JAMA | US Preventive Services Task Force | EVIDENCE REPORT

Preventive Services for Food Insecurity
Evidence Report and Systematic Review for the US Preventive Services Task Force

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IMPORTANCE An estimated 12.8% of US households experienced food insecurity in 2022.

OBJECTIVE To review the evidence on benefits and harms of screening and interventions for food insecurity in health care settings.

DATA SOURCES MEDLINE, CINAHL, and the Cochrane Central Registry of Controlled Trials through October 11, 2022; references of existing reviews; surveillance through January 24, 2025.

STUDY SELECTION English-language randomized clinical trials (RCTs), nonrandomized studies of interventions, and pre-post studies conducted in US health care settings that examine the impact of screening or interventions for food insecurity; instrument accuracy studies of brief screening tools.

DATA EXTRACTION AND SYNTHESIS Single extraction, verified by a second reviewer. Results were narratively summarized.

MAIN OUTCOMES AND MEASURES Food insecurity; dietary, physiologic, quality of life, health outcomes; sensitivity and specificity of screening tools.

RESULTS One RCT (n = 789) examined the impact of screening for food insecurity and found no difference in food insecurity after 6 months (29.6% in the intervention group vs 29.8% with usual care). Ten accuracy studies (n = 123 886) compared 1-, 2-, and 6-item subsets of the US Department of Agriculture Household Food Security Survey (HFSS) with the full HFSS. Sensitivity was typically above 95% and specificity above 82%, although most studies did not administer the screener separately from the reference standard, potentially overstating the accuracy. Twenty-nine studies (n = 74 292) examined interventions to address food insecurity, but 27 were rated as poor quality for the outcomes of interest for this review. Of the 2 fair-quality studies, 1 randomized crossover study (n = 44) found that home delivery of medically tailored meals was associated with reduced food insecurity (41.9% while "on meals" vs 61.5% while "off meals," $P = .05$). The other fair-quality propensity-matched cohort study found a smaller increase in body mass index among children whose families participated in a mobile food bank than those who did not after 6 months (mean difference in change, −0.68 [95% CI, −1.2 to −0.2]). The remaining studies found wide-ranging effect sizes for change in food security status but generally trended in the direction of benefit.

CONCLUSIONS AND RELEVANCE Brief screening tools likely have sufficient sensitivity to identify people with food insecurity in health care settings, but most studies of interventions to improve food insecurity had high risk of bias, limiting the ability to draw firm conclusions.

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Food insecurity is generally defined as a household-level economic and social condition of limited or uncertain access to adequate safe, nutritious food needed for an active and healthy life.[1,2] According to the US Department of Agriculture Economic Research Service's Current Population Survey, 12.8% (17.0 million) of households were food insecure in 2022, with 7.7% of households experiencing low food security and 5.1% of households experiencing very low food security.[3] There are differences by race and ethnicity; in 2022, 22.4% of Black non-Hispanic households and 20.8% of Hispanic households experienced food insecurity, compared with 9.3% of White households.[3] American Indian/Alaska Native groups are also more than twice as likely as White populations to experience food insecurity.[4] Food insecurity may lead to disrupted meal patterns and/or skipped meals, which can contribute to inadequate dietary intake, malnutrition, nutritional deficiency, or poor dietary quality.[5,6] Food insecurity is associated with a wide range of health issues in both children[7-9] and adults.[7,10-12]

This review was commissioned to support the US Preventive Services Task Force (USPSTF) in considering a recommendation on preventive services for food insecurity in primary care settings.

Methods

Scope of Review

Figure 1 shows the analytic framework and key questions (KQs) that guided the systematic review. This report is a summary of a full evidence review,[14] which includes additional methodologic details, results for additional outcomes, and the full findings for 7 contextual questions intended to provide additional background information.

Data Sources and Searches

This review builds on the work of 2 foundational reviews: a 2021 technical brief conducted for the USPSTF[15] on screening and interventions for social risk factors and a 2019 scoping review by De Marchis and colleagues[16] addressing screening for food insecurity in health care settings. Studies included in these reports were evaluated for inclusion in the current review. Bridge searches were conducted to capture any new studies published after the searches of the 2 foundational reviews by searching MEDLINE via Ovid, CINAHL via EBSCO, and the Cochrane Central Registry of Controlled Trials for relevant studies published beginning January 1, 2017 (for screening studies, bridging from the study by De Marchis et al[16]), and June 1, 2018 (for intervention studies, bridging from the technical brief[15]), and ending on August 21, 2023. A research librarian developed and executed the search, which was peer-reviewed by a second research librarian (eMethods in the Supplement). These searches were supplemented by examination of reference lists of other previously published reviews. Additionally, ongoing surveillance was conducted through January 24, 2025, using targeted searches to identify major studies that might affect the review conclusions.[13] One new study was identified[17]; however, it did not substantially change the review's interpretation or findings or conclusions and is not discussed further.

Study Selection

Two independent reviewers screened titles, abstracts, and full-text articles using a priori eligibility criteria (eTable 1 in the Supplement). Studies were restricted to English-language studies conducted in the US, with no age restriction on participants. Studies of screening for food insecurity or interventions to address food insecurity were included if they were conducted in general populations, pregnant women, or among people with chronic medical conditions such as diabetes and hypertension. Studies were excluded if 50% or more of participants were undergoing cancer treatment, had other acute medical or psychiatric conditions, or had severe malnutrition or known nutritional deficiencies. For all KQs other than KQ2 (performance of screening tools), randomized clinical trials (RCTs), nonrandomized studies of interventions, and pre-post studies were included as long as some part of the study occurred in a health care setting (eg, case-finding, recruitment, referral, intervention). The health care tie-in could include, for example, screening conducted in a clinical setting, recruitment through a health care delivery or payment system, and interventions or programs integrated into, associated with, or referred from health care. For studies of screening or intervention benefit (KQ1, KQ4), a minimum of 12 weeks postbaseline follow-up was required, but no minimum follow-up was required for studies reporting harms (KQ3, KQ5).

