

**Project no: 17/48/02**

**1. Title of the project**

**Child food insecurity in the UK: evidence on its extent, nature and effects and what can be done to address it. A rapid review**

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## Background

Food insecurity is a social and economic problem that involves difficulties in accessing sufficient, safe, and nutritious food necessary to meet individuals' dietary requirements and preferences for a healthy life.<sup>1</sup> This is a multifaceted phenomenon, where each stage is typified by conditions and experiences of food insufficiency and behavioural responses.<sup>2</sup> Food insecurity may be experienced when there is i) uncertainty about future food availability and access, ii) insufficiency in the amount and kind of food required for an optimal and healthy nutrition status, or iii) the need to use socially unacceptable ways to acquire food.<sup>3</sup> There are various indicators of food insecurity, such as quality, variety and desirability of diet as well as total intake, but not all are measured consistently.<sup>4</sup> Measuring food insecurity is challenging, especially in children, and there is currently no gold standard to assess this issue in an effective, efficient and feasible way among young people.<sup>5</sup>

Food insecurity in children may jeopardise their health and development. A key indicator for food insecurity is low income.<sup>6</sup> Poverty and food insecurity during childhood has immediate-, short- and long-term consequences for physical health, mental and emotional health, cognitive development, educational achievement and future employment and earnings prospects.<sup>7, 8</sup>

Poverty in children in the UK is on the increase. Around 30% of children in the UK are currently living in poverty, representing a notable reversal in the trend of decreasing poverty levels evident over the past 20 years.<sup>9</sup> Furthermore, it is estimated that around 4 million children (three in 10) live in poverty in the UK after housing costs are taken into account (2.7 million or one in five before housing costs).<sup>3</sup> According to recent Scottish data, 10% of children live in relative poverty (including variations in household size and composition net income for one year of less than 60% of median), 5% live in absolute poverty (variations in household size and composition net income of less than 60% of the a financial year; involves taking account of changes in the value of money since the financial year), 5% live in a combination of low income and material deprivation (variations in household size and composition net income of less than 70% of median net household income for the year and experiences material deprivation in the year), and 5% live in persistent poverty (variations in household size and composition net income of less than 60% in at least 3 of the survey years).<sup>10</sup>

It is always challenging to estimate how many children who live in poverty are hungry or food insecure, but recent evidence shows that signs of childhood hunger have become more visible to health workers and school staff, especially on Monday mornings or the first day back from school holidays.<sup>11</sup> Projections indicate that the number of children living in poverty in the UK, hence at higher risk of food insecurity, may rise to as many as 5 million by the end of this decade.<sup>12, 13</sup> Food insecurity is not only a matter of sufficient (in quantity and quality) nutritious food, but is also a matter of social justice.<sup>14</sup> Considering the high number of children at risk of food insecurity, and the associated health consequences, more efforts to adequately measure and tackle food insecurity are needed. Therefore, it is important to improve our understanding of the links between child food insecurity, health and developmental consequences, as well as any recent attempts to address it.

## Main objective

To determine the nature, extent, and consequences of food insecurity affecting children (< 16 years old) in the UK.

## General methods

This rapid review will focus on five main aspects of child food insecurity:

1. The nature and determinants of child food insecurity.
2. Estimations of the incidence, prevalence, and costs of child food insecurity in the UK, including recent trends.
3. The impact of child food insecurity on health in terms of physical, mental and social well-being.
4. Evaluated interventions to eliminate, reduce or mitigate food insecurity and its effects on children.
5. The cost-effectiveness of interventions designed to tackle child food insecurity including long term modelling economic impacts.

For each of these aspects, specific research questions will be formulated and relevant methods described. However, a number of elements are common across each research question, namely:

- Literature searches
- Participants/population
- Methods for selecting evidence (data screening, selection and synthesis).

To avoid repetition, these elements are described here and are applicable to each individual research question:

***Literature searches:*** Reports from 1995 onwards will be included in this rapid review to focus on information conducted under contemporary epidemiological and environmental circumstances of child food insecurity, focusing on high-income countries. All searches will be restricted to English language publications.

