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Interventions to address individual/household food insecurity in Europe since COVID-19: a scoping review

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Interventions to address Individual/Household Food Insecurity in Europe since COVID-19: A Scoping Review

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Abstract

Background: Since 2020, Europe has faced several system shocks which have led to a cost-of-living crisis and an increase in prevalence of food insecurity. These events have sparked a rise and diversification of local and national responses to household food insecurity throughout the region. This scoping review aimed to identify the interventions that have been examined in the scientific literature targeted at individuals/households experiencing food insecurity in Europe since 2020 and understand the extent to which their impact has been evaluated.

Methods: Searches were conducted in Web of Science, PsychINFO, MEDLINE and Applied Social Sciences Index & Abstracts (ASSIA), the WHO Institutional Repository for Information Sharing (IRIS), International Standard Randomised Controlled Trial Number (ISRCTN) Registry, MedRxiv (<https://www.medrxiv.org/>) and Google. Searches were limited to 2020-present and conducted between February-May 2025. Titles and abstracts were screened by two reviewers. Half of full texts were screened by two reviewers and half by a single reviewer. One reviewer extracted the data and analysed according to the PAGER framework.

Results: After removal of duplicates, 10,903 articles were screened, of which 166 were assessed for eligibility. A total of 34 studies met the inclusion criteria, which represented 10 intervention types across three countries. This review identified the most evidence in the UK and over half of the identified articles explored policy-level interventions targeted at children and adolescents. Of the community-level interventions, most were classified as ‘capacity building’ interventions, with relatively few published studies at the ‘catching’ level or as ‘self-organised community change’. Few articles had directly measured the intervention’s impact on food insecurity and there was varied reporting of the sociodemographic profile of participants.

Conclusion: Whilst continuing advocacy for more preventative solutions to tackle food insecurity, there is also a need for future research to conduct robust evaluations of the impact of food insecurity interventions in Europe. These evaluations must consider not only the feasibility and acceptability of

the interventions according to services users, service providers and policy makers, but also the longer term and any unintended impacts of the interventions.

Registration: The review protocol was registered on the Open Science Framework

(<https://osf.io/pv24n/>)

Keywords

Food insecurity, food poverty, Europe, intervention, evaluation

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Background

Around 2.3 billion people worldwide experience moderate to severe food insecurity (1). This is defined as facing barriers in the access, affordability, utilisation, stability, agency and/or sustainability of a safe and nutritious diet to lead an active and healthy life (2-4). Although progress has been made in some areas of the world, for example in South-East Asia, Southern Asia and South America, rates of food insecurity globally remain higher than before the COVID-19 pandemic (1, 5). Prevalence estimates for Europe show differing trends across the region, with some improvements in Eastern and Southern Europe since 2020 but rising rates in Western and Northern Europe (1). Global prevalence rates also mask any socio-demographic variations in experience of food insecurity. For example, disproportionate prevalence has been shown in households that include children, individuals with disabilities, members of minoritised ethnic communities and those with diet-related conditions, such as coeliac disease and diabetes (6-9).

Food insecurity is associated with a range of poor physical health and mental health outcomes (10, 11), including shorter life expectancy (12), obesity (13), cardiovascular disease (14), and mental illness (15). In a recent review across 160 countries, Elgar et al. (16) report that impacts on poor mental health and wellbeing were stronger in countries where relative food insecurity was lower (e.g., high-income countries), perhaps due to the stigma and shame of experiencing food insecurity in a relatively wealthy economy. Socially, there have also been associations found with poorer child development (17) and educational attainment (18), social isolation (19) and decreased health care access (20). These wide-ranging associations are compounding the pressures on health and social care systems and create a compelling argument for interventions that aim to reduce levels of food insecurity at the household, local, and national level.

The COVID-19 pandemic acted as a catalyst for change in the provision of food insecurity interventions globally. The pandemic created crisis conditions that encouraged national and local governments and non-governmental organisations to find innovative methods to support household food security (21). Since 2020, the European region has continued to face disruptions due to the war in Ukraine and extreme weather conditions, leading to a cost-of-living crisis that saw the cost of food

and other essential goods, such as energy and transport, rise considerably (22-24). These events have sparked a rise and diversification of local and national responses to household food insecurity throughout Europe and a call for the reliance on short-term emergency food aid (such as charities that directly give food to people in need (also known as food charities or food banks)) to end (21, 25-28). Despite these developments, evidence on the feasibility and impact of food insecurity interventions remains limited. Most European studies on food and nutrition security have focused on prevalence, personal experiences and coping mechanisms, food aid organisation, or food-system level issues (e.g., food distribution) (29). Additionally, recent research has highlighted a shift in responsibility from government policy to local communities for the management of food insecurity in some places (30, 31). Coupled together, the historic lack of focus and shift in responsibility points to a gap in knowledge as to the impact and effectiveness of food insecurity interventions in Europe.