Screening studies (KQ1, KQ3) were required to include an unscreened or usual care control group in which participants were not systematically screened. Intervention studies (KQ4, KQ5) were required to have elements specifically designed to reduce food insecurity, such as directly providing food or food vouchers, referrals to local food resources, or assistance with enrolling in government or other food assistance programs. Studies that addressed other social needs in addition to food insecurity were included as long as either more than 50% of the sample reported food insecurity at baseline or the results were reported separately for those with food insecurity at baseline. Evidence for KQ4a and KQ4b was limited to studies included in KQ4.

For KQ2 (performance of screening tools), studies that compared a brief screener or risk assessment tool with a longer, more detailed assessment of food insecurity were included if they were either conducted in a health care setting or included very large samples that were representative of the general US population.

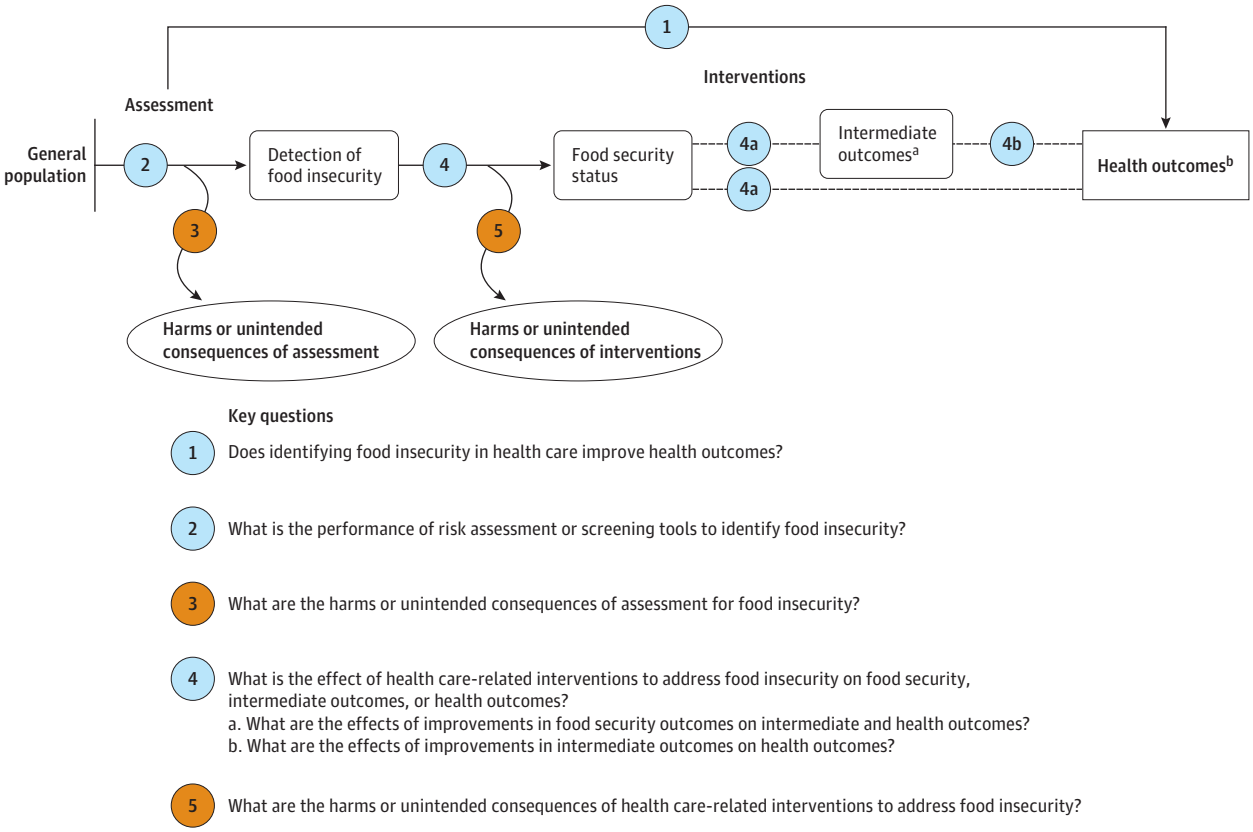
Data Extraction and Quality Assessment

Two reviewers independently rated each study as "good," "fair," or "poor" using design-specific criteria (eTable 2 in the Supplement).[13] Discordant ratings were resolved by consensus. One reviewer extracted data into standardized evidence tables, and a second reviewer checked the tables for accuracy.

Data Synthesis and Analysis

To synthesize findings on screening tool accuracy, sensitivity and specificity were calculated based on the 2 × 2 contingency table of true positives, false positives, true negatives, and false negatives if the sensitivity and specificity were not reported. Most studies examined agreement between the full US Household Food Security Survey 18-item assessment tool and a subset of the items embedded in this tool, without separate administration of the screener and reference standard. We used the terms *sensitivity* and *specificity* but acknowledge the departure from the preferred method of independent administration.

Figure 1. Analytic Framework: Preventive Services for Food Insecurity



Evidence reviews for the US Preventive Services Task Force (USPSTF) use an analytic framework to visually display the key questions that the review will address in order to allow the USPSTF to evaluate the effectiveness and safety of a preventive service. The questions are depicted by linkages that relate interventions and outcomes. A dashed line depicts a health outcome that follows an intermediate outcome. For more details, see the USPSTF Procedure Manual.[13]

[a]Intermediate outcomes include behavioral, physiologic, decision-making, patient participation, and health care utilization outcomes.

[b]Health outcomes include (but are not limited to): low birth weight, developmental outcomes in children, incident diabetes, mental health, cardiovascular events, quality of life.