The websites of UK government, public and private institutions, charities and international organisations concerned with child health and poverty will be consulted for relevant documents and information. These will include the national and international organisations listed in *Appendix 1*. From the results of scoping searches, it is anticipated that these sources will provide the majority of the evidence for the overviews to address points 1 and 2 listed above.

Published literature will be sought from healthcare, nutrition, education and social science databases. The literature searches will be designed to address points 3 to 5 above but any information identified

in the search results that is relevant to points 1 and 2 above will also be retrieved. The databases to be searched include: MEDLINE (including in In-process and E-pub ahead of print files), EMBASE, CINAHL, CAB abstracts, the Cochrane Library, ERIC, PsycINFO, Social Science Citation Index, ASSIA, EPPI-Centre, and SCIE (Social Care Institute for Excellence). No inclusion study design restrictions will be applied. The draft MEDLINE strategy is detailed in *Appendix 2* and will be adapted for searching other databases.

In addition, reference lists of identified studies will be scrutinised for additional publications and experts in the field contacted for additional relevant reports. A cited reference search using key publications will be undertaken in Web of Science.

***Participants/population:*** Children from 0 to 16 years old (at the start of the study or evaluation) from any ethnicity or gender living in specified high-income countries. Although we are interested in children up to 16 years of age, comments received from the members of this rapid review Advisory Group indicate that in the current literature age cut-offs may vary between reports with some studies including children up to 18 years of age. Therefore, in order to be inclusive and capture the age group of interest, we will include relevant studies involving children up to 18 years of age.

According to a UNICEF report published in 2015,<sup>5</sup> children as young as 7 years of age can respond accurately to questionnaire items sensitive to food insecurity. For children younger than 7 years, measurements of food insecurity based on assessments/judgments provided by parents, relatives, or other caregivers will be considered suitable for inclusion. We are also interested in the measurement tools used to evaluate food insecurity. Furthermore, with the intention of evaluating child food insecurity in depth as well as understanding the challenging task of measuring food insecurity in children, we aim at including studies that focus solely on child food insecurity as well as studies that address child food insecurity alongside household food insecurity, as long as they provide outcomes measured in children. We will accept both direct (from children) and indirect (from parents and caregivers) assessments of food insecurity.

To assist interpretation of our results, the impact of food insecurity will be categorised as: *direct impact* (referring to health outcomes measured in children where food utilisation by children, or their nutrition status, is measured), or *indirect impact* (referring to measures of food access including stability in food access, household income or household food production, and where results are presented in children). In addition, we will note how food insecurity has been measured in children.

To gain a broad understanding of the nature and consequences child food insecurity, as well as of the interventions designed to address it, the literature from countries with developed economies, according to the Organisation for Economic Co-operation and Development (OECD) categorisation.<sup>11</sup> will be included. However, in recent years, an economic recession has been experienced by several countries in Europe, resulting in diverse responses in the affected countries, for example, public budgets cuts, health, and welfare sectors austerity measures.<sup>15, 16</sup> There is growing evidence to

suggest that the different governmental responses to this economic crisis and its consequences (for example, unemployment, inflation of food prices, reducing salaries, and growing costs of fuel and housing) may impact upon a broad set of social, economic and health domains and contribute to the increased prevalence of food insecurity.<sup>17, 18</sup> Nevertheless, not all European countries facing such hardship experienced these problems, and statistics of food insecurity differ among countries.<sup>19</sup> For the purpose of this rapid review, we will focus only on those European countries (UK, France, Germany and Italy) that are part of the G8 (major developed economies worldwide). We have also decided to include Ireland due to its regional proximity and similarity to the UK in terms of social and political context and the Nordic countries which are among the most affluent countries worldwide, and where food insecurity has been successfully tackled due to well-established social security schemes.<sup>20</sup> Thus, only studies or reports from the following industrialised countries will be deemed suitable for inclusion: UK, Ireland, France, Germany, Italy, Sweden, Norway, Denmark, Finland, Iceland, the Russian Federation, Canada, United States, Japan, Australia and New Zealand.