This scoping review intends to address this gap, aiming to identify the interventions that have been conducted targeted at individuals/households experiencing food insecurity in Europe.

Research Questions

1. What interventions have been conducted in European countries that directly address individual/household food insecurity?
2. Have the identified interventions been assessed for their effectiveness at alleviating food insecurity or promoting food security?
3. What are the limitations and gaps in the existing literature?

Methods

A scoping review methodology was chosen as this review intended to scope the body of literature and identify knowledge gaps (32). The review was conducted according to the enhanced guidance for the conduct of scoping reviews provided by Peters et al. (33) and the Joanna Briggs Institute guidelines. Reporting adheres to the Preferred Reporting Items for Systematic Reviews extension for Scoping Reviews (PRISMA-ScR) (34). The protocol was registered with the Open Science Framework on 14th

September 2023 (<https://osf.io/pv24n/>) and amended on 24th February 2025 to reduce the scope of the review from all high-income countries to Europe and refine the search methodology.

Eligibility criteria

As this review aimed to identify interventions conducted since the COVID-19 pandemic, when rates of food insecurity rose in many European countries (1), the search was limited to 2020-2025. No language restrictions were imposed. Quantitative, qualitative and mixed-method studies were included to consider different aspects of intervention description, assessment and evaluation. The following additional eligibility criteria were utilised:

Inclusion criteria

- Studies conducted in European countries according to the 53 countries in the WHO European Region (35).
- Studies related to interventions, initiatives or services aimed at addressing food insecurity at a household/individual level.
- Studies with data collection which began after the COVID-19 pandemic was declared by the WHO (March 2020).

Exclusion criteria

- Studies conducted outside of the WHO European Region.
- Studies which are not examining interventions directly aimed at addressing food insecurity.
- Studies that collected data prior to March 2020.
- Studies addressing food system insecurity, such as supply chain interventions.
- Review articles, meta-analyses, conference abstracts/papers, commentary/opinion papers, or protocols

Public and practice partner involvement

Public and practice partner involvement was conducted in September 2023 to shape the direction of the review, set priorities, and ensure the output would be useful for public health practice. Participants

were recruited through a mixture of social media advertisement and targeted invitations to known food support providers, health and education professionals and local governments. Three participants in The Netherlands and four participants in England contributed to setting the priorities for this review.

Additionally, we conducted a short survey with practice partners to understand their perspectives on food insecurity in their area, the challenges in supporting those experiencing food insecurity and their views on how these challenges could be overcome. Responses were collected using Microsoft Forms. We received 82 responses (60 in the UK and 22 in the Netherlands) and from a variety of organisations including non-governmental organisations, local government and schools. Survey respondents focused on the need for action to support people experiencing food insecurity, which informed the development of this review to understand what forms of support had been evaluated in the literature.

Identifying relevant literature

The search strategy was developed using keywords from relevant studies, with input from an academic librarian and the research team. The Boolean method was used to combine search terms and truncation applied, where appropriate. An example search strategy can be found in **Additional file 1**. Pilot searches were conducted in Google Scholar, Web of Science, PsychINFO, and MEDLINE. Results were sorted by relevance and the keywords and terms in the titles and abstracts of the most relevant papers refined the search strategy.

The final academic literature searches were conducted in the following databases: Web of Science, PsychINFO, MEDLINE and Applied Social Sciences Index & Abstracts (ASSIA). Where databases allowed, results were filtered to exclude review articles and studies conducted in non-European countries. Grey literature searches were conducted on the following databases: the WHO Institutional Repository for Information Sharing (IRIS), International Standard Randomised Controlled Trial Number (ISRCTN) Registry, MedRxiv (<https://www.medrxiv.org/>) and Google. All grey literature

database searches were sorted by relevance and, where more than 100 results were returned, the first 100 results were screened for eligibility. Searches were conducted between February-May 2025.