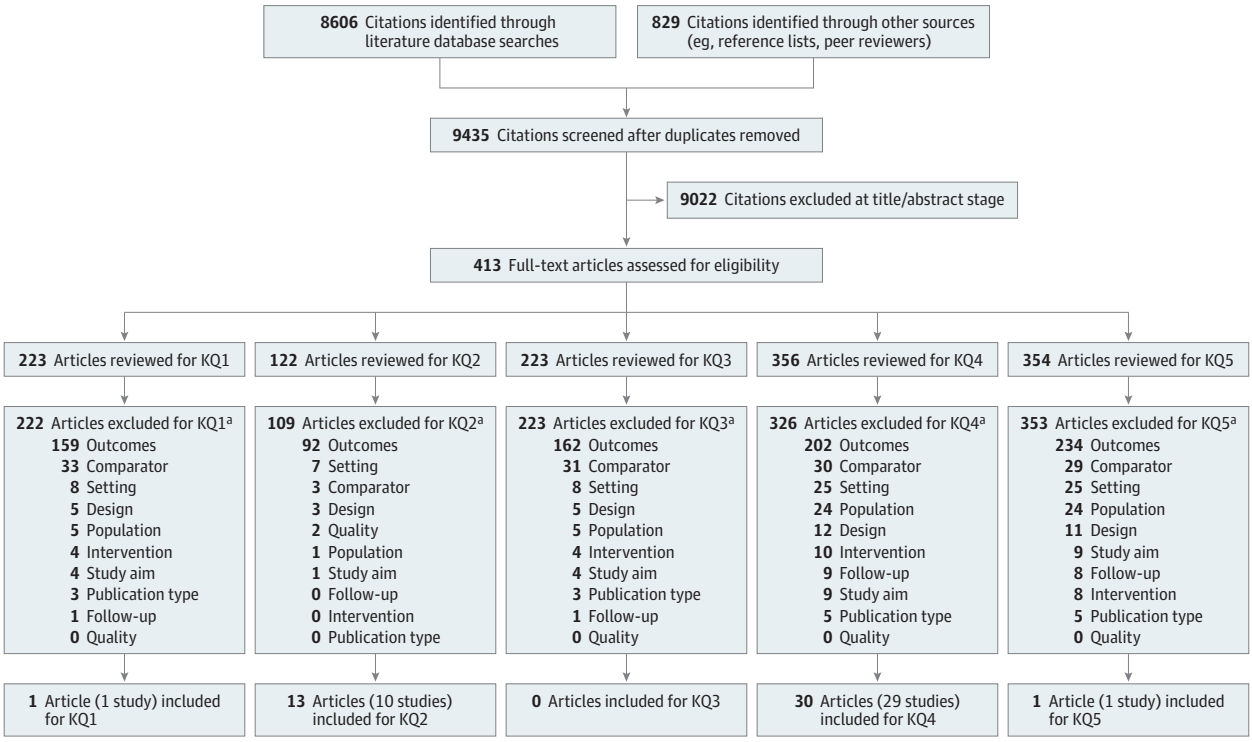
For KQ4, we grouped interventions into 3 broad categories:

- *Food security only*: intervention focused only on food security (eg, providing food or vouchers for food, referrals to local organizations that provide food, assistance with food-related benefits such as the Supplemental Nutrition Assistance Program [SNAP] and Special Supplemental Nutrition Program for Women, Infants, and Children [WIC]) and did not address other social needs.
- *Food security + nutrition education*: combined food security components with nutrition and food preparation education (beyond minimal approaches such as inserts in food boxes or demonstrations at food box pickups).
- *Multidomain*: interventions that assessed and addressed other social needs in addition to food insecurity, as needed.

For studies of food security plus nutrition education and multidomain interventions, this report included only the food security–related outcomes. This is because intervention components addressing nutrition, medical needs or disease management, or other social needs could affect health and intermediate outcomes; therefore, outcomes could not be specifically attributed to the food insecurity components of the intervention. The highest-level food security components were identified and categorized as (1) food (eg, food boxes, delivery of prepared meals), (2) vouchers (exchanged for food, or subsidies to increase purchasing power), (3) application support (eg, patient navigation or help with identifying relevant resources and completing applications), and (4) referral only (information about local and federal food resources, with no further support).

For the outcome of percentage of individuals with food insecurity, risk ratios and 95% confidence intervals were calculated comparing the intervention and control groups (for traditional RCTs and nonrandomized studies of interventions), "on meal" and "off meal" (for a randomized crossover trial of meal provision), and postintervention vs preintervention values (for pre-post studies). Risk ratios are shown in a forest plot but not pooled due to the heterogeneity in study design, intervention, population, and other important features. All significance testing was 2-sided, and results were considered statistically significant if $P \leq .05$. Strength of evidence was graded for each KQ, based on number, quality, consistency, precision, and risk of reporting bias.[18]

Figure 2. Literature Search Flow Diagram: Preventive Services for Food Insecurity



KQ indicates key question.

[a]Reasons for exclusion: Study aim: Study aim was not relevant. Setting: Study was not conducted in a country relevant to US practice or not conducted in, recruited from, or feasible for primary care or a health system. Population: Study was not conducted in an included population. Design: Study did not use an included design. Intervention: Study did not use an included intervention. Comparator: Study did not use an included comparator. Outcomes: Study did not report relevant outcomes. Quality: Study did not meet quality standards. Language: Study publication was not available in English. Publication type: Publication was a conference abstract only.

Results

A total of 9435 abstracts and 413 full-text articles were screened for inclusion (**Figure 2**). Thirty-nine studies were identified (n = 198 762) as meeting inclusion criteria for this review: 1 examined the benefits of screening for food insecurity (KQ1)[19]; 10 examined the accuracy of screening tools (KQ2), including the 1 study also included for KQ1[19-28]; 29 examined the impact of interventions to reduce food insecurity (KQ4)[29-57]; and 1 reported on harms of interventions (KQ5), which was also included for KQ4.[29]

Assessment Benefits

Key Question 1. Does identifying food insecurity in health care improve health outcomes?