#### ***Methods for identifying evidence: (data screening, selection and synthesis)***

The review process for the selection and synthesis of the current relevant evidence will be based on five main stages:

*Stage 1.* Title/abstract screening (by one reviewer with 10% checked by a second reviewer)

*Stage 2.* Full text screening (by one reviewer with 10% checked by a second reviewer)

*Stage 3.* Categorization of texts screened according to the topic of interest

*Stage 4.* Data extraction (by one reviewer and double checked by a second reviewer)

*Stage 5.* Data synthesis (tabulated and described narratively).

**Note:** Original studies cited in published reports (e.g. randomised control trials, cluster randomised control trials, quasi-randomised control trials) will be retrieved and selected for inclusion if they fit the pre-specified inclusion criteria. The risk of bias assessment of public health and health promotion studies may be challenging mainly because of the wide variety of study designs used.<sup>21</sup> If possible, the risk of bias of included studies will be assessed using the Cochrane Risk of bias Tool.<sup>22</sup> for evaluating RCTs and the standardised framework of the Quality Assessment Tool for Quantitative Studies, developed by the Effective Public Health Practice Project.<sup>23</sup>

#### **Research questions**

***Research question 1: What is the nature and what are the determinants of food insecurity affecting children?***

**Context:** Food insecurity and its causes are evident at community, household and individual levels. From around 7 years of age, children can accurately describe their experiences of food insecurity. Children's experiences are distinct from those of their parents, relating to their household roles and

status, developmental level and the distinct opportunities and boundaries that children have in observing, understanding and responding to family processes and problems.

*Objective:* To assess current evidence on child food insecurity, mainly from international sources of grey literature, in order to characterise/describe the nature and features of the problem.

*Study design:* All study designs.

*Inclusion criteria:*

- Children and adolescents (aged 0 to 18 years)
- Geographical setting: United Kingdom, Ireland, France, Germany, Italy, Sweden, Norway, Denmark, Finland, Iceland, the Russian Federation, Canada, United States, Japan, Australia and New Zealand
- Studies that focus solely on child food insecurity and studies that address child food insecurity alongside household food insecurity, as long as the outcomes are related to children
- Quantitative or qualitative reports of food insecurity either from young people themselves (if  $\geq 7$  years old), from any parent, relative or caregiver (if  $< 7$  years old), or from professionals who engage with them
- English language

*Exclusion criteria:*

- Reports focusing solely on household food insecurity
- Reports relating to the agricultural or farming aspect of food insecurity
- Reports measuring outcomes on adults (we will include longitudinal studies where children have been followed into adulthood)
- Reports published before 1995

*Intervention:* Any or none.

*Outcomes:*

- Terms used to describe child food insecurity
- Young people's experience of food insecurity or professionals' experience of engaging with child food insecurity
- Measures used to assess child food insecurity

*Strategy for data synthesis:*

- Terms used to describe food insecurity in children will be tabulated
- Causes of food insecurity in children will be tabulated

- Measures used to assess child food insecurity will be tabulated along with frequency of use in the literature, if possible
- Experiences of food insecurity: if data permit, an overview of the content of reported experiences will be presented along with qualitative evidence, where available

*Subgroup analyses:* None.

***Research question 2: What are the incidence, prevalence and costs of child food insecurity in the UK, including recent trends?***

*Context:* Food insecurity has a multitude of consequences on child well-being, aside from the obvious anthropometric ones, including nutritional and non-nutritional consequences. As a result, immediate-, short- and long-term after-effects may occur (e.g. exacerbation of diet-related chronic illnesses such as diabetes or hypertension). Food insecurity has been persistent, growing, and clinically relevant in high-income countries<sup>7</sup> and it has been suggested that it has social and economic consequences for societies, including increased social exclusion and greater reliance on healthcare.<sup>24</sup> Consequently, there are important implications for the quality, expenditures, and utilisation of healthcare and may increase demand for individual caregiving costs and national healthcare costs.<sup>25</sup> Furthermore, measures commonly used, such as use of food banks or school breakfast clubs, are used as proxy measures of food insecurity but are not necessarily representative of the actual extent of food insecurity. It is imperative that a complete picture of food insecurity affecting children in the UK is established and assessed in order to develop, target and implement effective health, nutrition and child development policies, practices, and programmes.

