Original Protocol

Title of the project

Factors that influence free school meal uptake and subsequent dietary choices in children: A systematic review based on the Socio-Ecological Model framework.

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Plain language summary

Not having enough money to buy food is known as food insecurity and is common for children in the UK. Free school meals are offered to children based on household income. Although all schools offer free meals, about 1 in 5 pupils in the UK do not take up their meal. There are also differences between schools in the proportion of pupils who take up free school meals. We do not know which factors influence pupils' uptake of free school meals in different schools, as well as how these meals affect the overall quality of a child's diet. Moreover, it is unclear whether schools with higher free school meal uptake see better dietary outcomes among their pupils compared with schools with lower uptake. Gaining insights into these issues will enable us to improve free school meal policies to better support children at higher risk of poor nutrition. We aim to identify and evaluate the relevant scientific literature on this topic. Specifically, we will examine factors related to pupils, parents, and schools that may influence whether eligible pupils choose to participate in free school meals. Furthermore, we will assess how differences in uptake rates across schools relate to children's overall diet quality. This research could provide schools with important information on how to improve the ways they deliver free school meals, ultimately maximising the impact of the free school meal policy on nutrition for lower-income families. By addressing food insecurity and health inequalities in the UK, our findings may also offer valuable insights for policymakers who are facing similar challenges in other countries.

Introduction

Not having enough money to buy food is known as food insecurity and is common for children in the UK;[1] 19% of UK children aged <15 years live in moderate-severely food insecure households,[2] and food insecurity is consistently linked with poor health outcomes.[3] The provision of free school meals is a government-implemented means-tested strategy intended to improve food insecurity and nutrition and reduce dietary inequalities. The proportion of children eligible for free school meals has been increasing, particularly post-pandemic (15.4% 2019; 17.3% 2020; 20.8% 2021).[4] However, free school meals uptake is variable, with around 20% (range 0-88%; figures based on pre-pandemic data) of eligible pupils in secondary schools not taking their free school meals.[5] We lack a clear understanding of the factors that influence pupils uptake of free school meals across different schools.[6] Food insecurity is likely to be exacerbated by the cost of living crisis, making it imperative that this key government strategy to tackle food insecurity, means-tested free school meals, is fit for purpose and implemented to maximise uptake and the benefits for diet and health outcomes.

Unhealthy dietary habits are common in children and adolescents in the UK, with high intakes of saturated fat and sugars, and low intakes of fibre and fruit and vegetables, with important differences between socioeconomic groups.[7] Unhealthy diets are associated with worse school attendance, behaviour, educational achievement, health/well-being outcomes and increased risk of later non-communicable disease risk.[8] For most food-insecure children, access to sufficient food remains a significant concern, and free school meals represent a main source of nutrition.[9, 10] We also do not know how free school meals affect the overall quality of children's diet and whether schools with higher free school meal uptake have better dietary outcomes among their pupils than schools with lower uptake.[11] This is also influenced by the quality of school meals compared to alternatives, such as lunches brought from home,[11, 12] and the findings of this review will be discussed in that context.

Most of the variation in free school meals uptake occurs at the school level, rather than at the local authority level, though individual factors also play a role. Therefore, understanding both individual and school-level contexts, as well as their influence on free school meal uptake, is essential for informing strategies to enhance policy implementation. Possible reasons for low uptake of free school meals include school system factors, such as free school meals registration, food pricing and payment systems, the school level of proactive engagement

with free school meal programmes, and a lack of clarity around eligibility criteria. Family circumstances, which can fluctuate over time, may also affect uptake.[12] Stigma around free school meals has been suggested as a barrier, though research findings are consistent; it may be influenced by school systems, such as cashless canteen system that allow for anonymity, as well as to the level of entitlement within the community.[13] Other factors influencing free school meal uptake are similar to those affecting school meal participation among all pupils, including food preferences, the eating environment, social dynamics and the school ethos and leadership. Remarkably, higher uptake of free school meals is associated with higher general uptake of school meals, suggesting that efforts to increase overall school meal participation may also boost free school meal uptake.[14]