One fair-quality RCT (n = 789) examined the impact of screening for food insecurity, using questions embedded in the Parent Screening Questionnaire, among parents with a child younger than 6 years (eTables 3 and 4 in the Supplement).[19] Families screening positive for food insecurity were given information on how to access federal and local food-related assistance. At the 6-month follow-up, there was no difference in food insecurity between groups (29.6% in the intervention group [from 32.7% at baseline] vs 29.8% in the usual care group [from 31.1% at baseline], $P = .90$). This finding occurred despite the fact that a larger proportion of the intervention participants had maintained SNAP enrollment at the 6-month follow-up (97% of intervention participants were still enrolled after 6 months, vs 81% of control participants; $P = .05$) (eTable 5 in the Supplement).

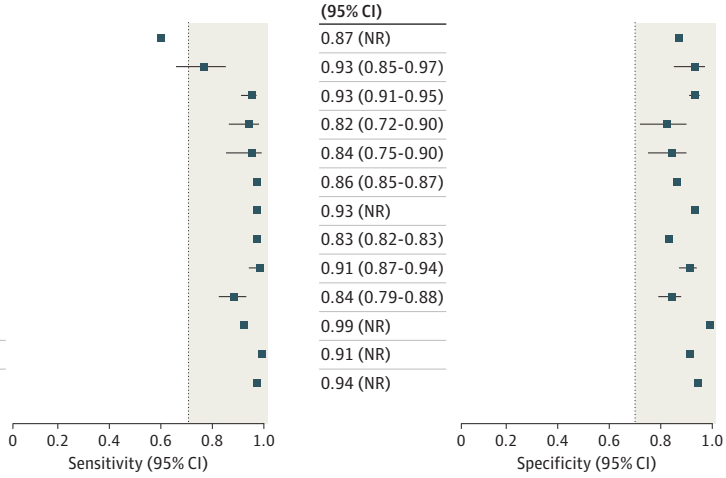
Accuracy of Screening Instruments

Key Question 2. What is the performance of risk assessment or screening tools to identify food insecurity?

Ten studies (n = 123 886) examined the accuracy of a brief screening instrument to identify individuals or families with food insecurity (eTable 6 in the Supplement).[19-28] These studies examined 1-item, 2-item, or 6-item screeners (eTable 7 in the Supplement), all derived from the US Household Food Security Survey 18-item assessment tool.[58] The screening and reference tests were administered separately in only 1 study.[19] One other study administered both the screening and reference tests in separate sections of a single questionnaire.[28] All of the remaining studies administered only the reference standard, with or without additional items, and examined the agreement of subsets of items with the full reference standard (referred to as "embedded" administrations). Sensitivity was typically above 95% and specificity was above 82% for all 2-item screeners when the screener was fully embedded in the reference standard or administered within the same larger questionnaire (**Figure 3**; eTable 8 in the Supplement). The lack of independent administration of the screener is likely to overestimate the

Figure 3. Sensitivity and Specificity of Brief Screeners for Food Insecurity (KQ2)

Source	Screener	Reference standard	Sensitivity (95% CI)	Specificity (95% CI)
Lane et al,[18] 2014	HFSS-1	HFSS-18	0.59 (NR)	0.87 (NR)
Makelarski et al,[25] 2017	HFSS-2 (AAP)	HFSS-6	0.76 (0.65-0.85)	0.93 (0.85-0.97)
Harle et al,[27] 2023	HFSS-2 (HVS)	HFSS-6	0.94 (0.91-0.97)	0.93 (0.91-0.95)
Makelarski et al,[25] 2017			0.94 (0.86-0.98)	0.82 (0.72-0.90)
Radandt et al,[26] 2018			0.95 (0.85-0.99)	0.84 (0.75-0.90)
Gattu et al,[21] 2019		HFSS-18	0.97 (0.96-0.98)	0.86 (0.85-0.87)
Gundersen et al,[22] 2017			0.97 (NR)	0.93 (NR)
Hager et al,[23] 2010			0.97 (0.96-0.97)	0.83 (0.82-0.83)
Harrison et al,[24] 2021			0.98 (0.94-1.00)	0.91 (0.87-0.94)
Baer et al,[19] 2015		USDA-FSS	0.88 (0.82-0.93)	0.84 (0.79-0.88)
Blumberg et al,[20] 1999	HFSS-6	HFSS-18	0.92 (NR)	0.99 (NR)
Gundersen et al,[22] 2017	Items 1 and 3	HFSS-18	0.99 (NR)	0.91 (NR)
Gundersen et al,[22] 2017	Items 2 and 3	HFSS-18	0.97 (NR)	0.94 (NR)



Shaded areas indicate range of 0.70-1.0, the arbitrary range in this review for good/acceptable accuracy. AAP indicates American Academy of Pediatrics; HFSS, Household Food Security Survey; HVS, Hunger Vital Sign; KQ, key question; NR, not reported; USDA-FSS, US Department of Agriculture Food Security Survey.

performance of the screener under usual clinical use. The 1-item screener had the lowest accuracy, with sensitivity of 0.59 and specificity of 0.87 (95% CIs not reported) but was also the only instance of the screener being administered independently from the reference standard.[19]

Assessment Harms

Key Question 3. What are the harms or unintended consequences of assessment for food insecurity?

No studies reported harms of assessment for food insecurity.

Intervention Benefits

Key Question 4. What is the effect of health care–related interventions to address food insecurity on food security, intermediate outcomes, or health outcomes?

KQ4a. What are the effects of improvements in food security outcomes on intermediate and health outcomes?

KQ4b. What are the effects of improvements in intermediate outcomes on health outcomes?