Results were uploaded into Rayyan.ai and duplicates removed. Title and abstract screening was conducted independently by two researchers. Conflicting decisions were discussed and, where necessary, reviewed by a third researcher. Potentially relevant articles were retrieved and the full text assessed against eligibility criteria. Half of the full text articles were reviewed in duplicate and conflicts were resolved in consultation with a third researcher. Where texts were reviewed by a sole reviewer, any uncertainties were discussed with a second reviewer and a joint decision made against the eligibility criteria. Forward and backward citation chaining was conducted for the articles remaining after full text screening. Where eligibility could not be assessed due to missing information, contact was made with the lead author to retrieve this information.

Data extraction process

Data were extracted using a Microsoft Form. Two researchers piloted the data extraction form using five papers, leading to revisions in wording and item order to enhance usability. Data items extracted included intervention description items included country of delivery, setting, life stage targeted, rung on the Food Ladders Framework (36), who developed the intervention, aims and objectives of the intervention and a brief description of intervention components. The Food Ladders Framework is a tool for classifying food security at a local level aiming to encourage a move towards resilient, self-sufficient local food system, that is less reliant on emergency food aid (36). It describes three levels: Catching (immediate crisis support), Capacity Building (developing skills and resources), and Self Organising (community-led, systemic change) (36).

Further items captured data related to the study conducted, including the aims and objectives of the study, the number of participants, the age, sex and ethnicity of the study participants, the study design, and study findings. Data extraction was conducted independently. No quality assessment was conducted.

Results were analysed and presented using the PAGER framework to present the patterns, advances, gaps, evidence for practice and research recommendations arising from this review (37).

Results

Search results

From 10,903 titles screened, 34 articles met the eligibility criteria (**Figure 1**). **Additional file 2** contains summary information for the included studies.

Figure 1: Flow diagram of screening process

Characteristics of included studies

Of the 34 studies, 10 intervention types were identified (**Table 1**). Intervention types were most commonly addressing the food security dimensions of access (n=8) and stability (n=5). Agency (n=4), utilisation (n=3), availability (n=3) and sustainability (n=1) were less commonly addressed.

Children and adolescents were the target group for approximately half of the studies identified (n=18); however this represented only three policy-level interventions, namely free school meals (FSM) during term-time (38-44), the provision of food and activities in school holidays (45-54), and a voucher scheme to enable families, with children usually eligible for free school meals, to buy food, implemented during the COVID-19 pandemic (55). Only one intervention was identified targeting pregnancy and the early years (56) and two interventions targeted older adults (three articles) (57-59). The remaining 12 articles investigated four community-based intervention types, without a particular target group (60-71).

Most of the included studies were from the UK (n=30), with three studies conducted in France (63-65) and one in Spain (69). Over one third of the studies were published in 2023 (n=13). Seventeen studies employed qualitative data collection methods (40, 45, 46, 49-51, 55-59, 61, 63-65, 67, 71), seven used quantitative data collection methods (39, 42, 44, 54, 60, 68, 69), and 10 studies employed mixed methods of data collection (38, 41, 43, 47, 48, 52, 53, 62, 66, 70).

Table 1: Intervention descriptions

The Food Ladder Framework, developed by Megan Blake, classifies the levels of intervention required to build community resilience to food insecurity (36). As shown in **Additional file 2**, most of the community-level interventions found were classified by the reviewers as ‘capacity building’ interventions (n=9) (58-60, 62, 64, 68-70), with relatively few published studies at the ‘catching’ (n=3) (63, 67, 70) or ‘self-organised community change’ levels (n=5) (57, 61, 66, 70, 71). However, differences can be seen by target audience, with no studies targeting pregnancy through to adolescence at the community-level.

PAGER Analysis

The evidence was synthesised using the PAGER framework (37) to depict the patterns, advances, gaps, evidence for practice and research recommendations arising from the review (**Table 2**). Four patterns were summarised – target group of the intervention, countries the interventions were conducted in, evaluation of the intervention’s impact on food insecurity and participant characteristics. This review showed that most evidence has been generated in the UK and over half of studies were exploring interventions targeted at children and adolescents. Few studies had directly measured intervention impact on food insecurity and there was varied reporting of the sociodemographic profile of participants.

Table 2: PAGER table

Interventions targeted at food insecurity in pregnancy and the early years, children and adolescents

Interventions aimed at reducing food insecurity in 0-18 year olds comprised over half of the studies identified. However, only four interventions were identified and all were UK-based. Only one study described an intervention for pregnant people and pre-school children. This study evaluated Healthy Start (HS), a scheme in place in England, Wales and Northern Ireland to provide vouchers for fruit, vegetables, and milk and provide free vitamins, for families on a low-income, from 10-weeks of pregnancy through to the child’s fourth birthday (56). Barrett et al. (56) used a rapid qualitative

analysis method and found that HS allowed families to purchase food they could not otherwise afford, however there were various limitations to the scheme reported, including the value of the vouchers, complexity of eligibility criteria, disconnection between services at local and national levels, and inadequate capacity, resources, leadership and accountability.