This protocol has been prepared in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analysis Protocols (PRISMA-P)[15] and the review will be reported in accordance with the PRISMA 2020 statement.[16]

Research Questions:

1. What factors influence the uptake of free school meals and the subsequent dietary choices of school children?

2. What is the effect of uptake of free school meals on children's overall diet quality?

Eligibility Criteria

Focus of the review

The provision of school meals, including free school meals, in high-income country settings (US and Europe, where school meal systems are comparable with the UK). The interpretation of findings will be framed within the context of the UK school food system and free school meals policy.

Type of studies

Primary research studies conducted in high-income countries including (i) qualitative studies, using appropriate methods of data collection and analysis (e.g. ethnography, focus groups or interviews), (ii) quantitative studies (including for example randomised trials and other comparative effectiveness studies, cross-sectional studies and prospective cohort studies) and (iii) mixed methods studies (using both qualitative and quantitative studies). Where available, we will use experimental or quasi-experimental studies as the most reliable source of

evidence on the association between particular policies or practices and the uptake of free school meals and diet quality. Case reports will be excluded but there will be no other restrictions on the types of study to be included. Systematic reviews will be used as a source of potentially eligible studies but will not be included in their own right. Studies conducted in low- and middle-income countries and those assessing children in preschool and students in tertiary-level education will not be deemed suitable for inclusion.

Condition or domain being studied

Participation in free school meals. We are interested in understanding factors that are not only at individual level, but also at interpersonal, organisational, community, and public policy level that influence participation in free school meals. These may include school system factors that are directly related to free school meals (free school meal registration system, food pricing and payment systems), school pro-activity around free school meals, lack of clarity about eligibility, and fluctuations in family circumstances, stigma around free school meals and other influences such as overall school meal uptake, child food preferences, school eating environment, social aspects, school ethos and leadership. We aim also to explore the characteristics of pupils who are eligible for free school meals and choose to take them, as well as those who are eligible but do not participate.

Participants/population

Pupils throughout primary and secondary school will be eligible for inclusion.

Setting

School canteen settings and other areas within schools where free school meals can be offered.

Search strategy

A comprehensive search strategy will be developed in collaboration with an information scientist and informed by discussions amongst the research team. MEDLINE, EMBASE, Web of Science Social Sciences Citation Index, Sociological Abstracts, ASSIA, and CINAHL will be searched using a combination of databases and index terms and keywords. Relevant *keywords* will include those for the intervention (e.g., free school meals, FSM, free lunch, free meal) and for the settings (e.g., primary school, elementary school, middle school, high school, secondary school, grammar school, and school). Searches will be supplemented

by carrying out hand searches of reference lists of retrieved studies and identified reviews on the topic. We will also consider searching the grey literature to identify reports from relevant governmental and charity organisations in the UK such as the Department for Education, the Food Foundation, and School Food Matters. The search will be limited to studies published in English in full in the last two decades, from 1 January 2004 to the present. The outcomes of the search strategy and the study selection process will be illustrated using a PRISMA flow diagram.[16]

Data extraction process

Covidence software will be used to manage the identified published studies effectively. Two reviewers, who will not be blinded to author or journal information, will independently extract information from the included studies using a specially designed and piloted data extraction form. The extracted data will include key study details such as study title, name of the first author, publication year, study design, geographical location, intervention type, education setting/school type, data collection period, and unit of analysis. In addition, information on free school meals uptake, subsequent dietary choices and characteristics of participants will be collected including quotations, narrative summaries and statistical analysis from surveys and questionnaires. A third reviewer will be consulted for discrepancies that arise during data extraction and cannot be resolved by consensus.