Twenty-nine studies (n = 74 292) examined interventions to address food insecurity,[29-57] and all but 2 were rated as poor quality (**Table 1**; eTables 9-14 in the Supplement). Six of the studies recruited families with children,[38,40,41,43,45,54] and the remainder focused on adult populations. The 23 studies among adults covered a range of populations, including broad-based or low-income adult populations,[29,33,34,36,42,44,46,49] pregnant women,[31] adults with chronic conditions or deemed at risk for chronic conditions (eg, meeting criteria for obesity, prediabetes, diabetes, hypertension, or dyslipidemia),[29,30,32,35,37-39,47,50-53,56,57] or adults with a prespecified level of emergency department use.[48,55] Across all KQ4 studies that reported race and ethnicity, 30% of the included participants were Black, 18% were Hispanic, and 41% were White. One study was limited to people of the Navajo Nation, but otherwise there was minimal other representation of Native American individuals and also very minimal representation of people of Asian descent. Fourteen of the interventions addressed only food insecurity, 6 addressed food insecurity supplemented by nutrition counseling, and 9 provided interventions covering multiple domains or risk factors. Nineteen of the 20 studies targeting only food insecurity (with or without nutrition counseling) provided food or vouchers to the intervention participants, whereas 7 of the 9 multidomain studies did not provide food or vouchers but instead provided referrals, with or without additional navigation or application support.

Of the 2 studies rated as fair quality, 1 was a randomized crossover trial (n = 44) that included home delivery of medically tailored meals to patients with diabetes for 12 weeks.[29] At the end of the 24-week study period, the intervention was associated with reduced food insecurity (13/31 [41.9%] while on meals vs 24/39 [61.5%] while off meals, *P* = .05) (**Figure 4**; eTable 15 in the Supplement), improved mental health quality of life (4.7-point change from baseline while on meals vs 0.8-point change while off meals) (eTable 16 in the Supplement), and improved diet quality (eg, the 100-point total Healthy Eating Index score improved by 14.1 points while on meals compared with baseline but declined by 17.3 points while off meals [eTable 17 in the Supplement]). However, there was no apparent impact on other quality-of-life measures; physiologic measures of blood pressure, lipid levels, or glucose levels (eTable 18 in the Supplement) or cost-related medication underuse (eTable 19 in the Supplement). The other study (n = 176) rated as fair quality compared children in families who participated in a mobile food pantry with a propensity score–matched cohort of pediatric patients from the same neighborhood as the mobile pantry participants or from nearby neighborhoods not offering a mobile pantry program after 6 months.[54] This study found a smaller increase in body mass index among children of families who participated in the mobile food pantry (eTable 20 in the Supplement). This study did not report between-group differences in food insecurity but reported a reduction from 4.3 to 3.3 on a 6-point food insecurity scale among those in the intervention group (eTable 15 in the Supplement).

Table 1. Overview of Studies, All Interventions (KQ4)

Intervention type; source	Quality rating[a]	No.	Study design	Population	Identified via screening[b]	Provides free food	Provides vouchers	Provides application support	Provides referrals
Food security–only intervention									
Berkowitz et al,[29] 2019	Fair	44	Randomized crossover trial	Patients with diabetes	Yes	✓			
Woo Baidal et al, 2023[54]	Fair	176	NRSI	Families with children <6 y	Yes	✓			✓
Aiyer et al,[33] 2019	Poor	242	Pre-post	Adult patients and parents of pediatric patients	Yes	✓			
Cohen et al,[36] 2017	Poor	177	Pre-post	SNAP enrolled adults	Yes		✓		✓
Freedman et al,[39] 2013	Poor	45	Pre-post	FQHC patients with diabetes	No		✓		
Izumi et al,[42] 2020	Poor	80	Pre-post	FQHC patients	No	✓			
Kempainen et al,[52] 2023	Poor	281	Pre-post	Adults with type 2 diabetes and food insecurity	Yes	IG1			IG1, IG2
Morales et al,[31] 2016	Poor	290	NRSI	Pregnant women	Yes			✓	✓
Orsega-Smith et al,[44] 2020	Poor	41	Pre-post	Adults who are Medicaid enrollees, overweight, or have ≥2 children	Yes	✓			
Ranjit et al,[53] 2023	Poor	2028	Pre-post	Adults who are food insecure and diagnosed with prediabetes/diabetes, hypertension, or obesity	No	✓			
Saxe-Custack et al,[45] 2019	Poor	261	Pre-post	Parents of children aged 7 to 18 y (regardless of food insecurity status)	No		✓		
Scher et al,[46] 2022	Poor	340	Pre-post	Adults	Yes	✓			
Wetherill et al,[50] 2018	Poor	80	Pre-post	Uninsured patients attending a chronic disease clinic	No	✓			
Xie et al,[51] 2021	Poor	353	Pre-post	Adults with diabetes (subgroup)[c]	Yes		✓		
Food security intervention with nutrition education									
Byker Shanks et al,[35] 2022	Poor	43	Pre-post	Adults at risk for chronic disease	No	✓			
Cook et al,[37] 2021	Poor	185	Pre-post	Adults with risk factor for diet-related chronic condition	Yes		✓		
Fischer et al,[38] 2022	Poor	25	Pre-post	Families with young children and diet-related chronic disease risk factor	Yes	✓			
Hager et al,[57] 2023	Poor	3881	Pre-post	Adults with, or at risk for, poor cardiometabolic health	No		✓		
Jones et al,[43] 2020	Poor	212	Pre-post	Navajo families with young children	Yes		✓		
Rivera et al,[56] 2023	Poor	13	Pre-post	Adults aged 35-75 y with hypertension	No	✓			
Intervention assessed and addressed multiple social risk factors (multidomain)									
Berkowitz et al,[34] 2018	Poor	141	Pre-post	Primary care patients	Yes				✓
Gottlieb et al,[40] 2018	Poor	1237	Pre-post	Parents/caregivers of children	Yes			IG1	IG2
Gottlieb et al,[41] 2020	Poor	639	Pre-post	Parents/caregivers of children	Yes			IG1	IG1, IG2
Renaud et al,[55] 2023	Poor	54 471	Pre-post	Medicare and Medicaid beneficiaries with ≥2 emergency department visits in the past year	Yes			IG1, IG2	IG1, IG2, IG3
Seligman et al,[47] 2015	Poor	687	Pre-post	Adults with diabetes	No	✓			
Shankar et al,[48] 2022	Poor	140	Pre-post	High emergency department utilizers	Yes				✓
Singer et al,[49] 2022	Poor	216	Pre-post	Medicaid patients at FQHC	Yes				✓
Slagel et al,[32] 2022	Poor	47	NRSI	Adults with diet-related condition(s)	Yes		✓		
Wu et al,[30] 2019	Poor	4917	Cluster RCT	Chronically ill adults at high risk for future hospitalization	No				✓

Abbreviations: FQHC, Federally Qualified Health Center; IG, intervention group; NRSI, nonrandomized studies of interventions; RCT, randomized clinical trial; SNAP, Supplemental Nutritional Assistance Program.