*Objectives:* To appraise the evidence, mainly from international sources of grey literature, to determine the incidence, prevalence and costs of food insecurity affecting children in the UK. Recent trends of food insecurity affecting children in the UK will also be considered.

*Study design:* All study designs.

*Inclusion criteria:*

- Children and adolescents (aged 0 to 18 years)
- Geographical setting: UK as a whole and UK regions
- Studies that focus solely on child food insecurity and studies that address child food insecurity alongside household food insecurity, as long as the outcomes are measured in children
- Quantitative or qualitative reports of food insecurity either from young people themselves (if ≥7 years old), or from any parent, relative, caregiver or professional who engage with them
- English language

*Exclusion criteria:*

- Reports focusing solely on household food insecurity
- Reports relating to the agricultural or farming aspect of food insecurity
- Reports measuring outcomes on adults (we will include longitudinal studies where children have been followed into adulthood)
- Reports published before 1995

*Outcomes:*

- Incidence of child food insecurity in the UK
- Prevalence of child food insecurity in the UK
- Recent trends (from 1995 to date) of child food insecurity in the UK
- Estimates of economic and social costs of food insecurity in children
  - Governmental costs
  - NHS costs
  - Other sectors (e.g. agricultural, economic, private, etc.)
- Terms used to describe child food insecurity

*Strategy for data synthesis:*

- Incidence and prevalence of child food insecurity in the UK will be tabulated
- Recent trends (from 1995 to date) will be presented graphically
- Terms used to describe food insecurity in children will be tabulated

*Subgroup analyses:*

- Place: Urban versus rural settings
- Gender: Male and female
- Age group: According to the life-cycle (new-borns, toddlers, children and/or adolescents)
- Socio-economic position: Neighbourhood location (low income or high income neighbourhoods)
- Ethnicity: White, Black, Asian, Mixed or Other ethnic group
- Disability: Children with disability versus children without disability
- Other socio-demographic factors of relevance: Number of people living in the household, occupation of the parents, education of parents
- Time component: Seasons (school holidays versus school days)



***Research question 3: What is the impact of food insecurity on children's health and social well-being?***

*Context:* The relationship between food insecurity and health outcomes is complex, especially in childhood where experiences of food insecurity can be particularly critical and difficult to measure and can jeopardise healthy growth and development.<sup>7</sup>

*Objectives:* To investigate the relationship between food insecurity and children's physical, mental emotional, and social well-being.

*Study design:* Observational, intervention and qualitative studies

*Inclusion criteria:*

- Children and adolescents (aged 0 to 18 years).
- Geographical setting: UK, Ireland, France, Germany, Italy, Sweden, Norway, Denmark, Finland, Iceland, the Russian Federation, Canada, United States, Japan, Australia and New Zealand.
- Studies that focus solely on child food insecurity and studies that address child food insecurity alongside household food insecurity, as long as the outcomes are measured in children.
- Quantitative or qualitative reports of food insecurity either from young people themselves (if ≥7 years old), or from any parent, relative, caregiver or professional who engage with them
- English language

*Exclusion criteria:*

- Reports focusing solely on household food insecurity
- Reports relating to the agricultural or farming aspect of food insecurity
- Reports measuring outcomes on adults (we will include longitudinal studies where children have been followed into adulthood)
- Reports published before 1995

*Outcomes:*

- Any reported measures of children's physical, mental, developmental, emotional and social well-being

*Strategy for data synthesis:*

- Measures of children's physical, mental, developmental, emotional and social well-being will be tabulated
- Measures used to assess child food insecurity will be tabulated along with frequency of use in the literature, if possible

- Experiences of food insecurity: if data permit, an overview of children reported experiences will be presented along with qualitative evidence, where available
- We will consider different levels of impact; we will use the term 'direct impact' to refer to those health outcomes measured in children where food utilisation is measured directly by children and the term 'indirect impact' to refer to measurements of food access including stability in food access, household income, or household food production with outcomes presented for children.