For school-aged children, three interventions were described – free school meals (targeted FSM n=5; universal FSM n=2), the holiday activities and food programme (HAF; n=9) and a voucher scheme that replaced free school meals for eligible children during the COVID-19 pandemic (n=1). Only four of the studies evaluated the impact on food insecurity and all reported null results (one universal FSM evaluation (38), two targeted FSM evaluations (42, 44), and one HAF evaluation (50)). For the FSM evaluations, Carlisle et al. (38) reported using a mixed-methods, quasi-experimental evaluation design, whereas Parnham et al. (42) and Yang et al. (44) utilised existing survey data (UK Household Longitudinal Survey and the Food Foundation surveys, respectively) to quantitatively assess the impact of FSM on food insecurity. It was reported that the null findings were indicative that FSMs alone are not sufficient to alleviate food insecurity (38, 42, 44). The final null result was for the HAF programme quasi-experimental evaluation, which highlighted that HAF attendees were no more likely to be food insecure than non-HAF attendees, rather than addressing a change in FI status due to attendance at HAF (50).

Participant characteristics were reported to varying degrees, with over half of the studies reporting either age (n = 12), gender (n = 10) or ethnicity (n = 11), however these characteristics were not always reported for all participant types within a study. For example, Carlisle et al. (38) report age, gender and ethnicity for pupils, but not parents or school staff. All three characteristics were reported to some degree in eight of the 17 eligible studies in this group (note, one study analysed menus and had no human participants (54) (**Additional file 2**)).

Interventions targeted at food insecurity in older adults

Three studies described interventions to address food insecurity in older adults. Two studies investigated the Meals on Wheels (MoW) programme, a service available in some parts of the UK to

provide frozen or hot cooked meals to those who cannot shop for food or cook meals at home (58, 59). However, neither study provided an evaluation of the programme's effectiveness at reducing food insecurity.

Davies et al. (57) described the Meal Makers intervention, where volunteers deliver and share their own home cooked meal with older adults living in their Scottish community. In common with the MoW studies, the authors highlighted the wider benefits to the community from the intervention, including improved local connections, social capital and support for diners that supplemented missing formal or informal support mechanisms (57). Whilst a formal evaluation for this intervention was not conducted, the volunteers interviewed felt the intervention was a key method of supporting food security for both them and their diners, who were described as isolated and dependent on others for basic needs like food shopping (57).

The gender of participants was reported in all three studies in this section (57-59), with age also reported in two studies (57, 59). However, ethnicity of participants was not reported in any studies in this section.

Multi-generation food insecurity interventions

Twelve studies described interventions that were open to all age groups. These interventions were more diverse but centred around four intervention types (**Table 1**). Type one interventions are a service where low-income consumers could choose to buy food at discounted prices. These had various names including social supermarkets, social grocery, food clubs, and community markets and accounted for half of the studies within this target group. They typically rely on using surplus and donated food in addition to purchased food for re-distribution. Some are supplemented with donations from local supermarkets, local producers, and alternative food providers (62). Type two interventions were typically services to link consumers with local farmers to purchase produce (70, 71).

Papargyropoulou et al. (70) described a range of operating models and typologies within this umbrella term, with some operating as a more typical wholesaler and others as non-profit organisations focused on social justice and sustainability. Type three interventions were vouchers/financial support for fresh

produce, alongside nutritional education. Two interventions were described within this group: the Fresh Streets intervention (68) and the MESAS intervention (69). The final type were food box schemes during COVID-19 intended to provide a week's worth of primarily shelf-stable food for shielding individuals (67).

Only two of the twelve studies describe an assessment of the intervention's impact on food insecurity - one from the perspective of service users and the other from service providers (66, 71). Both studies used a pre- post intervention evaluation design. Verfuert et al. (71) state they used four questions to measure food insecurity, administered during pre- and post-intervention qualitative interviews, which show self-reported levels of food insecurity decreased over the intervention period; however, the source and validation of these questions is not reported. Ziauddeen et al. (66) used a modified six-item questionnaire based on the US Department of Agriculture Household Food Security module to assess food security levels, and found a reduction in food insecurity, both in those with concurrent follow-up and those with assessments both before and after three months of food club use. Both evaluations qualitatively report improvements in the diversity and quality of the participants' diets, as well as improvements in participant well-being and sense of connectedness to the community (66, 71).