[a] Quality rating was applied only to the outcomes and related analyses relevant to this review, which may differ from the primary aim of the study. Thus, studies could have fair or good quality methods for their primary aim, which would not be reflected in the rating. For quality rating criteria, see eTable 2 in the Supplement.

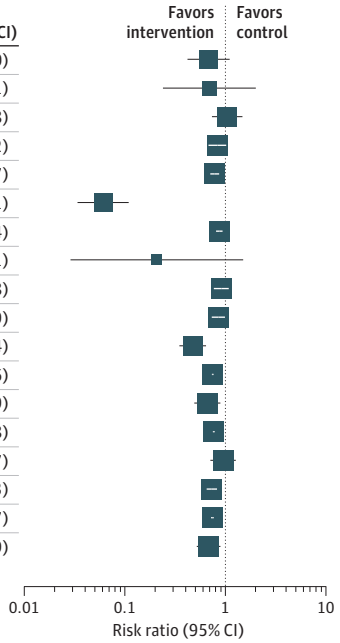
[b] Participants were screened for food insecurity as part of the study enrollment process (and may have also been screened for other social needs).

[c] Relevant outcomes only available on the subgroups of participants with diabetes.

Figure 4. Percent Reporting Food Insecurity at Longest Follow-Up (KQ4)

Source	Group	Component	Follow-up, y	Comparison	Food insecurity, No./total (%)		Risk ratio (95% CI)
					Group 1	Group 2	
Berkowitz et al,[28] 2019[a]	FS only	Free food	2.8	On vs off meal	13/31 (41.9)	24/39 (61.5)	0.68 (0.42-1.10)
Slagel et al,[31] 2022[b]	Multi	Vouchers	6	IG vs CG	5/18 (27.8)	4/10 (40)	0.69 (0.24-2.01)
Wu et al,[29] 2019[c]	Multi	Referrals	12	IG vs CG	50/198 (25.3)	45/186 (24.2)	1.04 (0.74-1.48)
Izumi et al,[41] 2020	FS only	Free food	5.3	Post vs Pre	35/48 (72.9)	42/48 (87.5)	0.83 (0.68-1.02)
Kempainen et al,[51] 2023	FS only	Free food	5.5	Post vs Pre	83/106 (78.3)	106/106 (100)	0.78 (0.71-0.87)
Aiyer et al,[32] 2019	FS only	Free food	6	Post vs Pre	10/172 (5.8)	242/242 (100)	0.06 (0.03-0.11)
Kempainen et al,[51] 2023	FS only	Referrals	5.5	Post vs Pre	94/108 (87)	108/108 (100)	0.87 (0.81-0.94)
Fisher et al,[37] 2022	FS + nutr ed	Free food	12	Post vs Pre	1/15 (6.7)	8/25 (32)	0.21 (0.03-1.51)
Byker Shanks et al,[34] 2022	FS + nutr ed	Free food	3.5	Post vs Pre	31/37 (83.8)	34/37 (91.9)	0.91 (0.77-1.08)
Jones et al,[42] 2020	FS + nutr ed	Vouchers	6	Post vs Pre	79/122 (64.8)	161/212 (75.9)	0.85 (0.73-0.99)
Cook et al,[36] 2021	FS + nutr ed	Vouchers	6	Post vs Pre	36/120 (30)	76/120 (63.3)	0.47 (0.35-0.64)
Renaud et al,[54] 2023	Multi	Appl support	12	Post vs Pre	2750/3671 (74.9)	3671/3671 (100)	0.75 (0.74-0.76)
Gottlieb et al,[40] 2020	Multi	Appl support	6	Post vs Pre	51/216 (23.6)	77/216 (35.6)	0.66 (0.49-0.89)
Renaud et al,[54] 2023	Multi	Appl support	12	Post vs Pre	2247/2929 (76.7)	2929/2929 (100)	0.77 (0.75-0.78)
Berkowitz et al,[33] 2018	Multi	Referrals	3	Post vs Pre	53/138 (38.4)	57/141 (40.4)	0.95 (0.71-1.27)
Shankar et al,[47] 2022	Multi	Referrals	12	Post vs Pre	74/101 (73.3)	101/101 (100)	0.73 (0.65-0.83)
Renaud et al,[54] 2023	Multi	Referrals	12	Post vs Pre	1132/1522 (74.4)	1522/1522 (100)	0.74 (0.72-0.77)
Gottlieb et al,[40] 2020	Multi	Referrals	6	Post vs Pre	60/225 (26.7)	88/225 (39.1)	0.68 (0.52-0.89)

Heterogeneity: $\tau^2 = 0.27$; $I^2 = 99.66\%$; $H^2 = 292.94$
Test of $\theta_i = \theta_j$: $Q_{17} = 115.13$; $P < .001$
Test of $\theta = 0$: $t_{17} = -2.83$; $P = .01$



The size of data markers indicates the weight of each study, based on the inverse of the variance of the estimate. Appl support indicates application support (eg, applications for Supplemental Nutrition Assistance Program or Supplemental Nutrition Program for Women, Infants, and Children); CG, control group; FS, food security; IG, intervention group; KQ, key question; multi, assessed and addressed multiple social domains; nutr ed, nutritional education.