*Subgroup analysis:*

- Place: Urban versus rural settings
- Gender: Male and female
- Age group: According to the life-cycle (new-borns, toddlers, children and/or adolescents)
- Socio-economic position: Neighbourhood location (low income or high income neighbourhoods)
- Ethnicity: White, Black, Asian, Mixed or Other ethnic group
- Disability: Children with disability versus children without disability
- Other socio-demographic factors of relevance: Number of people living in the household, occupation of the parents, education of parents
- Time component: Seasons (school holidays versus school days)

***Research question 4: What interventions exist to eliminate, reduce or mitigate the effects of child food insecurity in high-income countries?***

*Context:* Food insecurity has been experienced in high-income countries for many years. Consequently, charitable, public and private approaches to aid food provision have arisen, providing services to those who need them (for example, food banks, breakfast and lunch clubs, soup kitchens, etc.).<sup>24</sup> However, it is important to identify interventions that have been evaluated to consider their effectiveness.

*Objectives:* To assess the effects of interventions, programmes, or food aids designed to eliminate, reduce or mitigate the effects of child food insecurity.

*Study design:* Intervention (e.g. RCTs, cluster RCTs, controlled studies) and qualitative studies.

*Inclusion criteria:*

- Children and adolescents (aged 0 to 18 years).
- Geographical setting: UK, Ireland, France, Germany, Italy, Sweden, Norway, Denmark, Finland, Iceland, the Russian Federation, Canada, United States, Japan, Australia and New Zealand.

- Studies that focus solely on evaluated child food insecurity and studies that address child food insecurity alongside household food insecurity, as long as the outcomes are measured in children
- Quantitative or qualitative reports of food insecurity either from young people themselves (if  $\geq 7$  years old), from any parent, relative or caregiver (if  $< 7$  years old), or from the professionals who engage with them
- English language

*Exclusion criteria:*

- Reports that focus on the feasibility of the intervention (e.g. process and implementation) and not on the effects of the intervention
- Reports that focus on an educational aspects of an intervention and on nutritional labelling measurements
- Reports that include adult evaluation or evaluation in children based on adult reports
- Reports in the context of emergency situations, such as natural disasters
- Reports focusing solely on household food insecurity
- Reports relating to the agricultural or farming aspect of food insecurity
- Reports measuring outcomes on adults (we will include longitudinal studies where children have been followed into adulthood)
- Reports published before 1995

*Intervention:* Any interventions which aim to eliminate, reduce or mitigate child food insecurity, for example, interventions that provide food aid for children (e.g. food banks, school breakfast and/or lunch clubs, soup kitchens, food voucher) and those to improve children access to food at local, community, and national level. Interventions that include food purchasing from governmental bodies through school (e.g. free school meals), lunches, supermarket incentives will be included as long as they provide outcomes evaluated in children.

*Comparator:* Any or none.

*Outcomes:* Any relevant reported outcomes

*Strategy for data synthesis:*

- Individual interventions and their outcomes will be tabulated
- Measures used to assess child food insecurity will be tabulated along with frequency of use in the literature, if possible.
- People's experiences of food insecurity: if data permit, an overview of children reported experiences will be presented along with qualitative evidence, where available

*Subgroup analyses:*

- Place: Urban versus rural settings
- Gender: Male and female
- Age group: According to the life-cycle (new-borns, toddlers, children and/or adolescents)
- Socio-economic position: Neighbourhood location (low income or high income neighbourhoods)
- Ethnicity: White, Black, Asian, Mixed or Other ethnic group
- Disability: Children with disability versus children without disability
- Other socio-demographic factors of relevance: Number of people living in the household, occupation of the parents, education of parents
- Time component: Seasons (school holidays versus school days)

**Research question 5:** *What is the cost-effectiveness of existing interventions which aim to eliminate, reduce or mitigate the effects of child food insecurity in high-income countries?*

*Context:* Economic evaluations and in particular cost-effectiveness analyses are crucial for comparing the effects of different interventions and making decisions about which type of approach or programme is more appropriate to address food insecurity on a large scale population.

*Objective:* To assess the cost-effectiveness of interventions or programmes designed to tackle child food insecurity and described in research question 4 above.