As shown in **Additional file 2**, studies in this group were also limited in the description of their participants, with half ($n = 6$) reporting age and/or gender characteristics, but only three studies reporting ethnicity (62, 66, 68). Only two studies reported all three demographic characteristics (62, 66).

Discussion

Summary of evidence

This review found 34 articles describing 10 intervention types, across a range of ages and target audiences. However, most evidence identified was generated in the UK, with only three articles from France and one from Spain identified. Lambie-Mumford and Silvasti (31) suggest that comparative studies such as this review can be hampered by terminological differences surrounding food, poverty and food charity in Europe. For example, they highlight that 'food security' is synonymous with 'food

safety' in Italian, Finnish and Spanish languages and so problematic to use in these contexts (31).

Additionally, some terms have different meanings across contexts, for example a food bank may refer to a mid-level organisation that collects, stores and redistributes food to charitable organisations or, as is the case in the UK and Finland, a project that directly provides food parcels to people in need (31).

Additionally, it has been noted by Carrillo-Alvarez (29) that most European studies on food and nutrition security have not focused on interventions at the individual/household level, but rather on prevalence, personal experiences and coping mechanisms, food aid organisation, or food-system level issues (e.g., food distribution). These divergent study types may be reflective of differences in research and development funding (72), publication practices (73, 74), monitoring systems, or political prioritisation of food insecurity across European countries.

Recent fluctuations in inflation in Europe may have influenced the rise in publication of food insecurity interventions during this period. Whilst inflation rates in the European Union dropped to 0.7% overall during COVID-19, this was followed by a sharp increase in 2021 and a peak in 2022 of 9.2% and have since remained above pre-pandemic inflation rates (75). Food and non-alcoholic beverages showed the highest increase by product, with a reported increase of 42.8% between 2015-2024, with other basic needs essentials like housing, fuel and transport all reporting price increases between 12.7-39.3% during this period (75). Similar patterns were seen in the UK, (76) and the cumulative effect means household have faced a higher cost-of-living than in 2021, with a disproportionate impact on those who were struggling pre-inflation rises (24). A UK survey of adults who had reported an increase in their cost-of-living revealed that 92% felt that food prices were the driving factor (24). Combating food insecurity will have become a more pressing challenge in the region, leading to more research studies investigating this issue.

The interventions identified were largely focused on the food insecurity dimension of access (i.e., ensuring individuals/households have the means to access an adequate diet). Whilst poverty and food insecurity are not synonymous, those from lower-income households are disproportionately vulnerable to fluctuations in food prices and economic shocks, which further restrict access to adequate food (77). Providing additional resource, through direct payments, vouchers, or provision of

free/reduced price food, constitutes perhaps the most direct pathway to addressing food security of low-income individuals/households, but does not address to root cause (78). In contrast, only one intervention-type was judged as addressing sustainability – linking consumers with food producers through community supported agriculture/food hubs. This dimension is largely focused on the food system and so other types of interventions addressing the sustainability of food security may have been beyond the scope of this review.

Over half of the articles were exploring interventions targeted at children and adolescents. However, this equated to only four interventions, only one of these was targeted at children below school age, and all were UK-based. This narrow focus belies a growing concern over schools as the ‘fourth emergency service’, increasingly functioning as frontline welfare providers and often providing additional services to pupils and families to further protect them from hunger (e.g., free school breakfasts, school-based food pantries, and other informal food support; (79)). These additional wraparound services are often provided by not-for-profit and non-governmental agencies, such as charities, social enterprises and faith organisations, which can represent a system archetype that shifts the burden of responsibility for managing food insecurity from national government onto local government and charities, further entrenching a reliance on limited, often volunteer-led, community wraparound support (30). This transfer of social responsibility is not unique to this age-group nor the UK, but rather a shifting of social policies and welfare regimes, leading to an increasingly important role of charitable agencies, that can be seen across the European region (31).