[a]Randomized crossover trial.

[b]Nonrandomized study of interventions.

[c]Cluster randomized clinical trial.

Nineteen additional studies (n = 70 537) reported a food security outcome but were rated as poor quality for the specific outcomes of interest for this review; improvements in food security were rarely reported to be statistically significant.[30,32-35,37,38,40-44,48-50,52,55-57] Effect sizes were wide ranging, typically reported after 6 months or less, and trended in the direction of benefit in all studies but 1.[30] Eight studies (n = 3535) did not report a food security outcome; all of these included the provision of food or food vouchers but had other study aims, such as healthier diets or physiologic outcomes specific to the study population.[31,36,39,44-46,51,53] The consumption of fruits and vegetables generally increased after participation in interventions that included either food boxes or vouchers. For other outcomes, 1 pre-post study reported improvements in depression and self-rated health (eg, 69% rated their health as excellent or very good after receiving 23 weekly food boxes, compared with 52% at baseline [*P* = .04]).[42] There was minimal impact on physiologic outcomes (blood pressure, lipids, glucose levels) or acute health care utilization, although none of these outcomes were reported by more than 3 studies. Detailed results for all outcomes and all studies are available in eTables 15, 16, 18, 19, and 21 in the Supplement.

Intervention Harms

Key Question 5. What are the harms or unintended consequences of health care–related interventions to address food insecurity?

One fair-quality study included for KQ4 reported that 1 person experienced gastrointestinal symptoms during the on-meal phase.[29] None of the other studies reported on harms of their interventions.

Discussion

Evidence Summary

Evidence to support preventive interventions for food insecurity in primary care was very limited. The evidence on the benefits of screening was rated as insufficient; only 1 study examined the impact of a screening for food insecurity and found no improvement in food security. The strongest evidence was for accuracy of screening tools, finding that 2- and 6-item subsets of a longer 18-item food security assessment instrument had good agreement with the full 18-item questionnaire (moderate strength of evidence) (**Table 2**).

Evidence on the effectiveness of interventions to improve food security was hampered by methodologic limitations, particularly the fact that most were pre-post studies with only a single measurement at baseline and follow-up. As a result, confidence was very limited that changes in food security were due to the intervention. Setting aside these limitations, the evidence on interventions to reduce food insecurity was generally favorable. One very small (n = 44), fair-quality randomized crossover study did report lower levels of food insecurity when on meals vs off meals in a 24-week study (42% vs 62%),[29] and most of the poor-quality studies that focused on the provision of food or food vouchers generally found improved food security at follow-up, although many results were not statistically significant. The evidence was more mixed among studies that provided only application support or referrals, although some findings were favorable. Due to the limitations of the data, there was only low certainty that interventions can improve food security in the short term (1 year or less), particularly those that provide food or vouchers. Findings are consistent with those of other recently published systematic reviews of screening and intervention for food security, finding that much of the evidence is limited to study designs at higher risk of bias and focused on process (eg, receipt of referral) or food-insecurity status outcomes, rather than patient health outcomes.[59,60]

Social Risk Factors vs Social Needs

Food insecurity is considered a key social risk factor—a measurable, intervenable, individual-level social and economic condition shaped by broader social and structural determinants of health such as house costs, wages, and the cost of higher education.[15,61-63] The Centers for Medicare & Medicaid Services has identified 5 core social risk factors that community services can help with: food insecurity, housing instability, transportation needs, utility help needs, and interpersonal safety.[64] These social risk factors are interconnected. For instance, a low income and unemployment are often directly connected to other risk factors, such as food insecurity, housing instability, and transportation issues.

Social needs are social risk factors that individuals prioritize as something they believe is important to address and would like assistance with.[61] Not all households with food insecurity identify it as a pressing need,[65] and recent commentators have noted that exploring the patients' social needs demonstrates respect by recognizing individuals' autonomy and acknowledging that they are the best judge of their own needs.[66]

Implementation

The difference between screening for social risk factors and social needs demonstrates one potential challenge in implementation, but there are other considerations as well. Simply implementing a risk screening tool in an electronic health record system is unlikely to lead to widespread adoption.[67] Sufficient resources are needed, including appropriate staffing (eg, community health workers, translation services), training, and funding.[68-70]

Specifically, some authors have suggested the need to ensure that staff who administer social risk screening display empathy and are sensitive to patient's lived experience and social needs.[66] It is also important to involve community members and social service agencies in codesigning social support programs, support partnerships with existing community organizations, gather data on implementation to understand gaps in the process, identify unintended consequences, and help ensure equitable delivery of screening and interventions,[71] because some evidence suggests differences in screening for social risk factors by patient race or ethnicity and preferred language.[72] Although the acceptability of screening for food insecurity is generally rated good among patients,[16] it may also evoke feelings of stigma, shame, fear of consequences, or mistrust.[15,73] Further, 1 study found that those with food insecurity had higher levels of mistrust in medical professionals, suggesting the need for sensitive handling of discussions related to social needs.[74] Also, patients with limited health literacy or language barriers may struggle to understand the purpose and importance of food insecurity assessments, impeding their participation.[73]