Outcomes and prioritisation

The main outcomes of interest are factors that influence the uptake of free school meals and the dietary choices of school children. Due to the wide range of factors that may influence free school meal uptake, these factors will be organised using the socio-ecological model.[17,18] This model recognises that individuals are part of a broader social system and that health or health-related outcomes are shaped by the interaction between the characteristics of individuals and the environment. Using a socio-ecological approach offers the potential to stratify the free school meal environment into different analytical levels, allowing the identification of influences across levels and analysis of the way they interact. Such an approach has previously been used when trying to understand influences on education and academic outcomes in school settings, [19] or in public health interventions to reduce obesity.[20] Therefore, factors will be categorised as follows: 1) individual (pupil), 2) interpersonal (parents, friends, teachers), 3) organisational (school policy, after-school

activities, school type) and 4) public policy (free school meals policy, UK policies in different regions) at the data extraction stage.

Risk of bias assessment

The methodological quality of included studies will be assessed based on their study design, using appropriate risk of bias tools (e.g., Critical Appraisal Skills Programme [CASP],[21] JBI[22] checklists and Cochrane Risk of Bias tool).[23, 24] Two researchers will independently assess the risk of bias in each study. Any disagreements between researchers will be resolved by consensus or referred to a third researcher for arbitration.

Data synthesis

The integration of qualitative and quantitative analysis will use a convergent segregated approach. This involves qualitative and quantitative data being analysed separately and then being combined during the interpretation of data phase. Quantitative data will provide evidence of statistical evidence and relationships between identified factors and uptake rates, as well as uptake rates and overall diet quality, highlighting the key moderating factors. Qualitative data results will explore the contextual drivers of these relationships
The socio-ecological model will serve as the theoretical framework for categorising factors that influence the uptake of free school meals and dietary choices at different levels, including individual, interpersonal, organisational, community, and public policy levels. For each individual study, whether quantitative or qualitative, identified factors will first be extracted and organised into a tabular format. They will subsequently be categorised based on the levels within the socio-ecological model. The results will be synthesized in a joint display table, visually mapping quantitative and qualitative data to SEM levels and performing a narrative synthesis. This approach will enable a comprehensive understanding of the interplay between uptake rates, multi-level influences, and dietary outcomes.

The strength of each study's findings will be evaluated based on its risk of bias with higher-quality studies being given greater weight in the synthesis. Findings from studies with a high risk of bias will be interpreted cautiously. If the studies are sufficiently homogeneous, meta-analyses will be conducted of experimental or quasi-experimental studies that report an association between a particular policy or practice and the uptake of free school meals or diet quality. Subgroup analyses will be conducted to investigate the influence of variables such as age, gender, socioeconomic status, and geographic location on the uptake of free school

meals and dietary choices. In addition, sensitivity analyses will be performed to assess the robustness of the findings by excluding studies deemed to be at high risk of bias.

According to the socio-ecological framework, examples of potential factors affecting school meal participation are the following:

- *Individual Level:* Attitudes towards school meals, food preferences, nutritional knowledge, and dietary habits.
- *Interpersonal Level:* Parental influence, peer behaviours, and social support.
- *Organizational Level:* School policies, meal quality and variety, availability of food options, and school environment.
- *Community Level:* Cultural norms, community health initiatives, and local food environments.
- *Public Policy Level:* National and local government policies, free school meals eligibility criteria, and funding schemes.

Potential impact of this research

This systematic review will provide valuable evidence on various factors that influence the uptake of free school meals and subsequent dietary choices. Its findings have the potential to inform policy change at multiple levels including schools (e.g., policies to encourage greater uptake of free school meals), local authorities (e.g., improvement in free school meals enrolment systems) and regional and national governments (e.g., eligibility criteria for free school meals). In addition, the review will shed light on individual-level factors that affect free school meal participation. Our dissemination strategies will be tailored to these different audiences (e.g., producing a toolkit for schools and conducting policy briefings at different levels). Ultimately, identifying the factors that influence free school meal uptake could improve the quality of diet and reduce food insecurity for low-income children and their families, helping address socioeconomic inequalities in the UK.

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