Provision of FSM is evident throughout Europe to varying degrees and is a principal component of the European Child Guarantee (ECG), whereby member states are recommended to guarantee a minimum standard of an ‘effective and free access to at least one healthy meal each school day’ for children at risk of poverty or social exclusion (80). In fact, in a report following the 19th meeting of ECG coordinators published in 2024, it was reported that seven member states had universal free school meal provision, 16 had targeted programmes for low-income families, and three member states had schemes that were transitioning, either from no provision to a targeted provision, or from targeted to universal provision (81). However, this review only found FSM evaluations (with data collection

since 2020) from the UK and all report null results, which has been suggested to be indicative that FSMs alone are not sufficient to alleviate food insecurity (38, 42, 44). However, evaluations conducted pre-2020 and outside of Europe have shown FSM programmes to have an impact on food insecurity at the household level. For example, an evaluation of a multi-component school feeding programme (including FSM) from 2014-2015 in Greece found a greater decrease in food insecurity in intervention households compared to education only intervention (9.5% vs 1.5%; (82)). Furthermore, an evaluation in the US which compared states with universal FSM provision to states with targeted programmes, found food insecurity rates in states without a universal provision was 1.5% higher than states with a universal provision, and this was largely driven by families close to the eligibility threshold for targeted FSM programmes (83). Additionally, evaluations of the long term impact of the long-standing universal FSM programme in Sweden, highlighted the programme had substantial effects on educational attainment and health and reduced socioeconomic inequalities into adulthood (84). Together, this echoes the conclusions of Yang et al. (44), who suggest that eligibility criteria for FSM must be widened to prevent overlooking those in need.

Guidelines designed to improve quality of reporting, such as those published by the Equator network and the International Committee of Medical Journal Editors (85-88), suggest that studies should provide a description of the samples' social and demographic characteristics. However, there was varied reporting of the sociodemographic profile of participants across studies, with 11 studies reporting no participant socio-demographic details. This limits the ability of the those working in practice and policy to determine the applicability of results to the populations they serve. Future studies should ensure sample characteristics are reported, and where the sample allows, exploring potential intersectional differences in participants' intervention experiences (89).

Though all the studies included in this review examined interventions that were aimed at addressing individual/household food insecurity, few studies directly measured the intervention's impact on food insecurity. This reflects findings of other reviews that have explored food insecurity interventions in specific populations (e.g., pregnancy (90), infants (91), children (92), and older adults (19, 93)), in specific settings (e.g., healthcare settings (94)) and in specific contexts (e.g., UK (95), Canada (96)).

Where evaluations were performed, a few of these reported promising improvements in food insecurity as a result of the intervention – namely Healthy Start (56), Community Supported Agriculture (71), and food clubs (66). However, the various methodologies and measurement tools used hinder comparative assessments of their relative impact on food insecurity. These findings highlight the need for further research examining not only the impact of the interventions on food insecurity levels utilising validated and standardised methods, but also their influence on the different dimensions of food insecurity (i.e., access, affordability, utilisation, stability, agency and sustainability), perceptions of participants and key actors, and exploration of any unintended consequences, for example, widening of health inequalities (10).

Limitations

This scoping review provides a useful snapshot of published interventions for food insecure populations in European countries since the COVID-19 pandemic, however it is not without its limitations. As is common with scoping reviews, the search strategy was designed to capture a wide variety of literature on the subject. As such the search terms may have missed specific terminology used in certain countries. Furthermore, the review sought interventions aimed at addressing food insecurity and therefore may have missed interventions where food insecurity was not the primary focus, but improvement of food security occurred as a result, for example link worker social prescribing (97). Interpretation bias may be present in the classification of whether an intervention directly addressed food insecurity, however reviewing in duplicate and a clear requirement for inclusion based on the aims of the intervention should have limited the impact of this. No quality or risk of bias assessments were performed on the identified studies due the heterogeneity of the studies making comparisons difficult. However, this limited any discussion of the strength of the literature base. When discussing the socio-demographic profile of study participants, only age, gender and ethnicity were considered by this review, however studies should consider reporting other participant characteristics that relate to health equity, such as those suggested by the PROGRESS+ acronym (98).

Conclusions

To the best of our knowledge, this is the first scoping review to map the evidence on interventions to address food insecurity across Europe. Ten intervention types were identified across 34 studies, with a major focus on studies exploring interventions aimed at school-aged children and adolescents and those conducted in a UK context. Whilst preventative solutions remain a priority to tackle food insecurity, there is also a need for future research to conduct robust evaluations of the impact interventions supporting those experiencing food insecurity in Europe. These evaluations must consider not only the feasibility and acceptability as perceived by services users, service providers and policy makers, but also any unintended impacts of the interventions, such as widening of health inequalities.

