evaluation covers 12 schools in one region with cross-sectional samples five years apart, so secular change in diet is difficult to separate fully from policy effect despite the design [4]. The difference-in-differences analyses use older children as controls, which assumes the two age groups would otherwise have followed parallel trends [1,3]. And the obesity evidence comes from a different country with different school food provision, so its transfer to the settings where the dietary evidence was generated is an assumption rather than a finding [5].

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Conflict of Interest

The authors declare no competing interests.

Ethics Statement

This article reviews previously published studies only. No new patient data were collected and no participants were recruited, so ethical approval was not required.

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