Table 2. Summary of Evidence: Preventive Services for Food Insecurity

Study design (No. of observations)	Summary of findings	Consistency and precision	Other limitations	Strength of evidence	Applicability
KQ1: Benefits of screening					
1 RCT (n = 789)	No difference in the percentage reporting food insecurity after 6 mo (intervention group, 29.6%; usual care, 29.8%)	Consistency NA Imprecise	Attrition was fairly high (32% overall) and differential between groups (81% in the intervention group vs 67% in control group)	Insufficient	Conducted in a US health care setting; race and ethnicity not reported; lower educational attainment (only 24% had attended any college)
KQ2: Accuracy of screening tools					
10 Accuracy studies (n = 123 886)	Abbreviated screeners had adequate concordance with full instruments Sensitivity was typically above 95% and specificity above 82% for 2-item screeners embedded in the reference standard or administered within the same larger instrument, as was the case for most studies, and likely overestimates accuracy The 1-item screener had the lowest accuracy, with sensitivity of 0.59 and specificity of 0.87 (95% CIs not reported) but was also the only instance of the screener being administered independently from the reference standard	Consistent Precise	Minimal evidence in which the screener is independently administered from the reference standard	Moderate (adequate for detection)	Eight of 10 studies conducted in or recruited from a US health care setting; among studies in which race and ethnicity were reported, most studies reported that 50% or more of the participants were Black
KQ3: Harms of screening					
0 Studies	NA	NA	NA	Insufficient	NA
KQ4: Benefits of interventions					
29 Studies (n = 74 292): 1 Randomized crossover trial (n = 44) 1 Cluster RCT (n = 4917) 3 NRSIs (n = 513) 24 Single cohort pre-post studies (n = 68 818)	Effect sizes for food security at end of study were very wide-ranging but trended in the direction of benefit reduced food insecurity over time in all 21 studies reporting this outcome One study rated as fair (vs poor) quality, a randomized crossover trial of meal delivery for people with diabetes, found that 41.9% were food insecure while "on meals" vs 61.5% while "off meals" (P = .05) Consumption of fruits and vegetables generally increased after participating in interventions that provided either free food boxes or vouchers Other outcomes were sparsely reported and rarely showed statistically significant improvements	Food security, fruit and vegetable consumption (for intervention providing free food or vouchers) Other outcomes: Consistency NA or unclear due to heterogeneity in reporting Imprecise (all outcomes)	Twenty-seven of 29 studies rated as poor quality for the outcomes of interest to this review, raising serious questions about the validity of the findings	Food insecurity: low (benefit) All other outcomes: insufficient	All studies were at least in part conducted in or recruited from a US health care settings; 30% of the included participants were Black,18% were Hispanic, and 41% were White, among studies in which race and ethnicity were reported; 1 study was limited to people of the Navajo Nation, but there appeared to be minimal other representation of Native American populations; 16 of the 23 studies gave participants free food or vouchers for food, which is unlikely to be feasible for most health care settings
KQ5: Harms of interventions					
1 Randomized crossover trial (n = 44)	1 person experienced gastrointestinal distress while "on meals"	Consistency NA Imprecise	Minimal reporting of harms	Insufficient	Conducted in a US health care setting

Abbreviations: KQ, key question; NA, not applicable; NRSI, nonrandomized studies of interventions; RCT, randomized clinical trial.

Limitations

There were several limitations related to the scope and methods of this review. First, schools and community settings may provide important points of entry for addressing social needs for families with children but were not included because they are outside the scope of health care systems.

Second, although it was specified in the a priori research plan that only studies conducted in US health care settings would be considered for all KQs, the review included 2 studies examining the accuracy of screening tools (KQ2) that were not conducted in US health care settings. These were studies using data from the US Census Bureau, including very large samples that are representative of the US population. It was felt that instrument accuracy might be less vulnerable to variation across settings than screening and intervention studies and therefore that these studies would add potentially valuable information, given their large size and carefully constructed samples to be broadly representative of the US population.

Third, only screening and interventions to ameliorate food insecurity were addressed, yet people often experience more than 1 social risk factor, and it may not make sense to evaluate only food insecurity without considering other social risk factors such as financial or housing insecurity.

Last, because food security is a basic need as opposed to a medical condition, it may not fit well within the traditional USPSTF review. It would not be ethical to conduct a study that ignores identified food need (ie, includes a control group), and most long-term solutions to food insecurity are related to social and environmental factors that the health care system cannot change. The most important research questions, which are beyond the typical scope of the USPSTF review, may include what role the health care system can play with respect to food insecurity; patient preferences for how food insecurity is discussed to minimize feelings of shame and stigma; and identifying specific strategies and implementation approaches or components that are most effective and have the least risk of harm.

In addition, there are critical limitations of the evidence. First and most concerning, there were only 3 eligible studies (combined n = 1009) on the benefits of screening or interventions for food insecurity that were rated as having at least fair-quality methods for the outcomes relevant to this review, the largest of which (n = 789) showed no benefit of screening. There were additional studies included that were rated as "poor" quality for the outcomes relevant to this review but did not lead to clear conclusions due to the high risk of bias in these studies; these studies were generally reports of pragmatic programs in which the primary aim was to implement the intervention rather than providing robust research findings. Therefore, the studies included yielded little information on whether interventions to improve food security led to improvements in health. In addition, none of the studies conducted analyses showing whether individuals who showed greater improvement in food security also showed greater improvements in health.

Second, the lack of reporting of the assessment windows (eg, 30-day or 12-month look back) used to assess food insecurity further limits the strength of the conclusions from the pre-post studies, which constituted 24 of the 29 studies of interventions.

Third, for interventions addressing food security along with other intervention components (eg, nutrition counseling, medical management, addressing other social needs), the impact of the other components could not be separated from the impact of the food security components; improvements in health outcomes could be due to medical management or improved diet quality, for example, rather than the receipt of food aid. Therefore, these outcomes were not included in this review. Relatedly, it also is possible that the other components affected the food security outcomes, limiting confidence that the food security elements of the intervention would have the same impact in the absence of the co-interventions. Fourth, the included studies assessed for social risk factors but rarely described how or whether social needs were determined after risk factors were identified. Future studies should carefully develop and describe the shared decision-making process once social risk factors have been identified.

Conclusions

Brief screening tools likely have sufficient sensitivity to identify people with food insecurity in health care settings, but most studies of interventions to improve food insecurity had high risk of bias, limiting firm conclusions.

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Acquisition, analysis, or interpretation of data: O'Connor, Webber, Martin, Henninger, Eder.
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