List of abbreviations

Abbreviation	Definition
COVID-19	Coronavirus disease
ECG	European Child Guarantee
FSM	Free School Meals
HAF	Holiday Activities and Food programme
HS	Healthy Start
IRIS	WHO Institutional Repository for Information Sharing
MESAS	Economic, Healthy, and Sustainable Menus
MoW	Meals on Wheels
PAGER	Patterns, Advances, Gaps, Evidence for practice and Research recommendations
PRISMA-ScR	Preferred Reporting Items for Systematic Reviews extension for Scoping Reviews
UK	United Kingdom
WHO	World Health Organisation

Declarations**Ethics approval and consent to participate**

Not applicable

Consent for publication

Not applicable

Availability of data and materials

All data generated or analysed during this study are included in this published article.

Competing interests

The authors declare no competing interests.

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Authors' contributions

KH and LvdV designed the study. SC designed the search strategy with advice from an academic librarian. All authors completed screening. KH, JC, SC, and EA-J completed data extraction with support from Alon Keijzer. KH completed the data analysis and drafted the manuscript. All authors contributed to critical revision and confirmed the final manuscript for revision.

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Tables

Table 1: Intervention descriptions

Age group	Intervention name	Intervention Description	Food insecurity dimensions addressed by intervention	Studies included
Pregnancy / Early Years	Healthy Start	A UK government scheme offering a pre-loaded payment card and free vitamin supplementation to families on a low income. Pregnant women (>10 weeks) and families with children up to four years old can use the card to buy fruit, vegetables, cow's milk, infant formula and pulses.	• Access • Utilisation • Stability • Agency	(56)
Children / Adolescents	Free School Meals	Free school meals are meals provided free-of-charge to eligible students in schools. The extent of this provision varies across Europe, with some countries providing universal free meals for all age groups, some providing targeted free meals to low-income families or certain age groups, and others providing subsidised/free meals only in certain	• Access • Stability	(38), (39), (40), (41), (42), (43), (44)

Age group	Intervention name	Intervention Description	Food insecurity dimensions addressed by intervention	Studies included
		areas of the country.		
	Holiday Activities and Food (HAF) programme	A UK government initiative providing free activities and meals to children and young people from low-income families during the school holidays.	• Access • Stability	(45), (46), (47), (48), (49), (50), (51), (52), (53), (54)
	School food vouchers during COVID-19	A scheme, funded centrally by the UK Department of Education, to provide a weekly £15 shopping voucher, whilst schools were closed due to the pandemic. This was an alternative to provided meals/food parcels, which were offered where schools were able.	• Access • Agency	(55)
Older adults	Meal makers	A programme where volunteers deliver and share their own home cooked meal with older adults living in their community.	• Access	(57)
	Meals on Wheels	A discretionary service offered by local councils to provided frozen or hot cooked meals to those who cannot shop for food or cook meals at	• Access • Availability	(99), (58), (59)

Age group	Intervention name	Intervention Description	Food insecurity dimensions addressed by intervention	Studies included
		home.	• Stability • Utilisation	
Multi-generation	Social Supermarkets/ Social Grocery / Food Clubs / Community Markets	Stores where low-income consumers can choose to buy food at discounted prices. Typically rely on using surplus and donated food in addition to purchased food for re-distribution. Some are supplemented with donations from local supermarkets, local producers, and alternative food providers. Typically considered higher-agency food aid, as people can chose their food, rather than recieve a pre-packaged parcel.	• Availability • Stability	(60), (61), (62), (63), (64), (65), (66)
	Food box schemes during COVID-19	The Department for the Environment, Food and Rural Affairs (Defra) in England, the Northern Ireland Executive, Scottish Government and Welsh Government all established grocery box schemes during the early stages of the COVID-19 pandemic for shielding individuals. The boxes provided a week's worth of food that could be stored at room	• Access	(67)

Age group	Intervention name	Intervention Description	Food insecurity dimensions addressed by intervention	Studies included
		temperature.		
	Vouchers/financial support for fresh food alongside nutrition education	- The Fresh Street intervention provided households in selected residential areas with weekly envelopes containing £5 worth of vouchers redeemable for fresh fruit and vegetables at local independent vendors. Alongside the vouchers, households received weekly letters with recipes and brief nutritional information. - The MESAS (Economic, Healthy, and Sustainable Menus) project consisted of an educational and dietary program promoted by the Alimerka Foundation for low-income individuals belonging to local assemblies of the Red Cross of Asturias (northern Spain). The intervention consisted of a 1 h educational intervention explaining the basis of a healthy and affordable diet based on the consumption of	• Access • Agency • Utilisation	(68, 69)