*Study design:* Economic evaluations assessing the cost-effectiveness of interventions or programmes designed to tackle child food insecurity.

*Inclusion criteria:*

- Interventions conducted on children and adolescents aged 0 to 18 years
- Geographical setting: UK, Ireland, France, Germany, Italy, Sweden, Norway, Denmark, Finland, Iceland, the Russian Federation, Canada, United States, Japan, Australia and New Zealand.
- Studies that focus solely on child food insecurity and studies that address child food insecurity alongside household food insecurity, as long as the outcomes are measured in children
- English language

*Exclusion criteria:*

- Reports that focus on the feasibility of the intervention (e.g. process and implementation) and not on the effects of the intervention

- Reports that focus on an educational aspects of an intervention and on nutritional labelling measurements
- Reports that include adult evaluation or evaluation in children based on adult reports
- Reports in the context of emergency situations, such as natural disasters
- Reports focusing on costs of solely on household food insecurity
- Reports relating on costs of to the agricultural or farming aspect of food insecurity
- Reports measuring on costs of outcomes on adults (we will include longitudinal studies where children have been followed into adulthood)
- Reports published before 1995

*Strategy for data synthesis:*

- Results of existing relevant economic evaluations will be tabulated
- Measures used to assess child food insecurity will be tabulated along with frequency of use in the literature, if possible

*Subgroup analyses:* None

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## Appendix 1 - FOOD INSECURITY AFFECTING CHILDREN: Sources of Grey Literature

### *UK national and regional sources*

UK Parliament All Parliamentary Party Group on Hunger <http://www.parliament.uk/>

UK Department of Health <https://www.gov.uk/government/organisations/department-of-health>

Scottish Government Working Group [www.gov.scot/](http://www.gov.scot/)

NHS Health Scotland [www.healthscotland.com/](http://www.healthscotland.com/)

Royal College of Paediatrics & Child Health <https://www.rcpch.ac.uk/>

Scottish Food Coalition <http://www.foodcoalition.scot/>

Food Standards Agency <https://www.food.gov.uk/>

Food Foundation <http://foodfoundation.org.uk/>

Food Ethics Council <http://www.foodethicscouncil.org/>

Food Research Collaboration <http://foodresearch.org.uk/>

Food Poverty Alliance [www.povertyalliance.org/](http://www.povertyalliance.org/)

Healthy Living UK <http://healthylivinguk.org/>

Feeding Britain <https://feeding-britain.org/>

Community Food & Health Scotland <https://www.communityfoodandhealth.org.uk/>

Joseph Rowntree Foundation <https://www.jrf.org.uk/>

Church Action on Poverty <http://www.church-poverty.org.uk/>

Child Poverty Action Group <http://www.cpag.org.uk/>

Poverty & Social Exclusion <http://www.poverty.ac.uk/>

Fabian Society <http://www.fabians.org.uk/>

Shake Up Your Wake Up <http://www.shakeupyourwakeup.com/>

Magic Breakfast <https://www.magicbreakfast.com/>

The Trussell Trust <https://www.trusselltrust.org/>

FareShare <http://fareshare.org.uk/>

British Red Cross <http://www.redcross.org.uk/>

Sustain <https://www.sustainweb.org/foodpoverty/>

### *International sources*

UNICEF <https://www.unicef-irc.org/>

UN Food & Agriculture Organization <http://www.fao.org/>

USDA Food & Nutrition Services <https://www.fns.usda.gov/>

Food Insecurity Policy Research <http://proof.utoronto.ca/>

Child Trends (US) <https://www.childtrends.org/>

Joint Centre for Poverty Research <https://www.eurofoodbank.org/>

USDA Food Programs (SNAP, WIC, School Breakfast, School Lunch, Summer Food, Fresh Fruit & Veg etc) <https://www.fns.usda.gov/programs-and-services>

European Federation of Food Banks <https://www.eurofoodbank.org/>

## Appendix 2 - MEDLINE search strategy

Database: Ovid MEDLINE(R) Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Ovid MEDLINE(R) Daily and Ovid MEDLINE(R) <1946 to Present>

Search Strategy:

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- 1 food insecurity.kw. (339)
  - 2 food security.kw. (568)
  - 3 Food Supply/ (10859)
  - 4 (food adj3 (security or insecurity or poverty or poor or sufficien\$ or insufficien\$)).tw. (7296)
  - 5 Hunger/ (5205)
  - 6 or/1-5 (20558)
  - 7 adolescent/ or child/ or child, preschool/ (2920858)
  - 8 (child\$ or boy? or girl?).tw. (1405539)
  - 9 7 or 8 (3329130)
  - 10 6 and 9 (4673)
  - 11 exp africa/ or exp caribbean region/ or exp central america/ or exp "gulf of mexico"/ or exp latin america/ or exp south america/ or exp antarctic regions/ or exp arctic regions/ or exp asia/ (1147213)
  - 12 10 not 11 (3111)
  - 13 Food Assistance/ (593)
  - 14 Food Services/ (5343)
  - 15 (food adj2 (bank? or pantry or pantries or aid or parcel?)).tw. (583)
  - 16 (voucher? or stamp?).tw. (5012)
  - 17 (club? adj2 (breakfast or lunch or supper or food)).tw. (52)
  - 18 (meal? adj2 (school or nurser\$ or free)).tw. (1037)
  - 19 (holiday adj2 (club? or food or kitchen)).tw. (12)
  - 20 magic breakfast.tw. (0)
  - 21 (trussell or fareshare).tw. (63)
  - 22 ((food or meal? or breakfast or lunch or supper or nutrition\$) adj3 (program\$ or project? or scheme? or support or school)).tw. (22795)
  - 23 or/13-22 (32130)
  - 24 12 and 23 (625)
  - 25 exp Child Behavior/ (20383)

26 Child Behavior Disorders/ (21129)  
 27 exp Child Development/ (56646)  
 28 exp Child Development Disorders, Pervasive/ (30759)  
 29 Developmental Disabilities/ (18963)  
 30 exp Neurodevelopmental Disorders/ (173956)  
 31 Child Health/ (1121)  
 32 Diet/ (148107)  
 33 Nutritive Value/ (11634)  
 34 (child\$ adj3 (health or develop\$ or disorder\$ or well being or social)).tw. (124892)  
 35 (child adj3 (mental or psychiat\$ or psychologic\$ or cognitiv\$)).tw. (10841)  
 36 (child adj3 (growth or height or weight or diet or nutrit\$)).tw. (5573)  
 37 (child adj3 (academic or reading or numer\$ or verbal or speech or learn\$)).tw. (1635)  
 38 or/25-35 (490520)  
 39 12 and 38 (951)  
 40 exp "costs and cost analysis"/ (222474)  
 41 economics/ (27443)  
 42 exp economics,hospital/ (23311)  
 43 exp economics,medical/ (14359)  
 44 economics,pharmaceutical/ (2980)  
 45 exp models, economic/ (13791)  
 46 exp decision theory/ (11678)  
 47 monte carlo method/ (27478)  
 48 markov chains/ (13228)  
 49 exp technology assessment, biomedical/ (10790)  
 50 (cost\$ adj2 (effective\$ or utilit\$ or benefit\$ or minimis\$)).ab. (125392)  
 51 economics model\$.tw. (46)  
 52 (economic\$ or pharmacoeconomic\$).tw. (227047)  
 53 (price or prices or pricing).tw. (33468)  
 54 budget\$.tw. (25941)  
 55 (value adj1 money).tw. (34)  
 56 (expenditure\$ not energy).tw. (25874)  
 57 markov\$.tw. (20976)

58 monte carlo.tw. (44064)  
59 (decision\$ adj2 (tree? or analy\$ or model\$)).tw. (19442)  
60 or/40-59 (661694)  
61 (metabolic adj cost).tw. (1260)  
62 ((energy or oxygen) adj (cost or expenditure)).tw. (26334)  
63 60 not (61 or 62) (660872)  
64 12 and 63 (528)  
65 (food adj1 (security or insecurity)).ti. (1852)  
66 65 and (child\$ or children).tw,kw,hw. (621)  
67 24 or 39 or 64 or 66 (1962)