Age group	Intervention name	Intervention Description	Food insecurity dimensions addressed by intervention	Studies included
		locally produced fresh products. This activity was complemented with financial support (value not reported) for fresh products provided by Alimerka Foundation, along with dietary education materials (general dietary recommendations, a monthly meal plan, recipes and a shopping list adjusted to the budget).		
	Community Supported Agriculture (CSA) / Food Hubs	CSAs connect consumers with local farms by allowing advance purchases of farm produce. Food hubs, though variably defined, collect food from producers and distribute it ethically to consumers. They can offer food aid, surplus redistribution, social supermarkets, skills training, and community cafés. Many also promote sustainable local supply chains and reduce food waste.	• Availability • Agency • Sustainability	(70), (71)

Table 2: PAGER analysis

Pattern	Advances	Gaps	Evidence for practice	Research recommendations
Target group	Evidence was found of a variety of interventions to address food insecurity across the age ranges. Most articles were based on interventions either targeted children/adolescents (n=18) or were non-specific in their target age (e.g., users of social supermarkets)/were multi-generational (e.g., household fruit and vegetable vouchers); (n=12).	There is limited evidence on interventions that are targeted to communities with increased nutritional needs (e.g., in pregnancy, older adults). There was no evidence found of interventions targeted at other vulnerable groups (e.g., those with disabilities and diet-related conditions, those with no recourse to public funds) or assessment of whether non-targeted interventions are reaching these communities.		Explore whether current interventions are meeting the needs of communities with additional nutritional needs / other vulnerable groups. Potentially develop interventions which provide targeted support for these groups.

Pattern	Advances	Gaps	Evidence for practice	Research recommendations
Country	There is a growing body of evidence for interventions targeted at supporting individuals/households experiencing food insecurity in the UK.	Only three European countries were represented in the included articles, the UK (n=30), France (n=3) and Spain (n=1).	Further evidence is required of the interventions implemented in a wider range of European countries.	Explore the terminology used to describe and classify food insecurity in other European countries and the interventions to support those experiencing food insecurity.
Impact on food insecurity evaluated	Only seven of the 34 articles explicitly evaluated an intervention's impact on food insecurity. Four interventions described positively impacting food insecurity. The studies reporting null effects were all evaluations of interventions for	The positive evaluations were largely qualitative in nature, with only one mixed-methods study. Measuring quantitatively the impact on food insecurity prevalence may support these findings, however consideration must be given to the measurement tools used.	There is some evidence of a positive impact on food insecurity for some interventions, however the evidence based is limited by the small number of studies reporting intervention evaluation.	More widespread evaluations of the impact on food insecurity levels. Measurement of food insecurity in children. Longer follow-up periods on evaluations.

Pattern	Advances	Gaps	Evidence for practice	Research recommendations
	school-aged children.	Methods of understanding and capturing information on food insecurity in children may have influenced the null intervention findings for free school meals. Community/charity and academically developed interventions tended not to include evaluation of their impact on food insecurity levels. Longer term evaluations are needed to measure the impacts of interventions over time.	More evidence is needed on the impact of these interventions on food insecurity prevalence and lived experiences over time.	
Participant categories and	Most articles explored the views of individuals with lived	Only two articles included policymakers' views in their	The lack of sociodemographic	Further exploration of the views of policymakers and

Pattern	Advances	Gaps	Evidence for practice	Research recommendations
demographic characteristics	experience (n=20) and seven articles explored the views of professionals/delivery staff. Seven articles explored both the views of the participants (lived experience) and those delivering the intervention. These are important viewpoints when considering the feasibility and implementation of interventions.	evaluations and both were interventions implemented in the height of the COVID-19 pandemic (food boxes for those shielding and vouchers for free school meals). To understand the political landscape within which interventions are being commissioned it is important that the views of policymakers are explored further. The sociodemographic profile of the included samples was reported to varying degrees, with 10 studies not including any demographic information.	information provided by many studies limits the ability to make recommendations for practice.	commissioners in determining the support developed and commissioned. Continue exploring the views of both those who receive support and those who deliver it to ensure the acceptability and feasibility of interventions have been fully explored. Report sociodemographic profiles of study samples according to reporting

Pattern	Advances	Gaps	Evidence for practice	Research recommendations
				guidelines.

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